



Franklin Electric
FUELING SYSTEMS

VARIABLE SPEED SUBMERSIBLE TURBINE PUMPS

Introduced in 1995, FE Petro™ brand variable speed submersible turbine pumps (STPs) were the first of their kind for the petroleum equipment industry. With faster fill times during peak hours and power savings during non-peak hours, FE Petro™ brand variable speed STPs allow you to maximize profits while minimizing operating expense. These benefits are something only FE Petro™ brand variable speed STPs, the industry's highest performing 4" diameter STPs, can provide.

HIGHLIGHTS

Higher Flow Rates

Variable speed systems ramp up the system's horsepower as needed to provide optimal flow rates at fueling points. This results in faster and more consistent flow rates at peak business times compared to fixed speed systems. Benefits include:

- Faster and more reliable flow rates than fixed speed systems resulting in higher throughput at virtually the same total cost of ownership.
- Soft-starting and constant flow provide consistent user experience without high pressure issues

Meet Your Flow Rate Needs

The STP can be adjusted at installation to perform at a maximum per-nozzle flow rate of 10 gpm (38 lpm) based on the specifications of your piping and dispensing system.

- Depending on peak business requirements, choose from either 2 Hp or 4 Hp variable speed models to meet your desired flow rates.
- 2 Hp pumps provide constant 10 gpm (38 lpm) for up to eight fueling positions operating simultaneously.
- 4 Hp pumps provide constant 10 gpm (38 lpm) for up to 12 fueling positions operating simultaneously.



Minimize Hydraulic Hammer

Hydraulic hammer is defined as a sudden pressure spike that is the result of a sudden stoppage in flow in a pressurized piping system. Hydraulic hammer can be exaggerated in a system that utilizes a high pressure fixed speed STP.

- A fixed speed pumping system is incapable of changing the flow rate dependent upon demand and as a result, hydraulic hammer is likely to result when flow is interrupted.
- Hydraulic hammer may result in system fatigue and intensified wear to system components such as diaphragm valves in multiproduct dispensers, leak detectors or hanging hardware.
- A variable speed STP will ramp up and down to provide only the pressure required to meet demand significantly minimizing the effects of hydraulic hammer.

Efficient Energy Consumption

Because a variable speed system is constantly providing only the necessary horsepower to achieve desired flow rates, the system only consumes as much energy as is needed. Benefits include:

- Energy savings during non-peak business hours and increased flow during peak hours.
- Potential for reduced energy costs without sacrificing a faster customer refueling experience.

HIGHLIGHTS CONTINUED

MagVFC™ or EcoVFC™ Variable Frequency Controller

Variable speed pumps are controlled by the MagVFC™ or EcoVFC™ variable frequency controller which provides control for both 2 Hp and 4 Hp variable speed STPs.

Features include:

- Faster fill times during peak hours and power savings during non-peak hours.
- Control is determined through the PMA power consumption, eliminating the need for a transducer or special wiring.
- Setup selections include 2 Hp or 4 Hp, MLD or PLLD, gas or diesel, and Primary-Secondary, alternating circuit manifolded pump control options.
- Capable of networking with EVO™ Series consoles and other Franklin Electric intelligent pump controllers via Turbine Pump Interface (TPI) for enhanced pump control capabilities.

Diagnostic Fault Detection

The MagVFC™ or EcoVFC™ variable frequency controller features a dual 7-segment display that displays running status and fault codes. A fault history on the controller also provides an enhanced troubleshooting process with faults like:

Fault Detection Display Codes

UL	UL = Underload: Dry run or blocked PMA intake
LI	LI = Low Incoming: Input power under voltage
Lr	Lr = Locked Rotor: Overloaded while PMA is running
LU	LU = Locked Up: Overload at PMA startup
SC	SC = Short Circuit: Short typically from controller to PMA
SU	SU = Shorted Upper: Short typically in controller
OC	OC = Open Circuit: Broken connection to PMA
Er	Er = Extended Run: No power change for 60 minutes
HO	HO = Hot Operation: Excessive controller temp / fan protection



SPECIFICATIONS

- Variable speed models are available in variable lengths only.
- Check valve: 70 mm diameter fluorocarbon seal constructed with cast aluminum body and steel backing washer.
- Pressure relief valve: available in four pressure relief settings, integral to check valve. Standard model relieves at 2.76 bar and resets above 2.41 bar.
- Syphon: venturi-type syphon primer supplied with every submersible. Syphon check valve and secondary syphon sold separately.
- Air eliminator: every submersible includes a tank return path with one-way check valve to provide active air elimination.
- Electrical disconnect: electrical yoke for positive contractor disconnect during service.

Pump Motor

- 2 Hp or 4 Hp, variable speed, two-stage centrifugal type pump motor with integral, automatic, thermal overload protection.
- Max. pressure: selectable operating pressure on MagVFC™ or EcoVFC™ between 1.65 bar and 2.9 bar deadhead.
- Available with MagShell™ which results in 45% increased flow area around motor.

Approvals

- Consult factory for applicable approvals.

Quality Certification

- Franklin Electric is an ISO 9001 Certified Manufacturer.

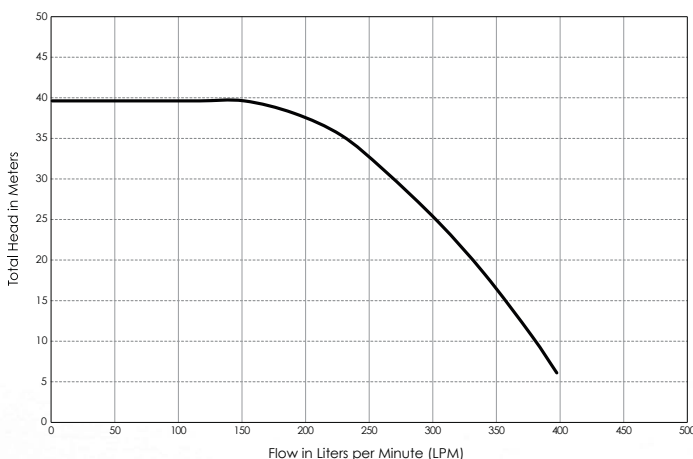
Power Requirements

- Variable speed pumps can only be controlled by a MagVFC™ or an EcoVFC™ controller:
 - VS2 models can operate with single-phase incoming power supply to the MagVFC™.
 - VS2 and VS4 models can operate with three-phase incoming power supply to the EcoVFC™.
 - Incoming power supply is 200-250 VAC, 50 Hz for the MagVFC™ and 360-440 VAC, 50 Hz for the EcoVFC™.
 - MagVFC™ and EcoVFC™ output a three-phase, variable frequency signal, valid for FE Petro™ variable speed pumps only.
 - VS2 max. motor draw: 9 Amps.
 - VS4 max. motor draw: 15 Amps
 - MagVFC™ or EcoVFC™ max. line draw: 20 Amps.

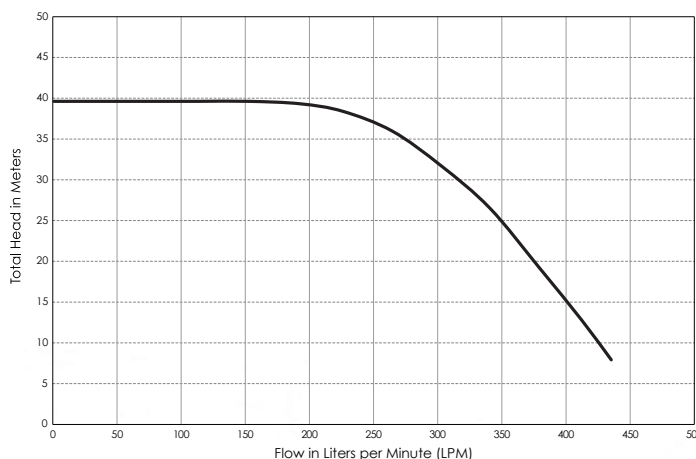
Liquid Compatibility

- Max. liquid viscosity: 70 SSU at 60° F (15° C).
- STP variable speed models are listed for fuel mixtures containing up to 10% ethanol, and 20% MTBE, 20% ETBE or 17% TAME with gasoline.
- IST variable speed models are listed for fuel mixtures containing diesel fuel with up to 20% biodiesel, 100% biodiesel, up to 85% ethanol with gasoline, and 20% MTBE, 20% ETBE or 17% TAME with gasoline.
- All variable speed (non-AG) models can also be used with diesel fuels, fuel oils, kerosene, Avgas and jet fuels in a non-gelled pourable state.
- All wetted elastomers are made of a high grade, fluorocarbon compound.

2 Hp Variable Speed Turbine Performance Chart



4 Hp Variable Speed Turbine Performance Chart with EcoVFC™



ORDERING INFORMATION

A typical turbine model designation has up to five components to define the pump being supplied as follows:

XXX YYYYY Z - A - B

XXX = Basic Model Designation

- STP = These standard variable speed and variable length models are capable of up to 10% ethanol with gasoline
- IST** = These variable speed and variable length models include alcohol-gasoline compatibility (up to 85% ethanol, up to 20% biodiesel, or 100% biodiesel).

YYYYY = Factory Installed Options

- Model designations may include one or more of the following characters in alphabetical order:
- F = Floating suction adapter (1½" NPT female adapter)
 - K = Intake filter screen (IFS, factory installed to PMA)
 - M = MagShell™ (flow enhancing, expanded PMA shell)
 - R* = Model R check valve (1.65 bar relief/1.52 bar reset for PLLD)

Z = Pump Motor Horsepower Rating

- VS2** = 2 Hp variable speed
- VS4 = 4 Hp variable speed

A = Model Length (see table)

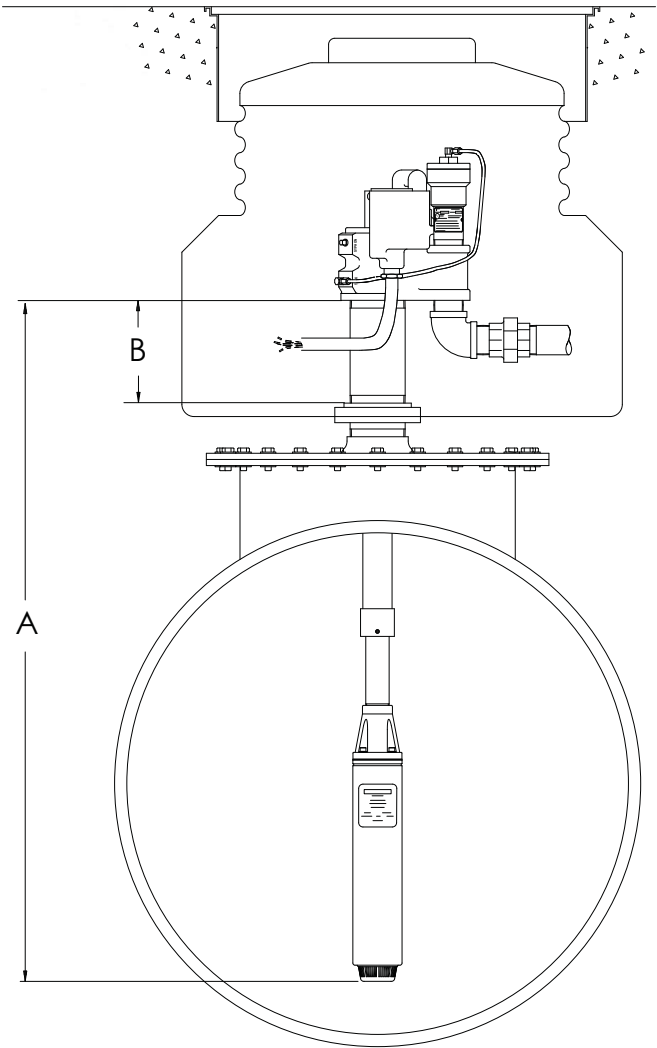
- VL1 = STP variable length range #1
- VL2 = STP variable length range #2
- VL3 = STP variable length range #3

B = Riser Pipe Length (see diagram)

Riser pipe length is expressed as two numeric characters that indicate the total length of the riser in inches. Riser pipes are available from from 178 mm to 1524 mm in 25.4 mm increments (additional charge for risers 787 mm or longer).

Notes:

- *If not otherwise specified, all models are supplied with standard model check valve (2.76 bar relief/2.41 bar reset for MLD, TS-LS300, and TS-LS500).
- **If not otherwise specified, 2 Hp variable speed pump motor horsepower rating is implied for IST models.



Model Length (A)

STP Horsepower	Model Length Range	Model Length Designation
2 Hp	1486 mm - 2228 mm	VL1
	2274 mm - 3835 mm	VL2
	3087 mm - 5429 mm	VL3
4 Hp	1613 mm - 2355 mm	VL1
	2401 mm - 3962 mm	VL2
	3214 mm - 5556 mm	VL3

ORDERING INFORMATION CONTINUED

Variable Speed Submersible Turbine Pumps

Variable speed, variable length.

Model	Description	Model Length Range Number	Model Length Range*
STPVS2-VL1	2 hp variable speed	VL1	1486 mm - 2228 mm
STPVS2-VL2	2 hp variable speed	VL2	2274 mm - 3835 mm
STPVS2-VL3	2 hp variable speed	VL3	3087 mm - 5429 mm
STPVS4-VL1	4 hp variable speed	VL1	1613 mm - 2355 mm
STPVS4-VL2	4 hp variable speed	VL2	2401 mm - 3962 mm
STPVS4-VL3	4 hp variable speed	VL3	3214 mm - 5556 mm

Variable Speed Intelligent Submersible Turbine Pumps

Variable speed, variable length, and AG compatible.

Model	Description	Model Length Range Number	Model Length Range*
IST-1	2 hp variable speed	VL1	1486 mm - 2228 mm
IST-2	2 hp variable speed	VL2	2274 mm - 3835 mm
IST-3	2 hp variable speed	VL3	3087 mm - 5429 mm
ISTVS4-VL1	4 hp variable speed	VL1	1613 mm - 2355 mm
ISTVS4-VL2	4 hp variable speed	VL2	2401 mm - 3962 mm
ISTVS4-VL3	4 hp variable speed	VL3	3214 mm - 5556 mm

Notes:

1. All STP models are listed for compatibility with fuel mixtures containing up to 10% ethanol with gasoline, diesel fuels, and 20% MTBE, 20% ETBE or 17% TAME with gasoline.
2. All IST models are compatible with fuel mixtures containing diesel fuel with up to 20% biodiesel, 100% biodiesel, up to 85% ethanol with gasoline, and 20% MTBE, 20% ETBE or 17% TAME with gasoline.
3. All models are supplied with a standard check valve unless factory option "R" is specified.
4. 4 Hp models require EcoVFC™ with three-phase incoming power supply, 2 Hp models can be operated with MagVFC™ or EcoVFC™.
5. 4" riser pipe, if supplied locally, must be 4½" OD by 3/16" WT tubing.
6. For riser pipe length 787 mm to 1524 mm, additional charge applies.

*Model length (A) defined as the dimension from turbine manifold bottom to pump motor inlet.

ORDERING INFORMATION CONTINUED

Factory Installed Approvals

Specify one in model number at time of STP order.

Model	Description
(ATXF)	Submersible turbine pumps with ATEX flameproof approval for EN markets
(RT)	Submersible turbine pumps with ROSTEST approval for Eastern European markets

Note: If not otherwise specified, all models are supplied to UL approval as standard. Consult Factory for other local approvals.

Factory Installed Options

Specify one in model number at time of STP order.

Model	Description
F	Floating suction adapter, 1½" NPT female, must be factory installed
K	IFS (intake filter screen) factory assembled to pump motor assembly
M	MagShell™ (flow enhancing expanded PMA shell)
R	Model R check valve, factory installed, for Veeder-Root™ PLLD Line Leak

Field Installed Options

Intelligent submersible turbine pump specific accessories.

Model	Description
5874202800	MagVFC™, 200-250 VAC, 50-60 Hz, one required per STP or IST
5874202900	EcoVFC™, 360-440 VAC, 50-60 Hz, one required per STP or IST
400137937	Syphon check valve, alcohol-gasoline compatible
402459931	Model 65 psi (4.5bar) relief check valve (for secondary of manifolded STPs or ISTs with Veeder-Root™ PLLD)
402507930	Secondary syphon kit (when two syphon primes are required for one STP or IST)
5800300200	STP-DHIB dispenser hook isolation for 240 volt dispenser handle switches, up to eight each

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