



Installation, Operation and Maintenance Instructions

Model TSP

Description and Specifications: The Model TSP is a close-coupled, end suction, two stage, enclosed impeller, back pull-out, centrifugal pump. Connections are NPT threaded. All wetted metal pump parts are 18-8, 304SS or better.

O-rings and elastomeric seal parts may be Buna, Viton, or EPR. Motors are specially built, based upon a NEMA 56 frame, with a C-Face mounting flange and an extended keyed shaft. All pumps use a mechanical seal to prevent leakage around the motor shaft.

Operating limits: The model TSP is designed for 120 PSIG at 212F with standard mechanical seal. Motor is limited to 20 starts per hour, evenly distributed.

Notice: Upon receipt of this equipment, inspect the carton and the equipment for any damages that might have occurred during shipment and notify the carrier immediately. Damage that occurs during shipment is not the responsibility of American Stainless Pumps. Failure to notify the carrier will place responsibility on you for any repairs or damages occurring during shipment.

Safety Instructions: To avoid serious or fatal injury and/or property damage, read and follow all instructions in this manual. Review all instructions and warnings included in this manual before attempting any work on this pump or pump/motor assembly. Do not remove or alter any decals.

The motor used to drive this pump is an electrical device connected to a potentially lethal voltage power source. Take all precautions required when working with or on the motor and its power source, including but not limited to:

- Always disconnect and lockout the electrical power source before attempting any connection, maintenance or repairs. Failure to do so can cause electrical shocks, burns and death.
- Install, ground and wire motors in accordance with all local and national electrical codes.
- Install an all leg disconnect switch near the motor for quick access.
- The electrical supply must match the motor nameplate specifications and the motor must be wired per the wiring diagram on the motor to match the selected voltage. **Incorrect wiring can cause fire and motor damage and will void the warranty.**
- Most single phase motors and some three phase motors will have automatic thermal protection switches wired in the motor. These switches will open and stop the motor if the motor overheats. As the motor cools, these switches will close and start the motor automatically and unexpectedly.
- Motors that do not have thermal overloads must have a properly sized contactors or magnetic starters and overload switches (or fuses) in the starter panel. Three phase motors require all leg protection.
- Use only stranded copper wire to motor and ground. Wire size must limit the maximum voltage drop to 10% of the motor nameplate voltage at the motor terminals.
- Three phase motors can rotate in either direction. The pump will operate properly only in one direction (clockwise when looking from the motor end, counter-clockwise when viewed from the pump end). **Operating the pump in the reverse rotation may damage or destroy the pump and motor, and voids the warranty.**

Installation:

- Locate the pump as near to the liquid source as possible. The pump must be primed with little or no air in the case to begin operation. The pump must be located below the liquid level when starting. **This pump is not self-priming.**
- If the discharge nozzle is not in the vertical position, an air chamber may form in the case. This air must be vented for proper operation. With the pump not running, loosen the case bolts until all of the air in the case is vented.
- Protect the pump and motor from freezing. The pump will not survive a freeze up
- Allow adequate space around the unit for service and ventilation.
- Units are designed to be installed horizontally. **Do not mount the motor below the pump as leakage from the pump will damage the motor and can cause a shock, burns or death.**
- Units mounted horizontally should be located on a flat, rigid surface. Unit may be free standing, but some vibrations may occur. If attached to a foundation, tighten hold down bolts before connecting the piping.

Rotation:

The model TSP will operate properly only in one direction (clockwise when looking from the motor end, counter-clockwise when viewed from the pump end). Operating the pump in the reverse rotation may damage the pump and/or the motor, and voids the warranty.

- Three phase motors can rotate in either direction. Single phase motors normally only rotate in the proper right-hand direction; however some single phase motors can be wired to operate with a left-hand rotation.
- To check rotation, you must observe the motor shaft or fan from the back of the motor. Quickly switch the motor on and off, and watch the shaft rotation as it slows down. Motor shaft should be turning in the clockwise (right-hand) direction when viewed from the back of the motor.
- If your three-phase motor is turning in the wrong direction (left-hand), interchange any two of the three motor power wires. This should reverse the rotation. If a single-phase motor is turning with left-hand rotation, it needs to be rewired. Consult the motor manufacturer or American Stainless Pumps for instructions.
- Check the rotation again. If it is correct, replace any removed conduit box cover.

Operation:

- Pump must be completely primed before starting. Air in the suction lines and/or the case must be vented.
- The pump cannot run dry. Running for more than a few seconds without water may damage the pump.
- If the pump case is rotated so that the discharge nozzle is not vertical, an air pocket may form in the case which will prevent the pump from operating properly. Loosen the case bolts until this air is removed for proper operation. Be sure to retighten the bolts before operating the pump.
- **Do not operate the pump at or near zero flow.** At zero flow, heat will build up in the pump and can cause extreme damage to the pump, property damage and/or possible injury to operating personal. Minimum flows of 10% of the pumps best efficiency point are recommended unless otherwise authorized by ASP.
- Do not operate the pump beyond the flow rates shown on published curves. Noisy pumps or the sounds of "pumping rocks" may be signs of cavitation or operation beyond the pump capacity.
- Check pump and motor for vibration. Vibration may be a sign of pipe strain, insufficient mounting or operation beyond the pumps capacity.

Maintenance:

There is no scheduled maintenance required. Close-coupled pumps have no bearings. Bearings in the motors are usually permanently grease lubricated and cannot be re-greased (some large motors may have grease fittings). Mechanical seals will need to be replaced when leaking. O-Rings may harden with age and need to be replaced when they leak.

Piping:

- All piping must be independently supported. No piping loads may be carried by the pump.
- Piping should be at least the same size as the pump connections.
- Piping to the suction is critical for proper pump operation.
- Suction pipe should be short and direct, with a minimum of fittings and turns.
- Suction pipe must continuously rise to the pump to avoid air pockets. All pipe connections must be airtight.
- If suction pipe is larger than the pump, an eccentric reducer may be needed with the straight side on top to avoid an air pocket.
- If suction of pump is above the liquid source level, a foot valve or other isolation valve will be needed to prime the pump. A continuous stream of liquid must be made available for the pump suction to hold its prime.
- Do not use any suction valve for throttling the pump. This will cause loss of prime and damage to the pump that is not covered by warranty.
- Be sure that the source liquid level is sufficient to prevent vortices from drawing air into the pump.
- Install a valve on the discharge line for use in regulating the pump flow and for isolating the pump during maintenance and inspection.

Disassembly:

Disconnect and lockout the electrical power before attempting any disassembly. Casing may contain hazardous fluids. Drain and flush and take necessary precautions.

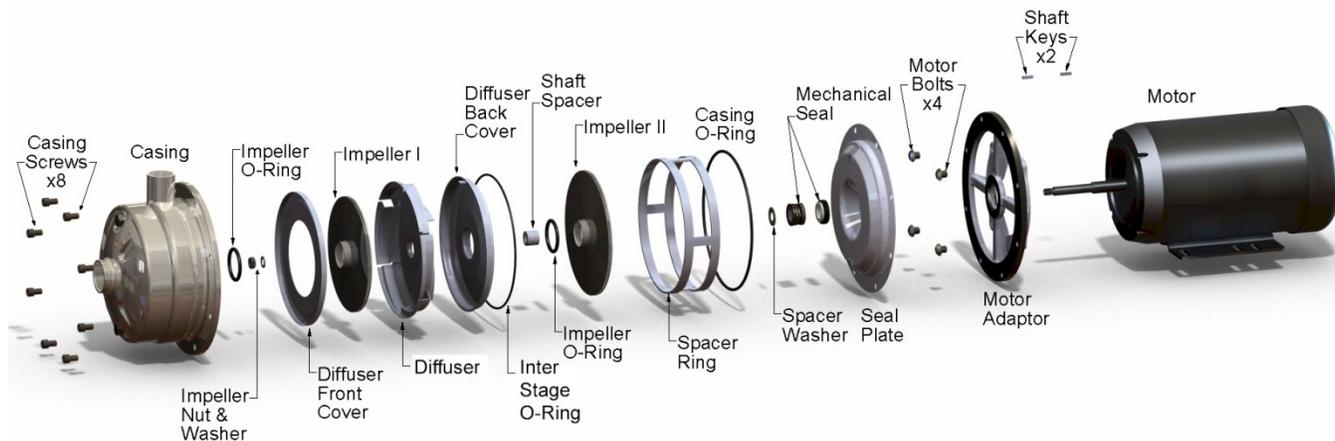
It is not necessary to remove piping from the case to disassemble the pump. Pump is a back pullout design and unless casing needs to be repaired or replaced, it can stay in place during servicing. Note that it will be much easier to reassemble on a work bench than when the pump case stays in place.

1. Close all valves and drain pump and pipes and flush if necessary.
2. Remove any motor hold down bolts.
3. Remove the eight (8) case bolts with a wrench or socket.
4. Pull the motor and pump internals back out of the case. If the pump and motor are on a bench, pull the case off of the pump. It may be necessary to gently rock the case back and forth to work it off the pump internals. There are internal o-rings that will resist this removal.
5. Remove the diffuser front cover from the case. It is sandwiched in place between the case and the diffuser and should be easy to remove.
6. A locking nut and washer are used keep the impellers from moving axially on the shaft. The locking nut is a right hand threaded nut. Remove with a wrench while holding the impellers.
7. After removing the locking nut, remove the first stage impeller by sliding it forward and off the shaft. Remove the floating o-ring from the impeller. There is a small impeller key that may or may not fall out.
8. Remove the diffuser, the diffuser back cover, the diffuser o-ring, the spacer ring, the shaft spacer, the second stage impeller with its key and floating o-ring, and the spacer washer that is in front of the mechanical seal. All of these parts should slide easily off. Do not bend or use excessive force on any of these parts.
9. Remove the rotating element of the mechanical shaft seal. If the rotating element does not come off easily, it is stuck to the shaft. Pry up the seal plate with screw drivers or pry bars. The seal plate should compress the seal spring and force the seal off the shaft. If seal is stuck, and you must pry with force, do not pry towards your face or body. The seal and seal plate can come free unexpectedly and injure you.
10. If the seal plate did not come off with the seal, remove it now. If you plan to replace the stationary seat, you will need to press it out of the seal plate from the back. Do not push with your finger or you will probably cut yourself on the edges of the seal plate when the seal pushes out.
11. If you plan to replace the motor, remove the four motor adapter bolts with a 5/16" Allen wrench and remove the motor adapter plate. If you are not replacing the motor, leave the adapter plate in place.
12. If the motor comes with a rubber deflector, the deflector should go between of the motor and the adapter plate.
13. Check the impeller floating o-rings that ride on the impeller suction shrouds. Replace if damaged, swollen, fretted or just worn out. This O-Ring is not necessary for pump operation but it acts as a restriction to recirculating flow and will improve the pump efficiency. It should be loose enough on the impeller that it can slide forward when running.
14. Check the interstage o-ring and the case o-ring. Replace if damaged or hard. If the o-rings have been in service for over a few months, it is best practice to replace.

Assembly or Reassembly:

- -Assembly of the pump and motor is easier when the motor shaft is pointing up so that parts are properly aligned.
 - -It is considered good practice to replace the mechanical seal and o-rings whenever you have to disassemble the pump. If all seal components are in good condition, you may reuse the parts.
1. If replacing the motor, and the motor has a deflector, be sure the deflector is placed behind the motor adapter plate so the deflector can spin freely.
 2. Install the motor adapter plate with the four motor bolts using an Allen wrench. Tighten the bolts to approximately 12 foot lbs.
 3. Install the mechanical seal stationary seat into the Seal Plate by putting a suitable lubricant on the cup seat and gently pressing into the seal plate bore. **Do not get any lubricant or dirt on the seal faces.** Place the seal plate with a new o-ring onto the motor adapter plate.
 4. Lubricate the sealing elastomers on the rotating assembly of the mechanical seal and press gently onto the shaft.
 5. Install in the following order these parts: The mechanical spacer washer, the second stage impeller key, the second stage impeller (the second stage impeller is always the larger impeller), the impeller o-ring, fit the spacer ring over the impeller and align the notches with the tabs on the seal plate, the impeller shaft spacer, install the diffuser back cover with the diffuser o-ring, the diffuser, the first stage impeller key, and the first stage impeller with an impeller o-ring.
 6. Tighten the impeller nut over the impeller washer. If the nylon locking material is ineffective, replace or lock tight on the nut.
 7. Put some soapy water or other lubricant on the Interstage O-Ring to make it easy for the case to slide past the o-ring.
 8. Place the diffuser front cover on the diffuser so that the edges of the cover are pointing up to the case.
 9. Place the case back over the stack of parts and press down, wiggling and working the case over all of the parts on the stack. Do not force. The case will be on when there is about a 1/16" gap between the case flange and the seal plate flange. Tightening the eight case bolts will pull the case down to the seal plate and compress the stack.
 10. If you are reassembling with the case left in place, you will need much patience to slide the stack into the case. Do not force anything in. Put a little Vaseline or grease onto the first stage suction o-ring to keep it from falling off. Put the Diffuser Front cover into the case with the edge pointing toward the suction connector. Gently slide the stack into the case, checking for free rotation as you go. Be sure the impellers rotate freely before and after tightening the case bolts.
 11. Tighten the eight case bolts evenly and carefully so you do not get the case or the stack of parts tilted. Tighten the bolts to approx. 10 foot lbs.
 12. Make sure the impellers rotate freely by spinning the motor shaft from the rear of the motor. If the impellers do not turn freely (with a little friction from the seal faces), disassemble and find the cause of the bind.
 13. Replace any motor back covers.

Model TSP Exploded View



| Part | Materials |
|-----------------------------------|--|
| Casing Screws (Qty 8) | 304 SS |
| Casing, 1.25" x 1.0" NPT | 304 SS |
| Impeller O-Ring (Qty 2) | Buna, Viton, EPR |
| Impeller Nut and Washer | 304 SS |
| Diffuser Front Cover | 304 SS |
| Impeller I (Enclosed) | 304 SS |
| Diffuser | 304 SS |
| Diffuser Back Cover | 304 SS |
| Interstage O-Ring | Buna, Viton, EPR |
| Shaft Spacer | 304 SS |
| Impeller II (Enclosed) | 304 SS |
| Spacer Ring | 304 SS |
| Casing O-Ring | Buna, Viton, EPR |
| Spacer Ring Washer | 304 SS |
| Mechanical Seal – Type 6 standard | Faces: Car/Cer, Car/SiC, SiC/SiC. Elast: Buna, Viton, EPR |
| Seal Plate | 304 SS |
| Motor Bolts (Qty 4) | 304 SS |
| Motor Adapter Plate | 304 SS |
| Shaft Keys (Qty 2) | 304 SS |
| Motor | Various |

Limited Warranty:

American Stainless Pumps (ASP) warrants that its manufactured products are made of first class materials and in a skillful and workmanlike manner, and when properly installed and maintained, will operate as proposed in the company's written documents. This warranty is in effect for a period of two years from shipment. ASP will pass through to its customers any warranties granted by the manufacturers of motors and mechanical seals but does not itself warrant these items. There are no other warranties, expressed or implied, except for the warranties given here. ASP does not warranty against corrosion or erosion of its products when placed in service. Under no circumstances will ASP be liable for any penalties or any incidental or consequential damages caused by the failure of its products, by late delivery or by any other causes. This warranty may not be modified verbally by any employee or agent of ASP.