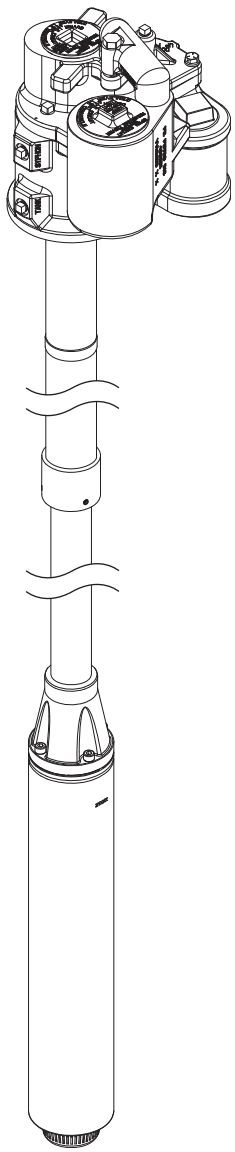
Franklin Electric
FUELING SYSTEMS

STP / IST
FIXED & VARIABLE LENGTH



INSTALL GUIDE

400604005 r26

Submersible
Pumping

SCAN / CLICK

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400604005 r26

CONVENTIONS USED IN THIS DOCUMENT

This document includes safety precautions and other important information presented in the following format:

NOTE: This provides helpful supplementary information.

IMPORTANT: This provides important supplementary information and instructions to avoid damaging hardware or a potential hazard.

⚠ **CAUTION**: This indicates a potentially hazardous situation that could result in minor or moderate injury if not avoided. This may also be used to alert against unsafe practices.

⚠ **WARNING**: This indicates a potentially hazardous situation that could result in severe injury or death if not avoided.

⚠ **DANGER**: This indicates an imminently hazardous situation that will result in death if not avoided.

OPERATING PRECAUTIONS

Franklin Electric equipment is designed to be installed in areas where volatile liquids such as gasoline and diesel fuel are present. Working in such a hazardous environment presents a risk of severe injury or death if you do not follow standard industry practices and the instructions in this document. Before working with or installing the equipment covered in this document, or any related equipment, read this entire document, particularly the following precautions:

IMPORTANT: To help prevent spillage from an underground storage tank, make sure the delivery equipment is well-maintained, that there is a proper connection, and that the fill adaptor is tight. Delivery personnel should inspect delivery elbows and hoses for damage and missing parts.

⚠ **CAUTION**: Use only original Franklin Electric parts. Substituting non-Franklin Electric parts could cause the device to fail, which could create a hazardous condition and/or harm the environment.

⚠ **WARNING**: Follow all codes that govern the installation and service of this product and the entire system. Always lock out and tag electrical circuit breakers while installing or servicing this equipment and related equipment. A potentially lethal electrical shock hazard and the possibility of an explosion or fire from a spark can result if the electrical circuit breakers are accidentally turned on while installing or servicing this product. Refer to this document (and documentation for related equipment) for complete installation and safety information.

⚠ **WARNING**: Before entering a containment sump, check for the presence of hydrocarbon vapors. Inhaling these vapors may cause dizziness/unconsciousness, and if ignited, can explode causing serious injury or death. Containment sumps are designed to trap hazardous liquid spills and prevent environmental contamination, so they can accumulate dangerous amounts of hydrocarbon vapors. Check the atmosphere in the sump regularly while work is in process. If vapors reach unsafe levels, exit the sump and ventilate it with fresh air before resuming work. Always have another person standing by for assistance.

⚠ **WARNING**: Follow all federal, state, and local laws governing the installation of this product and its associated systems. When no other regulations apply, follow NFPA codes 30, 30A, and 70 from the National Fire Protection Association. Failure to follow these codes could result in severe injury, death, serious property damage, and/or environmental contamination.

⚠ **WARNING**: Always secure the work area from moving vehicles. The equipment in this document is usually mounted underground, so reduced visibility puts service personnel working on it in danger from moving vehicles that enter the work area. To help prevent this safety hazard, secure the area by using a service truck or other vehicle to block access to the work area.

⚠ **DANGER**: Inspect the installation location for potential ignition sources such as flames, sparks, radio waves, ionizing radiation, and ultrasound sonic waves. If any potential ignition sources are identified, implement proper safety measures.

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1 Introduction

1.1 Regulatory Compliance

IMPORTANT INFORMATION - FOLLOW ALL INSTRUCTIONS

- The products contained within in this guide shall only be assembled and installed by a qualified person (see §2.6). *Use of non-qualified personnel, or any deviations from these recommended procedures, could result in damage or malfunction.*
- For Storage & Transit Information see §3.1.1
- For Replacement Parts, see §3.2.1
- For Operating Parameters, see §3.2.3.1
- For Specific Conditions of Use, see §3.2.3.2
- For Required Equipment, see §3.2.4

1.2 Documentation

- Instructions of this document are in English. All other language versions are translations of this original document.
- Information given in this document is provided as a guide only.
  - The Illustrations depict a typical setup and are for instruction and description purposes only.
  - It is the installer's responsibility to ensure that correct and safe procedures are followed at the worksite.
- This document and related documents are available from Franklin Electric at www.franklinfueling.com.

1.2.1 Symbol Legend


Wear Protective Headwear


Wear High-Visibility Clothing


Wear Eye Protection


Wear Protective Clothing


Wear Protective Gloves


Wear Safety Footwear


Refer to instruction guide


Ventilate Before & During Entering


Ensure Continuous Ventilation


Lockout/Tagout Electrical Equipment


Disconnect main plug from electrical outlet


Connect an earth terminal to the ground


Disconnect before carrying out maintenance or repair


General Warning


Warning: Industrial vehicles


Warning: Electricity


Warning: Flammable Material


No open flame; Fire, open ignition source and smoking prohibited

2 Safety/Security

2.1 General Safety Information

- Procedures in this document are only to be performed by people qualified and certified to perform them (see §2.3 and §2.6).
- Personnel working on or with energized equipment must be authorized by relevant regulatory bodies to carry out such work and must have the appropriate training. Check with your employer and relevant regulatory body's rules for working with energized equipment.
- Obey all local laws, rules, regulations, and instructions in this document. In case of inconsistency or contradiction between information contained in this document and any laws, rules and regulations, obey the stricter of the two.
- Keep unqualified personnel at a safe distance during installation.
- If it is necessary to remove safety/security devices, immediately reinstall the safety/security devices after completing the work.

2.2 Documentation Availability

Upon installation completion, this document shall be transferred by the qualified installer or service technician to the site owner, operator, or other responsible person of the facility where the installation is done.

- Save this guide for future use, and make sure to provide it to anyone who services or removes this equipment (see §2.3).
- Always reference the guide(s) that came with the equipment for a complete list of installation and safety precautions. The most current Franklin Electric documentation can be found online at www.franklinfueling.com.

2.3 Installation & Service Access

Certified Installer or Service Technician*

Only Franklin Electric certified installers and service technicians are allowed to service or install the STP/IST. *See §2.6 for information on certification training.*

If the STP/IST is serviced by someone who is not a Franklin Electric certified installer or service technician,* ***your warranty will be void.*

2.4 Hazard Assessment

Prior to beginning work and prior to recommencing work after leaving and returning to the worksite, *a worksite pre-job hazard assessment* ***must be performed*** *to identify safety and environmental needs.* At a minimum, this hazard assessment should:

- Identify possible hazards and risks.
- Identify the safety needs of the job.
- Identify the correct procedures, practices and equipment.
- Eliminate unsafe conditions and actions from the worksite.
- Identify the need for personal protective equipment.
- Inspect equipment before use.
- Confirm sheaths of all cables are secured and undamaged.
- Confirm plugs and connectors are properly connected and serviceable.
- Perform ongoing risk assessment during the project

2.5 Required Personal Protective Equipment (PPEs)

These PPEs are required during all phases of installation.


Wear Protective Clothing


Wear Eye Protection


Wear High-Visibility Clothing


Wear Protective Gloves


Wear Protective Headwear


Wear Safety Footwear

2.6 Qualifications and Responsibilities

Completion of this course is required *before certification test access will be granted for* ***any other course (online or live):***

- Fuel System Installation Safety

2.6.1 Qualifications for Certification

To be considered “qualified”, individuals shall pass training from the following certification training courses (online or live) for the process or processes to be performed:

FE Online or Live Certification Training

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Forecourt Specialist

- Submersible Pump

Additional Training

- Compliance Testing

2.6.2 Responsibilities

The following responsibilities are for guidance only and are not limited to those listed here. It is the responsibility of:

- The owner of the install site(s) to ensure that all STP/IST installers and service technicians shall be certified (see §2.6.1), follow all local laws, rules and regulations, along with the instructions and the specifications listed in this document.
- The certified installer(s) and service technician(s) to know the STP/IST and its safe use.
- The certified installer(s) and service technician(s) to have and maintain a valid Franklin Electric training certification (see §2.6.1).

3 Pre-Installation Overview

3.1 Upon Receipt of Item(s)

- Verify all items are in accordance with the order.
- Check all items for damage.
- If any item shows damage or is not in accordance with the order, inform Franklin Electric *immediately*.
- Remove the packaging material.
    - Follow all local laws, rules and regulations regarding disposal of discarded parts, packaging material or items and any subsequent components.

3.1.1 Storage & Transit Information

- Rough handling (drops, impacts, crushing, dragging, etc.) during storage or transit may damage the STP/IST and affect its safe operation.
- The bottom end-bell of the PMA is not designed to support the weight of the entire pump. Resting or dropping the pump on this end-bell may damage the plastic end-bell and the plastic pump components inside. This type of damage is not considered a manufacturing defect under the Franklin Electric warranty.

3.2 Technical Overview

The piping and underground storage tank must be installed using good standard industry practices. Listed below are several publications that may be used for reference:

- Automotive and Marine Service Station Code, NFPA 30A, Flammable and Combustible Code, NFPA 30, and National Electrical Code, NFPA 70 (NEC), National Fire Protection Association, Quincy, Mass.
- Recommended Practices for Installation of Underground Liquid Storage Systems, The Petroleum Equipment Institute, PEI / RP100, Latest Edition.
- Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling, The Petroleum Equipment Institute, PEI / RP200, Latest Edition.
- Installation of Underground Petroleum Storage Systems, American Petroleum Institute, API Recommended Practice 1615, Latest Edition.
- Installation of ATEX approved pumps should be done in compliance with the following Standards: EN 60079-14, EN 60079-17, EN 60079-19 and VDE 0100

IMPORTANT:

- ATEX approved pumps to be installed in Zone 0 (category 1) locations require SIL-1 certified motor control.
- Review the Additional Information Sheet for ATEX Compliant Installations for

details (Franklin Electric document 401358001).

- The manufacturing of Submersible Turbine Pumps (STPs) meets the National Standards of: GB/T3836.1-2021, GB/T3836.2-2021, GB/T3836.9-2021, and GB3836.20-2010.
    - The Explosion Proof certificate number is on the Nameplate.
    - Explosion-proof mark for Chinese-certified models: Ex db sa IIB T4 Gb/Ga.
- All NPT threaded STP pipe fittings should be assembled using a non-hardening, UL classified, gasoline resistant pipe sealing compound.
- Fittings should be installed hand-tight, *and then tightened until wrench tight (without exceeding 3 turns for fittings up to and including 2" and 2 turns for larger fittings).*
- To ensure proper installation, the joint must be pressurized and checked that there is no leakage. *This check is essential and must be the specification for making sure a joint is properly assembled.*

⚠ WARNING:

- Do not modify the STP/IST, modifying any feature of the STP/IST can cause environmental and safety issues. FE Petro® submerged turbine pumps (STPs) are subjected to rigorous quality control testing during assembly. *Field alteration of the pumps in any way, including shortening of the column pipe and conduit, defeats these quality tests, and could result in a fuel leak or dangerous electrical contact.*
- Thermal expansion may cause pressure to build up in the product lines. FE PETRO® STP/ISTs have a built-in relief valve to release this excess line pressure back to the tank. *Do not use an additional check valve unless it has the capability to relieve excess pressure back to the tank, as this could result in a buildup of abnormal pressure in the lines, causing a pipe or joint in the supply line piping to burst, and release of fuel into the environment.*
- Product explosion-proof bonding surfaces should not be repaired/maintained.

NOTE:

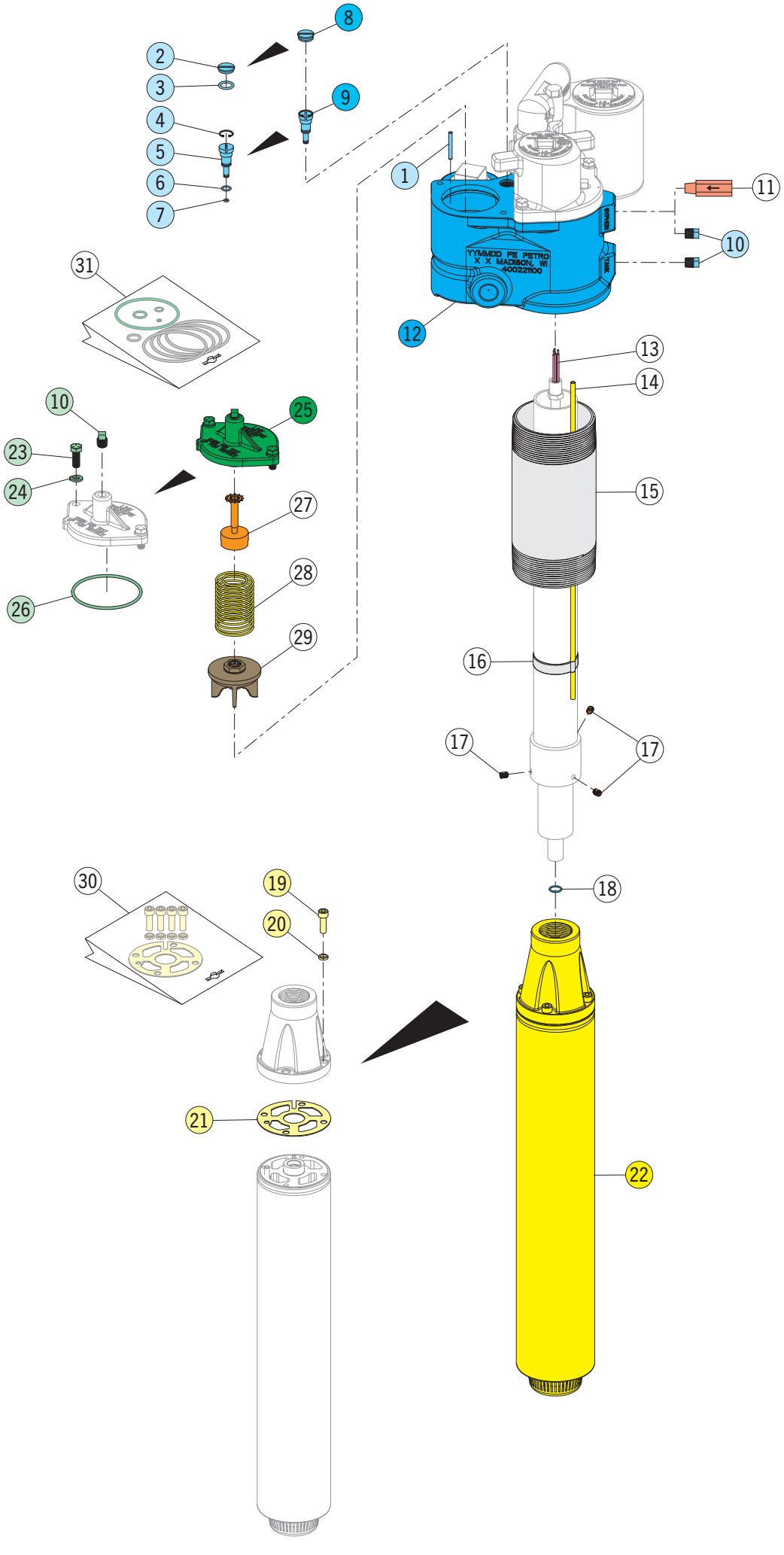
- Some underground storage tanks are ballasted with water during construction. ***Do not use the submersible pump to remove water from the tank.*** *The pump is designed for use with petroleum products only, and pumping other fluids will seriously damage the unit.*
- *Franklin Electric does not recommend immersing the pump in water,but if this does happen,* ***immediately fill the tank with motor fuel after the water is removed from the tank.*** Severe corrosion takes place very quickly if the unit has been submerged in water and is then exposed to air.
- *If the pump will not operate after gasoline is put into the tank,* ***remove the extractable portion, remove the black plastic end cap from the pump motor assembly (PMA), and turn the Allen screw clockwise at the end of the PMA.*** This will break free the PMA from any corrosion that may be present. *Reinstall the PMA end cap and the extractable section into the pump housing.*

3.2.1 Identifying Components

3.2.1.1 PMA, Riser & Check Valve for Variable Length (VL) & Fixed Length

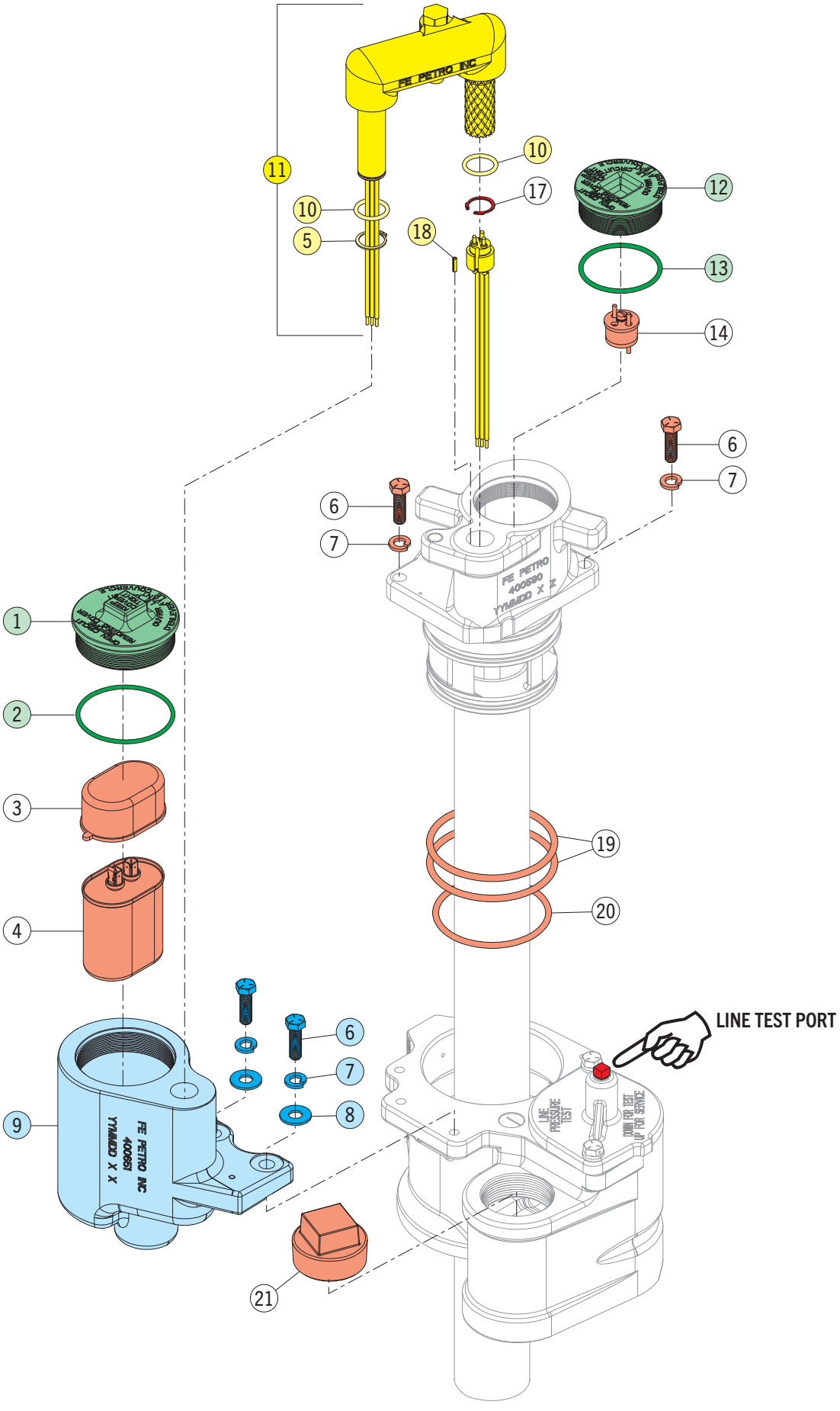
† = Purchase Locally SEE NEXT PAGE FOR ILLUSTRATION OF PART LOCATIONS

Item	Model	Description	Qty
1	400125001	3⁄16" × 1 5⁄8" spiral pin	1
2	400615001	Manual relief plug (400615002 AG compatible)	1
3	400211114	O-ring, MPR plug	1
4	400627001	Retaining ring, MPR	1
5	400616001	Manual relief screw (400616002 AG Compatible)	1
6	400333012	Relief screw, top O-ring	1
7	400333007	Relief screw, bottom O-ring	1
8	400628901	Manual relief plug assembly, includes items #2 and #3 (400628902 AG compatible)	1
9	400629901	Manual relief screw assembly, includes items #4, #5, #6, and #7 (400629902 AG compatible)	1
10	*†400259001*	¼" NPT pipe plug, *may be purchased locally*	3
	†403499001	¼" NPT pipe plug, *may be purchased locally* ***(stainless steel, for AP models)***	
11	400137937	Siphon check valve	-
12	400221930	Discharge manifold, includes #1, #8, #9, and two #10	1
	400221931	Discharge manifold (includes item #1, #8, #9, and #10) (for AP models)	-
13	151213930 151213932	156" lead assembly 240" lead assembly	1
14	†	Stationary vapor tube, 3/8 OD × 7/20 WT	-
15	4001689XX (XX = length)	Riser, 4½" OD × 3⁄16" WT steel tubing (consult factory for lead times for 31–60" lengths) 7" – 19" 20" – 30" 31" – 49" 50" – 60"	1
	4035229XX (XX = length)	Riser, 4½" OD × 4.12" ID (stainless steel, for AP models) consult factory for lead time 7" – 19" 20" – 30" 31" – 49" 50" – 60"	
16	†	½" steel banding (stainless steel for AP models)	-
17	400600002	5⁄16-24 × 7⁄16" set screw for variable lengths only	3
	403432002	5⁄16-24 × 7⁄16" set screw for VL models only (stainless steel, for AP models)	-
18	400333015	Lead assembly O-ring	4
19	*†400264009*	5⁄16-18 × 1⅛" socket head cap screw, *may be purchased locally*	4
	†403506001	5⁄16-18 × 1⅛" socket head cap screw, *may be purchased locally* ***(stainless steel, for AP models)***	
20	*†400263004*	5⁄16" high-collar lock washer, *may be purchased locally*	1
	†403505001	5⁄16" high-collar lock washer, *may be purchased locally* ***(stainless steel, for AP models)***	
21	403403001	PMA gasket (403403002 AG/AP compatible)	1
22	PMA XXX	Pump motor assembly, includes item #30 (XXX indicates options and horsepower)	1
23	400981001	3⁄8-16 × 1" hex head screw	2
	403504001	3⁄8-16 × 1" hex head screw (stainless steel, for AP models)	
24	*†400285002*	3⁄8" standard lock washer, *may be purchased locally*	2
	1117703	3⁄8" standard lock washer (stainless steel, for AP models)	
25	400197930	Manifold assembly cover (includes #10, #26, two #23, and two #24)	1
	400197931	Manifold assembly cover (includes item #10, #23, #24, and #26 for AP models)	
26	400333238	O-ring, manifold cover (AG compatible)	1
27	400147930	Clamp valve assembly (AG compatible)	1
28	400174930	Check Valve Spring	1
29	400988931 400988932 400988933 402459931	Standard check valve, includes item #26 (400988934 AG compatible) Model R check valve, (for Veeder-Root™ PLLD) includes item #26 (400988935 AG compatible) Model W check valve, (for Red Jacket® PPM4000) includes item #26 (400988936 AG compatible) Model 65 psi check valve, AG compatible (for secondary manifolded STPs with Veeder-Root™ PLLD)	1
30	152350902	PMA Hardware Pack, includes #21, and four #19 and #20 (152350904 AG compatible)	-
31	400216905	Ag Compatible O-Ring Kit, includes items #3, #6, #7, and #26 on this page and items #2, #10, #13, #19 and #20 on the Discharge Manifold Assembly page (see §3.2.1.2)	-


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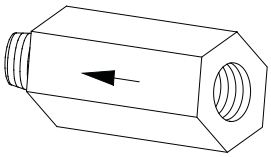
3.2.1.2 Discharge Manifold Assembly

Item	Model	Description	Qty.
1	400192930	Junction box cover, includes item #2	1
	400192931	Junction box cover, includes item #2 (for AP models)	
2	400210233	O-ring, junction box cover	1
3	400655001	Capacitor boot	1
4	400170931	Capacitor assembly for ⅓ to 1½ hp, 60 Hz, 15µfd, 370 V single-phase; includes one black lead	1
	400170934	Capacitor assembly for 2 hp, fixed speed, 60 Hz, 40µfd, 370 V single-phase; includes one black lead	
5	400257001	Retaining ring, Female connector	1
6	400258002	⅜-16 × 1¼" Hex head bolt, may be purchased locally	4
	602011016	⅜-16 × 1¼" Hex head bolt (stainless steel, for AP models)	
7	400285002	⅜ standard lock washer, may be purchased locally	4
	1117703	⅜ standard lock washer (stainless steel, for AP models)	
8	400280001	⅜ standard flat washer, may be purchased locally	2
	403500001	⅜ standard flat washer (stainless steel, for AP models)	
9	400651930	Junction box assembly, includes two #6, #7, and #8	1
	400651931	Junction box assembly (includes item #6, #7, and #8, for AP models)	
10	400210212	O-ring, Female connector	2
11	400200930	Wire connector kit, includes male/female connectors, two #10, one #5, and #18	1
	400200931	Wire connector kit, includes male/female connectors, two #10, one #5, and #18 (for AP models)	
12	400589930	Cover, includes item #13	1
	400589931	Cover, includes item #13 (for AP models)	
13	400210229	O-ring	1
14	400236903	Contractor's plug, 4-wire	2
15	400259002	⅜" NPT pipe plug, may be purchased locally (403499002, stainless steel for AP models)	1
16	400562901	Siphon jet assembly (400562903 AG compatible)	1
17	400249001	Retaining ring	1
18	400250002	⅛" dia. × ½" roll pin	1
19	400333343	AG compatible O-ring, extractable (upper, large)	2
20	400333340	AG compatible O-ring, extractable (lower)	1
21	400259005	2" NPT square head plug	1
	403499003	2" NPT square head plug (stainless steel, for AP models)	


FE PETRO INC
FE PETRO
400690
YYMMDD X Z
FE PETRO INC
400691
YYMMDD X X
LINE PRESSURE TEST
DOWN FOR TEST
UP FOR SERVICE
LINE TEST PORT
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3.2.1.3 Siphon Check Valve

NOTE: See also §3.2.1.1



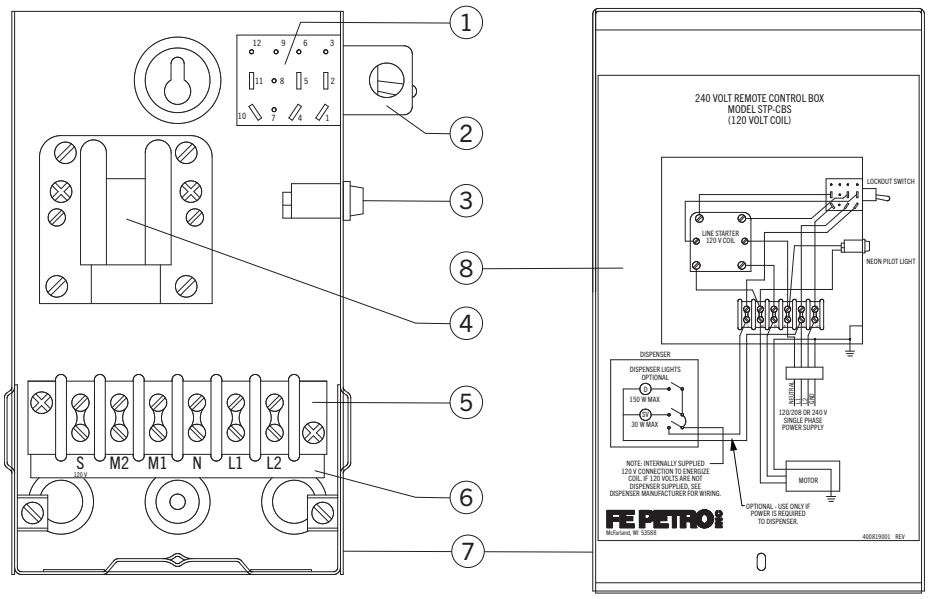
Item #	Part #	Description	Qty
1	400137937	Siphon Check Valve ordered separately	1
1	400137908	Siphon Check Valve ordered with STP	1

3.2.1.4 Control Box Assemblies

NOTE: Control box assemblies for Franklin Electric controllers other than those shown in this section are available in the install guide for the specific Franklin Electric controller installed (see §6.1).

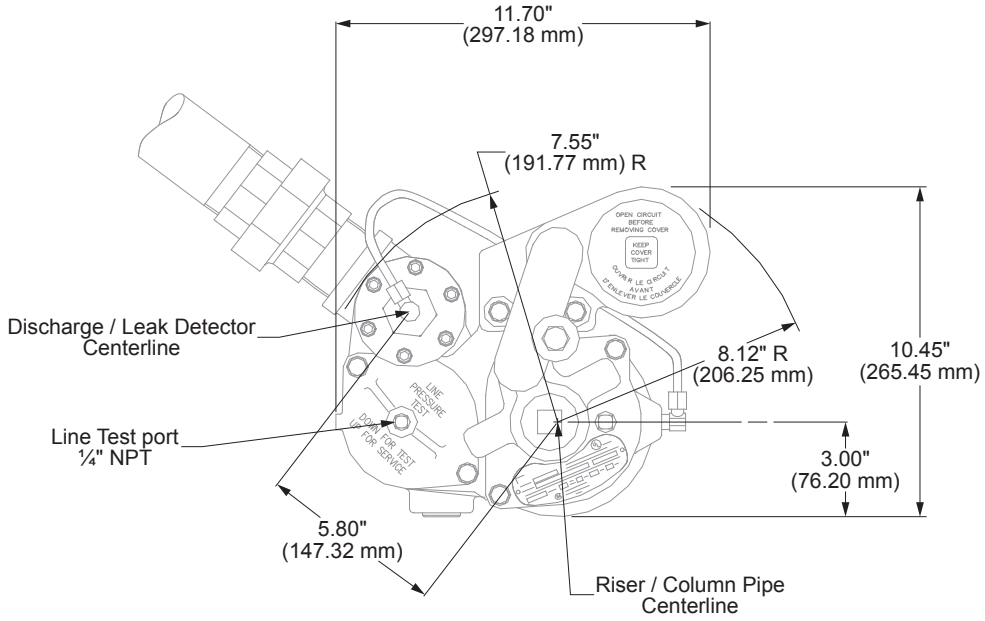
3.2.1.4.1 STP-CBS

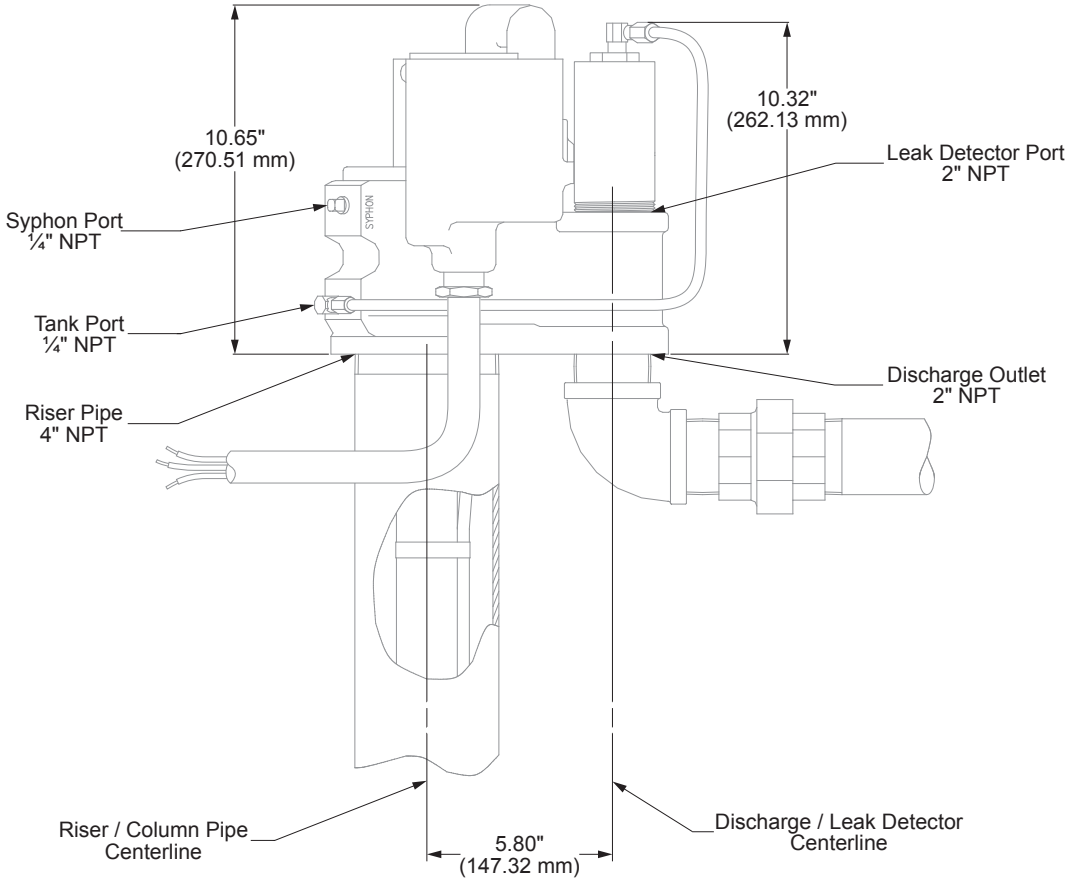
NOTE: Enclosure dimensions: 8.5"H x 5"W x 3"D (215 mm x 127 mm x 76 mm)



Item #	Part #	Description	Qty
1	400575001	Power Switch (for CBS and CBBS models)	1
2	400574001	Bracket, Power Switch	1
3	400158901	Light Assembly, 120V (CBS)	1
	400158902	Light Assembly, 240V (CBBS)	1
4	400215931	Relay, 30A, 120V	1
	400215933	Relay, 30A, 240V	1
5	400278005	Terminal Strip	1
6	402410001	Label, Terminal Strip (CBS)	1
	402410002	Label, Terminal Strip (CBBS)	1
7	400817901	Cover & Enclosure	1
8	400819001	Wiring Diagram (CBS)	1
	400819002	Wiring Diagram (CBBS)	1

3.2.2 Dimensions – Manifold Assembly





3.2.3 Specifications

3.2.3.1 STP / IST Models

Approximate STP / IST Specifications

Model	Description	Operating Pressure (PSI)	PMA Length (in)	S.F. Amps	Locked Rotor Amps	Winding Resistance		
						R-B	R-O	B-O
STP33*	208/230 V, 60 Hz, 1 ph	27	16	3.1	11	26.6–32.5	19.1–23.4	7.5–9.1
STP75*	208/230 V, 60 Hz, 1 ph	30	18.25	6.1	22	17.5–21.4	14.4–17.6	3.1–3.8
STP150*	208/230 V, 60 Hz, 1 ph	32	21	10.5	38	11.9 - 15.0	9.8 - 13.0	2.0–2.5
STPH150*	208/230 V, 60 Hz, 1 ph	45	21.75	10.5	38	11.9 - 15.0	9.8 - 13.0	2.0–2.5
STP200+	208/230 V, 60 Hz, 1 ph	36	23.75	11.4	46	4.6 - 6.1	3.0–4.1	1.6–2.0
STPH200+	208/230 V, 60 Hz, 1 ph	46	24.5	11.4	46	4.6 - 6.1	3.0–4.1	1.6–2.0
STP75B++	200/250 V, 50 Hz, 1 ph	37	20.5	5.6	21	23.9–29.2	20.2–24.6	3.8–4.6
STP150B++	200/250 V, 50 Hz, 1 ph	38	22.75	8.8	31	16.0–19.9	13.0–16.8	2.5–3.0
STPH150B++	200/250 V, 50 Hz, 1 ph	48	23.25	8.8	31	16.0–19.9	13.0–16.8	2.5–3.0
STP200B‡	200/250 V, 50 Hz, 1 ph	37	25.75	9.5	35	5.5 - 7.8	3.5–5.2	2.0–2.6
STPH200B‡	200/250 V, 50 Hz, 1 ph	44	26.25	9.5	35	5.5–7.8	3.5–5.2	2.0–2.6
STP75C	380/415 V, 50 Hz, 3 ph**	37	19.75	2.1	8	28.0–34.2	28.4–34.7	28.8–35.1
STP150C	380/415 V, 50 Hz, 3 ph**	38	21.75	3.0	14	14.0–17.4	14.0–17.6	14.0–17.8
STPH150C	380/415 V, 50 Hz, 3 ph**	48	22	3.0	14	14.0–17.4	14.0–17.6	14.0–17.8
STP200C	380/415 V, 50 Hz, 3 ph**	37	23.5	4.1	18	11.1 - 13.6	11.3 - 13.8	11.4 - 13.9
STPH200C	380/415 V, 50 Hz, 3 ph**	44	24	4.1	18	11.1–13.6	11.3–13.8	11.4–13.9
IST/STPVS2^	190 V, 70 Hz, 3 ph†	24-42	20	6.7	35	2.5–3.1	2.5–3.1	2.5–3.2
ISTVS4/STPVS4^^	190 V, 70 Hz, 3 ph†	24-42	25	14.4	74	1.0–1.3	1.0–1.3	1.0–1.3

Symbols

* Use a 15 µF, 370 V, 1-phase, 60 Hz capacitor.

\+ Use a 40 µF, 370 V, 1-phase, 60 Hz capacitor.

++ Use a 15 µF, 440 V, 1-phase, 50 Hz capacitor.

‡ Use a 40 µF, 440 V, 1-phase, 50 Hz capacitor.

† 190 V, 70 Hz, 3-phase power to variable speed units is output from IST-VFC, MagVFC™ or Variable Frequency Guardian Controllers (VFGC) only. VFCs are powered by 200–250 V, 50 or 60 Hz, 1-phase or 3-phase input.

^ Use with EcoVFC™, MagVFC™ or VFGC controller only, No Capacitor.

^^ Use with EcoVFC™, MagVFC™ or VFGC controller only, No Capacitor (3-phase input is required for full VS4 output).

** No Capacitor is used with 3-phase pump motor assemblies.

NOTE: The models listed in the table above may contain (ATXF) or (ATXF1) for ATEX certified pumps.

3.2.3.2 Specific Conditions of Use

Putting into service:

- Monitoring devices have to be adjusted to the required switching thresholds and checked for correct operation. *Before the equipment can be used in potentially explosive atmospheres it must have been checked with positive results.*
- The operating company shall ensure that the equipment cannot be operated without the specified monitoring devices. *The monitoring devices shall conform with IPL 1 ignition prevention level in accordance with DIN EN 13463-6.*

Operation:

- Connecting elements must be locked in a suitable manner.
- Values in excess of the monitoring thresholds must lead to disconnection of the submersible pump.
- For category-II 2 G applications, the submersible pump assembly shall be protected to prevent faults. This measure consists of monitoring the liquid exposure inside the pump.
- For category-II 1/2 G applications, the submersible pump assembly shall be protected to prevent rare faults. These measures consist of monitoring the liquid exposure inside the pump and the liquid cover above the suction opening of the pump.
- The monitoring devices shall be checked for proper operation at regular intervals.

3.2.3.3 Compatible Flammable & Combustible Liquids & Fuels

FE Petro® Submersible Turbine Pumps (STPs) are designed for use with motor fuels and are UL listed for blend concentrations of:

Standard Models	AG (Alcohol/Gasoline) Models
0% - 10% ethanol with gasoline	0% - 85% ethanol with gasoline
20% MTBE with 80% gasoline	20% MTBE with 80% gasoline
20% ETBE with 80% gasoline	20% ETBE with 80% gasoline
17% TAME with 83% gasoline	17% TAME with 83% gasoline
100% Diesel	0-20% BioDiesel Blend or 100% Biodiesel

NOTE:

- Diesel, fuel oil, avgas, jet fuel, or kerosene may also be used with FE Petro® PMAs. *The maximum liquid viscosity for a product is 70 S.S.U. at 60°F.*
- Using FE Petro® PMAs in liquids other than those mentioned above has not been tested. *The reaction of other liquids with seals and wetted surfaces of the pump is unknown. A hazardous situation may result from using other liquids with our pump.*

3.2.3.4 Wire Size / Run Table

IMPORTANT: All wiring must conform to guidelines in accordance with all federal, state, and local codes. *Failure to comply with all applicable guidelines could result in an unsafe installation.* Use the following table for maximum wire length to wire gauge ratios for submersible wiring:

Wire Size	Maximum Run
10 gauge	650 feet
12 gauge	400 feet
14 gauge	250 feet

3.2.4 Required Tools

- Standard ¾" drive ratchet wrench or breaker bar (no sockets required)
- Standard flat head screwdriver
- Wire cutter and stripper
- 5⁄32" Allen wrench for securing set screw in telescoping pipe coupling (VL units only)
- Pipe wrench (36" minimum) for tightening 4" Riser
- ¼" hex driver with socket and ratchet wrench, or ¼" Allen wrench for attaching the Pump Motor Assembly (PMA)
- Measuring tape (long enough to reach bottom of the tank from 30" to 70" above the tank)

3.3 Operational Overview

3.3.1 Manual Pressure Relief

The manual line pressure relief is in the center of the stationary manifold under a brass cap. The pressure must be relieved in the piping when performing maintenance or troubleshooting.

Remove the brass cap at the top of the stationary manifold, and turn the pressure relief screw counter-clockwise until the screw's retaining ring is reached (about 4 turns). This allows the pressure in the piping system to bleed back to the storage tank. Next, turn the screw clockwise to its original position to close the path. (Do not over tighten.) Replace the brass cap. Line side pressure is now relieved, and maintenance or troubleshooting can be performed.

3.3.1.1 Clamp Valve (Check Valve Clamp)

The clamp valve is directly above the check valve inside the stationary manifold of the submerged pump. It consists of a lead screw with a sealing disk attached. The head of the screw is accessible by removing the ¼" line test port pipe plug on the check valve cover of the STP/IST.

NOTE: The cavity under the ¼" pipe plug is at full pump pressure and product will be released through this opening. If the pump is equipped with a manual pressure relief, use it to relieve line pressure prior to removing the plug.

For normal operation, rotate the clamp valve counter-clockwise where a star washer locks it in place. Be sure to replace the ¼" pipe plug. During a line test, the clamp valve should be rotated fully clockwise, where the sealing disk secures against the check valve. This blocks the pressure relief valve in the check valve so it does not relieve line pressure back to the tank.

3.3.1.2 Tightening STP Manifold fittings

Franklin Electric recommends that NPT threaded STP pipe fittings should be assembled using a non-hardening, UL classified, gasoline resistant pipe sealing compound. Fittings should be installed hand tight and then tightened until wrench tight without exceeding 3 turns for fittings up to and including 2" and 2 turns for larger fittings. To ensure proper installation, the joint must be pressurized and checked that there is no leakage. This check is essential and must be the specification for making sure a joint is properly assembled.

3.3.2 Siphon Systems (Optional)

Siphoned tanks should be of the same diameter with tank bottoms located on the same horizontal plane. Using tanks of different diameter, or installing the bottoms of the tanks on different horizontal planes may create a potential site for fuel to leak into the environment and/or the containment sump due to overfill of the tank(s).

Some jurisdictions allow two or more tanks of the same product grade to be manifolded together with a siphon loop. These systems usually have a single submersible pump, and the siphoning action keeps the tanks level while pumping out of only one tank. All FE Petro® submersible pumps have siphoning capability built into the pump. Siphon check valves, however (if required). must be ordered separately. The outlet of the siphon check valve should be connected with a line to the highest spot in the siphon loop. At this point the pump creates a vacuum of 20–28" Hg.

When correctly installed, the siphon action between the tanks will continue whether the pump is running or not, as long as the product level in the tanks is higher than the bottom of the siphon loop vertical piping. The function of the STP/IST in the siphon system is merely to prime the siphon line, removing the air and allowing the siphon to take place.

NOTE:

- The siphon port on FE Petro® submersible pumps was designed to be connected to the siphon piping between tanks. Using the vacuum port (siphon port) for other purposes may create complications with the pump's ability to draw a vacuum because of excessive foreign materials being drawn into pump components.
- A fuel filter, between the siphon check valve and the siphon loop, may be useful to help eliminate debris from entering the siphon check valve. Debris can keep a siphon check valve from operating properly. Be sure to use a fuel filter, which is compatible with the application.

4 Installation



⚠ WARNING:

- Ensure power to the electrical circuit breakers is turned off, tagged, and locked-out at the power panel *before performing any installation or service work to this and any related equipment.*
- The Lockout switch is not a substitute for proper Lockout/Tagout of electrical circuit breakers while installing or servicing this equipment or related equipment.
- Follow all necessary safety steps as required by federal, state and local regulations in relation to working with electrical equipment.

⚠ CAUTION:

- All electrical connections shall be made with threaded rigid conduit, seal fittings, and conductor seals.
- Install field wiring, junction boxes, CableTight™ (or other code-approved conduit), and EYS seal fittings per the National Electrical Code (NEC) and all other codes governing the installation of these products.
- Ensure all conduits, conduit fittings, junction box fittings and hole plug threads are *sealed with pipe thread sealant (UL-classified petro-resistant) and produce a weather proof seal.*

IMPORTANT:

- Read, understand, and follow information in §2 and §3 *before beginning any process in this section.*
- Always use safe electrostatic discharge practices when connecting/removing power and any work associated with making electrical connections to the console and related connected components.

NOTE:

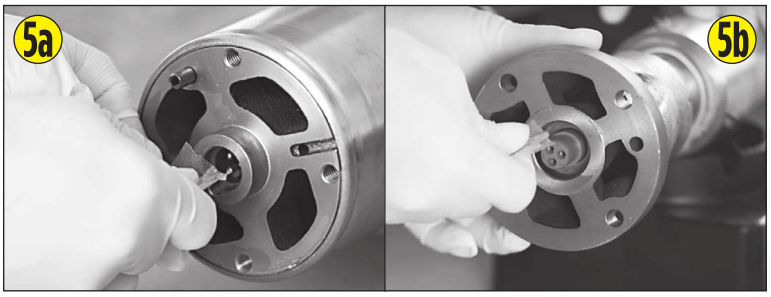
- If the STP/IST does not operate correctly or there are any questions concerning installation or service, contact Franklin Electric.
- When the installation is complete, ensure this guide is left with the site owner, operator or other responsible person of the facility where the installation is done.

4.1 Initial Steps – All Configurations

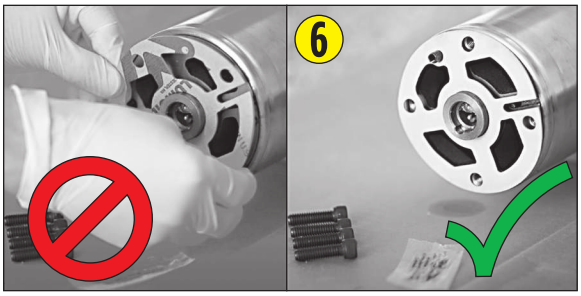
1. Fill out the Warranty Registration Card *and return it to Franklin Electric.*
2. Disconnect power to the submersible pump at the electrical supply box (if already installed).
3. Perform a facility/worksite approved Lockout/Tagout procedure for the circuit breakers to be connected to the STP/IST and related systems (de-energize).
4. Do one of the following:
   - If installing a **variable length pump**, *go to §4.2 through §4.5.*
   - If installing a **fixed length pump (non-variable) with PMA mounted**, *go to §4.5.*
   - If installing a **fixed length pump (non-variable) without a PMA mounted**, *go to §4.2.* ***and then*** *go to §4.5.*

4.2 Mounting the PMA – All Configurations

1. Lay packaged pump on a flat, open surface and remove the packaging.
2. Flatten pump packaging and lay the PMA near the end of the pump in preparation for mounting.
3. The PMA mounting hardware kit (p/n 152350902) is attached to the PMA packaging. It contains a gasket, a tube of grease, and four 5⁄16" cap screws with lock washers.
4. Remove the two packaging ends and the protective sleeve from the PMA.
5. Apply grease provided to the inside wall of the pump motor electrical connector (a), and the rubber of the lead assembly connector (b).

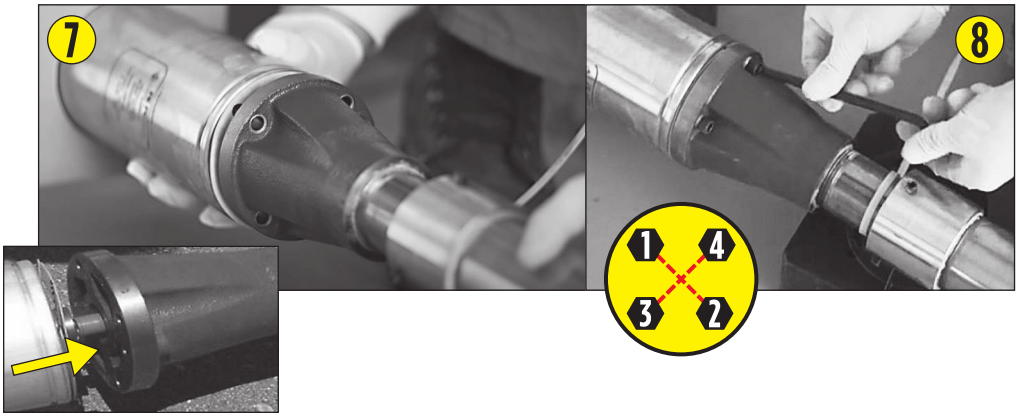


6. Place the gasket on the end of the PMA, aligning locating pin and bolt holes.



7. Mount the PMA onto discharge head by aligning locating pin on the PMA with the hole in the discharge head, *assuring that the lead assembly in the motor discharge head is seated in its notched position, and that the PMA gasket is properly in place.*

   ⚠ **WARNING**: The motor discharge head must not be rotated more than one full rotation in either direction. Rotation could cause damage to the electrical connections in the conduit, creating a risk of lethal electrical shock or equipment failure.



8. Tighten the PMA onto discharge head using the four cap screws and lock washers supplied. A cross bolt-tightening pattern is recommended for securing the PMA.

NOTE:

- Before assembling the PMA to the discharge casting, ensure the wire lead is properly set and aligned in the discharge casting. *Improper alignment may damage the wire lead or motor pins.* ***Failure to push the PMA up snug against the discharge casting before tightening cap screws, or failure to use a cross-pattern while tightening the bolts may break the discharge casting or strip the threads in the PMA.***
- IST units ***without*** a VS4 suffix and STP units ***with*** a VS2 suffix, *may only be electrically connected to FE Petro® branded Variable Frequency Controllers.*
- STP or IST units ***with*** a VS4 suffix, *may only be electrically connected to a FE Petro® Variable Frequency Controller, except IST-VFC.* Unlike FE Petro® standard pumps, *the following pumps cannot be interchanged with competitive models:*
  - The variable speed PMA VS2 (which is part of IST units ***without*** the VS4 suffix or the STP units ***suffixed with*** VS2)
  - The PMA VS4 (which is part of the IST and STP units ***with*** the VS4 suffix)

9. Apply a non-hardening, UL classified, gasoline-resistant pipe sealing compound to the riser pipe threads, if not already installed.

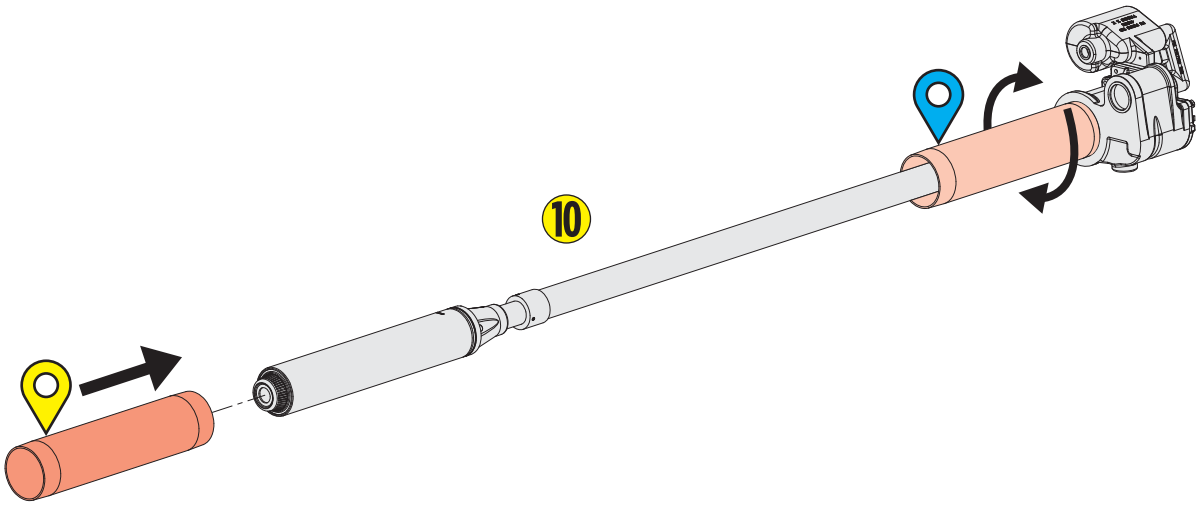
   IMPORTANT: Failure to use a proper thread sealing compound may result in a lack of seal where the riser threads into the tank opening, making it impossible to perform a tank-tightness test. This may also create a potential site for fuel to leak into the environment and/or the containment sump.

10. Slide riser over the PMA (📍) and tighten into manifold threads (📍). ***Maximum riser size*** *is found by taking the grade to tank mounting thread measurement and subtracting the manifold height and clearance (6" clearance recommended).*

    EXAMPLE

Grade to tank mounting threads (bury depth)	48"
Minus manifold height without leak detector (w/ leak detector height = 12.50")	-11"
Minus 6" for top clearance (2" minimum)	-6"
= Maximum riser size	31"

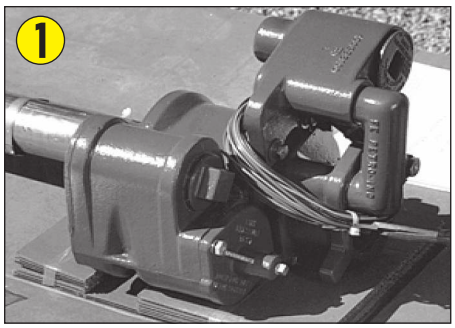
    NOTE: Riser material required for the pump is 4.5" outside diameter with a .188" wall. *Minimum riser length supplied by Franklin Electric is 7".*



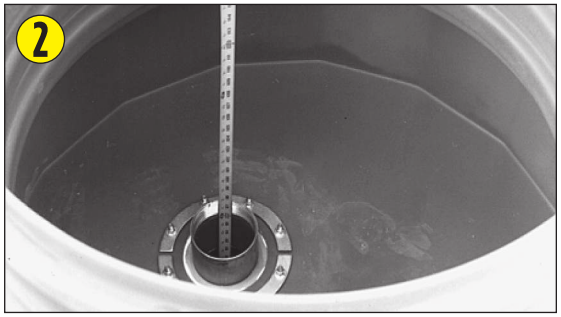
4.3 Length Setting – Variable Length Pump Only

IMPORTANT: Failure to cut wire ties prior to setting pump length could result in damage to electrical motor wires, presenting a risk of lethal electrical shock or equipment failure.

1. Cut the wire tie(s) securing the motor wire at the top of the pump; lay the wires out above the pump head so that wires can feed through conduit freely when setting length.



2. Measure from the bottom of the tank to the top of tank mounting threads. Subtract the distance for clearance between the PMA and the bottom of the tank (6" recommended). *This is the length to which the pump should be extracted,* ***measured from the bottom of the riser threads to the bottom of the motor end bell.***



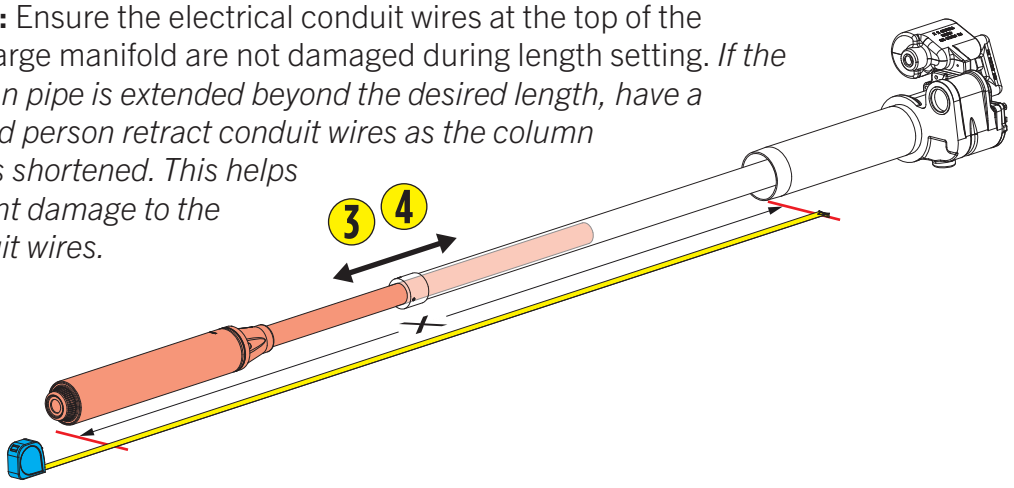
NOTE: 6" clearance provides a 5" clearance from the pump motor end bell to the bottom of the tank once the riser is screwed into tank mounting threads.

EXAMPLE

Tank + thread measurement	96"
Distance from bottom (5") + riser thread engagement (1")	-6"
= Length (bottom of riser to end bell)	90"

3. Hold the manifold securely to the surface to prevent damage while setting length.
   - To allow movement of the telescoping pipe, *verify that none of the pipe coupling setscrews are in contact with the pipe.*
   - Lay a tape measure out to accurately measure the distance from the bottom of the riser to the bottom of the pump motor end bell.
4. Grasp the pump just above the PMA *and* ***pull firmly,*** *extending to the length required.*

NOTE: Ensure the electrical conduit wires at the top of the discharge manifold are not damaged during length setting. *If the column pipe is extended beyond the desired length, have a second person retract conduit wires as the column pipe is shortened. This helps prevent damage to the conduit wires.*

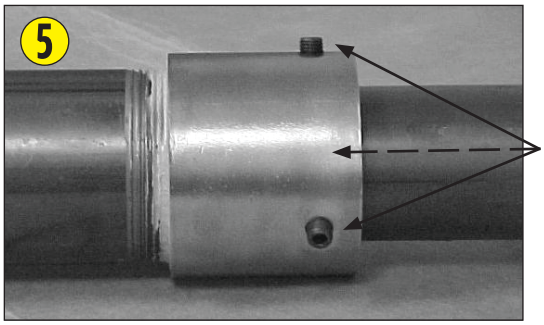


IMPORTANT: The motor discharge head must not be rotated more than one full rotation in either direction. *Rotating could cause damage to the electrical motor wires, presenting a risk of potentially lethal electrical shock or equipment failure.*

NOTE: O-ring seals inside the locking coupling may have sealed to the column pipe during shipping. Spin the motor discharge head slightly (not more than one full rotation) while pulling to loosen the O-ring seals.

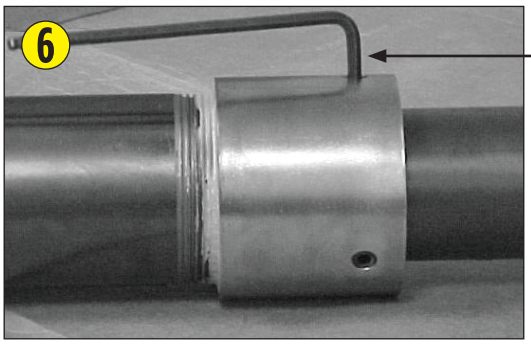
5. Once the length is correct, lock the STP length by tightening all three coupling setscrews. *Tighten the setscrews finger-tight, making sure they come into contact with the pipe.*

   NOTE: Loctite® 243 thread locker *must be used on all ATEX approved pumps.*



6. Tighten each setscrew an additional full turn minimum. T*he head of the setscrews should be flush or below flush with the outer surface of the coupling.*

   NOTE: Failure to properly tighten the coupling setscrews at this stage could present a risk of death, serious bodily injury and/or equipment damage due to movement of pipes during installation.

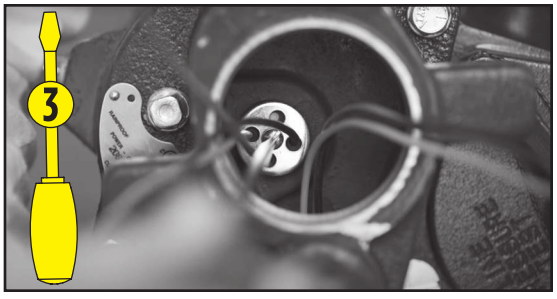


4.4 PMA Wiring – Variable Length Pump Only

1. Measure 6" of wire from the discharge manifold. *Cut off excess wire and discard.*
2. Place the three wires through the plug assembly (from hardware pack p/n 400301XXX).
3. Using the screwdriver slide the contractors plug into its seat in the discharge manifold. Tighten the screw(s) in the contractor plug to secure it in place.







4. Strip the wire insulation back approximately ⅜" on the three motor leads. Using the wire nuts or terminal blocks supplied (from hardware pack p/n 400301XXX), connect to the wires from the electrical connector ORANGE to ORANGE, BLACK to BLACK, and RED to RED.

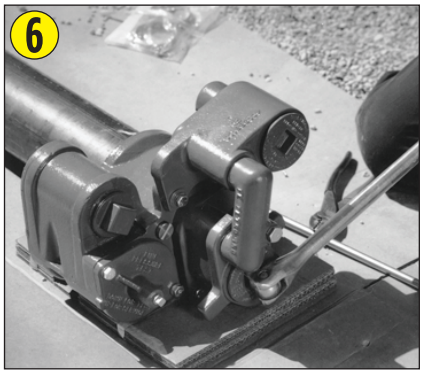


NOTE: Terminal blocks are provided for wire connections on ATEX approved pumps. For terminal blocks, strip 5 mm insulation from the end of the wires. Torques terminal screws to 0.4–0.45 Nm.

5. Coil the wires and push into the discharge manifold cavity using care to ensure wires are not damaged on discharge manifold threads.

   IMPORTANT: Damage to the electrical conduit wires creates a risk of lethal electrical shock and equipment failure. ***Do not use equipment if electrical wires have been damaged.*** *Contact Franklin Electric for assistance.*

6. Tighten the discharge head cover (from hardware pack p/n 400301XXX) in place using a ¾" ratchet or breaker bar.



4.5 Secure to Tank – All Configurations

NOTE: The bottom end-bell of the PMA is not designed to support the weight of the entire pump. *Resting or dropping the pump on this end-bell may damage the plastic end-bell and the plastic pump components inside.* ***This type of damage is not considered a manufacturing defect under the Franklin Electric warranty***

1. Measure the pump, from the bottom of the threaded riser to the bottom of the pump-motor, and compare this to the tank measurement, measured from the mounting flange to the inside of tank bottom.
   - The STP/IST and riser are sized to place the intake (at the bottom of the pump-motor) approximately 5" off the bottom of the tank.
   - If the difference between the bottom of the pump motor and the bottom of the tank is more than 6" or less than 4", *verify that this is the correct pump for this tank installation.* If it is not the correct pump and is outside the above specifications, contact Franklin Electric.
2. Apply a non-hardening, UL classified, gasoline-resistant pipe sealing compound to the riser pipe threads.

   IMPORTANT: In order to perform a tank-tightness test, make sure to use a thread sealing compound to help ensure a seal where the riser threads into the tank opening. *A lack of seal may also create a place for fuel to leak into the environment and/or the containment sump.*
3. Carefully lower the unit into the tank, and engage the threaded riser of the pump into the threaded flange on the tank. *Tighten the riser into the tank using a large*

pipe wrench until a water/air tight joint has been made. ***Do this by turning in the tightening (clock-wise) direction only.***

NOTE: Turning the pump in the loosening direction during the tightening process may scrape away the thread sealing compound, making it impossible to perform a tank-tightness test. *This may also create a potential site for fuel to leak into the environment and/or the containment sump.*

4. Connect the supply line piping to the discharge port in the discharge manifold assembly. *The discharge port is the 2" NPT vertical opening.*
5. Connect the electrical conduit coming from the power supply to the bottom entry of the junction box using approved fittings.

   NOTE: The fittings used to connect the electrical conduit to the junction box must be approved for use per NFPA 30, NFPA 30A, NFPA 70, IEC 60079-14, and/or GB/T3836.2. *Where required, the conduit and entry fitting shall be certified as explosion-proof or flameproof by the appropriate regulatory body and create a seal around the conduit and conductors entering the junction box.*
6. Remove the junction box cover (see §3.2.1.2 for reference), and remove the compression seal (contractors plug) by loosening the screw(s) *(do not remove screw(s)).* A four hole compression seal (contractors plug) is provided on all units.

   NOTE: On single phase units, there are two power wires, one ground wire and a blank (with celcon rod supplied to fill forth hole). For 3-phase units, there are three power wires and one ground wire.
7. Verify that the power is still OFF at the supply box.
8. Pull wires from the power supply into the junction box, and feed through the compression seal (contractors plug).
9. Replace the compression seal and tighten into place securely. *All wiring must be done in accordance with the National Electrical Code (NEC), European Norm (EN), International Electrotechnical Committee (IEC), or National Standard (GB) and any other local, state, or federal regulations required.*

   ⚠ **CAUTION**: The compression seal (contractors plug) is not intended to replace the vapor explosion seals required by the NEC. *All materials used between the power supply box and the pump junction box must be gasoline and oil resistant.* ***Failure to comply with all applicable codes, could result in an unsafe installation.***
10. Do one of the following, according to the type of unit:

    ⚠ **WARNING**: All wire connections must be contained inside the junction box.

    - Single Phase Units – Connect the ground wire to the lug in the junction box; using the wire nuts or terminal block supplied (from hardware pack p/n 400301XXX) connect the wires from the power supply to the ORANGE and BLACK wires in the junction box. *A capacitor is required and color-coding is not necessary.*
    - Three Phase Units (*except* IST *or* STP units *with* VS2 *or* VS4 suffix) – Connect the ground wire to the lug in the junction box. Connect any three wires from the pump to any three wires from the 3-phase power source using the wire nuts or terminal block supplied (from hardware pack p/n 400301XXX). Capacitors are not needed for 3-phase units. Install a pressure gauge in the line test port (see §3.2.1.2 for reference), turn on the

pump, and read the pressure gauge. Turn off the pump at the power supply, and change the connection of any two wires at the pump. Turn the pump back on and read the pressure gauge again. The electrical connection that gives the higher reading on the pressure gauge is the correct one.

- IST UNITS *or* STP units *with* a VS2 *or* VS4 suffix – Connect the ground wire coming from indoors to the ground lug in the junction box. Connect any three wires from the pump connector assembly to the three power wires coming from the Variable Frequency Controller (VFC). *Capacitors are not needed for these units.* ***Detailed installation instructions for the VFC should be referenced when connecting the VFC (supplied with the VFC.)***

NOTE: Terminal blocks are provided for wire connections on ATEX approved pumps. For terminal blocks, strip 5 mm insulation from the end of the wires. Torques terminal screws to 0.4–0.45 Nm.

⚠ **WARNING**: Not installing a ground wire increases the risk of lethal electric shock and equipment failure. *All holes of the compression seal (contractors plug) must be filled with wires or a celcon rod to enable it to seal.*

11. Replace the junction box cover and tighten securely.

    ⚠ **CAUTION**: The pump discharge manifold has two labeled ports: one for the siphon system and one for the tank. *A piston leak detector must be vented to the tank port (lower port) only.* ***Do not connect a piston leak detector to the siphon port because this will make the leak detector inoperative, resulting in an increased risk of contamination of the environment.***

12. Connect power to the submersible pump at the electrical supply box.
13. Test proper operation by dispensing product into calibration can.
14. Turn off the dispenser switch. *Feel the submersible pump to make sure that the pump has stopped running.*

    IMPORTANT: If the pump does not turn off when the dispenser switch is turned off, this may indicate an electrical problem in the dispenser or other wiring error or malfunction. *Call this to the immediate attention of a qualified electrician.*

15. Visually check for leaks on the manifold head during and after pump operation.
16. Install a pressure gauge in the line test port to ensure that the STP/IST is providing proper line pressure.
17. Turn on the STP/IST. *While running, the pressure should be above 24 psi (1.65 bar).* ***PMA size will affect psi.***
18. Turn off the STP/IST and verify that the line pressure is holding.
19. Remove the pressure gauge and replace the plug.
20. Turn on the STP/IST and visually inspect again for any leaks.

    ⚠ **CAUTION**: Product operators should be trained in explosion protection.

    ⚠ **WARNING**:

    - The product installation and use should meet the requirements of the GB3836.15-2024 standard.
    - The inspection and maintenance should meet the requirements of the GB3836.16-2024 standard
    - The product overhauls should meet the requirements of the GB/T3836.13-2021 standard.

5 Maintenance

The STP is designed for durability and extended service life when operated under recommended conditions. Actual service life will vary based on application and operating environment. Equipment may be subject to operation outside recommended limits, including but not limited to power quality, ambient temperature, environmental exposure, fuel type and cleanliness, or atmospheric conditions.

The STP utilizes a simplified mechanical design with a limited number of moving components, which may reduce routine maintenance requirements. Components subject to normal wear are serviceable and may be replaced as required, allowing continued use of the core STP assembly. *Internal fluid confining parts shall be replaced only with identical parts.*

Maintenance requirements, service intervals, and component life depend on operating conditions and application. Operation within recommended parameters and use of appropriate protective measures are advised to support long-term performance.

6 Appendix

6.1 Related Documents

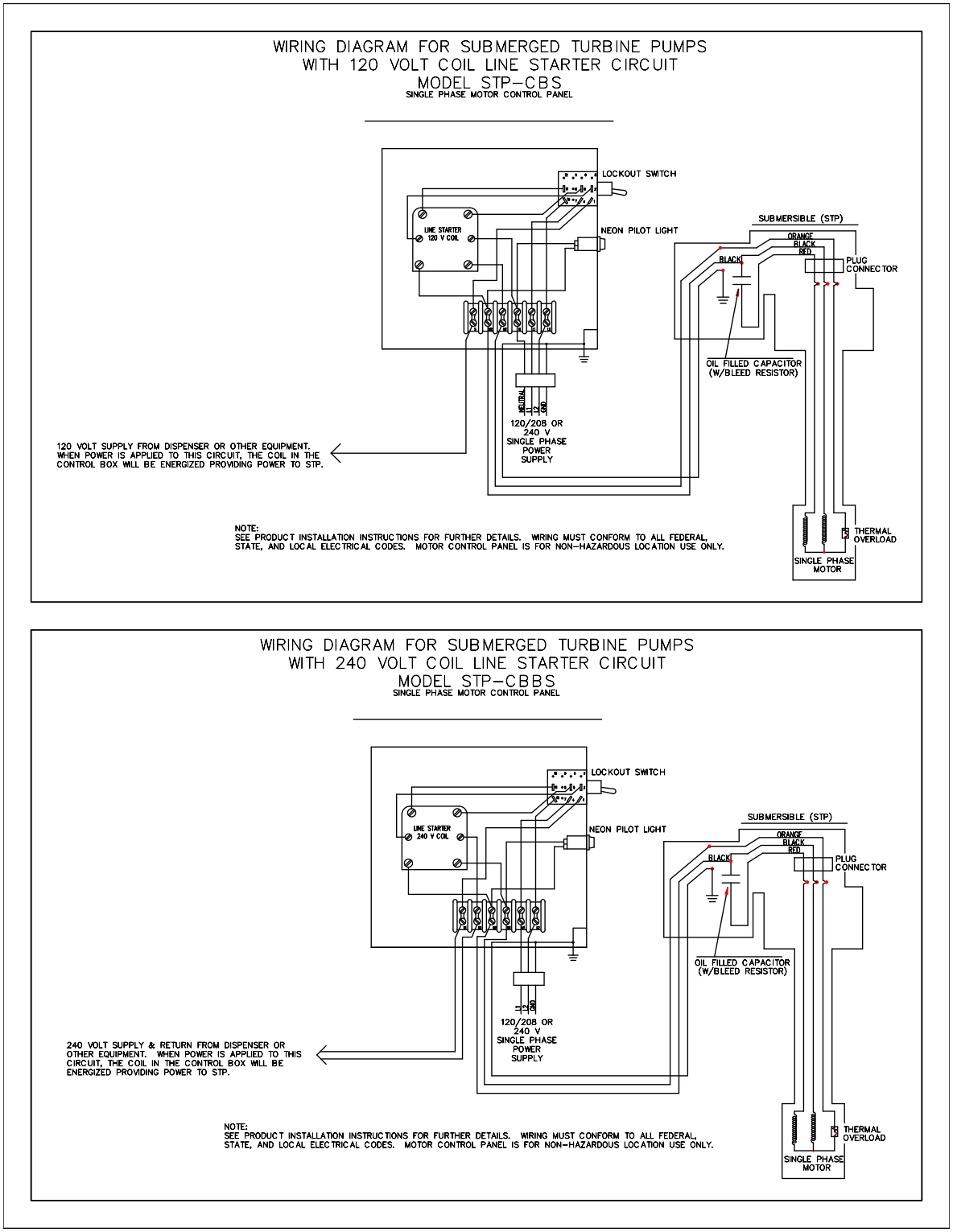
Documentation can be found online at www.franklinfueling.com.

Part Number	Description
000-1050	Tank Sentinel Installation Guide
000-1176	Two Inch Float Install Guide
000-0113	TSP-K4AS with TSP-UVPK Installation Instructions
000-0527	Density Measurement Option Installation Guide
000-1041	Direct Burial Cable Installation Instructions
000-1133	Direct Burial Splice Kit Installation Guide
000-2142	Fuel Management System Programming Guide
000-2150	Fuel Management System Installation Guide
000-2173	EVO™ 550 Programming
000-2170	EVO™ 550 Installation
000-2153	Colibri® Automatic tank Gauge Installation Guide
000-2155	Colibri® Set-Up and Operation Guide
228001101	MagVFC™ Install/Owner's Guide
228001102	EcoVFC™ Install/Owner's Guide
223632101	IST-VFC Install/Owner's Guide
223987102	TPGC-220 Install Guide
223987103	SPGC-220 Install Guide
223987104	TPGC-380 Install Guide
10000009501	VFGC-220 Install Guide

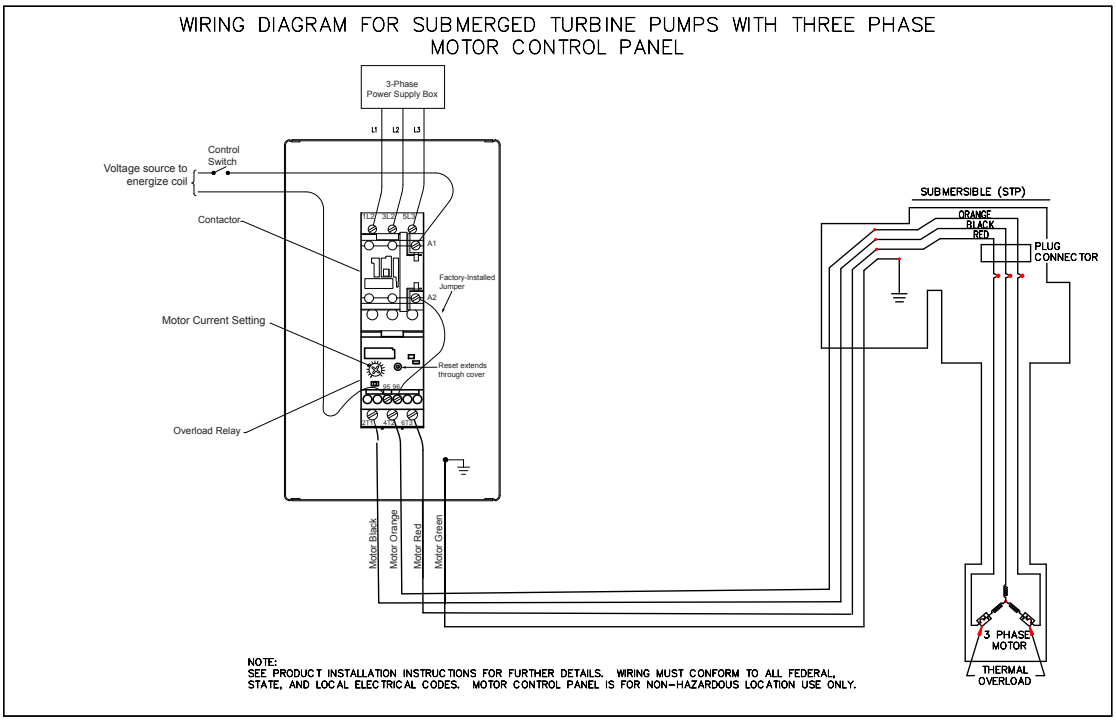
6.2 Wiring Diagrams

NOTE: Wiring diagrams for Franklin Electric controllers other than those shown in this section are available in the install guide for the specific Franklin Electric controller installed (see §6.1).

6.2.1 Diagram 1



6.2.2 Diagram 2



6.3 Notes



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