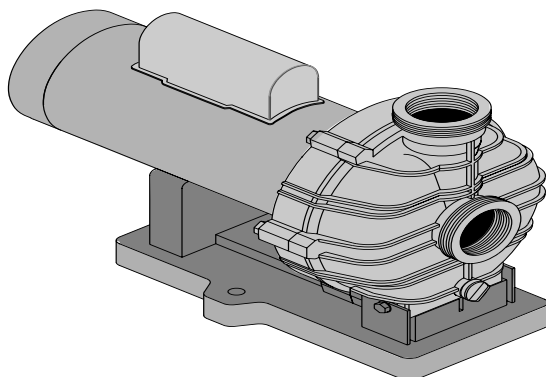


# STA-RITE®

## SPA PUMP

### O W N E R ' S M A N U A L



794 0394

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#### INSTALLATION, OPERATION & PARTS

#### 115/230V/60Hz/1Ph TPEA & TPRA Series MODELS

1 HP	TPEAE-165L	TPRAE3-165	
1-1/2 HP	TPEAF-166L	TPRAF-174L	5TPRAYF-156 (50 Hz.)
1-1/2 HP		TPRAYF-174S	
2 HP	TPEAG-167L	TPRAG-175L	TPEAYG-167LS
2 HP	TPEAG-167LS	TPEAYG-175L	TPEAYG-175LS
2-1/2 HP	TPEAAG-168L	TPEAAYG-168L	
2-1/2 HP	TPEAAG-168LS	TPEAAYG-168LS	

This manual should be furnished to the end user of this pump; its use will reduce service calls and chance of injury and will lengthen pump life.

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04-09-10

**S330 (Rev. B)**

# STA-RITE SPA PUMP

To avoid unneeded service calls, prevent possible injuries, and get the most out of your pump, READ THIS MANUAL CAREFULLY!

The Sta-Rite 'TPEA' Series pump:

- Is designed for use with spas.
- Is an excellent performer; durable, reliable.

## Table of Contents

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## IMPORTANT SAFETY INSTRUCTIONS

Always follow basic safety precautions with this equipment, including the following.

**⚠ WARNING** To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

**⚠ CAUTION** This pump is for use with permanently installed pools and may also be used with hot tubs and spas if so marked. Do not use with storable pools. A permanently installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it may be readily disassembled for storage and reassembled to its original integrity.

## SAVE THESE INSTRUCTIONS

# READ AND FOLLOW SAFETY INSTRUCTIONS!

**⚠** This is the safety alert symbol. When you see this symbol on your system or in this manual, look for one of the following signal words and be alert to the potential for personal injury.

**⚠ DANGER** warns about hazards that **will** cause death, serious personal injury, or major property damage if ignored.

**⚠ WARNING** warns about hazards that **can** cause death, serious personal injury, or major property damage if ignored.

**⚠ CAUTION** warns about hazards that **will** or **can** cause minor personal injury or property damage if ignored.

**NOTICE** indicates special instructions not related to hazards.

**Carefully read and follow all safety instructions in this manual and on equipment.** Keep safety labels in good condition; replace if missing or damaged.

**⚠ WARNING** **Hazardous pressure** **Incorrectly installed or tested equipment may fail, causing severe injury or property damage.**

Read and follow instructions in owner's manual when installing and operating equipment. Have a trained pool professional perform all pressure tests.

1. Do not connect system to a high pressure or city water system.
2. Use equipment only in a pool or spa installation.
3. Trapped air in system can cause explosion. BE SURE all air is out of system before operating or testing equipment.

**Before pressure testing, make the following safety checks:**

- Check all clamps, bolts, lids, and system accessories before testing.
- Release all air in system before testing.
- Tighten Sta-Rite trap lids to 30 ft. lbs. (4.1 kg-m) torque for testing.
- Water pressure for test must be less than 25 PSI (7.5 kg/cm<sup>2</sup>).
- Water Temperature for test must be less than 100° F. (38° C).
- Limit test to 24 hours. After test, visually check system to be sure it is ready for operation. Remove trap lid and retighten hand tight only.

**NOTICE:** These parameters apply to Sta-Rite equipment only. For non-Sta-Rite equipment, consult manufacturer.

# INSTALLATION

Only qualified, licensed personnel should install pump and wiring.

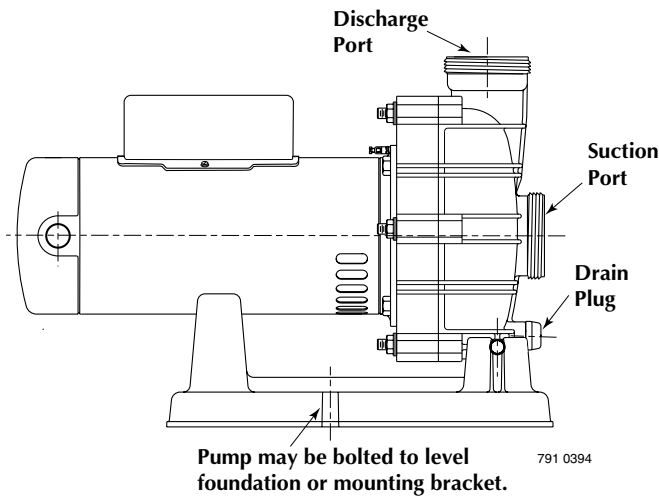


Figure 1

## Port threads:

Internal - 2" NPT for direct connection to pipe. External - 3" Buttress. Fits Sta-Rite 38405 - 4094 Union Collar for quick disconnect pipe connection.

Order: Union Kit #77703-0105 (1-1/2" and 2" Union Halves).

## Pump mount must:

Be solid - Level - Rigid - Vibration free. (To reduce vibration and pipe stress, bolt pump to mount.)

Install pump with suction port below water level (flooded suction) only. Pump does not lift water.

Allow use of short, direct suction pipe (To reduce friction losses).

Allow for gate valves in suction and discharge piping.

Have adequate floor drainage to prevent flooding.

Be protected from excess moisture.

Allow adequate access for servicing pump and piping.

**NOTICE:** When connecting threaded pipe directly to pump, use Teflon tape or Plasto-Joint Stik<sup>1</sup> to seal connections. Do not use pipe dope; pipe dope causes cracking in some plastics and may damage components in piping system.

When connecting threaded pipe to pump with union half, use Teflon tape or Plasto-Joint Stik between pipe and union adapter. Union collar to pump should be assembled dry and hand-tight. Make sure O-ring is seated in groove.

**NOTICE:** Pump suction and discharge connections have molded in thread stops. DO NOT try to screw pipe in beyond these stops.

## Teflon Taping Instructions:

Use only new or clean PVC pipe fittings.

Wrap male pipe threads with one to two layers of Teflon tape. Cover entire threaded portion of pipe.

**Do not** overtighten or tighten past thread stop in pump port!

If leaks occur, remove pipe, clean off old tape, rewrap with one to two additional layers of tape and remake the connection.

**NOTICE:** Support all piping connected with pump!

## Piping:

Use at least 1-1/2" (38mm) pipe (use 2" (51mm) pipe if possible). Increase size if a long run is needed. When using 1-1/2" pipe, connect to pump with 1-1/2" to 2" (38 to 51mm) reducing adapter.

To avoid strains on the pump, support both suction and discharge pipes independently. Place these supports near the pump.

To avoid a strain left by a gap at the last connection, start all piping at the pump and run pipe **away** from the pump.

To avoid airlocking, slope suction pipe slightly upward toward the pump.

**NOTICE:** To prevent flooding when removing pump for service, all flooded suction systems **must** have gate valves in suction and discharge pipes.

<sup>1</sup>Lake Chemical Co., Chicago, Illinois

**Fittings:**

Fittings restrict flow; for best efficiency use fewest possible fittings.

Avoid fittings which could cause an air trap in suction piping.

Pool and spa drains must conform to International Association of Plumbing and Mechanical Officials (IAPMO) standards.

Use only non-entrapping suction fittings and dual suction outlets.

**ELECTRICAL**



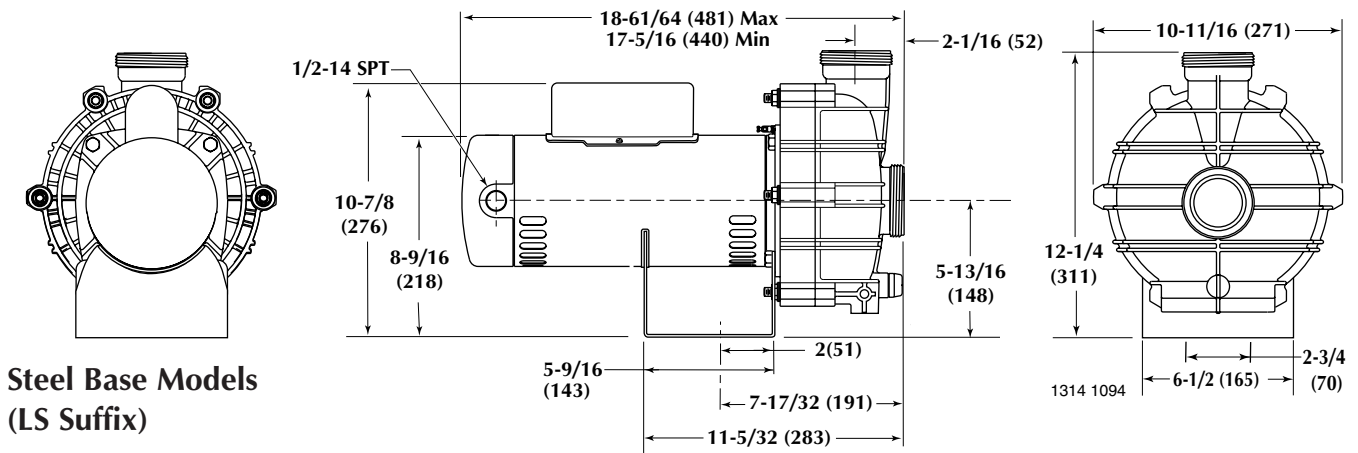
**⚠ Ground motor before connecting to electrical power supply. Failure to ground motor can cause severe or fatal electrical shock hazard.**

**⚠ Do not ground to a gas supply line.**

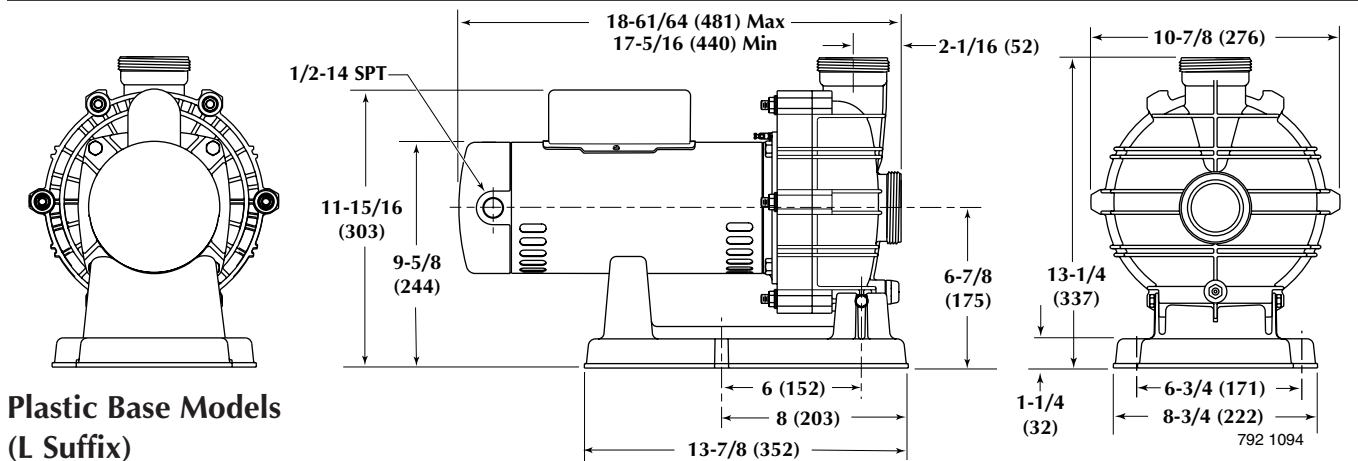
**⚠ To avoid dangerous or fatal electrical shock, turn OFF power to motor before working on electrical connections.**

**⚠ Ground Fault Circuit Interrupter (GFCI) tripping indicates an electrical problem. If GFCI trips and**

**will not reset, have a qualified electrician inspect and repair electrical system.**



**Steel Base Models  
(LS Suffix)**



**Plastic Base Models  
(L Suffix)**

**Figure 2 – Outline Dimensions in Inches (mm)**

**⚠️ Exactly match supply voltage to motor nameplate voltage. Incorrect voltage can cause fire or seriously damage motor and voids warranty. If in doubt consult a licensed electrician. See Figure 4.**

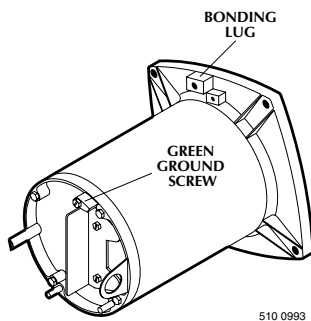
## Voltage

Voltage at motor must be not more than 10% above or below motor nameplate rated voltage or motor may over-heat, causing overload tripping and reduced component life. If voltage is less than 90% or more than 110% of rated voltage when motor is running at full load, consult power company.

## Grounding/Bonding

Install, ground, bond and wire motor according to local or National Electrical Code requirements.

Permanently ground motor. Use green ground terminal provided under motor canopy or access plate (See Fig. 3); use size and type wire required by code. Connect motor ground terminal to electrical service ground.



**Figure 3 – Typical ground screw and bonding lug locations.**

Bond motor to pool structure. Use a solid copper conductor, size No. 8 AWG (8.4 sq.mm) or larger. Run wire from external bonding lug (see Fig. 3) to reinforcing rod or mesh.

Connect a No. 8 AWG (8.4 sq.mm) solid copper bonding wire to the pressure wire connector provided on the motor housing and to all metal parts of the swimming pool, spa, or hot tub and to all electrical equipment, metal piping or conduit within 5 feet (1.5 m) of the inside walls of swimming pool, spa, or hot tub.

## Wiring

Pump must be permanently connected to circuit (see Figure 4A and 4B); be sure no other lights or appliances are on the same circuit. Match wire sizes to Table I (Pg. 6).

**NOTICE:** To prevent dirt, rain, bugs, etc., from entering motor when not wiring with conduit, **be sure** to seal wire opening on end of motor.

Use Ground Fault Circuit Interrupter (GFCI) as master on-off switch; it will sense a short circuit to ground and disconnect power before it becomes dangerous to pool users. Test according to maker's instructions.

In case of power outage, check GFCI for tripping (which will prevent normal water circulation). Reset if necessary.

**⚠️ WARNING Risk of dangerous or fatal electrical shock. Be sure that power to the motor circuit is off before working on wiring, wiring connections, or motor. Re-install the motor end cover and all other wiring covers before turning on the power.**

1. Turn off power.
2. Remove the motor end cover.

## To Wire a Single Speed, Single Voltage Motor

There are two terminals labeled L1 and L2. Attach the power leads to these terminals. Either wire may attach to either terminal.

## To Wire a Dual-Voltage Motor

Dual voltage motors have a plug to change from 230 volts (factory setting) to 115 volts.

1. If you have 230 volts motor supply voltage, confirm that the plug is set for 230 volts. The arrow on the plug will point to the 230 volt position. Note that plug only connects with one prong in this position.
2. If you have 115 volt supply, pull the plug straight up and place it on the **two** brass prongs as shown.



**Figure 4A -Voltage Change Plug Set for 230 Volts**

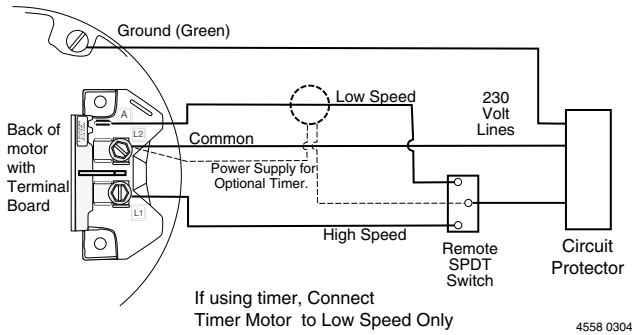


**Figure 4B Voltage Change Plug Set for 115 Volts**

**NOTE:** Arrow is highlighted for clarity.

## To Wire a Two-Speed Motor

Wire the pump as shown in the diagram.



Minimum switch and timer amp rating must equal Branch Fuse Rating given in "Recommended Fusing and Wiring Data" table.

Figure 4C - 2-Speed Motor Wiring Diagram

## OPERATION

**NOTICE:** NEVER run pump dry. Running pump dry may damage seals, causing leakage and flooding. Fill pump with water before starting motor.

**⚠ DANGER**

**Hazardous suction. Can trap hair or body parts, causing severe injury or death.**

Do not block suction. Do not operate system with broken or missing drain covers.

**⚠ Do not block pump suction. To do so with body may cause severe or fatal injury. Small children using pool must ALWAYS have close adult supervision.**

### Priming Pump

Release all air from filter and piping system: see filter owner's manual.

In a flooded suction system (water source higher than pump), pump will prime itself when suction and discharge valves are opened.

### Storage/Winterizing:

**NOTICE:** Allowing pump to freeze will damage pump and void warranty!

**NOTICE: Do not** use anti-freeze solutions (except propylene glycol) in your pool/spa system. Propylene glycol is non-toxic and will not damage plastic system components; other anti-freezes are highly toxic and may damage plastic components in the system.

## TABLE I - RECOMMENDED FUSING AND WIRING DATA

**NOTICE:** Series TPEA and TPRA pumps use 60 Cycle current only.

Motor HP	Branch Fuse Rating Amps*	Max Load Amps	Voltage/Hz/Phase	Serv. to Motor - Dist. in Ft. (M)			AWG Wire Size (mm <sup>2</sup> )	
				0-100' (0-30)	101-200' (30-60)	201-300' (60-90)		
<b>TPEA Models:</b>								
1	20/15	12.6/6.3	115/230/60/1	12(3)/14(2)	10(5)/14(2)	8(7)/14(2)	}	
1-1/2	25/15	16.0/8.0	115/230/60/1	12(3)/14(2)	8(7)/14(2)	6(13)/14(2)		
2	15	10.4	230/60/1	14(2)	14(2)	14(2)		
2-1/2	15	11.2	230/60/1	14(2)	12(3)	12(3)		
<b>TPEAY Models (2-speed):</b>								
2	15	10.1/3.7	230/60/1	14(2)	14(2)	14(2)		
2-1/2	15	11.9/3.5	230/60/1	14(2)	12(3)	12(3)		
<b>TPRA Models:</b>								
1	15	3.6/1.8	208-230/460/60/3	14(2)	14(2)	14(2)		
1-1/2	25/15	19.2/9.6	115/230/60/1	10(5)/14(2)	8(7)/14(2)	6(13)/12(3)		
2	15	12.0	230/60/1	14(2)	14(2)	12(3)		
<b>TPRA Models (2-Speed):</b>								
1-1/2	15	9.2/2.5	230/60/1	14(2)	14(2)	12(3)		
<b>5TPRAY Model (2-speed):</b>								
1-1/2	15	8.3/3.0	230/50/1	14(2)	14(2)	12(3)		

\* Time delay fuses are recommended instead of standard fuses in any motor circuit.



Drain all water from pump and piping when expecting freezing temperatures or when storing pump for a long time (see instructions below).

Keep motor dry and covered during storage.


To avoid condensation/corrosion problems, **do not** cover pump with plastic.

For outdoor/unprotected installations:

1. Enclose entire system in a weatherproof enclosure.
2. To avoid condensation/corrosion damage, allow ventilation; **do not** wrap system in plastic.
3. Use a 40% propylene glycol/60% water solution to protect pump to -50°F (-46°C).

### Draining Pump

**⚠ WARNING**



**Hazardous voltage. Can shock, burn, or cause death.**

Disconnect power before working on pump or motor.

1. Pump down water level below all inlets to the pool.

**⚠ To avoid dangerous or fatal electrical shock hazard, turn OFF power to motor before draining pump.**

2. Cap inlet piping after draining to keep water out of the pipes.
3. To prevent pump from freezing, drain the pump body through the drain fitting provided.
4. Be sure motor is kept dry and covered.

### Startup For Winterized Equipment

1. Remove any temporary weather protection placed around system for shutdown.
2. Follow filter manufacturer's instructions for reactivation of the filter.
3. Inspect all electrical wiring for damage or deterioration over the shutdown period. Have a qualified service-man repair wiring as needed.
4. Inspect and tighten all watertight connections.
5. Open all valves in suction and return piping.
6. Remove any winterizing plugs in piping system.
7. Drain all antifreeze from system.
8. Close all drain valves and replace all drain plugs in piping system.
9. Prime pump according to instructions on Page 6.

## PUMP SERVICE

**⚠ WARNING**



**Hazardous voltage. Can shock, burn, or cause death.**

Disconnect power before working on pump or motor.

Pump should only be serviced by qualified personnel.

Be sure to prime pump (Pg. 6) before starting.

1. **STOP PUMP** before proceeding.
2. **CLOSE GATE VALVES** in suction and discharge pipes.
3. **RELEASE ALL PRESSURE** from pump and piping system.

**⚠ To avoid dangerous or fatal electrical shock hazard, turn OFF power to motor before working on pump or motor.**

If shaft seal is worn or damaged, repair as follows:

### Pump Dissassembly/Removing Old Seal

Disconnect power to pump motor.

**⚠ Be sure** gate valves on suction and return piping are closed before starting work.

Release all pressure by opening all vents before starting work.

1. Drain pump through drain fitting on bottom of pump body.
2. Remove 6 nuts, lockwashers and flat washers holding seal plate to pump body. Pull seal plate and motor away from pump body. (You may have to CAREFULLY use a screwdriver to separate body from seal plate.)
3. Remove seven screws and washers holding diffuser to seal plate. Remove diffuser.
4. Remove motor canopy. Being careful not to touch capacitor terminals, loosen capacitor clamp and move capacitor to one side.
5. Hold shaft with 7/16" open-end wrench on motor shaft flats.
6. Unscrew impeller from shaft (turn counterclockwise when facing it).  
**NOTICE:** On 2 and 2-1/2 HP models, remove impeller screw (left hand thread - turn **clockwise**) and gasket before removing impeller. Inspect gasket for damage, cracks, etc. Replace if damaged.

7. Remove four screws holding seal plate to motor.
8. Place seal plate face down on flat surface and tap out ceramic seat (Fig. 5).



**Figure 5**

9. Remove slinger from motor shaft and inspect for damage or abrasion.
10. Clean seal cavity in seal plate and clean motor shaft.

### **Pump Reassembly/Installing New Seal**

1. Ceramic seat must be clean and free of dirt, grease, dust, etc. Wet outer edge with small amount of liquid detergent; press ceramic seat into seal plate cavity firmly and squarely with finger pressure (Fig. 6).



**Figure 6**

2. If ceramic seat will not locate properly, remove it, place **face up** on bench and reclean cavity. Ceramic seat should now locate.
3. If seat still will not locate properly, place a cardboard washer over the polished face and use a piece of 3/4" (19mm) standard pipe for pressing purposes.  
**NOTICE: Be sure** not to scratch or mar polished surface or seal will leak.
4. Replace slinger on end of motor shaft so that impeller sleeve will push it into position. If slinger shows signs of wear or damage, replace it.
5. Remount seal plate on motor. Tighten bolts to 60-80 inch-lbs. (69-92 kg/cm) torque.
6. Apply a **small** amount of liquid detergent to inside diameter of rotating half of seal.
7. Slide rotating seal member, polished carbon face out, over impeller sleeve until rubber drive ring hits back of impeller.  
**NOTICE: Be sure** not to nick or scratch polished seal face; seal will leak if face is damaged.
8. Screw impeller onto shaft (clockwise); this will automatically locate seal in seal plate.  
**NOTICE: On 2 HP, 2-1/2 HP and 3-Phase models;** install impeller gasket and lock screw (left-hand thread - turn counterclockwise). Torque lock screw to 50-55 inch-lbs. (57.6-63 kg/cm).
9. Mount diffuser on seal plate; tighten screws to 10-14 inch-lbs. (11.2-16.1 kg/cm) torque.
10. Assemble motor and seal plate to pump body with nuts, flat washers and lock washers. Torque nuts to 120-130 in-lbs. (138-150 kg/cm).
11. Prime pump according to instructions on Page 6.



## TROUBLESHOOTING GUIDE

**⚠** Read and understand safety and operating instructions in this manual before doing any work on pump!

**⚠** Only qualified personnel should electrically test pump motor!

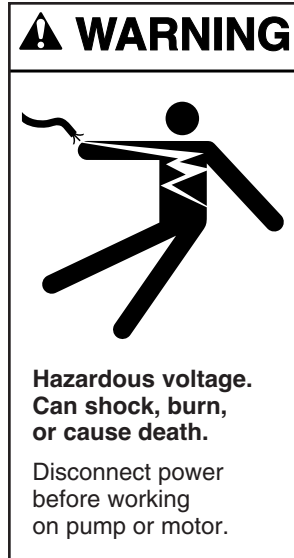
### FAILURE TO PUMP; REDUCED CAPACITY OR DISCHARGE PRESSURE

#### Suction leaks/lost prime:

1. Make sure there are no leaks in suction piping.
2. Make sure suction pipe inlet is well below the water level to prevent pump from sucking air.
3. Make sure pump is not trying to lift water.
4. Make sure suction pipe is at least 2" (51 mm) in diameter.

#### Clogged pipe/impeller, worn impeller:

1. Make sure impeller is not clogged (follow steps 1 through 7 under "Removing Old Seal", Page 7; check impeller for clogging; follow steps 7 through 11 under "Installing New Seal", Page 8, for reassembly).
2. Impeller and diffuser may be worn. If so, order replacement parts from Repair Parts List, Page 10.

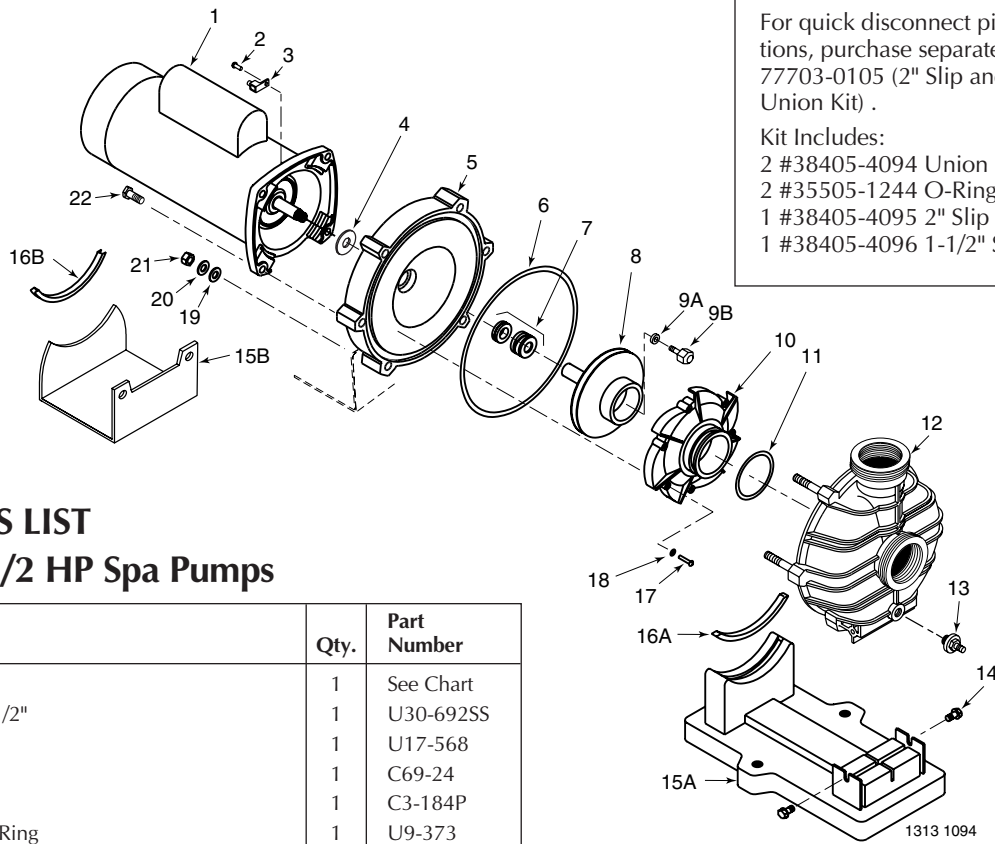


#### Electrical:

1. Pump may be running too slowly; check voltage at motor terminals and at meter while pump is running. If low, see wiring instructions or consult power company. Check for loose connections.
2. Pump may be too hot.
  - A. Check line voltage; if less than 90% or more than 110% of rated voltage consult a licensed electrician.
  - B. Increase ventilation.
  - C. Reduce ambient temperature.
  - D. Tighten any loose connections.

### MECHANICAL TROUBLES AND NOISE

1. If suction and discharge piping are not adequately supported, pump assembly will be strained. See "Installation", Page 3.
2. Do not mount pump on a wooden platform! Securely mount on concrete platform for quietest performance.



For quick disconnect pipe connections, purchase separately Part No. 77703-0105 (2" Slip and 1-1/2" Slip Union Kit) .

Kit Includes:

- 2 #38405-4094 Union Collars
- 2 #35505-1244 O-Ring
- 1 #38405-4095 2" Slip Adapter
- 1 #38405-4096 1-1/2" Slip Adapter

## REPAIR PARTS LIST 1 through 2-1/2 HP Spa Pumps

Key No.	Part Description	Qty.	Part Number
1	Motor	1	See Chart
2	Screw #10-32x1/2"	1	U30-692SS
3	Bonding Lug	1	U17-568
4	Slinger	1	C69-24
5	Seal Plate	1	C3-184P
6	Seal Plate Cord Ring	1	U9-373
7	Shaft Seal	1	17351-0101A
8	Impeller	1	See Chart
9A	Impeller Lock Screw Gasket*	1	33455-1047
9B	Impeller Lock Screw*	1	37337-6080
10	Diffuser**	1	C1-270P
11	Diffuser "O" Ring	1	U9-374
12	Pump Body (Only)	1	17303-0001
13	Drain Plug	1	U178-920P
14	Hi-Lo Screw 5/16-14x5/8"	2	U30-919SS
15A	Base - Corrosion Resistant	1	C4-77P
15B	Base - Steel***	1	17303-0113
16A	Motor Pad - for Corrosion Resistant Base	1	C35-45
16B	Motor Pad - for Steel Base***	1	C35-5
17	Screw #8-32x7/8" Rd. Hd.	7	U30-542SS
18	Lock Washer #8 Ext. Tooth	7	U43-21SS
19	Flat Washer 3/8"	6	U43-62SS
20	Lock Washer 3/8"	6	U43-12SS
21	Nut 3/8-16 Hex	6	071403
22	Cap Screws 3/8-16x1" Hex.	4	U30-74SS
	• Nameplate	1	U33-174
	• Tag, "Warning/Caution/Instruction"	1	C63-12
	• Tag, "NOTICE: Do not use pipe dope..."	1	C63-13
	• Decal, "Tested for use with spas..."	1	U27-635
	• Voltage Sticker 115/230 Volts (1-1/2 HP only)	1	U27-153
	• Voltage Sticker 230 Volts (2, 2-1/2 HP and 3 Ph. only)	1	U27-68

• Not illustrated.

\* Models TPEAG-167L, TPEAAG-168L, and TPRAG-167L only.

\*\* Model TPEAE-165L and TPRAE3-165 use Part No. C1-270PC.

\*\*\* Models with LS suffix only.

**Parts are common to all models except as noted:**

Key Nos. 1, Motor, and 8, Impeller, are listed below.

Model No.	HP	Motor No. (Key No. 1)	Impeller (Key No. 8)
<b>115/230/60/1</b>			
TPEAE-165L	1	62003-2025	C105-236PB
TPEAF-166L	1-1/2	AE100FLL	C105-236PC
TPRAF-174L	1-1/2	A100FLL	C105-236PF
<b>230/60/1</b>			
TPEAG-167LS	2	AE100GLL	C105-236PDA
TPRAG-175L	2	A100GLL	C105-236PGA
TPEAAG-168LS	2-1/2	AE100G5LL	C105-236PEA
<b>230/60/1 (2 Speed)</b>			
TPRAYF-174S	1-1/2	A100FLL-Y	C105-236PF
TPEAYG-175L	2	AE100GLL-Y	C105-236PGAB
TPEAYG-175LS	2	AE100GLL-Y	C105-236PGAB
TPEAYG-167LS	2	AE100GLL-Y	C105-236PDA
TPEAAYG-168L	2-1/2	AE100G5LL-Y	C105-236PHA
TPEAAYG-168LS	2-1/2	AE100G5LL-Y	C105-236PHA
<b>230/50/1 (2 Speed)</b>			
5TPRAYF-156	1-1/2	J218-887A	C105-236PE
<b>208-230/460/60 3-Phase</b>			
TPRAE3-165	1	J218-562A	C105-236PBA

**STA-RITE®**



S330 (Rev. A) 04-09-10