Operating Instructions
ProMinent® ProMix SMS
Chemical Mixing Systems

Please completely read through these operating instructions first! Do not discard! The warranty may be voided due to damage caused by operating errors!

Ver.01_23_2020

ProMinent Fluid Controls, Inc. (USA), 136 Industry Drive, Pittsburgh, PA 15275

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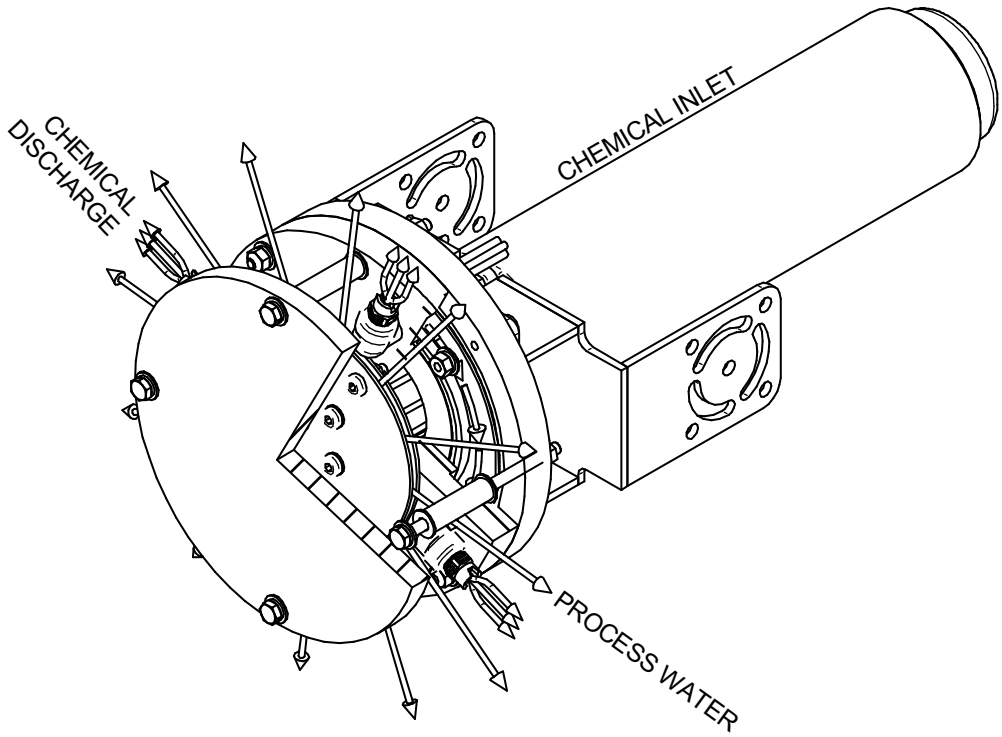
General Description

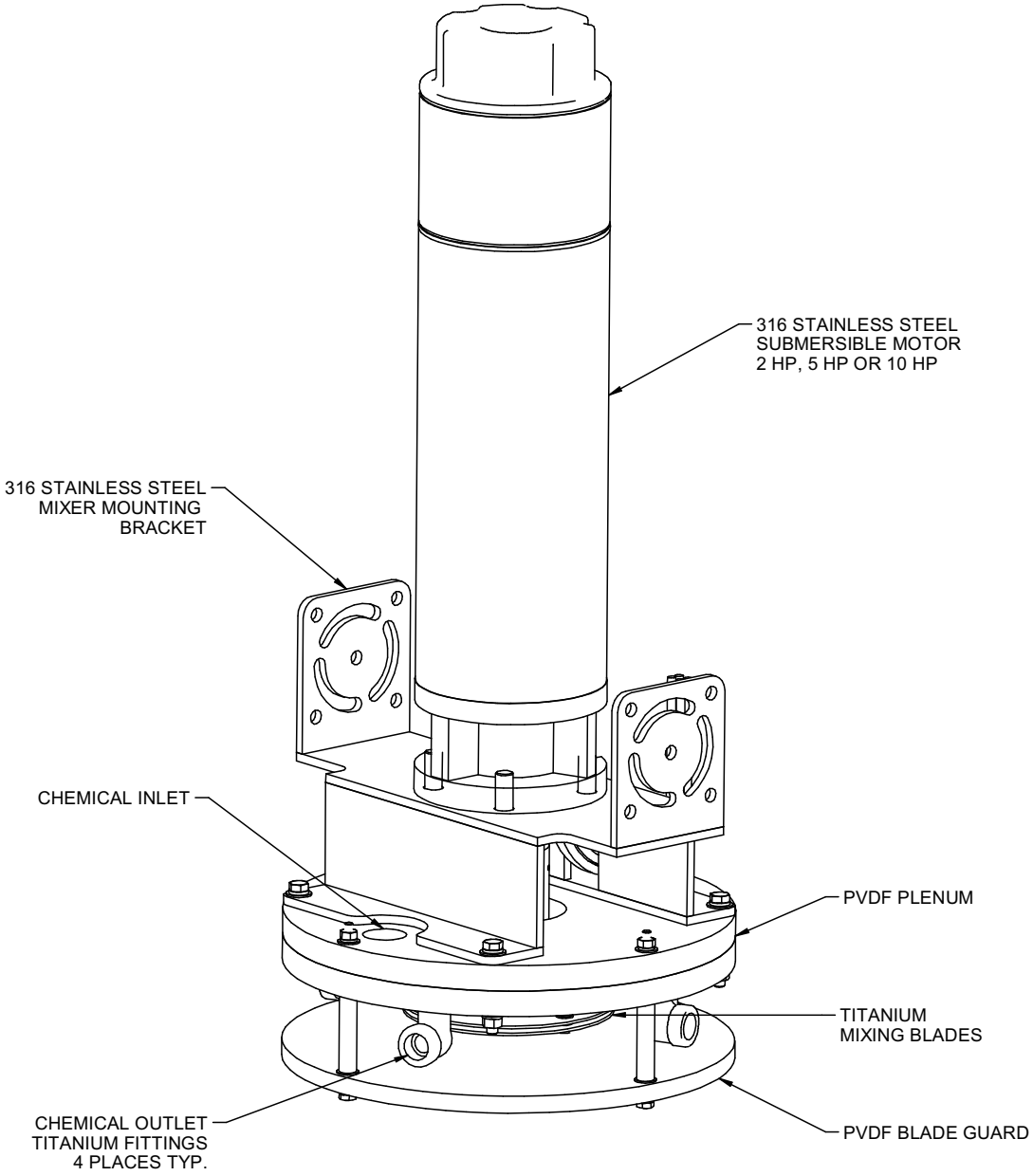
The ProMix SMS is a submersible mixer designed to disperse liquid chemical into a process stream. The chemical is metered to the mixer at the desired rate, and the ProMix SMS will effectively disperse it across the process stream.

Figure 1



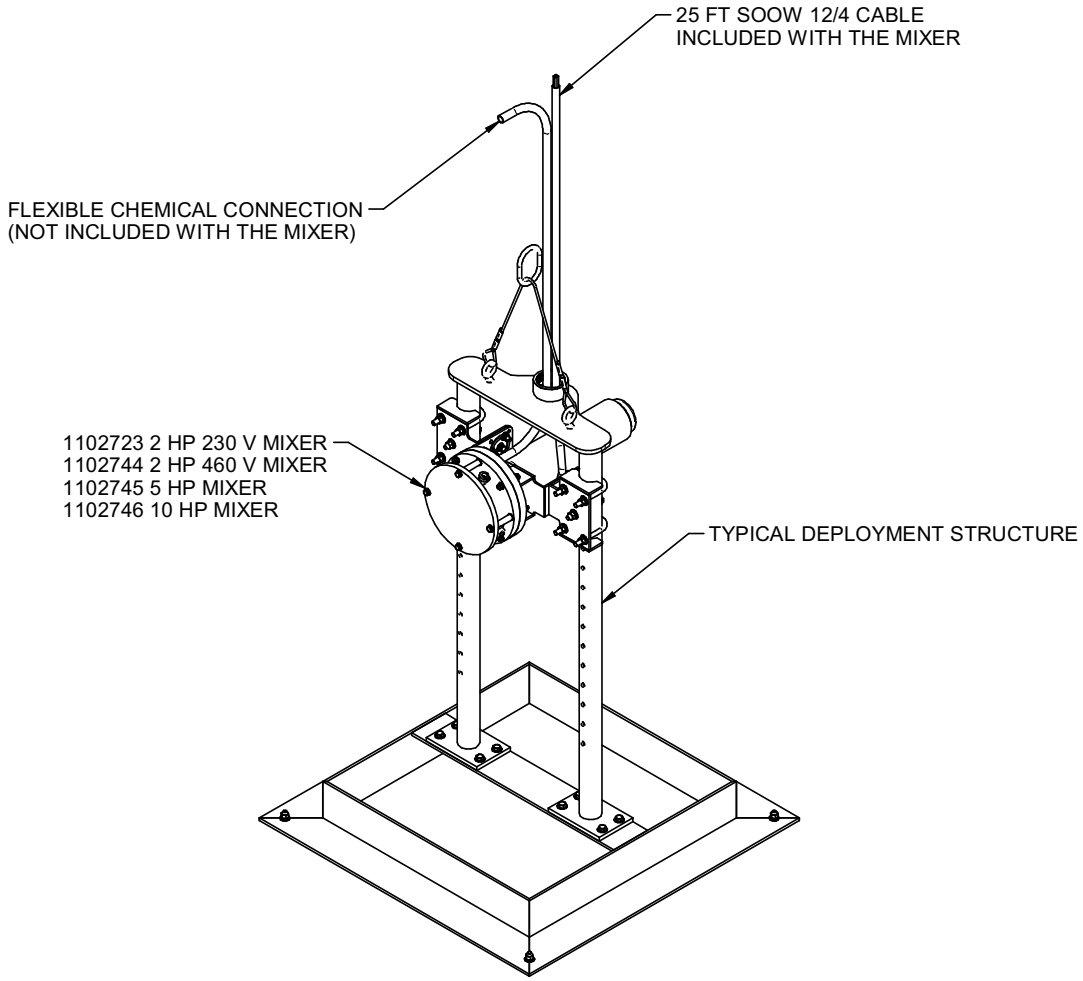
System Components

Figure 2



Layout Drawing

Figure 3



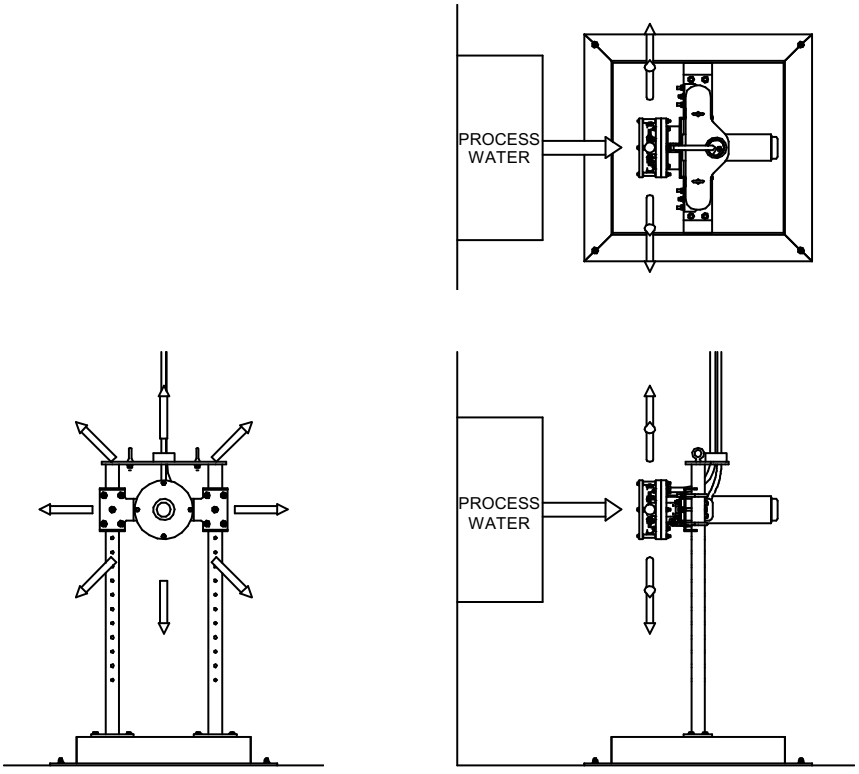
Installation

Unpacking

- Inspect the packaging of your ProMix SMS for any damage in shipment, and report it to the shipping company immediately, as shipping damage is not warranted by ProMinent.
- Check your goods against the packing list and purchase order to be sure you have received your entire order. If there is anything missing, contact your ProMinent distributor.

Location

- The ProMix SMS is placed into the process stream. It should be centered with the inlet pipe/channel, with the mixer facing into the process flow, to properly disperse the chemical across the entire inlet stream.
- A winch should be installed for installing/removing the ProMix SMS from the process stream.



Electrical Installation

IMPORTANT

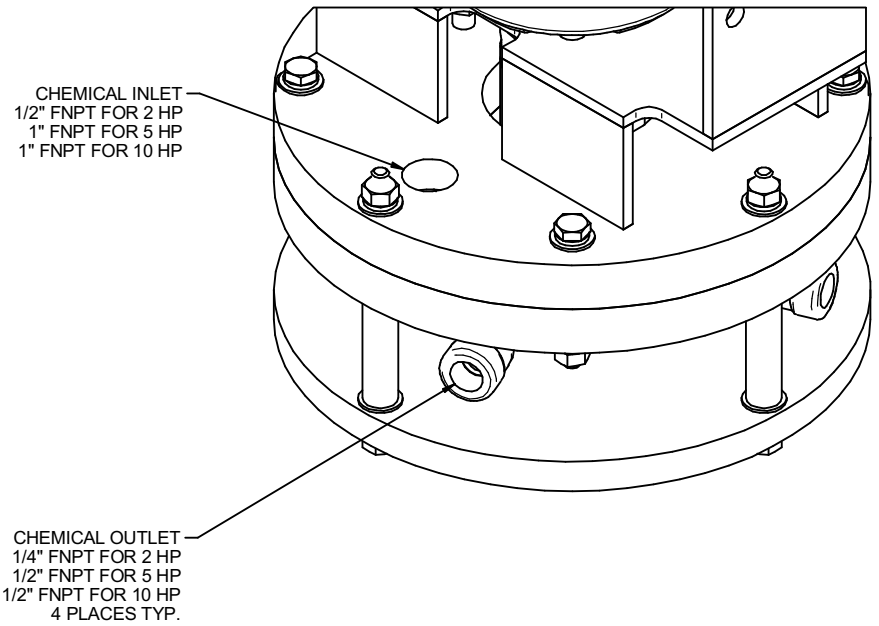
- ***Observe all local state and national electrical codes when installing your ProMix SMS.***
- ***The electrical installation of the system should only be performed by qualified electricians.***

- The ProMix SMS utilizes a 3 phase motor which will turn CW or CCW depending on how the phases are connected. 5 HP and 10 HP models include a SubMonitor motor protection device in the control panel door which will indicate if phase reversal is required when powered for the first time. The 2 HP ProMix SMS is designed to work equally well in either direction, rotation verification is not required.
- The ProMix SMS is electrically connected according to the enclosed electrical diagram (see Appendix for drawing). Make sure that the ProMix SMS is grounded per all applicable electrical codes to prevent electrical shock.

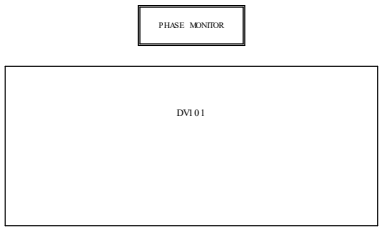
  NOTE: *If electrical drawings were provided with your ProMix SMS, they supersede the drawings in this manual.*

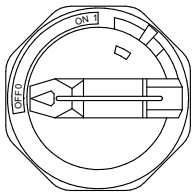
Chemical connection

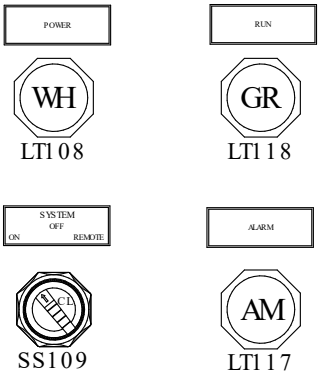
- The chemical connection is located on the motor side of the plenum. Use a flexible connection here to make installing and removing the mixer easier.
- 2 HP model has ½" FNPT connection
- 5 and 10 HP models have a 1" FNPT connection.



Description of System Control Panel







Power Disconnect Switch

The disconnect switch is located in the upper right hand corner of the control panel. This switch is used to remove the supply power while service or maintenance is being performed.

POWER light

The POWER light will illuminate to indicate that power is connected and the safety disconnect switch is in the ON position. The control panel door should be closed when the power is on.

RUN light

The RUN light will illuminate to indicate the mixer motor is spinning.

ALARM light

The ALARM light will illuminate to indicate a tripped motor protection device. Check the motor starter and reset if needed.

ON OFF REMOTE switch

ON: The mixer will run.

OFF: The mixer will not run.

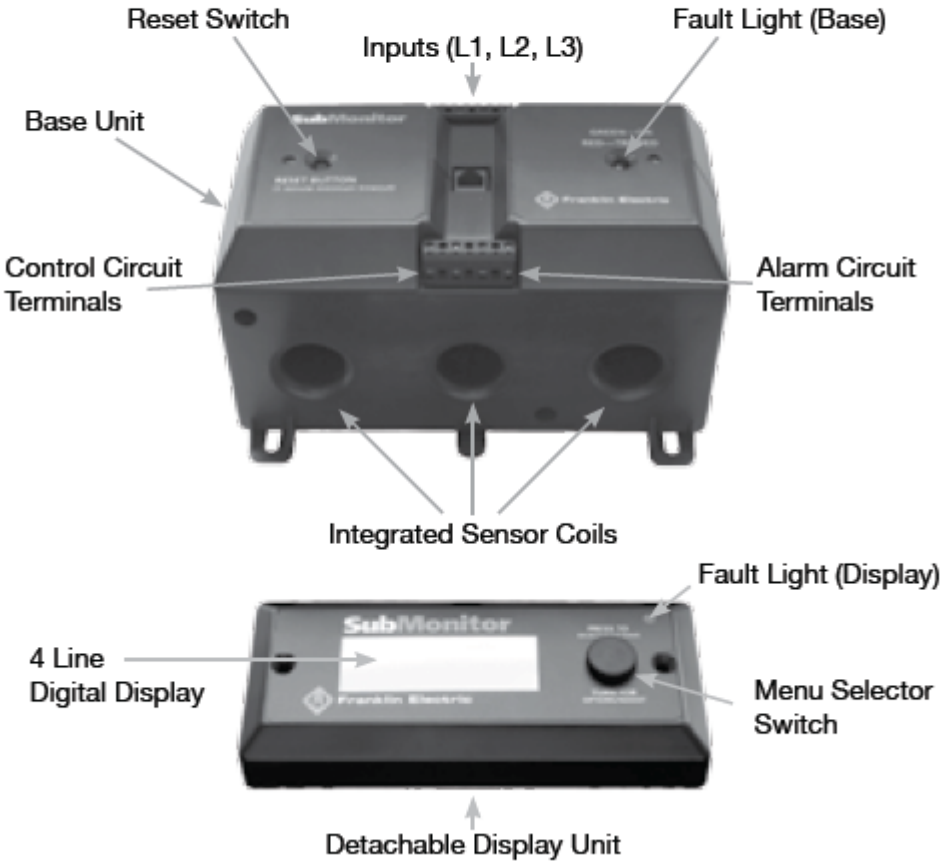
REMOTE: The mixer will respond to a remote switch/contact to operate. The mixer will run when the remote switch is closed.

SUBMONITOR motor protection (not available for the 2 HP model)

The ProMix SMS is designed utilizing a motor protection device to ensure long motor life. This monitor will be pre-programmed for your mixer prior to shipment. The entire manual for this monitor is included in this manual as an appendix.

SubMonitor

Components



SubMonitor Submersible Pump Motor Protection System

Franklin's SubMonitor is an easy to use, programmable protection device for Franklin Electric three-phase submersible motors.

SubMonitor's features provide advanced protection of submersible motors:

- SubMonitor operates over the full range of three-phase motor voltages, 200 - 575 volts, 50 and 60 Hz.
- Operates on motors with service factor current rating of 5 amps through 350 amps - no external current transformers required.
- Protects motors and pumps from overloads, underloads, overvoltage, undervoltage, unbalanced currents, phase loss*, chattering contacts, and phase reversal.
- Operates with a Subtrol-equipped submersible motor to provide motor winding overheat protection.
- Monitors and displays three-phase voltages, three-phase currents, and pump status.
- When a fault occurs, displays the fault conditions and status.
- Records and displays the history of up to 502 fault trip events, plus records changes to programmable parameters.
- Records total pump operating time.
- Features a detachable display unit which may be mounted on the front of a panel for viewing operating status.
- Includes the option of password protection to avoid tampering.
- Easy mounting with DIN rail mounts.
- Totally integrated unit - current transformers are built in.

Simple Programming

SubMonitor has been pre-programmed with default settings for submersible motors and pumps. Set-up is as simple as setting the motor ratings - voltage, Hertz, and SF max amps.

Additional programming options can be selected if desired to customize the features and levels of protection. See page 7 for an overview of the menu structure and page 12 for a full list of programmable options.

All programming set-up can be made prior to installing at the field site by connecting 230 volts single-phase between voltage inputs L1, L2 and L3 of SubMonitor (jumper between L2 and L3) and entering the motor data and any other options.

* Phase loss is a severe case of current unbalance. Reported unbalance trips are due to phase loss when current on one of the legs (noted in the data log) is very small, or when the current unbalance function has been disabled.

Other Features

Reset

The SubMonitor will not allow a reset for several minutes after a fault trip, depending on the programmed reset time and fault mode. This allows time for the motor to cool before it is restarted after a problem has occurred. Any Manual Reset causes the motor to restart in exactly one minute.

Operation without the Display Unit

After the `Select Motor` parameters are entered (volts, Hz, and SF Amps), the base unit of SubMonitor provides full motor protection even when the Display Unit is disconnected.

When operating with a Base Unit only:

- A "run enable" condition is indicated by a green LED
- A trip condition is indicated by a red Fault LED
- Manual reset is initiated by pressing the Reset Switch
- The Event History is not recorded (total run time is recorded).

Special Conditions

Note: The SubMonitor **is not** compatible with variable frequency drives, electronic phase converters, or solid state soft starters. These devices will cause nuisance tripping of the motor overheat fault, or may cause damage to SubMonitor components.

Reduced voltage starters may be used with SubMonitor if they are bypassed during normal running condition (Figure 5), and if the starting time does not exceed 3 seconds.

Power Factor or Surge Capacitor— across-the-line capacitors for either power factor correction or surge protection may be used with SubMonitor. If used, these capacitors must be connected to the power supply lines before these lines pass through the SubMonitor sensor coil windows or motor overheat protection may be lost.

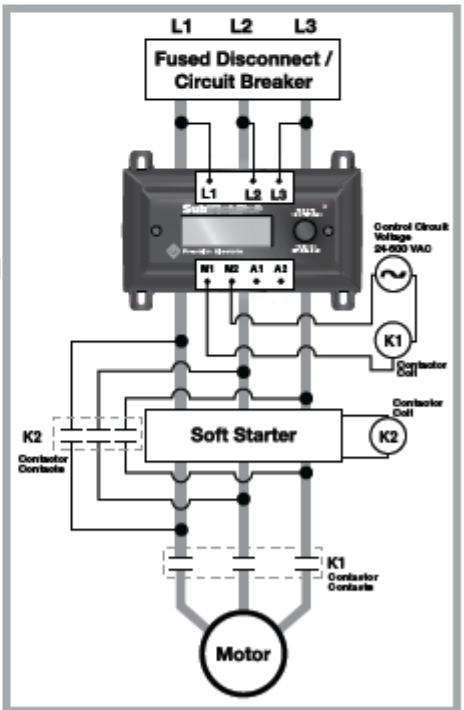


FIGURE 5

Note: At installations where the line voltage is typically 100 to 110% of nominal, it may be necessary to increase the default underload trip setting to fully protect the system against underload conditions.

Commissioning/Start Up/Operation

DANGER! ***This mixer has rotating parts, do not operate while anyone is within 5 feet of the mixing blades.***

Do not operate mixer above water, mixer must be submerged.

The ProMix SMS is a submersible mixer designed to disperse liquid chemical into a process stream. The chemical is metered to the mixer at the desired rate, and the ProMix SMS will effectively disperse it across the process stream.

- Connect supply power to the control panel.
- The ProMix SMS utilizes a 3 phase motor which will turn CW or CCW depending on how the phases are connected. 5 HP and 10 HP models include a SubMonitor motor protection device in the control panel door which will indicate if phase reversal is required when powered for the first time. The 2 HP ProMix SMS is designed to work equally well in either direction, rotation verification is not required.
- Verify the safety disconnect is OFF. Connect the mixer motor leads to the control panel according to the electrical drawings.
- Verify all internal breakers are in the ON position.
- Once control panel door is closed, turn the disconnect switch to the ON position. POWER light should illuminate.
- Connect the chemical supply plumbing.
- Place the ProMix SMS into the process stream. It should be centered with the inlet pipe/channel, with the mixer facing into the process flow, to properly disperse the chemical across the entire inlet stream.
- The motor must be covered by water.

The ProMix SMS can be started by placing the selector switch to the ON position or by closing a remote switch/contact in the REMOTE position. The chemical delivery pump can now be started, allowing the ProMix SMS to disperse the chemical into the process stream. A typical installation would be to utilize the REMOTE operation and interlock the mixer with the chemical feed pump such that both start/stop at the same time.

Maintenance/Troubleshooting

The ProMix SMS does not require any regularly scheduled maintenance. The below is for an "as needed" basis.

Tightening the motor lead connector jam nut

- A motor lead assembly should not be reused. A new lead assembly should be used whenever one is removed from the motor.
- Jam nut tightening torques recommended for field assembly are shown below.

2 HP ProMix SMS	15-20 ft-lbs (20-27Nm)
5 HP ProMix SMS	40-50 ft-lbs (54-68Nm)
10 HP ProMix SMS	40-50 ft-lbs (54-68Nm)

Shaft height and free end play

- When the motor is vertical, the height of the shaft, measured from the motor face, can indicate the amount of wear of the thrust bearing. If the height is low or if there is excessive end play, this may indicate the thrust bearing is damaged and should be replaced.

Model	Normal shaft height	Free end play
2 HP	1.498-1.508" (38.05-38.30 mm)	.010-.045" (.25-1.14 mm)
5 HP	2.869-2.875" (72.88-73.02 mm)	.030-.050" (.76-1.27 mm)
10 HP	2.869-2.875" (72.88-73.02 mm)	.030-.050" (.76-1.27 mm)

Motor winding resistance

Measuring the resistance of the motor windings will give an indication of open or shorted windings. The ohms should be read from lead to lead and be within the below range.

Model	Acceptable range in Ohms
2 HP	9.2-12
5 HP	3.6-4.4
10 HP	1.8-2.3

The above ranges are for 460V motors. Consult factory for other voltage motors.

Replace the motor if the readings are outside the listed range.

Motor winding insulation

Motor winding insulation integrity can be measured utilizing a megohm meter. The below values are based utilizing a 500VDC output megohm meter. The insulation readings vary little between different HP models so all models will have very similar insulation resistance.

Motor condition	Insulation resistance
New motor	2 megohm or higher
Acceptable	.5-2 megohm
Insulation damage	<.5 megohm, needs repair

Please note these measurements should be taken on the motor only, do not include the power cord.

Troubleshooting

Mixer won't start

Possible Cause	Checking procedure	Corrective Action
No power	Verify voltage on incoming power. Must be within 10% of rated voltage	If no power, check for upstream circuit breaker
Control switch in wrong position	Check control switch. Mixer should run when placed in ON position. REMOTE position requires a remote control switch.	Place control switch in correct position.
Circuit breaker tripped	Check breaker in mixer control panel.	Reset breaker if needed. Check motor if this problem persists.
Defective wiring/Defective motor	Check for loose or corroded connections.	Correct faulty wiring or connections. Check motor.

Mixer starts but overload trips

Possible Cause	Checking procedure	Corrective Action
Incorrect voltage	Measure voltage while under load. Voltage must be within 10% of rated voltage.	If voltage is low, check upstream transformer.
Defective wiring	Check for loose or corroded connections.	Correct faulty wiring or connections.
Motor overload set incorrectly	Verify trip setting on overload relay.	Adjust trip set point if needed.
Defective motor	Measure operating amperage.	Replace motor if needed.

Specifications

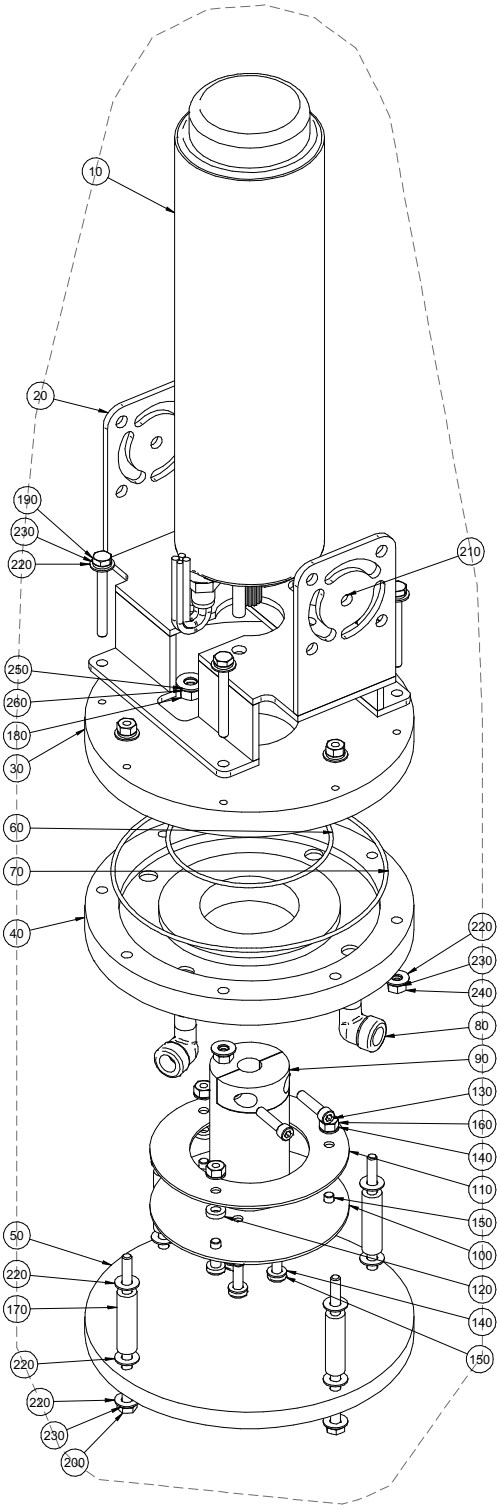
The standard ProMix SMS systems are offered in 460 VAC, 3 phase, 60 Hz. Other voltages/frequencies are available on request. Please consult factory.

The amperages listed below are for 460VAC, 3 phase, 60 Hz models.

Model	Full Load Amps	Maximum Amps
2 HP	3.4	4.1
5 HP	7.5	8.8
10 HP	14.2	16.1

Appendix

1102723 2 HP, 230 V, MIXER EXPLODED VIEW



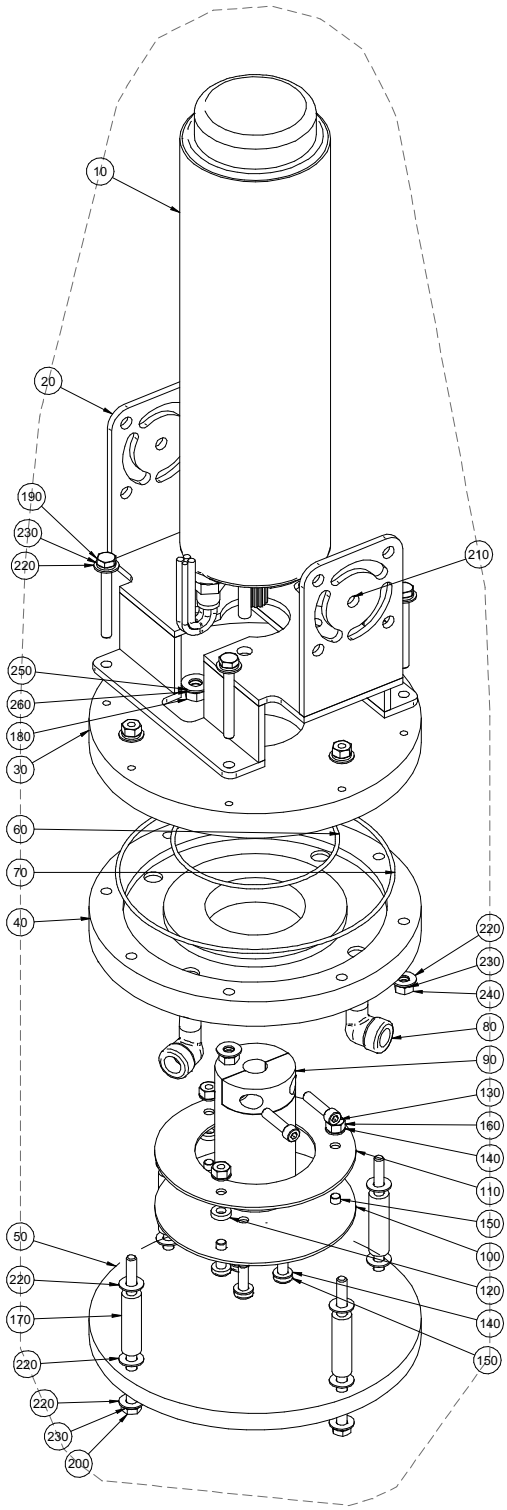
Appendix

1102723 2 HP, 230 V, MIXER BILL OF MATERIALS

ITEM#	USA P\N	QTY.	UN	SAP	DESCRIPTION
10	1080781	1	EA	L	MOTOR, SUBMERSIBLE, 2 HP, 4", NEMA, 3 PH, 230 V
20	1107366	1	EA	L	BRACKET, MOTOR MOUNTING, 2 HP, W, PROMIX SMS
30	1080748	1	EA	L	PLENUM, UPPER, 2 HP, PROMIX SMS
40	1102455	1	EA	L	PLENUM, LOWER, 2 HP, SE PROMIX SMS
50	1107325	1	EA	L	GUARD, BLADE, 2 HP, W, PROMIX SMS
60	1080790	1	EA	L	O-RING, 3/32" X 3.987 ID, AS 568-155, VITON
70	1080791	1	EA	L	O-RING, 3/32" X 6.737 ID, AS 568-166, VITON
80	1102467	4	EA	L	ELBOW, STREET, 1/4", FNPT X MNPT, GRADE 4 TITANIUM, 150 #
90	1102459	1	EA	L	HUB, BLADE, 4" SUBMERSIBLE MOTOR, TI, SE, PROMIX SMS
100	1107289	1	EA	L	BLADE, BASE, 5.0" DIAMETER, 2 HP, W, PROMIX SMS
110	1107290	1	EA	L	BLADE, MIXING, 5.0" DIAMETER, 2 W, RV, PROMIX SMS
120	1080736	3	EA	L	SPACER, 1/2" OD, 1/4" ID, 1/8" THICK, TITANIUM
130	1102469	2	EA	L	SCREW, 1/4-20 X 1", TITANIUM, SOCKET HEAD CAP, TORX
140	1080762	6	EA	L	WASHER, LOCK, 1/4", TI
150	1080763	6	EA	L	SCREW, 1/4-20 X 3/4", TITANIUM, TORX PAN HEAD
160	1080761	3	EA	L	NUT, 1/4-20, TI
170	1102472	4	EA	L	SPACER, 1/2" OD, 1/4" ID, 1-3/4" LONG, 316
180	1080796	4	EA	L	NUT, 5/16-24, 316 SST
190	1080794	4	EA	L	BOLT, 1/4-20 X 2-1/4", 316 SST, FULLY THREADED
200	1102470	4	EA	L	BOLT, 1/4-20 X 4-1/2", 316 SST, FULLY THREADED
210	7744688	1	EA	L	CAP PLUG, 1/2",
220	STOCK	24	EA	L	WASHER, FLAT, 1/4", 316 SST
230	STOCK	16	EA	L	WASHER, LOCK, 1/4", 316 SST
240	STOCK	8	EA	L	NUT, 1/4-20, 316 SST
250	STOCK	4	EA	L	WASHER, FLAT, 5/16", 316 SST
260	STOCK	4	EA	L	WASHER, LOCK, 5/16", 316 SST

Appendix

1102744 2 HP, 460 V, MIXER EXPLODED VIEW

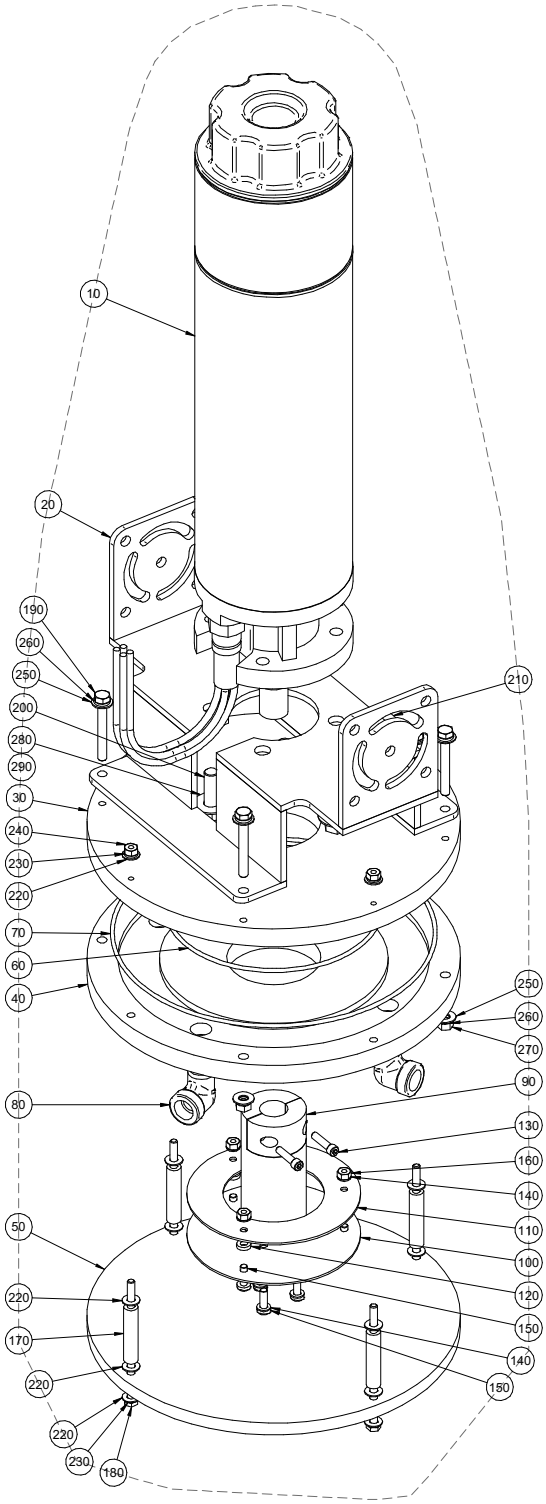


1102744 2 HP, 460 V, MIXER BILL OF MATERIALS

ITEM#	USAP\N	QTY.	UN	SAP	DESCRIPTION
10	1102466	1	EA	L	MOTOR, SUBMERSIBLE, 2 HP, 4", NEMA, 3 PH, 460 V
20	1107366	1	EA	L	BRACKET, MOTOR MOUNTING, 2 HP, W, PROMIX SMS
30	1080748	1	EA	L	PLENUM, UPPER, 2 HP, PROMIX SMS
40	1102455	1	EA	L	PLENUM, LOWER, 2 HP, SE PROMIX SMS
50	1107325	1	EA	L	GUARD, BLADE, 2 HP, W, PROMIX SMS
60	1080790	1	EA	L	O-RING, 3/32" X 3.987 ID, AS 568-155, VITON
70	1080791	1	EA	L	O-RING, 3/32" X 6.737 ID, AS 568-166, VITON
80	1102467	4	EA	L	ELBOW, STREET, 1/4", FNPT X MNPT, GRADE 4 TITANIUM, 150 #
90	1102459	1	EA	L	HUB, BLADE, 4" SUBMERSIBLE MOTOR, TI, SE, PROMIX SMS
100	1107289	1	EA	L	BLADE, BASE, 5.0" DIAMETER, 2 HP, W, PROMIX SMS
110	1107290	1	EA	L	BLADE, MIXING, 5.0" DIAMETER, 2 W, RV, PROMIX SMS
120	1080736	3	EA	L	SPACER, 1/2" OD, 1/4" ID, 1/8" THICK, TITANIUM
130	1102469	2	EA	L	SCREW, 1/4-20 X 1", TITANIUM, SOCKET HEAD CAP, TORX
140	1080762	6	EA	L	WASHER, LOCK, 1/4", TI
150	1080763	6	EA	L	SCREW, 1/4-20 X 3/4", TITANIUM, TORX PAN HEAD
160	1080761	3	EA	L	NUT, 1/4-20, TI
170	1102472	4	EA	L	SPACER, 1/2" OD, 1/4" ID, 1-3/4" LONG, 316
180	1080796	4	EA	L	NUT, 5/16-24, 316 SST
190	1080794	4	EA	L	BOLT, 1/4-20 X 2-1/4", 316 SST, FULLY THREADED
200	1102470	4	EA	L	BOLT, 1/4-20 X 4-1/2", 316 SST, FULLY THREADED
210	7744688	1	EA	L	CAP PLUG, 1/2",
220	STOCK	24	EA	L	WASHER, FLAT, 1/4", 316 SST
230	STOCK	16	EA	L	WASHER, LOCK, 1/4", 316 SST
240	STOCK	8	EA	L	NUT, 1/4-20, 316 SST
250	STOCK	4	EA	L	WASHER, FLAT, 5/16", 316 SST
260	STOCK	4	EA	L	WASHER, LOCK, 5/16", 316 SST

Appendix

1102745 5 HP, 460 V, MIXER EXPLODED VIEW

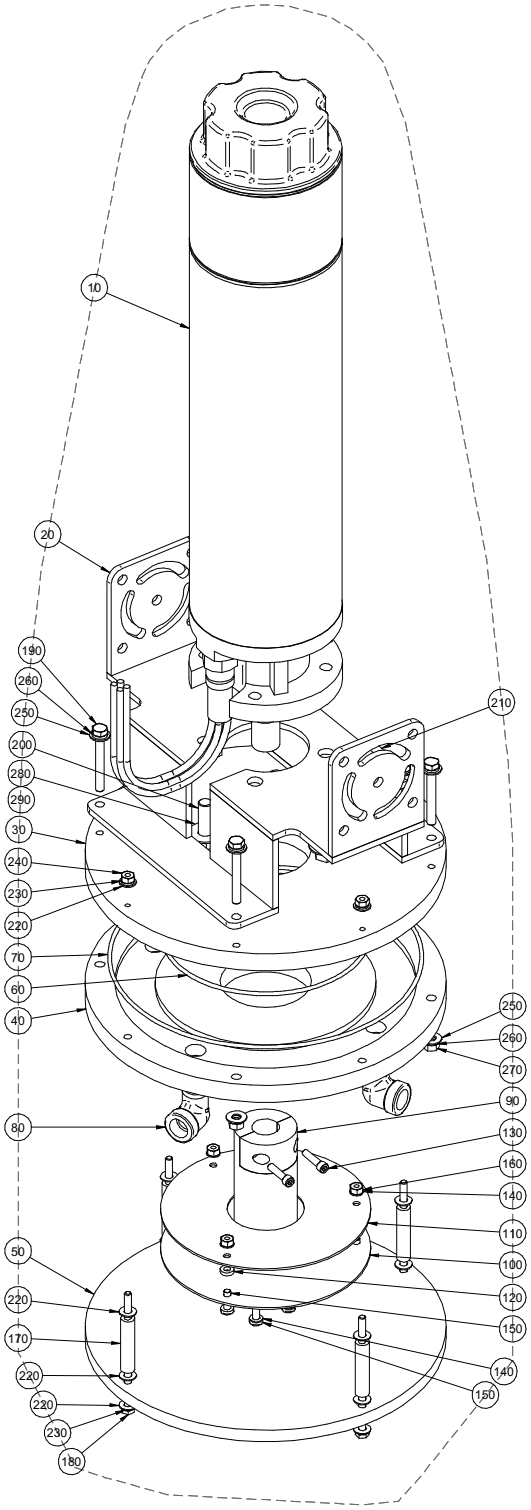


Appendix

1102745 5 HP, 460 V, MIXER BILL OF MATERIALS

ITEM#	USA P\N	QTY.	UN	SAP	DESCRIPTION
10	1080782	1	EA	L	MOTOR, SUBMERSIBLE, 5 HP, 6", NEMA, 3 PH, 460 V
20	1107367	1	EA	L	BRACKET, MIXER, 5/10 HP, W, PROMIX SMS
30	1080751	1	EA	L	PLENUM, UPPER, 5/10 HP. PROMIX SMS
40	1102457	1	EA	L	PLENUM, LOWER, 5/10 HP. SE PROMIX SMS
50	1107326	1	EA	L	GUARD, BLADE, 5/10 HP, W, PROMIX SMS
60	1080792	1	EA	L	O-RING, 1/8" X 7.234 ID, AS 568-263, VITON
70	1080793	1	EA	L	O-RING, 1/8" X 10.984 ID, AS 568-276, VITON
80	1102468	4	EA	L	ELBOW, STREET, 1/2", FNPT X MNPT, GRADE 4 TITANIUM, 150 #
90	1102460	1	EA	L	HUB, BLADE, 6" SUBMERSIBLE MOTOR, TI, SE, PROMIX SMS
100	1107291	1	EA	L	BLADE, BASE, 6" DIAMETER, 5 HP, W, PROMIX SMS
110	1107292	1	EA	L	BLADE, MIXING, 6" DIAMETER, 5 HP, W, PROMIX SMS
120	1080736	3	EA	L	SPACER, 1/2" OD, 1/4" ID, 1/8" THICK, TITANIUM
130	1102469	2	EA	L	SCREW, 1/4-20 X 1", TITANIUM, SOCKET HEAD CAP, TORX
140	1080762	6	EA	L	WASHER, LOCK, 1/4", TI
150	1080763	6	EA	L	SCREW, 1/4-20 X 3/4", TITANIUM, TORX PAN HEAD
160	1080761	3	EA	L	NUT, 1/4-20, TI
170	1102473	4	EA	L	SPACER, 1/2" OD, 1/4" ID, 2-1/4" LONG, 316
180	1102471	4	EA	L	BOLT, 1/4-20 X 5", 316 SST, FULLY THREADED
190	1080795	4	EA	L	BOLT, 5/16-18 X 2-1/2", 316 SST, FULLY THREADED
200	1080858	4	EA	L	BOLT, 1/2-20 X 1-1/2", 316 SST
210	7744690	1	EA	L	CAP PLUG, 1",
220	STOCK	16	EA	L	WASHER, FLAT, 1/4", 316 SST
230	STOCK	8	EA	L	WASHER, LOCK, 1/4", 316 SST
240	STOCK	4	EA	L	NUT, 1/4-20, 316 SST
250	STOCK	8	EA	L	WASHER, FLAT, 5/16", 316 SST
260	STOCK	8	EA	L	WASHER, LOCK, 5/16", 316 SST
270	STOCK	4	EA	L	NUT, 5/16-18, 316 SST
280	STOCK	4	EA	L	WASHER, FLAT, 1/2", 316 SST
290*	STOCK	4	EA	L	WASHER, LOCK, 1/2", 316 SST

1102746 10 HP, 460 V, MIXER EXPLODED VIEW



Appendix

1102746 10 HP, 460 V, MIXER BILL OF MATERIALS

ITEM#	USA P\N	QTY.	UN	SAP	DESCRIPTION
10	1080783	1	EA	L	MOTOR, SUBMERSIBLE, 10 HP, 6", NEMA, 3 PH, 460 V
20	1107367	1	EA	L	BRACKET, MIXER, 5/10 HP, W, PROMIX SMS
30	1080751	1	EA	L	PLENUM, UPPER, 5/10 HP. PROMIX SMS
40	1102457	1	EA	L	PLENUM, LOWER, 5/10 HP. SE PROMIX SMS
50	1107326	1	EA	L	GUARD, BLADE, 5/10 HP, W, PROMIX SMS
60	1080792	1	EA	L	O-RING, 1/8" X 7.234 ID, AS 568-263, VITON
70	1080793	1	EA	L	O-RING, 1/8" X 10.984 ID, AS 568-276, VITON
80	1102468	4	EA	L	ELBOW, STREET, 1/2", FNPT X MNPT, GRADE 4 TITANIUM, 150 #
90	1102460	1	EA	L	HUB, BLADE, 6" SUBMERSIBLE MOTOR, TI, SE, PROMIX SMS
100	1107293	1	EA	L	BLADE, BASE, 7.5" DIAMETER, 10 HP, W, PROMIX SMS
110	1107324	1	EA	L	BLADE, MIXING, 7.5" DIAMETER, 10 HP, W, PROMIX SMS
120	1080736	3	EA	L	SPACER, 1/2" OD, 1/4" ID, 1/8" THICK, TITANIUM
130	1102469	2	EA	L	SCREW, 1/4-20 X 1", TITANIUM, SOCKET HEAD CAP, TORX
140	1080762	6	EA	L	WASHER, LOCK, 1/4", TI
150	1080763	6	EA	L	SCREW, 1/4-20 X 3/4", TITANIUM, TORX PAN HEAD
160	1080761	3	EA	L	NUT, 1/4-20, TI
170	1102473	4	EA	L	SPACER, 1/2" OD, 1/4" ID, 2-1/4" LONG, 316
180	1102471	4	EA	L	BOLT, 1/4-20 X 5", 316 SST, FULLY THREADED
190	1080795	4	EA	L	BOLT, 5/16-18 X 2-1/2", 316 SST, FULLY THREADED
200	1080858	4	EA	L	BOLT, 1/2-20 X 1-1/2", 316 SST
210	7744690	1	EA	L	CAP PLUG, 1",
220	STOCK	16	EA	L	WASHER, FLAT, 1/4", 316 SST
230	STOCK	8	EA	L	WASHER, LOCK, 1/4", 316 SST
240	STOCK	4	EA	L	NUT, 1/4-20, 316 SST
250	STOCK	8	EA	L	WASHER, FLAT, 5/16", 316 SST
260	STOCK	8	EA	L	WASHER, LOCK, 5/16", 316 SST
270	STOCK	4	EA	L	NUT, 5/16-18, 316 SST
280	STOCK	4	EA	L	WASHER, FLAT, 1/2", 316 SST
290*	STOCK	4	EA	L	WASHER, LOCK, 1/2", 316 SST