

CoreDEF Series Submersible DEF Pump

With Franklin Electric Fueling Systems[®] DEF PMA

Installation, Service, & Parts Lists



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RESPONSIBILITIES OF THE INSTALLER AND STATION OWNER

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

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Introduction

Overview

The CoreDEF Series Submersible DEF Pump described in this manual utilizes column piping, variable length clinch fitting assembly, check valve, relief valve, and pipe fittings assembled and supplied by Veeder-Root. The PMA (Pump Motor Assembly) is manufactured by Franklin Electric Fueling Systems and supplied by Veeder-Root with the column piping assembly. The CoreDEF Pumps in this manual are only offered with Franklin Electric Fueling Systems Model PMA150A, single phase 60hz.

The CoreDEF Series Submersible DEF Pump and Franklin Electric Fueling Systems PMA, herein referred to as the Submersible DEF pump, is only intended to be used to pump Diesel Exhaust Fluid (DEF) from underground storage tanks (UST) or above ground totes in retail, commercial, and industrial applications. For recommended PMA access opening diameter in the bulk head, refer to Franklin Electric Fueling Systems Manual 403414001 Diesel Exhaust Fluid Pumping Accessories or 403395001 DEF Pump Motor Assembly Replacement Guide. The adjustable column pipe is available in a variety of lengths to accommodate various tank diameters and designs.

The Submersible DEF pump system is equipped with variable length column pipe, check valve, pressure relief kits, optional pressure gauge and PMA. **Operation in flammable fluids is not allowed.** The submersible DEF pump should only be used as described in this manual and is designed for DEF consisting of 32.5% urea and 67.5% de-ionized water.

The Submersible DEF pump offers the following features:

- **Liquid Quality Compliance** - the pump and supplied components satisfy the ISO 22241 standard for DEF quality.
- **Continuous Run Capability** - the pressure relief valve will allow the pump to run continuously regardless of dispensing from the fueling nozzle. Fluid is recirculated back to the tank through the pressure relief valve.

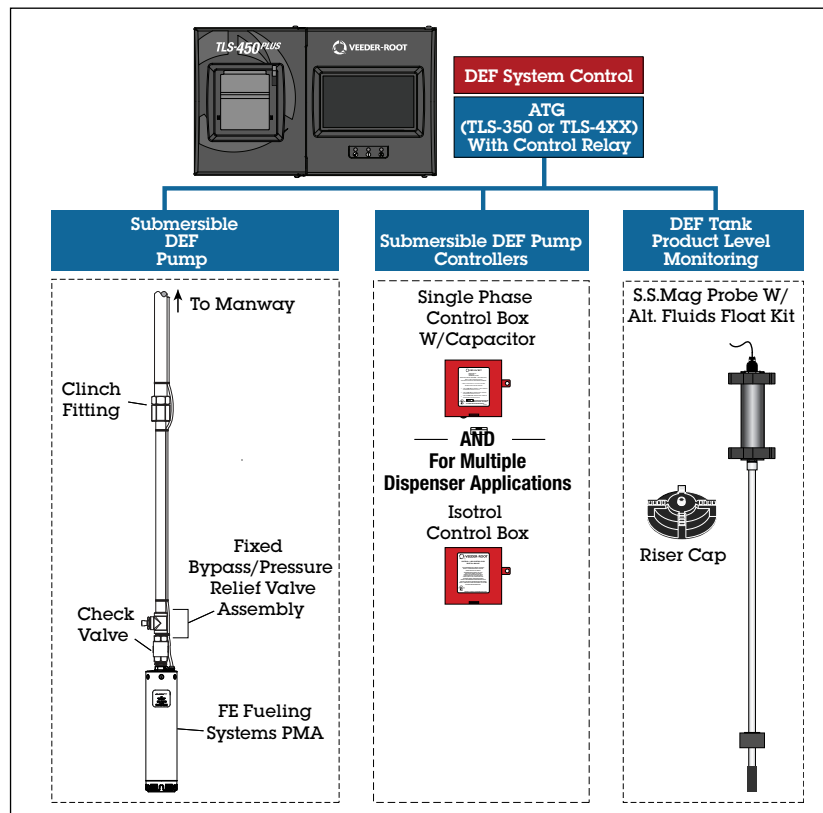


Figure 1. Typical Submersible DEF Pump System Components

Notes To Contractor/Installer

Some considerations may be needed prior to specifying the Red Jacket Submersible DEF pump and its accessories/options. The replacement system is offered as fixed pressure relief only.

For additional PMA details and instructions, refer to Franklin Electric Fueling Systems Manual 403414001 Diesel Exhaust Fluid Pumping Accessories or 403395001 DEF Pump Motor Assembly Replacement Guide. If additional PMA assistance is required, contact Franklin Electric Fueling Systems Technical Support at +1(800) 984-6266.

NOTICE The cord grip shall not be installed in the same opening as a product flow.

RECOMMENDED BULK HEAD AND MANWAY COVER OPENINGS

Installer to determine system needs and configuration prior to specification of manway lid and bulkhead (see Figure 2). Typical size requirements for DEF system openings are listed below:

- Strain relief for wiring - 1/2" NPT
- Probe - 4" NPT
- Submersible DEF pump - 2" NPT full coupling
- DEF recirculation - 2" NPT full coupling
- Remote fill - 2" NPT
- Vent - 2" NPT

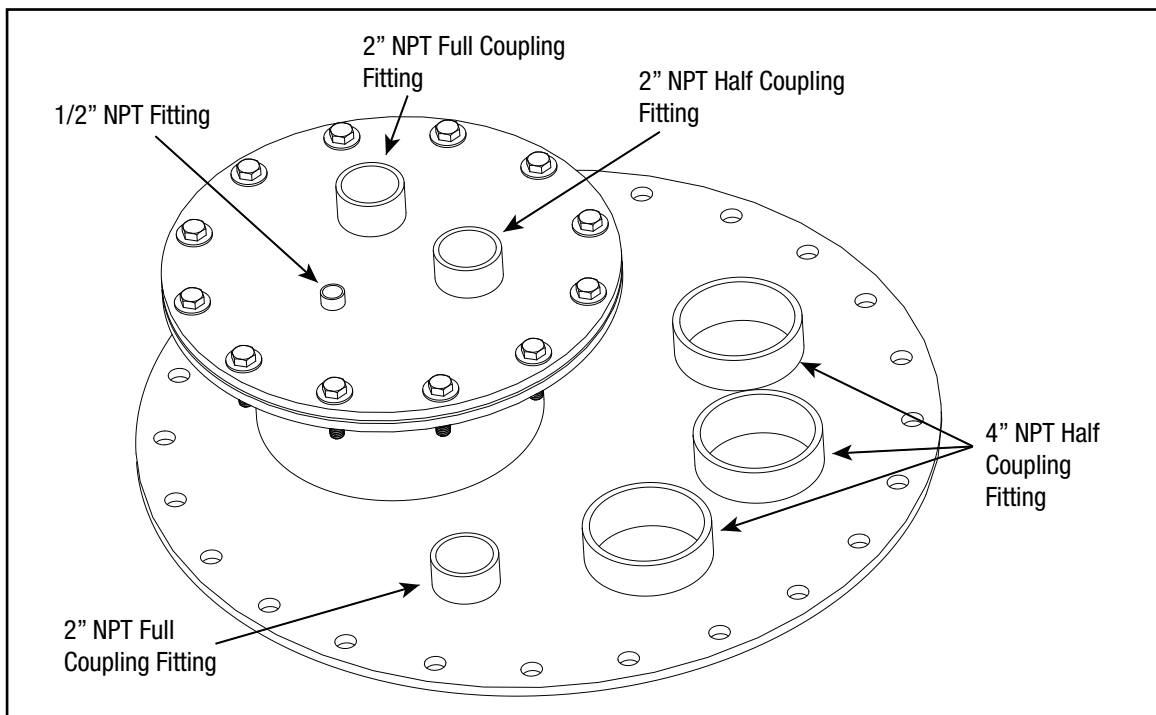
















Figure 2. Example Opening Locations in Manway Cover for the Submersible DEF Pump System

Safety Precautions

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

 <p>EXPLOSIVE Fuels and their vapors are extremely explosive if ignited.</p>	 <p>FLAMMABLE Fuels and their vapors are extremely flammable.</p>
 <p>ELECTRICITY High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</p>	 <p>TURN POWER OFF Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.</p>
 <p>WARNING Indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>	 <p>READ ALL RELATED MANUALS Knowledge of all related procedures before you begin work is important. Read and understand all manuals thoroughly. If you do not understand a procedure, ask someone who does.</p>
 <p>WEAR EYE PROTECTION Wear eye protection when working with pressurized systems or epoxy sealant to avoid possible eye injury.</p>	 <p>WEAR GLOVES Wear gloves to protect hands from irritation or injury.</p>
 <p>CLEAN WORK AREA Remove spilled liquid and dispose of it in an environmentally sound manner.</p>	

⚠ WARNING

    	<p>The Submersible DEF Pump and wiring shall not be installed within a hazardous environment as defined by NFPA 70 (NEC).</p> <p>FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.</p> <ol style="list-style-type: none"> 1. All installation work must comply with the latest issue of the National Electrical Code (NFPA 70), PEI/RP1100 Recommended Practices For The Storage And Dispensing Of Diesel Exhaust Fluid (DEF), and any European, national, state, and local code requirements that apply. 2. Turn off, tag, and lockout power to the submersible DEF pump before connecting or servicing it. 3. Do not step on DEF plumbing when entering or leaving the sump. 4. Before installing pipe threads apply an adequate amount of fresh DEF compatible, UL listed non-setting thread sealant. 5. Not reading and following all warnings and instructions in this manual can cause damage to property, environment, resulting in serious injury or death.
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Warnings and Instructions

▲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 1-800-323-1799 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.**

For additional PMA details and instructions, refer to Franklin Electric Fueling Systems Manual 403414001 Diesel Exhaust Fluid Pumping Accessories or 403395001 DEF Pump Motor Assembly Replacement Guide. If additional PMA assistance is required, contact Franklin Electric Fueling Systems Technical Support at +1(800) 984-6266.

Follow The Regulations

Applicable information is available in PEI/RP1 100 Recommended Practices For The Storage And Dispensing Of Diesel Exhaust Fluid (DEF)¹, 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.

ISO Standard For DEF

The production, handling and transportation of Diesel Exhaust Fluid (DEF) are governed by the ISO 22241 standard. Guidelines require manufacturers to follow clear procedures for the manufacture and distribution of DEF, ensuring that the product meets the requirements of vehicle manufacturers. The ISO standards are available from the ISO website².

REQUIREMENTS FOR USE

NOTICE

Contractors MUST supply additional pressure relief in the DEF system downstream of the check valve to assure the system does not exceed the recommended 50 psi during thermal expansion!

When using Loctite 567 thread sealant, apply Loctite primer 7090 to the pipe threads, then apply Loctite 567 to all contractor assembled joints for additional residual torque.

- Application of the Submersible DEF pump must be consistent with NFPA Code 70/NEC, OSHA regulations, and federal, state and local fire codes, and other applicable local regulations.

1. <http://pei.org/PublicationsResources/RecommendedPracticesExams/RP1100/tabid/849/Default.aspx>

2. http://www.iso.org/iso/search.htm?qt=22241&sort=rel&type=simple&published=on&active_tab=standards

- 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.

INSTALLATION ENVIRONMENT

▲WARNING The Submersible DEF pump is only intended to be used to pump DEF fluid.

CLEANLINESS OF SURFACES IN CONTACT WITH DEF

All surfaces in direct contact with DEF shall be free of foreign matter (fuel, oil, grease, detergent, dust and any other substance).

To avoid any contamination of DEF with trace elements, particles and foreign matter, surfaces of equipment not exclusively used with DEF shall be cleaned with distilled or de-ionized water and DEF in the last cleaning step immediately before the use with the DEF to be handled with the equipment.

The use of tap water should especially be avoided due to the high concentrations of alkali and alkali earth metal ions therein. However, if distilled water or de-ionized water is not readily available, the material may be cleaned with tap water, provided the last rinse is done using DEF.

SAFETY INSTRUCTIONS

- The maximum operating pressure and the operating temperature must be observed.
- High operating pressure may result in the containers, fittings, pipelines or the hoses bursting or becoming loose. Make sure that excessive pressure does not result when filling a container.
- **Remove spilled liquid from the floor and dispose of it in an environmentally sound manner.**
- Comply with technical requirements of local power supply companies.
- Only use the pump for its intended use.
- Always operate the pump in a vertical position.
- Follow internal instructions.
- **Wear protective clothing (face and breathing protection, protective gloves, etc.).**



Pump Dimensions

Figure 3 shows reference dimensions/components of a typical variable length Submersible DEF pump as installed with a fixed pressure relief valve and PMA.

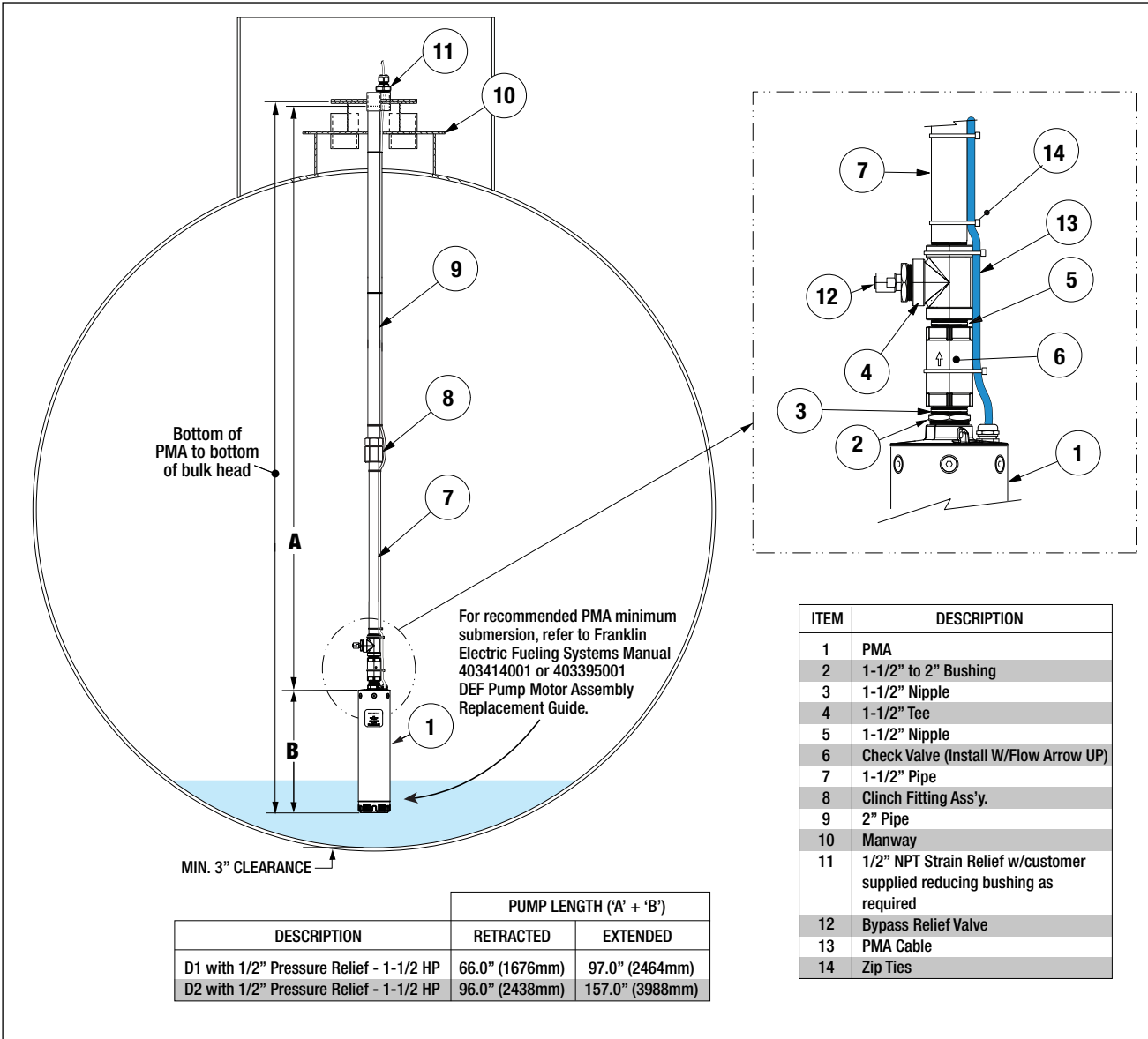


Figure 3. Submersible DEF Pump Dimensions/Tank Installation w/ Fixed Bypass Pressure Relief Assembly

Kits And Accessories

The submersible pump system is designed to operate as a complete solution for UST applications. The tote applications will require custom fabrication and installation of the piping systems by the contractor. The contractors should be aware of material compatibility and use only fittings, sealants and plumbing compatible with DEF per ISO 22241.

1. Select UMP (HP and voltage requirements).

Part Number	Model Number	HP	Volts	Hz	Phase	Length ('B' Figure 3)
411062-001	DP150U1	1-1/2	208-240	60	1	18.70" (474mm)

2. Select Piping Kit.

Part Number	Description
410869-026	D1 with 1/2" Pressure Relief - 1-1/2 HP
410869-027	D2 with 1/2" Pressure Relief - 1-1/2 HP

3. For multiple dispenser applications select the Isotrol box:

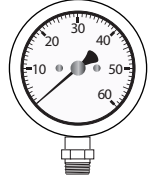
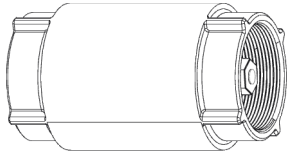
- Isolates the handle signals between each dispenser
- Isolates and protects individual dispensers from wiring shorts or phasing issues
- Isolates and protects technicians from dangerous feedback during service
- Accepts up to eight individual dispenser signals

Isotrol Box	Hook Voltage	P/N
W/O Relay For Standalone	120V hook	880-049-1
	240V hook	880-050-1
W/Relay For Manifoldded	120V hook	880-047-1
	240V hook	880-048-1

4. Select the Control Box for each pump.

	Dispenser Hook Voltage	PMA DP150U1 (25 μ F Capacitor)
Single Phase Control Box with Capacitor	120V hook	880-046-5
	240V hook	410860-002

5. Select optional accessories.

Item	Part Number	Description
Pressure Gauge	410880-001	1/4" NPT fitting- SST 316 components 
Check Valve*	410875-001	

Temperature Data

Operating Temperature (Fluid)	+12°F to +104°F (-11°C to +40°C)*
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NOTICE *DEF will degrade with prolonged storage above 77°F (25°C). Refer to the DEF manufacturer’s guidelines for proper storage.

Operating Data

Table 1. Electrical Service Information

Model	HP	KW	Voltage	Hz	PH	Capacitor (µF)	UMP Resistance (Including Cable) (Ω)		
							Black-White/Grey	Black-Brown/Red	White/Grey-Brown/Red
DP150U1	1-1/2	1.12	208 - 240	60	1	25.0; 440V	1.7 - 2.5	4.6 - 5.4	6.3 - 7.1

NOTICE For any additional PMA specs, refer to Franklin Electric Fueling Systems Manual 403414001 or 403395001 DEF Pump Motor Assembly Replacement Guide.

Installation

Assembling The Submersible DEF Pump

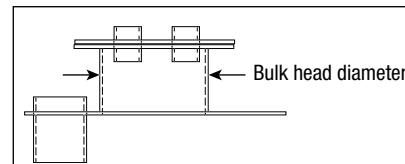
NOTICE If no column pipe assembly or fixed pressure relief valve was purchased it is mandatory the contractor follow the ISO 22241 guidelines. Pressure relief must be used with all systems to limit discharge pressure to 50 psi (344.7 kPa). Ensure all sealants are DEF compatible and use only stainless steel plumbing and hardware to avoid any product contamination. For additional PMA details and instructions, refer to Franklin Electric Fueling Systems Manual 403414001 Diesel Exhaust Fluid Pumping Accessories or 403395001 DEF Pump Motor Assembly Replacement Guide.

WARNING Plastic pipe is not recommended for support of pumps in any applications.

Manway Fittings And Connections

Take caution of fitting and plumbing routing, size and materials to assure adequate performance and material compatibility per ISO 22241.

NOTICE For recommended PMA access opening diameter in the bulk head, refer to Franklin Electric Fueling Systems Manual 403414001 or 403395001 DEF Pump Motor Assembly Replacement Guide.



Installing the Pump

1. Before installing pipe threads apply an adequate amount of fresh, UL classified for DEF, non-setting thread sealant. Loctite 567 sealant is recommended with Loctite 7090 primer for all field serviceable pipe threads. Loctite 8009 is to be used as the DEF compatible anti-seize on the clinch nut threads (see Figure 4).

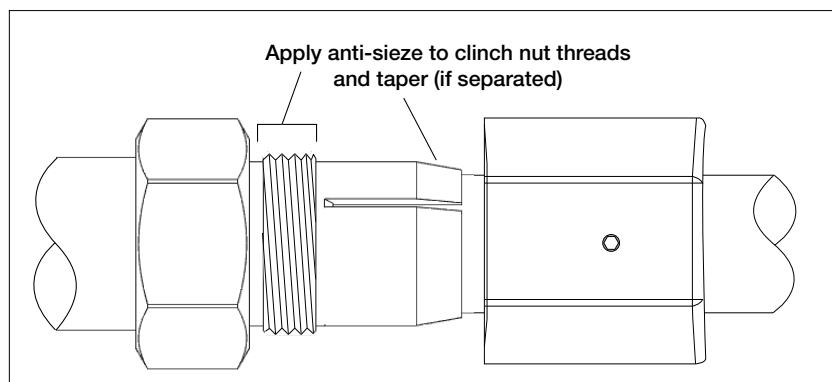


Figure 4. Apply Loctite 8009 to Threads and Tapered Fingers of Clinch Nut

2. Measure the distance from the bottom of the tank to the top of the manway as shown in Figure 5.

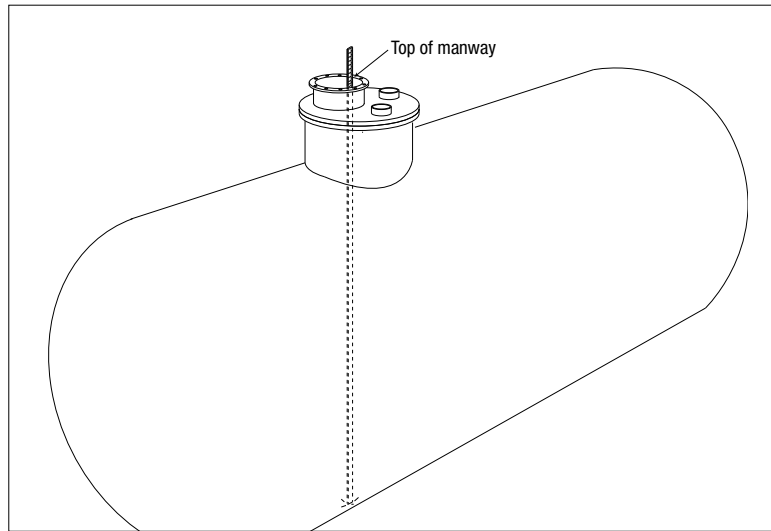


Figure 5. Measuring Tank

3. Apply Loctite 7090 primer and coat Loctite 567 sealant on threads of 2" stainless steel bushing adapter and hand screw PMA onto column pipe assembly. Tighten 2" NPT outlet of the PMA to 150 ft-lbs (203 N.m) minimum. If further PMA installation assistance is required (see Figure 6), refer to Franklin Electric Fueling Systems Manual 403414001 or 403395001 DEF Pump Motor Assembly Replacement Guide.

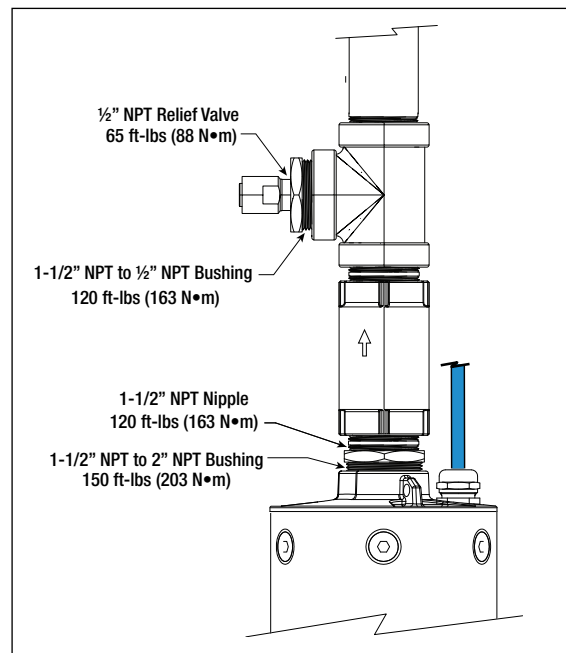


Figure 6. Attaching PMA to Column Piping

4. Apply Loctite 7090 primer and attach 2" NPT column pipe with Loctite 567 sealant to an ISO 22241 compliant manway cover and torque to 150 ft-lbs (203 N.m).
5. Loosen the clinch assembly on the column pipe by unscrewing the three set screws in the side of locking nut, then backing off the locking nut (see Figure 7).

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

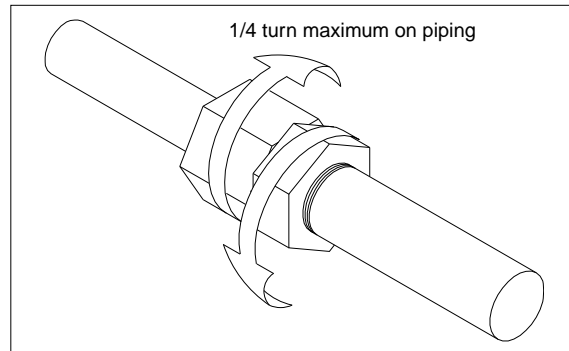


Figure 7. Loosening Locking Nut

- Referencing Figure 8, pull the PMA end until the distance between the bottom of the bulk head and the bottom of the PMA is 3 inches (76 mm) shorter than the distance measured in Step 2.

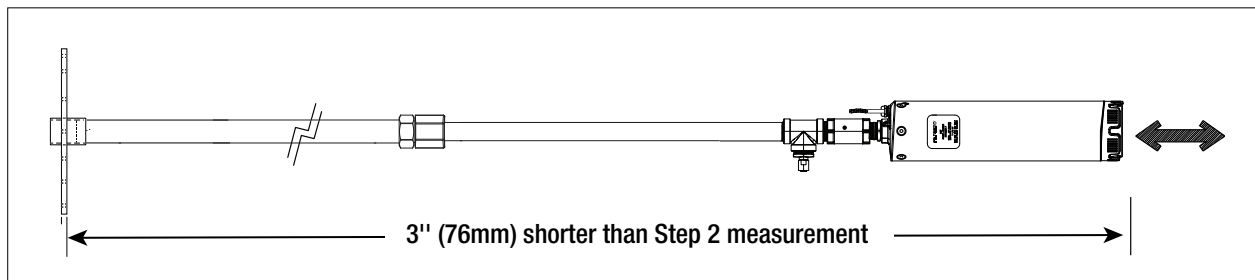


Figure 8. Adjusting Pump Length

NOTICE Take care not to damage the PMA cable.

- Tighten the column pipe locking nut and torque to 150 ft-lbs (203 N•m) minimum, then torque each set screw in the locking nut to 10 ft-lbs. (14 N•m).

NOTICE Set screw torque is critical to proper function.

- Feed PMA cable through strain relief (supplied) and tighten cord grip to 3 ft-lbs (4 N•m) after removing excess slack in the tank. Thread sealant is not required between cord grip and bushings. Threads are 1/2" NPT.
- Secure the PMA cable to the column pipe with tie straps. Locate the tie straps approximately as shown in Figure 9. Ensure the PMA cable is not in front of (blocking) the pressure relief valve.

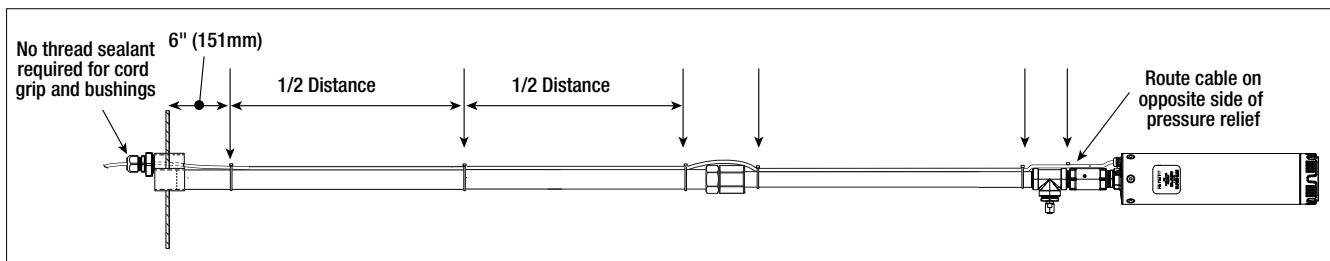


Figure 9. Tie Strap PMA Cable to Column Piping

- Gently lower the assembly using manway cover.

NOTICE Do NOT use the PMA cable as a lowering or restraining device as damage can occur.

TYPICAL FIXED PRESSURE RELIEF INSTALLATION

See example installation in Figure 10.

NOTICE No additional thermal relief is needed when using fixed pressure relief when located downstream of check valve.

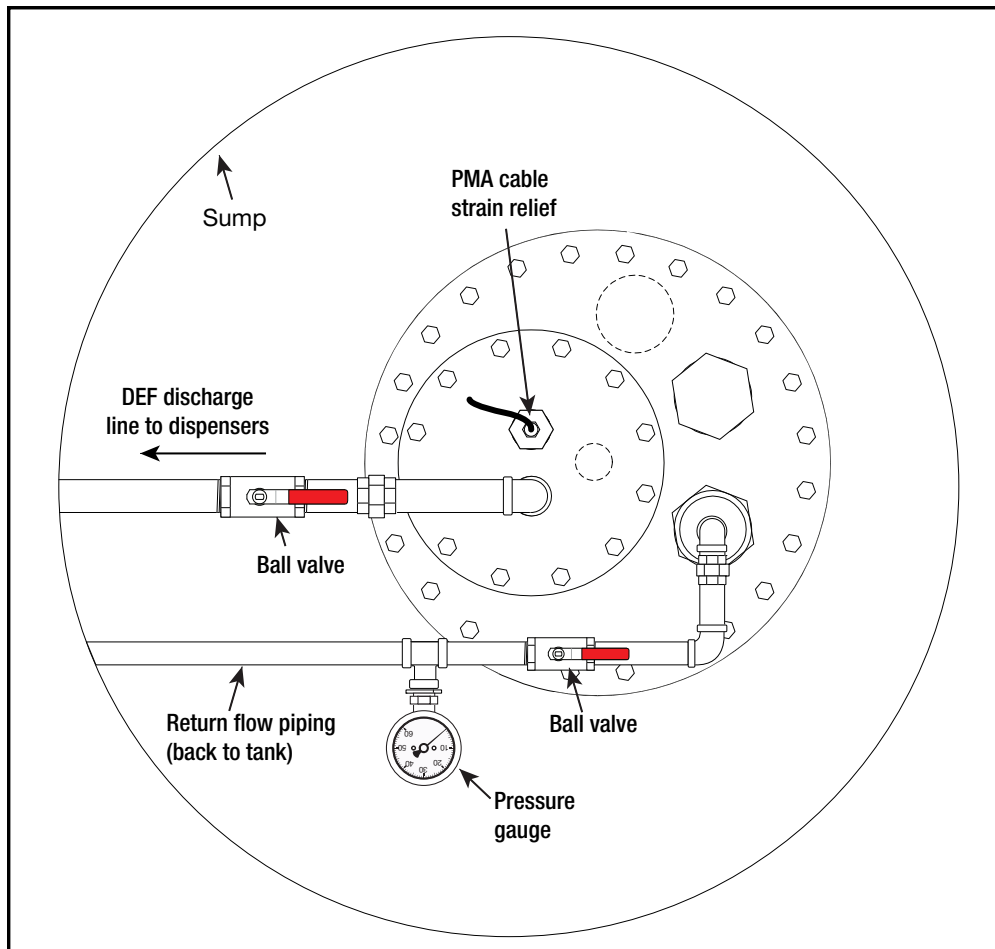


Figure 10. Fixed Pressure Relief Installation Example

NOTICE Ball valve (not supplied) should be installed to contain DEF in lines to dispenser for servicing.


NOTICE If DEF recirculation option is selected, return flow, pressure gauge and ball valve are required.

1. Install optional pressure gage if desired.

NOTICE Carefully apply sealant to port to avoid contamination of gauge.

Electrical Connections

⚠ WARNING The Submersible DEF pump is **NOT** designed for use in flammable liquids, or to be installed in locations classified as hazardous per NFPA 70 (NEC)!

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

In DEF fueling sites that are being upgraded to include a Control Box with capacitor, it is imperative to verify the wiring connections between the pump and the Control Box. Energizing a pump with incorrect connections can cause the thermal overload in the pump to trip open, resulting in a very lengthy wait for the thermal protector to reset.

Resistance tests are always made with the power off and the wires disconnected from the Control Box.

Set up the electrical meter to the ohms (Ω) function. Measure the resistance between each pair of wires that run out to the pump. Consider the three readings as "low", "medium" and "high". Ignore actual color of wires.

1. Locate the two wires that give the highest ohmmeter reading. Mark the remaining wire "BLACK".
2. Mark the wire "GREY" that in combination with the "BLACK" wire (as determined in Step 1.) gives the lowest reading.
3. Mark the remaining wire "BROWN".
4. Connect the "GREY" wire to the "M1" terminal of the Control Box.
5. Connect the "BLACK" wire to the "M2" terminal of the Control Box.
6. Connect the "BROWN" wire to the "M3" terminal of the Control Box.

SIMPLIFIED WIRING DIAGRAMS

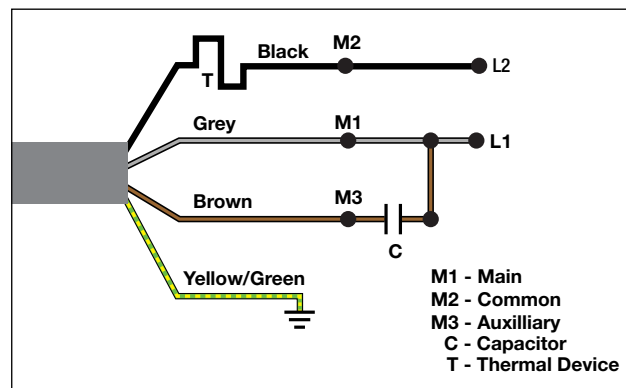


Figure 11. Single Phase Wiring Diagram

Wiring Diagrams

SINGLE TANK INSTALLATIONS

Figure 13 through Figure 15 contain example wiring diagrams for various single tank/submersible DEF pump installations.

MANIFOLDED TANK INSTALLATIONS

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

Figure 16 through Figure 17 contain example wiring diagrams for various manifolded tanks/submersible DEF pump installations featuring Isotrol Control Boxes.

ISOTROL CONTROL BOX WIRING PRECAUTIONS (Apply to Figure 14 through Figure 17):

⚠ WARNING

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

- The N connection on TB1 and the eight N connections on TB2 may be spliced to a common neutral wire from the service panel described above.
- Make only one 'wire' connection on each N terminal on TB2.

NOTICE

The phase of L1 (TB1) must match the phase of the power supplying the ATG device 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.

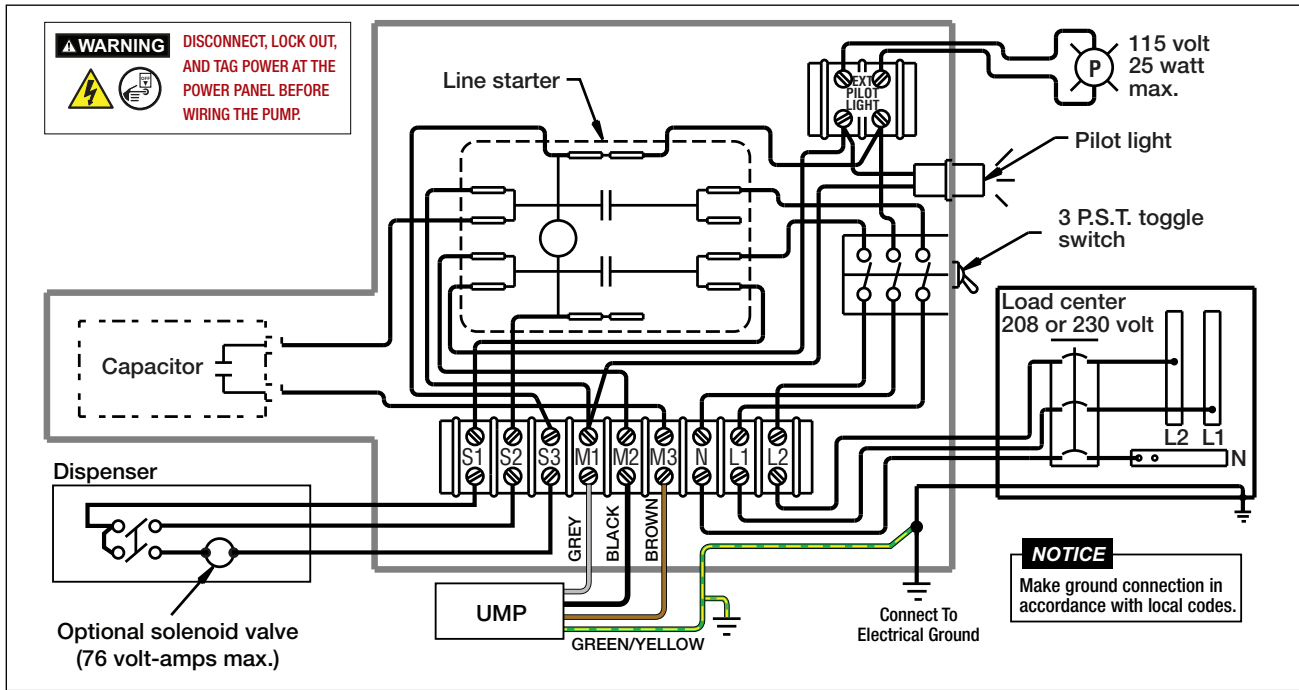


Figure 12. 240 Vac Remote Control Box with 120 Vac Coil and Capacitor (Model 880-046-5)

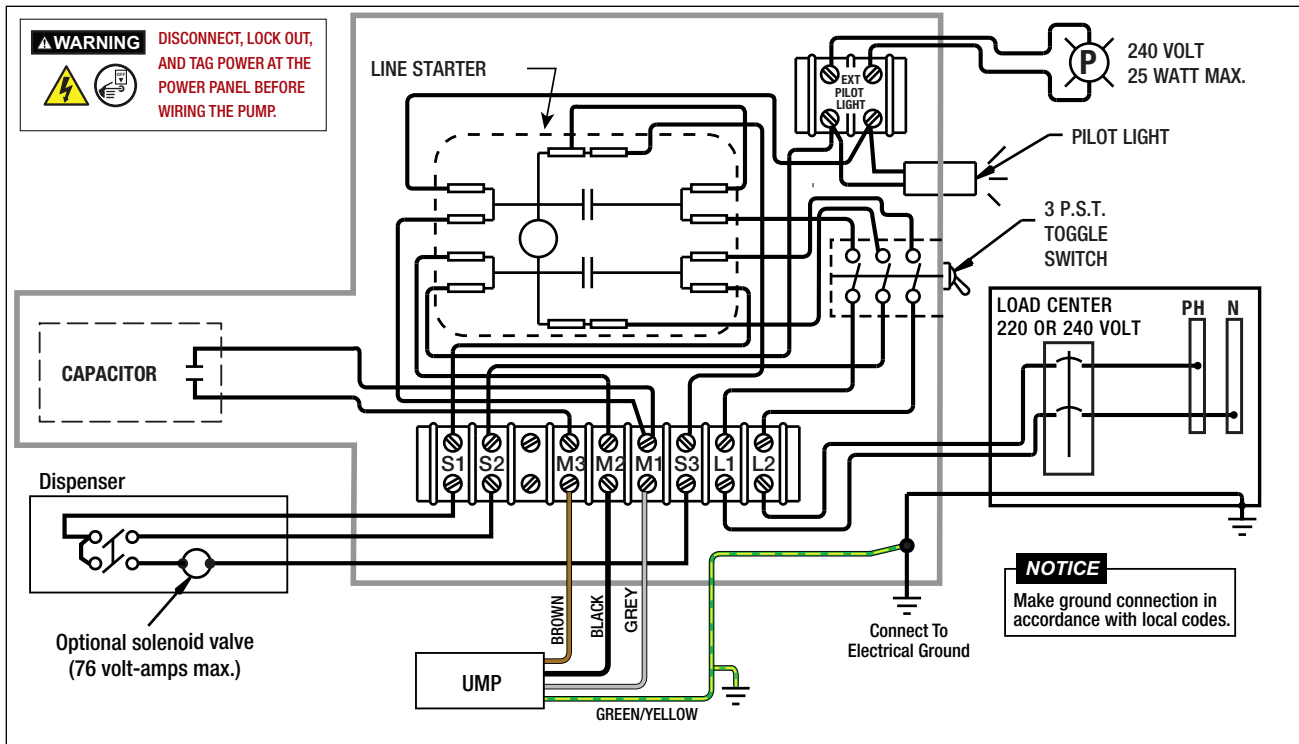


Figure 13. 240 Vac Remote Control Box with 240 Vac Coil and Capacitor (Model 410860-002)

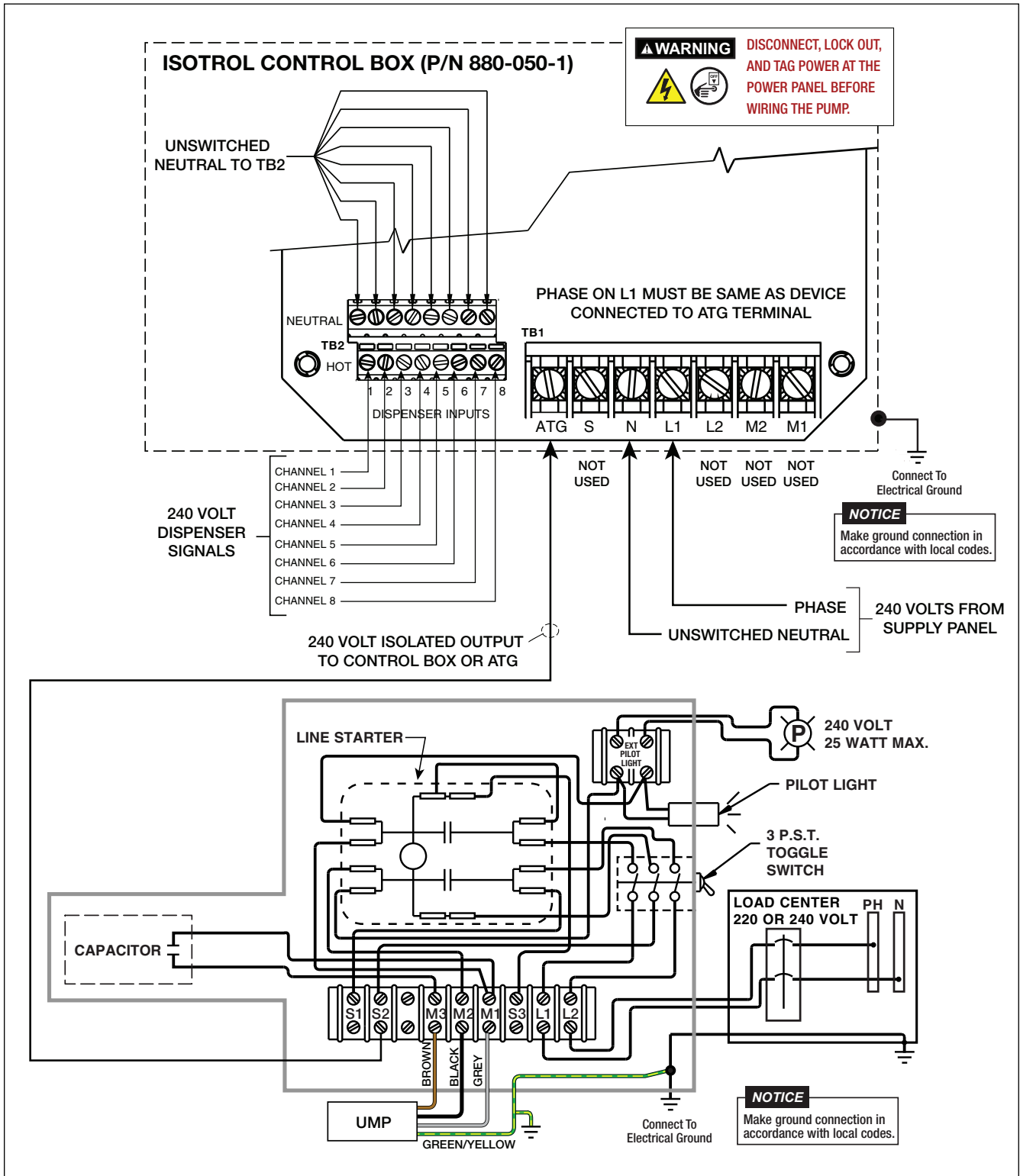


Figure 15. Isotrol to Remote Control Box with 240 Vac Coil and Capacitor (Model 410860-002)

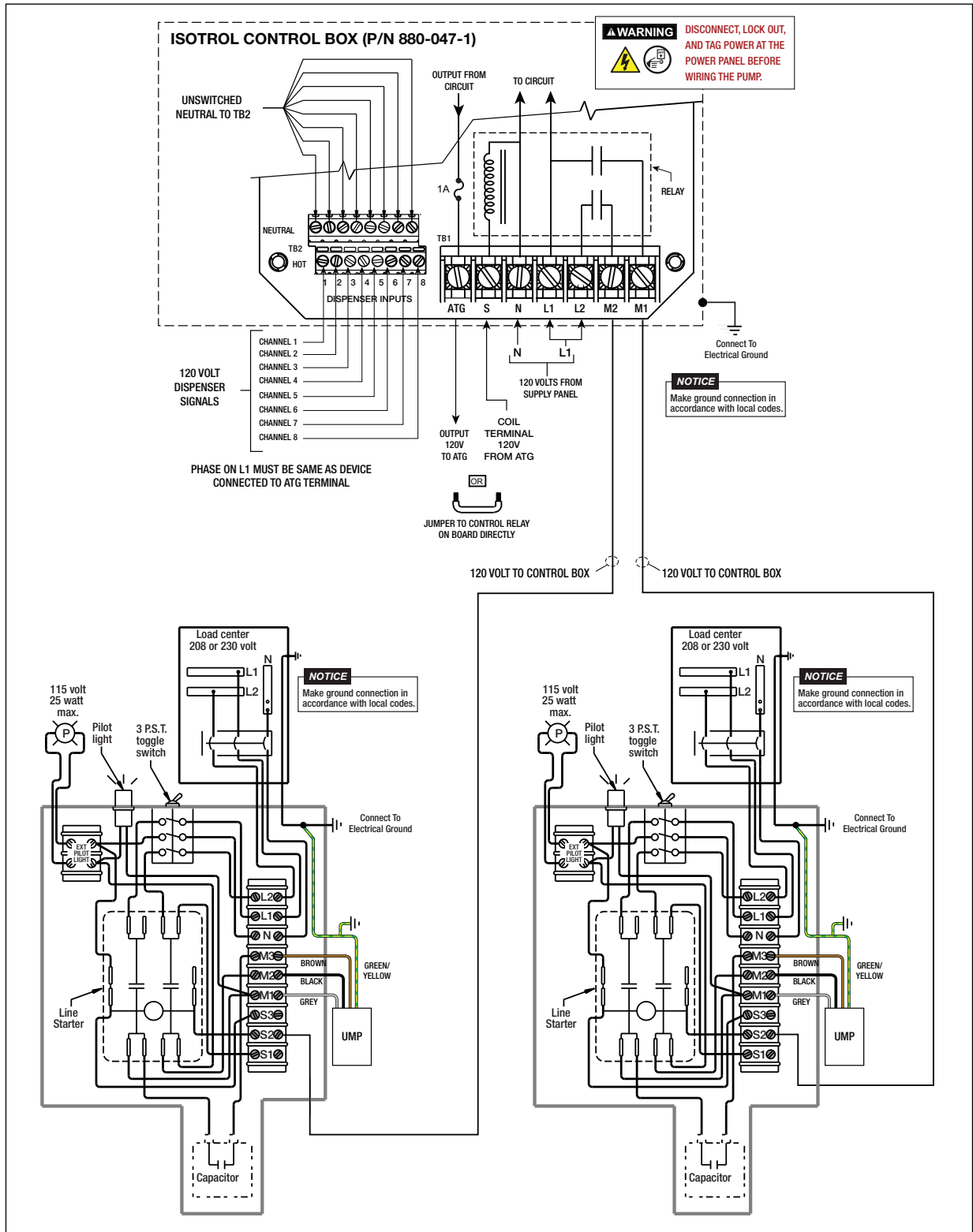


Figure 16. Isotrol with Relay to Manifolded 240 Vac Remote Control Boxes with 120 Vac Coil and Capacitor (Model 880-046-5)

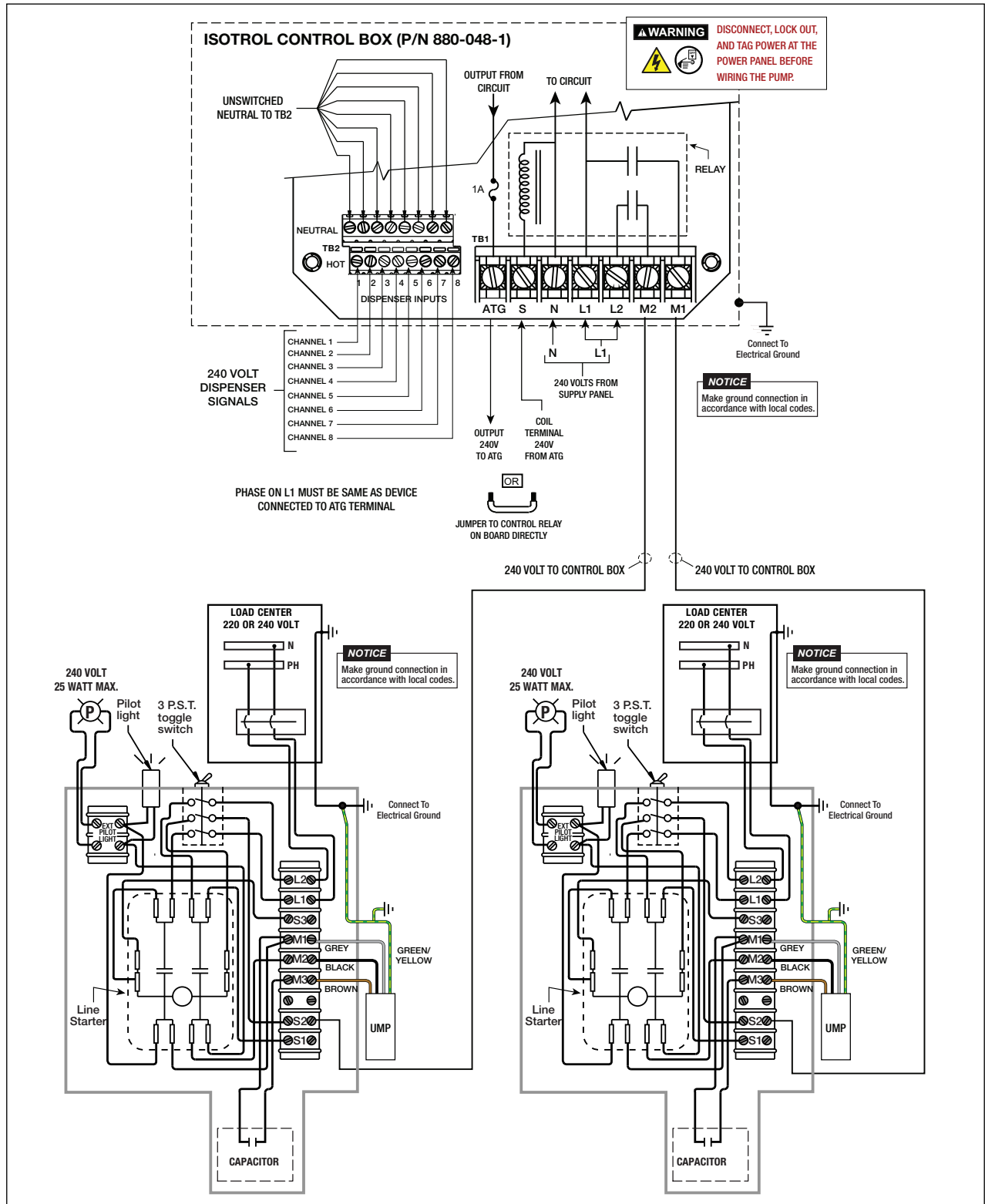


Figure 17. Isotrol with Relay to Manifolded 240 Vac Remote Control Boxes with 240 Vac Coil and Capacitor (Model 410860-002)

Operational Precautions

- Pump must be completely submerged in DEF (primed) prior for initial install to avoid a dry start condition.
- Do not allow pump to run dry or damage will occur.
- DEF freezes at approximately 12°F (-11°C).
- Bypass/relief valves (capable of minimum 5 gpm [19 lpm]) are needed for proper pump cooling when no product is flowing through dispensers. These valves are provided by Veeder-Root as part of the plumbing system.
- Do not allow DEF to freeze in plumbing, pump or in any fittings or damage may occur.
- Only skilled contractors may install the submersible DEF pump, accessories and controls.

Initial Start Up of Pump

1. If a ball valve is installed down line from the pump, close it.
2. Turn the pump on and let it run for about 2 minutes to verify or set discharge pressure (50 psi maximum).
3. If applicable, open the ball valve down line from the pump.
4. Purge system of air by pumping at least 15 gallons (57 liters) through each dispenser. Begin with the dispenser furthest from the pump and work back toward the pump.
5. Turn off pump.
6. Pump start-up is now complete.

Maintenance

- No maintenance of system is required. Service only as needed utilizing the included troubleshooting guide.
- If additional PMA maintenance is required, refer to Franklin Electric Fueling Systems Manual 403414001 Diesel Exhaust Fluid Pumping Accessories or 403395001 DEF Pump Motor Assembly Replacement Guide or contact Franklin Electric Fueling Systems Technical Support at +1(800) 984-6266.
- Check valves and pressure relief have no internal serviceable parts.
- All replacement parts are to be serviced by a qualified contractor.

Troubleshooting

Table 2. Submersible DEF Pump System Troubleshooting

Trouble	Cause	Corrective Action
Pump stops and starts	<ul style="list-style-type: none"> a. Incorrect voltage or voltage drop. b. Open circuit or incorrect pump wiring. c. Motor protection trips out. 	<ul style="list-style-type: none"> a. Check the voltage during starting. If the wiring cross-section is too small, the voltage drop may be such that the motor cannot function normally. Installation of a voltage boost transformer may be necessary. b. Measure the resistance between pump wires. Check the pump cable and all wiring to the pump and control boxes is per the manuals. c. Confirm pump has bypass flow per manual requirements. For single phase pumps, check capacitor for opens or shorts.
No product flow	<ul style="list-style-type: none"> a. Pump is not running. b. Controller not powered. c. Restriction in piping system. d. Insufficient DEF in tank. e. Frozen DEF in piping system. f. Wrong direction of rotation (single phase). 	<ul style="list-style-type: none"> a. See above. b. Check that the circuit breaker and lockout switch on control box are not in the Off or tripped position. c. Confirm flow direction of check valve is correct. Confirm ball valves and plumbing in sump is correct. d. Check fluid level in tank, Confirm minimum of 6 inches (150mm) above the pump strainer/inlet. e. DEF freezes at +12°F (-11°C). Installation of pipe heaters or a DEF recirculation system may be necessary. f. Interchange the two pump wires to the capacitor.
Insufficient product flow	<ul style="list-style-type: none"> a. Strainer clogged. b. Fixed pressure relief is stuck open. c. Partially frozen DEF in piping system. 	<ul style="list-style-type: none"> b. Confirm pump strainer is not clogged. b. Confirm fixed pressure relief valve is closed and sealed before setting pressure (30 - 40 psi [207 - 276 kPa]). c. Continue to dispense DEF to thaw out piping.
Slow to discharge DEF	<ul style="list-style-type: none"> a. Confirm system is holding pressure. 	<ul style="list-style-type: none"> a. Check pressure holding of system with pump off and assure check valve does not have any contamination.

NOTICE Refer to Franklin Electric Fueling Systems Manual 403414001 or 403395001 DEF Pump Motor Assembly Replacement Guide for PMA150A pressure details.

General Repair

WARNING



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

If a system has any issues found during the troubleshooting process follow the steps below:

1. Remove pressure from system. Ensure no DEF fluid is in the lines in the sump.
2. Carefully disconnect all plumbing, gauges and any pressure relief units in manway as is necessary to allow removal of the manway cover.
3. Disconnect electrical connections to PMA cable.
4. Loosen and remove manway cover fasteners from tank.
5. Carefully lift bulk head cover from tank with column pipe and PMA connected.

NOTICE Approximate weight of the Submersible DEF pump/piping assembly is 75 pounds (34 kg).

6. Determine clean, safe workspace and carefully set down motor assembly/plumbing and manway cover.

NOTICE All surfaces in direct contact with DEF shall be free of foreign matter (fuel, oil, grease, detergent, dust and any other substance). See “Cleanliness Of Surfaces In Contact With DEF” on page 5.

7. Remove device that is being replaced (PMA, fixed pressure relief or check valve) from system.

NOTICE Ensure check valve’s flow arrow is correctly oriented (towards manway cover) during its replacement.

8. Clean all fittings and reapply thread sealant (Loctite 567 recommended).
9. See recommended torque settings for fittings in Table 3.

Table 3. Recommended Torque Settings

Item	Torque
2” NPT Column Pipe To Manway Cover Nipple	150 ft- lbs (203 N•m)
Column Pipe Locking (Clinch) Nut	150 ft- lbs (203 N•m)
Column Pipe Locking (Clinch) Nut Set Screw	10 ft-lbs (14 N•m)
PMA to 2” Bushing	150 ft- lbs (203 N•m)
1/2” Small Fixed Pressure Relief	65 ft-lbs (88 N•m)
Adjustable Pressure Relief Valve Hex Cover	30 ft-lbs (41 N•m)
Cable Cord Grip	3 ft- lbs (4 N•m)

Replacing Veeder-Root UMP

If replacing any Veeder-Root UMP (DP75U1, DP75U3, DP200U1, DP200U17, or DP200U4), the following kits are required:

- 411062-001 PMA DP150U1
- 410882-002 1/2" NPT Pressure Relief Valve and Cord Grip Kit
- 411063-001 Retrofit Plumbing Kit
- 410164-002 25 μ F Capacitor Kit

1. Remove Veeder-Root UMP.
2. Remove 1-1/4" NPT nipple and 1-1/2" NPT female to 1-1/4" NPT female reducer bushing (See Figure 18).

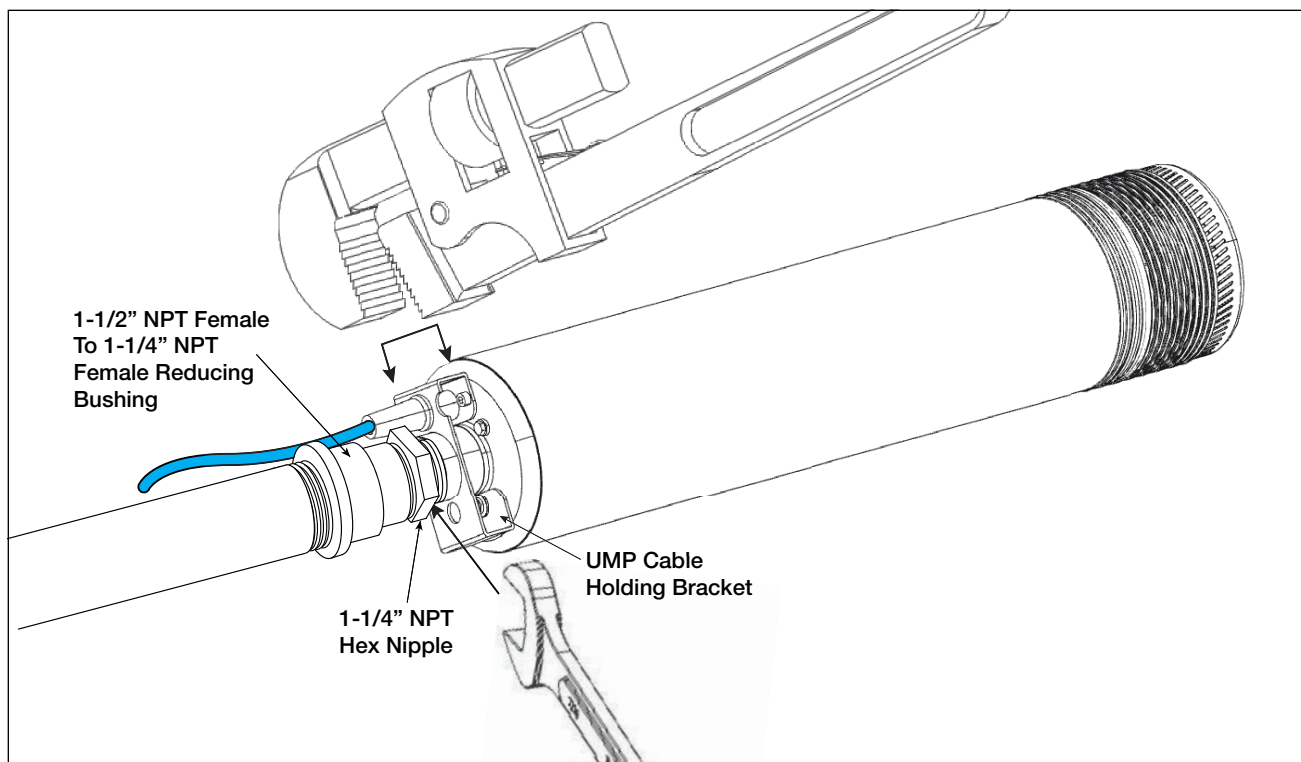


Figure 18. Disconnecting UMP

3. Clean female threads in the check valve and apply Loctite 7090 primer and coat Loctite 567 on both ends of new 1-1/2" NPT nipple (from plumbing kit 411063-001).
4. Hand thread 1-1/2" NPT nipple into check valve.
5. Hand thread new 1-1/2" NPT female to 2" NPT male adapter bushing onto 1-1/2" NPT nipple (from plumbing kit 411063-001).
6. Torque new plumbing fittings to 120 ft-lbs (633 N•m) (see Figure 6).

New PMA Installation

For new PMA installation and column pipe adjustment, read 'Installing the Pump' section above and refer to the plumbing fittings in Figure 19 below.

NOTICE The Veeder-Root UMPs are different lengths and therefore the column pipe assembly must be re-adjusted to the appropriate length.

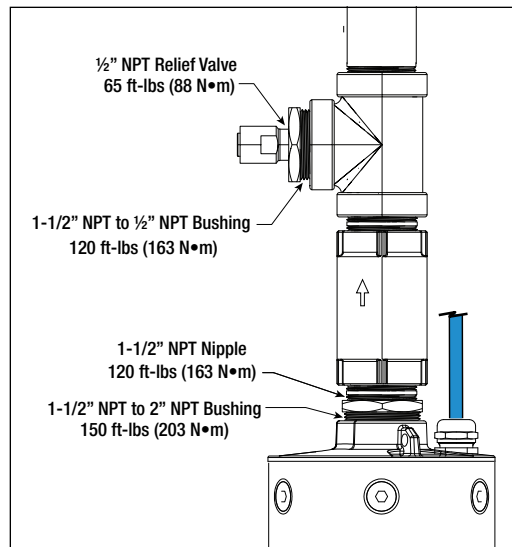


Figure 19. Attaching PMA to Column Piping

1. Remove 1/2" NPT fixed pressure relief valve. If previous system utilized a Veeder-Root 2HP UMP and large 1-1/4" NPT fixed relief valve, then the associated reducer bushing in tee will also need to be removed (refer to Figure 19).
2. If reducer bushing was removed, clean female threads in tee and apply Loctite 7090 primer and coat Loctite 567 on new 1-1/2" NPT male to 1/2" NPT female reducer bushing (from plumbing kit 411063-001).
3. Hand thread 1-1/2" NPT male end into tee. Torque to 120 ft-lbs (163 N.m).
4. New 1/2" NPT fixed pressure relief valve installation process applies to both new and existing 1/2" NPT male to 1/2" NPT reducer bushing.
5. Apply Loctite 7090 primer and coat Loctite 567 on new 1/2" NPT fixed pressure relief valve.
6. Torque relief valve to 65 ft-lbs (88 N.m)

NOTICE The Veeder-Root Umps use a different relief valve with different set pressure, therefore the relief valve must be replaced with new valve within kit 410882-002.

7. Remove existing cord grip from manway and replace with new (from kit 410882-002). Feed PMA cable through and tighten new cord grip to 3 ft-lbs (4 N.m) after removing excess slack in the tank. Thread sealant is not required between cord grip and bushings.
8. Read and follow 'Installing the Pump' section above for remaining pump, cord, and tank adjustment and installation.
9. Remove existing capacitor from DEF system control box and replace with 25 μ F capacitor (from kit 410164-002).
10. Read and follow 'Electrical Connections' and 'Wiring Diagrams' sections from above for remaining PMA electrical connections and replacement.

Parts Lists

Submersible Pump And Accessories

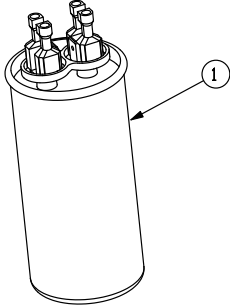
Table 4. Replacement Parts

Item	Description	P/N
PMA	DP150U1	411062-001
Miscellaneous Accessories	1/2" NPT Pressure Relief Valve and Cord Grip Kit	410882-002
	Check valve kit	410875-001
	Pressure Gauge Kit	410880-001
	Retrofit Plumbing Kit	411063-001

Capacitor Kits

Table 5 lists the capacitor kits parts list.

Table 5. Capacitor Kits*

Item (ref. Figure 20)	Part Number	Description	Qty.	Figure 20. Capacitor Kits
1	410164-002	25 μ F Capacitor	1	
<p>*Capacitor contains internal bleed-down resistor and is rated 440 volts.</p>				

Control Boxes

Table 6. Control Box W/Capacitor (120V Coil)

Item (Refer Figure)	Qty. / Part Number	Description	880-046-5
			CB-1-1/2 HP 25 μ F 120V Coil
1	1	Capacitor Kit	410164-002
2	014-723-1	Line Contactor Relay	1
3	247-001-5	Pilot Light Assy.	1
4	080-858-1	Toggle Switch	1
5	008-202-1	Terminal Block	1

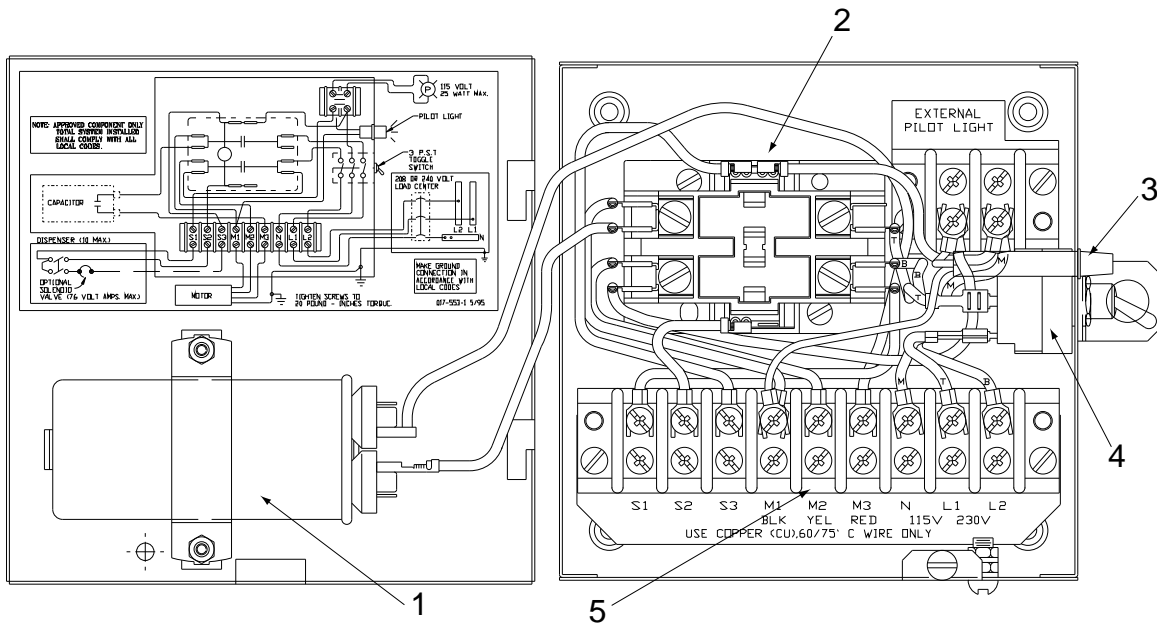


Figure 21. Control Box W/Capacitor

Table 7. Control Box W/Capacitor (240V Coil)

Item (Refer Figure)	Qty./Part Number	Description	0410860-002
			CB-1-1/2 HP 25 μ F 240V Coil
1	1	Capacitor Kit	410164-002
2	014-720-1	Line Contactor Relay	1
3	247-001-5	Pilot Light Assy.	1
4	080-858-1	Toggle Switch	1
5	008-202-1	Terminal Block	1



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