



**Franklin Electric**  
FUELING SYSTEMS

# DIESEL EXHAUST FLUID PUMPING ACCESSORIES

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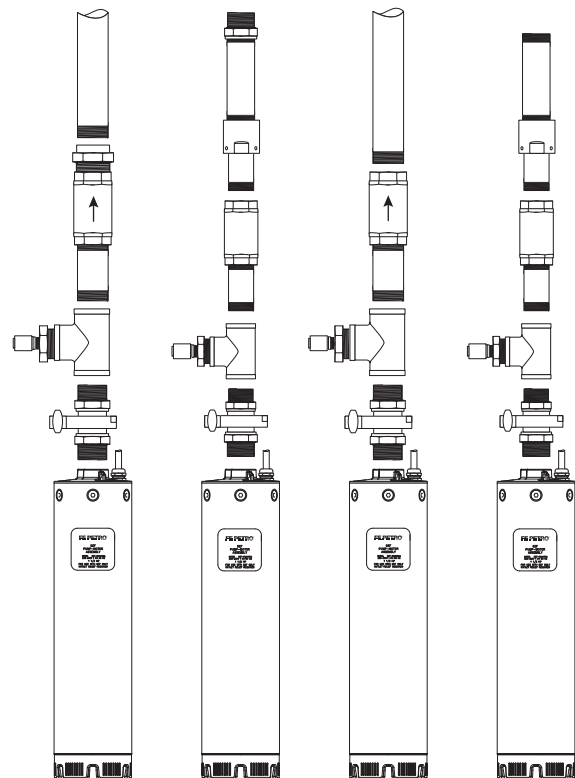
## INSTALL GUIDE

403414001 r4

DEF Pumping  
Accessories



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## **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

FE PETRO® diesel exhaust fluid (DEF) pumping accessories come with everything you need for pumping DEF/AdBlue®, and work with easy-to-order variable length complete packages (also available as individual kits for fixed length applications).

## 1.1 Documentation

- This document is intended for qualified and certified installation persons.
- Instructions of this document are in English. All other language versions are translations of this original document.
- Illustrations in this document show a typical setup and are for instruction and description purposes only.
- Information given in this document is given as a guide only. It is the installer's responsibility to ensure that correct and safe procedures are followed at all times.
- This document and related documents are available from Franklin Electric at [www.franklinfueling.com](http://www.franklinfueling.com).

### 1.1.1 Symbol Legend



Wear Protective Headwear



Wear Eye Protection



Wear Protective Clothing



Wear High-Visibility Clothing



Wear Protective Gloves



Wear Safety Footwear



Refer to instruction guide



Ventilate Before & During Entering



Ensure Continuous Ventilation



Connect an earth terminal to the ground



Lockout/Tagout Electrical Equipment



Disconnect main plug from electrical outlet



Disconnect before carrying out maintenance or repair



General Warning



Warning: Flammable Material



Warning: Electricity



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.
- 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 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.

## 2.3 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

# 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.

## 3.2 Technical Overview

Diesel Exhaust Fluid (DEF) is a non-flammable, non-combustible liquid with a specific gravity of 1.09 at 20° C (68° F) and is made according to ISO 22241-1 specifications. It is composed of 32.5% urea and distilled or deionized water. DEF is used in diesel vehicles that are equipped with Selective Catalytic Reduction (SCR) emission control. DEF freezes at –11° C (12° F) and can be impaired by prolonged storage above 25° C (77° F).

**NOTE:** There may be applications where the DEF is exposed to elevated temperatures that could impair DEF quality, such piping systems incorporating heat trace or piping systems that are in warm climates and/or direct sun exposure. To minimize the impact of these elevated temperatures on the DEF piping system and possible impairment of the DEF, an optional Thermal Relief Kit can be added inside the storage tank between the Non-Return Check Valve and the DEF-STP Column Pipe. For FE PETRO® Variable Length DEF-STP, use 1.5" NPT Thermal Relief Kit (p/n **403461911**). For FE PETRO® Fixed Length DEF-STP, use 2.0" NPT Thermal Relief Kit (p/n **403462911**). *The optional Thermal Relief Kit is not a substitute for the FE PETRO® DEF-STP required Bypass Relief Valve.*

DEF systems require compatible materials to prevent product contamination / degradation and unintended release. DEF Pumping Accessories are intended for use only with DEF and in conjunction with DEF Pump Motor Assemblies (PMA) models. DEF-PMA models are suitable for vertical installation where the pump motor is suspended off the bottom of the storage tank by the discharge piping.

DEF-PMA models are rated for continuous operation with motor cooling provided by product flow and protected from dry running. DEF-PMA models require a Bypass Relief Valve with a cracking pressure of 30–40 psi (2.1–2.8 bar) and capable of 4 gpm (15 lpm) minimum flow at the discharge outlet.

DEF-PMA models require a Non-Return Check Valve with a maximum cracking pressure of 3 psi (0.2 bar) between the product piping and the Bypass Relief Valve. Three-phase DEF-PMA models require overload protection in the motor starter, whereas single-phase DEF-PMA models have thermal overload protection built into the motor.

# 4 Installation



## NOTE:

- When the installation is complete, make sure this guide is left with the service station owner or operator. Make sure to provide it to anyone who services this equipment.
- Always reference the guide(s) that came with the equipment for the most current and complete list of installation and safety precautions.

## 4.1 Install Instructions

When installing DEF Pumping Accessories:

1. Disconnect power to the DEF Pump Assembly at the electrical supply box prior to any service. *Tag and lock out electrical circuit breakers so they are not turned on accidentally.*

**NOTE:** Wiring for single-phase units can include run/start capacitor. *Make sure the capacitor is safely discharged before disconnecting supply wiring.*

2. Apply only DEF compatible thread sealant to all pipe thread connections, and tightened to the following specifications:

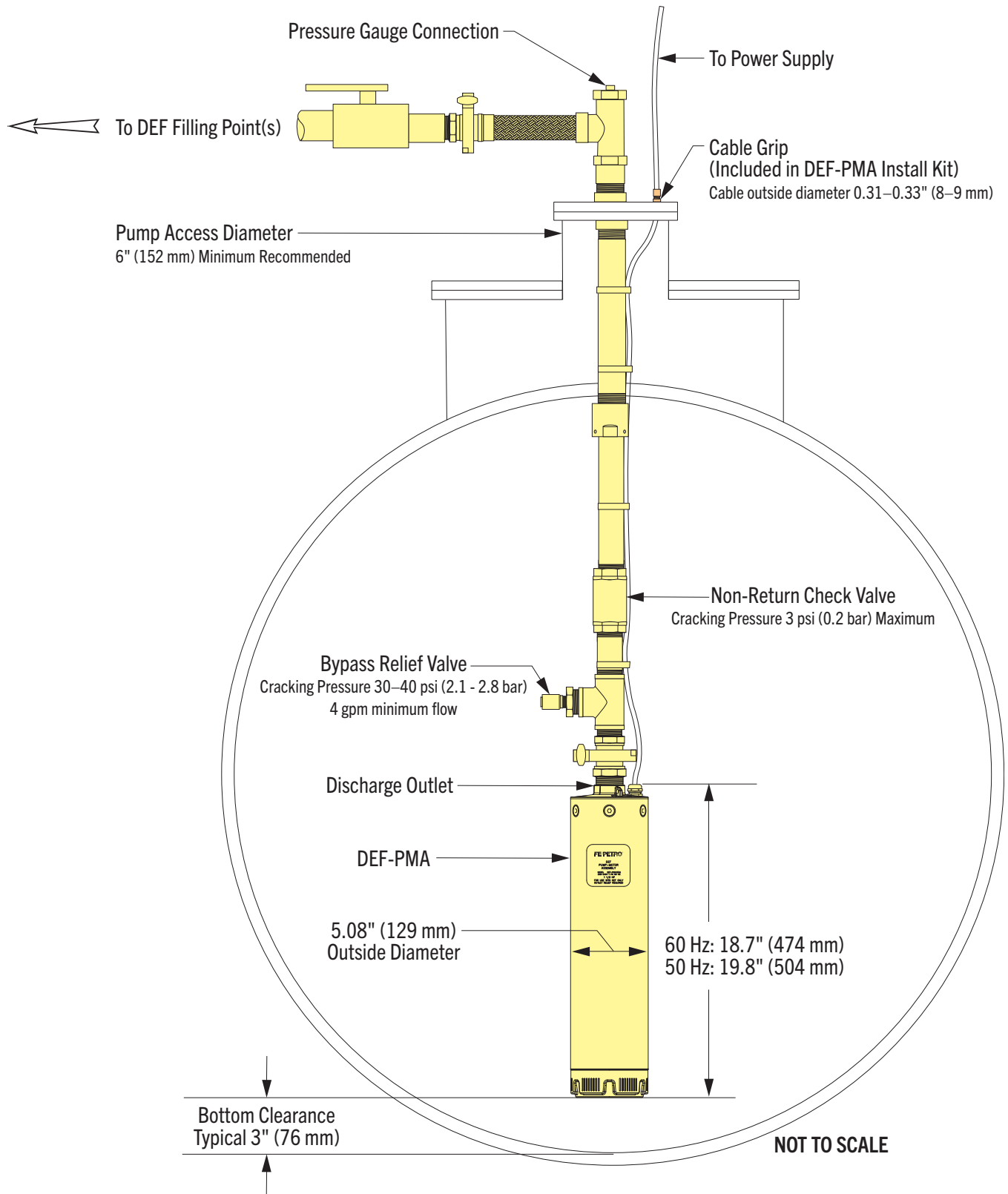
NPT Pipe Thread Size	Minimum Torque Required (ft-lbs)	Tightening Reference (turns past hand tight)
0.5"	30	1.5–3.0
1.5"	100	1.0–2.5
2.0"	150	1.0–2.5

**IMPORTANT:** Care should be taken when extracting and installing the DEF Pump Assembly to prevent component damage, including but not limited to the Power Cable of the DEF-PMA. *Never lift or suspend the DEF Pump Assembly by the DEF-PMA Power Cable.*

3. 0.5" Bypass Relief Valve must be installed with the outlet pointed away from DEF-PMA Power Cable. *Discharging the Bypass Relief Valve at the Power Cable could damage the jacket and the wiring inside.*
4. 1.5" or 2.0" Non-Return Check Valve must be installed with the flow direction arrow orientation from the DEF-PMA upward towards the top of the DEF Pump Assembly. *If the Non-Return Check Valve orientation is not correct, the DEF Pump Assembly will not produce any flow.*
5. Do not over-tighten product piping into 2" NPT Discharge Outlet of DEF-PMA or irreparable damage could occur.
6. Verify that the length of the DEF Pump Assembly will not touch the bottom of the tank. The DEF-PMA will typically be suspended about 3" (76 mm) off the bottom of the storage tank.
7. Do not start the DEF-PMA unless it has been completely submerged in fluid. *Running the DEF-PMA without product to properly cool the unit can cause irreparable damage.*

# 4.2 Install Reference Drawing

## Typical DEF-PMA Installation



# 5 Service Parts Information

## 5.1 60 Hz Variable-Length DEF-STP Replacement Kits

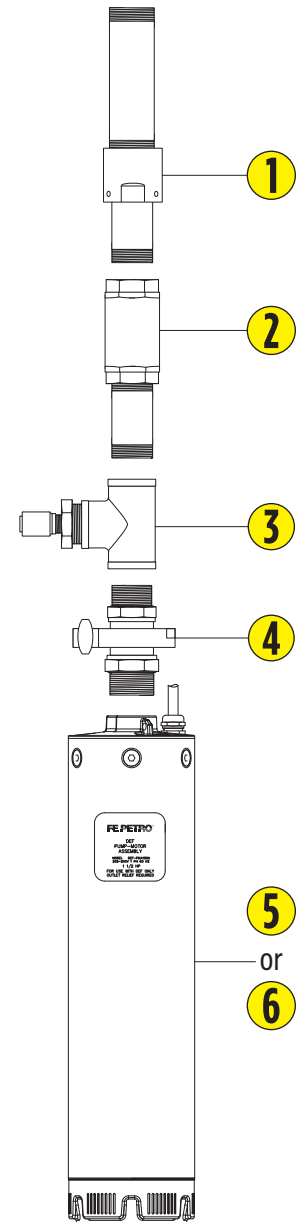
**NOTE:** Variable Length Column Pipe (item #1) reduces from 2.0" NPT at the top to 1.5" NPT at the bottom connection to the Check Valve Kit.

### Replacement Kits

Item	Model	Description
1	N/A	Variable-Length Column Pipe Assembly: Only available as part of complete DEF-STP Kits
2	403463901	Check Valve Kit: Includes 1.5" NPT non-return check valve and 1.5" NPT x 4.0" long nipple on inlet
3	403461901	Bypass Kit: Includes 0.5" NPT bypass relief valve, 0.5" NPT x 1.5" NPT bushing in 1.5" NPT tee
4	403454901	Pump Motor Assembly Connection Kit: Includes 2.0" NPT male inlet x 1.5" NPT male outlet EZ FIT connection
5	403383903	Single-Phase Pump Motor Assembly: <i>DEF-PMA150A</i>
6	403383933	Three-Phase Pump Motor Assembly: <i>DEF-PMA150D</i>

### Accessories and Service Parts

Model	Description
400170936	Capacitor: 25 uF/370 V (for use with <i>DEF-PMA150A</i> )
400818921	Single-Phase Pump Control: 208–240 V, 120 V coil
401220903	Three-Phase Pump Control: 208–240 V, overload protection, and 120 V coil
403408931	1.5" NPT Non-Return Check Valve: Part of item #2 (valve only)
403409931	0.5" NPT Bypass Relief Valve: Part of item #3 (valve only)
403468901	DEF-PMA Hardware Pack: Part of item #5 or #6 (includes cable grip, cable ties, and documentation)



# 5.2 50 Hz Variable-Length DEF-STP Replacement Kits

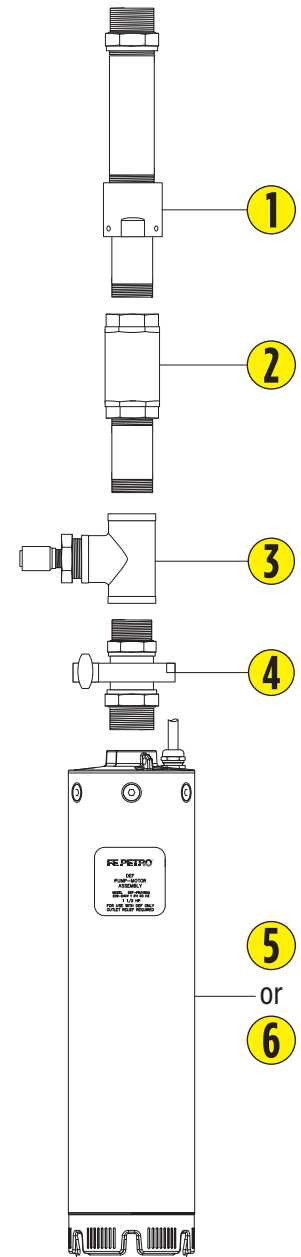
**NOTE:** Variable Length Column Pipe (item #1) reduces from 2.0" BSPT at the top to 1.5" NPT at the bottom connection to the Check Valve Kit.

### Replacement Kits

Item	Model	Description
1	N/A	Variable-Length Column Pipe Assembly: Only available as part of complete DEF-STP Kits
2	403463901	Check Valve Kit: Includes 1.5" NPT non-return check valve and 1.5" NPT x 4.0" long nipple on inlet
3	403461901	Bypass Kit: Includes 0.5" NPT bypass relief valve, 0.5" NPT x 1.5" NPT bushing in 1.5" NPT tee
4	403455901	Pump Motor Assembly Connection Kit: Includes 2.0" BSPT male inlet x 1.5" NPT male outlet EZ FIT connection
5	403383953	Single-Phase Pump Motor Assembly: <i>DEF-PMA150B</i>
6	403383963	Three-Phase Pump Motor Assembly: <i>DEF-PMA150C</i>

### Accessories and Service Parts

Model	Description
400170937	Capacitor: 30 uF/440 V (for use with <i>DEF-PMA150B</i> )
400818922	Single-Phase Pump Control: 200–250 V, 240 V coil
401220966	Three-Phase Pump Control: 380–415 V, overload protection, and 240 V coil
403459901	2.0" NPT female x 2.0" BSP male thread adapter: Part of item #1 (valve only)
403408931	1.5" NPT Non-Return Check Valve: Part of item #2 (valve only)
403409931	0.5" NPT Bypass Relief Valve: Part of item #3 (valve only)
403468901	DEF-PMA Hardware Pack: Part of item #5 or #6 (includes cable grip, cable ties, and documentation)



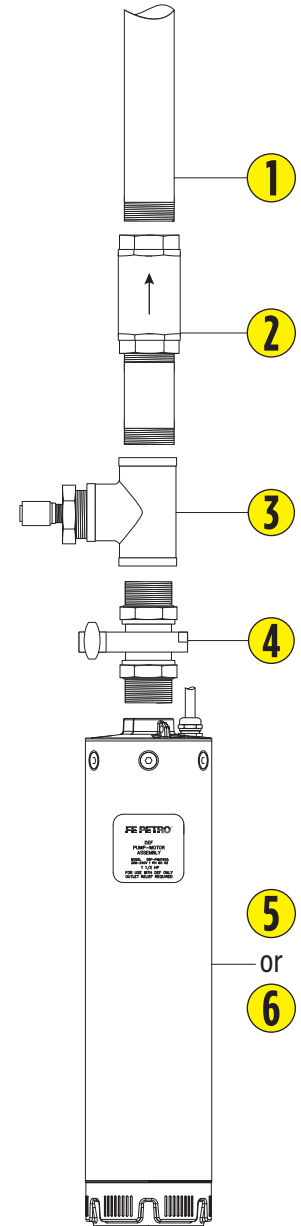
# 5.3 60 Hz Fixed-Length DEF-STP Kits

## Replacement Kits

Item	Model	Description
1	N/A	Fixed-Length Column Pipe: 2.0" (locally supplied)
2	403464901	Check Valve Kit: Includes 2.0" NPT non-return check valve and 2.0" NPT x 4.0" long nipple on inlet
3	403462901	Bypass Kit: Includes 0.5" NPT bypass relief valve, 0.5" NPT x 2.0" NPT bushing in 2.0" NPT tee
4	403456901	Pump Motor Assembly Connection Kit: Includes 2.0" NPT male inlet x 2.0" NPT male outlet EZ FIT connection
5	403383903	Single-Phase Pump Motor Assembly: <i>DEF-PMA150A</i>
6	403383933	Three-Phase Pump Motor Assembly: <i>DEF-PMA150D</i>

## Accessories and Service Parts

Model	Description
400170936	Capacitor: 25 uF/370 V (for use with DEF-PMA150A)
400818921	Single-Phase Pump Control: 208–240 V, 120 V coil
401220903	Three-Phase Pump Control: 208–240 V, overload protection, and 120 V coil
403408932	2.0" NPT Non-Return Check Valve: Part of item #2 (valve only)
403409931	0.5" NPT Bypass Relief Valve: Part of item #3 (valve only)
403468901	DEF-PMA Hardware Pack: Part of item #5 or #6 (includes cable grip, cable ties, and documentation)



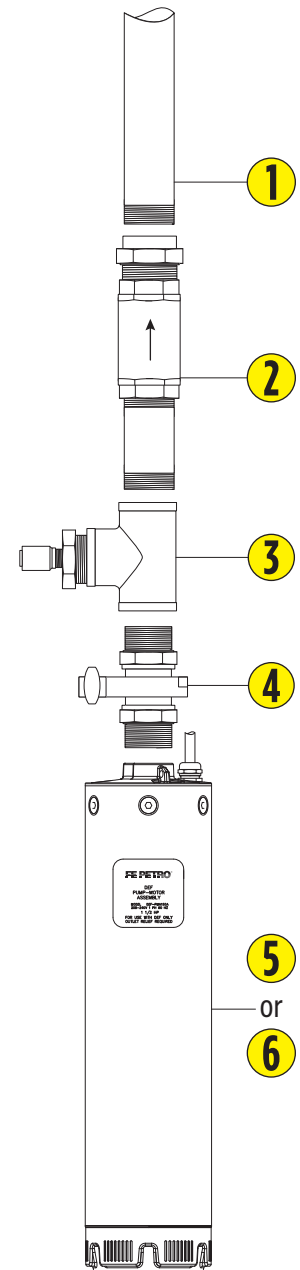
# 5.4 50 Hz Fixed-Length DEF-STP Kits

## Replacement Kits

Item	Model	Description
1	N/A	Fixed-Length Column Pipe: 2.0" (locally supplied)
2	403465901	Check Valve Kit: Includes 2.0" NPT non-return check valve and 2.0" NPT x 4.0" long nipple on inlet with 2.0" BSPT Adapter
3	403462901	Bypass Kit: Includes 0.5" NPT bypass relief valve, 0.5" NPT x 2.0" NPT bushing in 2.0" NPT tee
4	403457901	Pump Motor Assembly Connection Kit: Includes 2.0" BSPT male inlet x 2.0" NPT male outlet EZ FIT connection
5	403383953	Single-Phase Pump Motor Assembly: <i>DEF-PMA150B</i>
6	403383963	Three-Phase Pump Motor Assembly: <i>DEF-PMA150C</i>

## Accessories and Service Parts

Model	Description
400170937	Capacitor: 30 uF/440 V (for use with <i>DEF-PMA150B</i> )
400818922	Single-Phase Pump Control: 200–250 V, 240 V coil
401220966	Three-Phase Pump Control: 380–415 V, overload protection, and 240 V coil
403408932	2.0" NPT Non-Return Check Valve: Part of item #2 (valve only)
403409931	0.5" NPT Bypass Relief Valve: Part of item #3 (valve only)
403468901	DEF-PMA Hardware Pack: Part of item #5 or #6 (includes cable grip, cable ties, and documentation)



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