



## Model SSP & SSPC Installation Operation & Maintenance Instructions



### Description and Specifications

The Model **SSP** is a close coupled, end suction, single stage, open-impeller, back-pullout centrifugal pump. The model **SSPC** is the enclosed impeller version of the same pump. Connections are NPT threaded. All wetted metal pump parts are 18-8, 304SS, or better. Most parts are formed from stainless steel sheet. O-rings and elastomeric seal parts are Buna (Viton & EPR are optional). Motors are NEMA 56J frame, with a C-Face mounting flange and a threaded shaft. All pumps use a mechanical seal to prevent leakage around the motor shaft. Standard mechanical seal faces are carbon and ceramic, with silicon carbide also available.

### Operating limits

The models **SSP & SSPC** are designed for a 125-psig operating pressure at 212 deg. F., with the standard Type-16, Carbon vs. Ceramic faces with Buna-N elastomers mechanical seal. A maximum temperature limit of 250 deg. F is possible with Viton elastomers. The motor is limited to 20 starts per hour, evenly distributed. Minimum flows are 5% of the best efficiency operating point. **These pumps are not designed for use with hazardous liquids or gasses.**

### 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 the purchaser 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 the following:**

### **Safety Instructions (continued...)**

1. 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.
2. Install ground and wire motors in accordance with all local and national electrical codes.
3. Install an all leg disconnect switch near the motor for quick access.
4. 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.**
5. 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.
6. Motors which do not have thermal overloads must have a properly sized contacts or magnetic starters and overload switches (or fuses) in the starter panel. Three phase motors require all leg protection.
7. 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.
8. Three phase motors (and some single phase motors) can rotate in either direction. The pump will operate properly only in one direction (clockwise when looking from the motor end, counterclockwise 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.** See section below titled, Rotation.

### **Installation**

Units may be installed horizontally, at an angle or vertically with the motor on top. **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.**

- 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. Ideally, the pump should be located below the liquid level when starting. This pump is not self-priming.
- Protect the pump and motor from freezing. The pump will sustain significant damage if allowed to freeze.
- Allow adequate space around the unit for service and ventilation.
- 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.

### **Piping**

- All piping must be independently supported. No piping loads may be carried by the pump.
- Piping should be the same size or larger than the pump connections.
- Proper 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 be designed to avoid potential air pockets. All pipe connections must be airtight.
- If suction pipe is larger than the pump's suction port, an eccentric reducer should be used with the straight side on top to avoid creating an air pocket.
- If suction of pump is above the liquid level source, a foot valve or other isolation valve will be needed to maintain the prime of the pump. A continuous stream of liquid must be made available for the pump suction to hold its prime.
- Be sure that the source liquid level is sufficient to prevent vortices from drawing air into the pump.
- Install suction and discharge valves for isolating the pump during maintenance and inspection.
- Do not use any suction valve for throttling the pump. This may cause a loss of prime, and damage to the pump that is not covered by warranty. Flow regulating using throttling valves should only be done on the discharge side of the pump.

## Rotation

The models SSP & SSPC will operate properly only in one direction (clockwise when looking from the motor end, and counterclockwise when viewed from the pump end). Three phase motors can rotate in either direction. Single phase motors normally only rotate in the proper direction. **Operating the pump in reverse rotation may cause the impeller to unscrew; breaking the shaft, damaging the pump and/or the motor, and voids the warranty.**

**To check rotation, you must observe the motor shaft from the back of the motor.**

1. Remove the cap or plug in the center rear of the motor to expose the back of the shaft. You do not need to remove any screws on most motors.
2. Quickly switch on and off the motor and watch the shaft rotation as it slows down. Motor shaft should be turning in the clockwise direction when viewed from the back of the motor.
3. If your three-phase motor is turning in the wrong direction, **have a qualified electrician interchange two of the three motor power wires**. This should reverse the rotation. If a single-phase motor is turning in the wrong direction, consult the motor manufacturer or American Stainless Pumps for instructions.
4. Check the rotation again. If it is correct, replace the end cover cap.

## Operation

- Pump must be completely primed before starting. Air in the suction lines or case must be vented.
- **Model SSPC Only:** If the pump case is rotated so that the discharge nozzle is not vertical, an air pocket may form in the case that 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 5% 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 pumps capacity.
- Check pump and motor for vibration. Vibration may be a sign of pipe strain, insufficient mounting or operation beyond the pumps capacity.
- The pump models SSP & SSPC are not designed for handling large amounts of solids. For the model SSP, spherical solids size should not exceed the vane height of the impeller, less 0.060”. For the model SSPC, solid sizes must be smaller than the opening at the discharge of the impeller.

## Maintenance

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

## Motor Bearings and Pump Thrust: Model SSP Only

Open impellers generate significantly more thrust than do enclosed impellers. The Model SSP with a 4.38” diameter impeller operating at 20 psig generates about 150 pounds of thrust. This thrust load is carried by the motor bearing. The standard jet pump motor and the standard SSP motor uses as a front and rear bearing size 203 grease lubricated bearing. This bearing has a B10 rated life of approximately 6,000 hours when operated with a thrust load of 150 pounds at 3500 RPM. This rating means that 10% of all bearings operated in this condition will fail within 6,000 hours of operation. The average bearing life will be 3 to 4 times these 6,000 hours. Pumps and motors which operate intermittently, or only operate 40 hours per week, will usually have acceptable bearing lives with the standard jet pump motor bearing. Pumps that operate continuously, 24 hours per day, will have about 10% of their thrust bearings fail in the first year of operation.

**For service applications that are critical, for installations that are difficult to access, or for pumps operating at differential pressures above 25 psig, American Stainless Pumps recommends that motors with a larger thrust bearings and higher load ratings be used.** Consult factory for pricing and details.

## Disassembly

**Disconnect and lockout the electrical power before attempting any disassembly. The pump 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 the casing needs to be repaired or replaced, it can stay in place during servicing. See page 7 for cross sectional drawings.

1. Close all valves and drain pump and pipes. Flush pumps and piping if necessary.
2. Remove any motor hold down bolts from the motor foot or stainless steel pump base (Item 800)
3. Remove the eight (8) case bolts (Item 7CS) with a 3/16" Allen wrench.
4. Pull the motor and pump internals back out of the case. The baseplate (Item 800) will slip off when the bottom two case bolts are removed and can be left with the pump case.
5. Remove the case o-ring (item 500) and inspect for damage or hardness.
6. If the motor is a three phase motor, a locking mechanism (item 7SC) is used to prevent the impeller (item 200) from unthreading if started in the wrong direction. The locking screw (item 7SC) is installed with removable Loctite® thread locking compound, to prevent it from coming out when operating in the correct rotation. Remove this locking screw by turning it **counterclockwise** while holding the impeller against rotation. If the pump casing has a label indicating the impeller locking screw has LEFT HAND threads, or if the motor is manufactured by Emerson or Nidec, remove this screw by turning it **clockwise**.
7. Remove the impeller (item 200) by turning the impeller counterclockwise (when looking at the impeller from the pump end) while holding the motor shaft. It may be necessary to remove the motor shaft plug/cap in the center of the rear of the motor to gain access to the shaft. Using a screwdriver, wrench or vise grips as needed, hold the shaft tightly against rotation while turning the impeller. **DO NOT apply any heat to the components.** If you are unable to hold the shaft in this manner, remove the rear motor housing and grip the motor shaft with vise grips or other similar device (do not hold shaft where bearings will mount).
8. **Model SSP Only:** There should be several spacing washers behind the impeller. These spacers locate the open impeller vanes close to the case for efficient operation. Measure the thickness of this stack of spacers for future reference. Remove them from the shaft but do not lose these washers. You will need them for reassembly.
9. Remove the rotating element of the mechanical shaft seal (item 300). This element is held in place by the impeller only. If the rotating element does not come off easily, it is stuck to the shaft. Pry up the seal plate (Item 400) with screwdrivers 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 (item 400) did not come off with the seal, remove it now.
11. To replace the stationary seal seat, you will need to press it out from the back of the sealplate (Item 400). Do not push with your finger, as you may cut it on the edges of the seal plate when the seal pushes out. Use a flat head screw driver to press seal seat out of the seal plate.
12. If you plan to replace the motor or motor adaptor (Item 600), remove the four motor adaptor bolts (Item 7MB) with a 7/32" Allen wrench. Remove the motor adaptor.
13. If the motor comes with a rubber deflector (slinger), the deflector should go outside of the motor adapter plate and must be removed if the adapter plate is to be removed.
14. Check the suction o-ring (item 510) in the casing suction nozzle. It may be difficult to remove. Use a sharp pointed awl or similar device to pry the o-ring from the groove, or blow it out with a high pressure air nozzle. Replace o-ring if damaged, swollen, fretted, or worn out. The o-ring improves the pumps efficiency, but is not necessary for pump operation.

## **Assembly or Reassembly**

- See page 7 for cross sectional drawings.
  - Assembly of the pump and motor is easier when the motor is standing face up so that parts do not fall off, although access to the motor shaft at the rear of the motor will require a horizontal position.
  - It is considered good practice to replace the mechanical seal and o-rings whenever you have to disassemble the pump.
1. If replacing the motor, remove the deflector from the motor shaft. There will not be enough room behind the motor adapter plate for the deflector to spin freely.
  2. Install the motor adapter plate (Item 600) with the four motor bolts (Item 7MB) using a 7/32" Allen wrench. You must use the low profile button head socket screws that came with the pump or other low profile head bolts. Tighten the bolts to approximately 120 inch pounds torque.
  3. Install the shaft deflector. Slide the deflector up against the motor adaptor plate.
  4. Install the mechanical seal stationary seat into the Seal Plate (Item 400) by putting a suitable lubricant on the rubber cup seat and gently pressing the seat, cup end first, into the seal plate bore. **Do not get any lubricant on the seal faces.** Use a soft cloth or other suitable item to protect the seal face from dirt and scratches while pressing into the seal plate.
  5. Place the seal plate onto the motor adapter plate. Observe that the shaft comes through the center of the seal stationary face, and does not contact the seal stationary face.
  6. Lubricate the sealing elastomers on the rotating assembly of the mechanical seal and press gently onto the shaft so that the rotating face will contact the stationary seal face. Fully compress the seal ensuring face contact. You may have to hold the seal in place until the impeller is installed.
  7. **Model SSP Only:** Place the necessary number and thickness of impeller spacer/washers onto the threaded portion of the shaft. If you are not changing the impeller or the motor, use the same batch of spacer/washers you removed when disassembling the pump. See the section on **Setting Impeller Clearance** for procedures if you are changing the impeller to case setting, or are building a new pump.
  8. Thread the impeller onto the pump shaft, and tighten into place. You will need to hold the motor shaft from the rear of the motor with a large screwdriver, wrench or vise grips while tightening the impeller. **Wear leather gloves to avoid cuts when holding impeller while tightening.**
  9. If the motor is three-phase, install the impeller locking screw and washer (item 7SC). Use a thread locking compound similar to Loctite® 242 on the locking screw. Make sure screw does not bottom-out in the bottom of the threaded hole.
  10. Install the case o-ring (item 500) onto the sealplate. Replace if brittle, damaged or misshapen.
  11. **Model SSPC Only:** Install the suction o-ring (item 510) into the groove on the inside of the suction nozzle. Replace if brittle, damaged or misshapen.
  12. **Model SSPC Only:** Join up the back pull out assembly with the case. Do not force the pump into the case. The impeller o-ring (item 510) can be pinched by the impeller when installing. You may have to back out the pump from the case, center up the impeller o-ring with your finger and slip in the pump assembly again. Before installing the case bolts, check to be sure the impeller is spinning freely.
  13. **Model SSP Only:** Insert the back-pull-out-assembly into the case.
  14. If the pump has a stainless steel base plate (Item 800), align the two mounting holes on the base with the bottom two casing screw holes.
  15. Install the (8) case bolts (item 7CS), and hand tighten. Then tighten screws into place using approximately 80 inch pounds of torque, and a cross bolting technique.
  16. **Model SSP Only:** Check the impeller to case clearance per the following instructions for setting impeller clearance, and adjust as needed.
  17. Install and tighten the motor base hold down bolts.

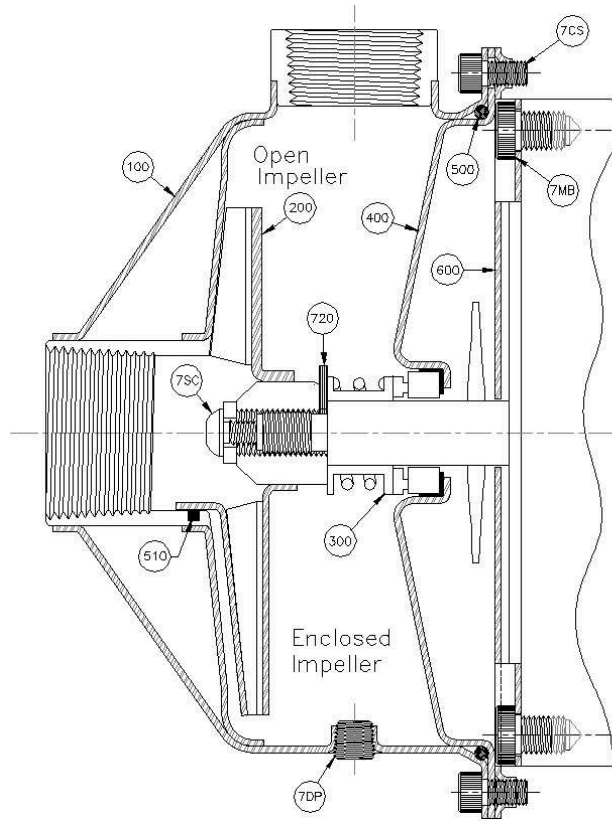
### Setting Impeller Clearance: Model SSP Only

- See SSP Performance Notes for impeller shimming discussion [www.aspumps.com/products/ssp/3500-rpm/ssp\\_perf\\_notes.htm](http://www.aspumps.com/products/ssp/3500-rpm/ssp_perf_notes.htm)
- Properly setting the impeller to case clearance is the most critical factor in determining the SSP's performance.
- You will get maximum performance and efficiency (and maximum amp draw) with near to zero clearance. Factory standard clearance is 8 to 12 mil. Spacer/Washers to adjust clearances are available in 10 mil and 15-mil thickness, and can be ordered as a kit from the factory, p/n 720101.
- You can have more or less than normal flow and head by changing the clearance. To increase clearance, remove impeller spacer/washers. To decrease clearance, add impeller spacer/washers. **Be aware that if you set the impeller at near to zero clearance, and operate near maximum flow rates, you may overload the standard motor. Also be aware that impeller clearances near zero greatly increase the risk of the impeller grinding against the casing.**
- Standard factory settings for spacers are 30 to 90 mils of spacer/washers to obtain 10-mil clearance. Since the tolerances of the motor shaft and pump parts can stack up, some pumps may need more or less than this standard.
- Some special OEM assemblies will not have any spacers when the customer elects to accept reduced performance in return for ease of assembly.

### Use the following impeller shimming method when building a new pump

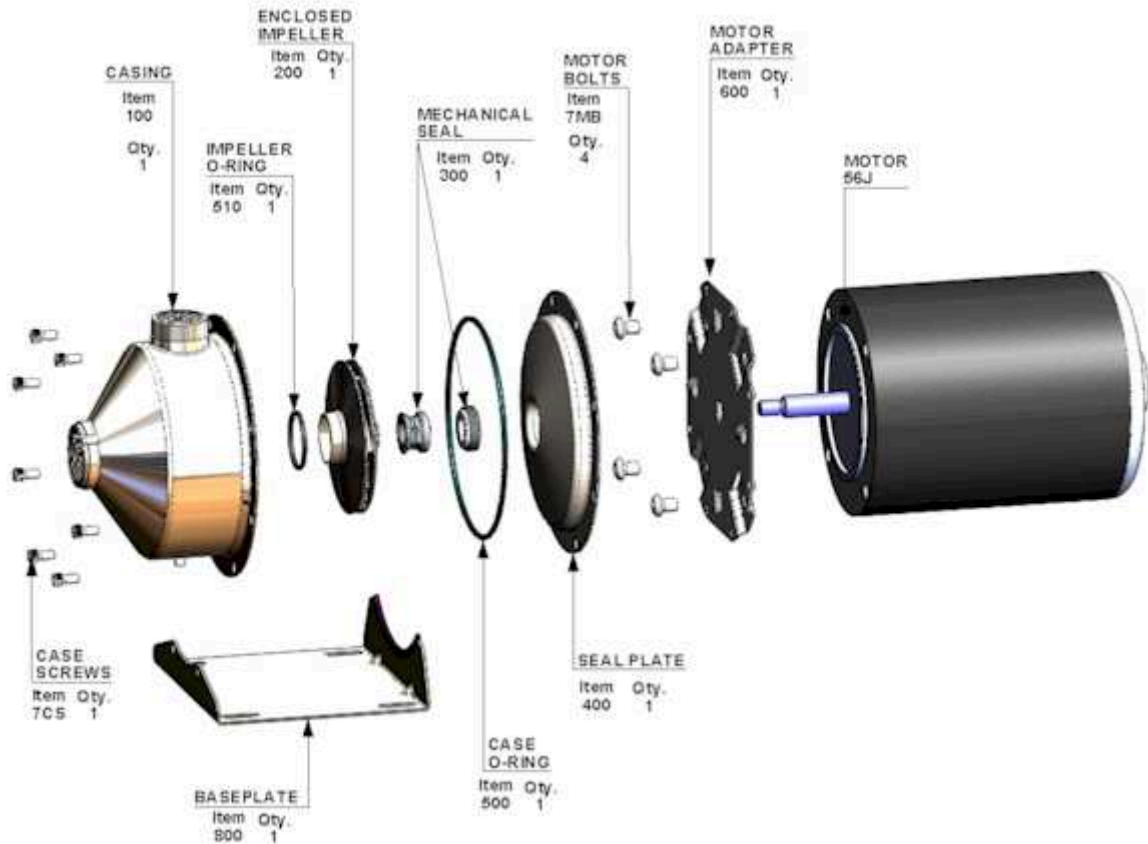
1. Place the pump (as assembled through step 4 of the Assembly section above) on the workbench, positioned vertically.
2. Place 0.050" shims onto the motor shaft (two 0.015" shims and two 0.010" shims).
3. Thread the impeller onto the shaft, compressing the seal and shims. You will need to hold the motor shaft from the rear of the motor with a large screwdriver, wrench or vise grips while tightening the impeller. **Wear leather gloves to avoid cuts when holding impeller while tightening.**
4. Place casing (item 100) onto seal plate **without** casing o-ring (item 500). Install 4 case screws (item 7CS) and tighten moderately (20-30 inch pounds torque). This is a time saving step to allow for observation of impeller clearance. Try to view through the suction and discharge nozzles, the impellers clearance between the vanes and casing. Rotate the shaft while listening and feeling for contact between the impeller and casing. Alternatively, use a feeler gauge to measure the clearance between impeller vanes and pump casing. This can be done through either the suction nozzle or the discharge nozzle.
5. Add or remove shims/washers from behind the impeller to achieve proper impeller clearance, and repeat step 4. When proper clearance has been established, remove the 4 casing screws and the casing, and proceed to **step 9 in the Assembly Instructions above.**

**SSP & SSPC Cross-Sectional Drawings**  
**SSP (Open Impeller) on top, SSPC (Enclosed Impeller) on bottom.**



Item	Part	Materials
100	Casing	304 SS
200	Impeller (Open or Enclosed)	304 SS
300	Mechanical Seal – Type 16	Car/Cer/Buna N/304SS
	Other materials: SilCar, Viton, EPR,	
400	Seal Plate	304 SS
500	Casing O-Ring	Buna N, Viton, EPR
510	Impeller O-Ring (Enclosed Imp. Only)	Buna N, Viton, EPR
600	Motor Adapter Plate	304 SS
720	Impeller Shims/Washers (0.010 & 0.015 thick)	304 SS
7CS	Case Screw 1/4-20 x 1/2"	304 SS
7DP	Casing Drain Plug (1/8" NPT)	304 SS
7MB	Motor Bolt (3/8-16 x 1/2")	304 SS
7SC	Impeller Washer & Screw (3-phase motors only)	304SS

**SSPC Exploded View**



**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 does not warranty against corrosion or erosion or wear of its products when placed in service.
- ASP will pass through to its customers any warranties granted by the manufacturers of products purchased by ASP and sold with its manufactured products (such as motors or mechanical seals), but does not itself warrant these items.
- 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.
- All ASP products are sold FOB The Factory. Freight charges for returning and reshipping products are the buyer's responsibility, regardless of warranty status.
- There are no other warranties, expressed or implied, except for the warranties given here. This warranty may not be modified verbally by any employee or agent of ASP.

**Returns**

All products returned to ASP for warranty evaluation must be authorized in advance by the issuance of a Return Material Authorization number (RMA#) by ASP. The returned equipment must be clearly tagged with the RMA#, as well as the name and address of the consignor. Any products proven to ASP's satisfaction to be defective will be replaced or repaired at the ASP's option. ASP will not pay for any transportation charges to or from its facilities.

**Shipments**

All sales are FOB the ASP's facility in Los Angeles CA. Acceptance of material by common carrier constitutes a shipment and ASP is not liable for any loss caused by the carrier. Customer is responsible for filing a claim against the carrier for equipment damaged or lost in transit. Claims for shortage must be made within ten (10) working days of receipt of equipment or goods.