Model SSP & SSPC & SSPB

Installation, Operation and Maintenance Instructions

Description and Specifications:

The Model **SSP, SSPC, SSPB** are close coupled, end suction, single stage, open-impeller, back-pullout centrifugal pump. The model **SSPC and SSPB** are enclosed impeller versions 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:

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 that do not have thermal overloads must have properly sized contactors 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 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 void 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.
- Protect the pump and motor from freezing. Although the pump may survive a freeze up, the mechanical seal and o-rings will not.
- Allow adequate space around the unit for service and ventilation.
- 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.**
- 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.

- The suction pipe should be short and direct, with a minimum of fittings and turns.
- The 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 must be used 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 a 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.

Rotation:

The model SSP/C/B 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 cause the impeller to unscrew, breaking the shaft, damaging 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 direction.
- To check rotation, you must observe the motor shaft or fan from the back of the motor. Remove the end cover from the center of the back of the motor by prying off the cap. You do not need to remove any screws on most motors. 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.

- If motor is turning in the wrong direction, **have a qualified electrician interchange two of the three motor power wires**. This should reverse the rotation.
- Check the rotation again. If it is correct, replace the end cover cap.

Operation:

- The pump must be completely primed before starting. Air in the suction lines or case must be vented.
- **Model SSPC/SSPB 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 & SSPB 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 SSPB/C, 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 regreased. 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:

- Open impellers generate significantly more thrust than do enclosed impellers. The Model FDP with a 4.38" diameter impeller operating at 20 psig generates about 150 pounds of thrust. The motor bearing carries this thrust load.
- The standard jet pump and FDP motors use size 203 grease-lubricated bearings, with a B10 life of about 6,000 hours at a 150-pound thrust load and 3500 RPM. This means 10% of bearings will fail within 6,000 hours, while the average life is 3 to 4 times longer.
- Pumps and motors running intermittently or 40 hours per week typically have acceptable bearing life with standard jet pump bearings. Those running continuously, 24/7, will see about 10% of thrust bearings fail within the first year. Pumps operating at 1750 rpm do not have these thrust limitations.
- **For service applications that are critical, for installations that are difficult to access, for pumps operating at differential pressures above 25 psig, or for open impellers larger than 4.38" diameter, American Stainless Pumps recommends that motors with larger thrust bearings and higher load ratings be used.**

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. The pump's back-pullout design allows the casing to remain in place during servicing, unless repair or replacement is needed. See cross sectional drawings for reference.

1. Close all valves and drain pump and pipes. Flush pumps and piping if necessary. Remove any motor hold down bolts from the motor foot or stainless-steel pump base (Item 800).
2. Remove the eight (8) case bolts (Item 7CS) with a 3/16" Allen wrench.
3. 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.
4. Remove the case o-ring (item 500) and inspect for damage or hardness.

5. 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 Nidec (US Motors brand), remove this screw by turning it **clockwise**.
6. 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).
7. **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.
8. 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.
9. If the seal plate (item 400) did not come off with the seal, remove it now.
10. 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 screwdriver to press seal seat out of the seal plate.
11. If you plan to replace the motor or motor adaptor (Item 600), remove the four motor adapter bolts (Item 7MB) with a 7/32" Allen wrench. Remove the motor adaptor.
12. 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.
13. 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 must disassemble the pump.

1. When replacing the motor, remove the deflector (slinger) 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 using very lightly soapy water (or just water) and press gently onto the shaft so that the rotating face will contact the stationary seal face. Do NOT use grease to lubricate the seal. Fully compress the seal ensuring face contact. You may have to hold the seal in place until the impeller is installed.
7. Open Impellers Only: Place the necessary number and thickness of impeller spacer/washers over 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. Enclosed impellers only: Install the suction o-ring (item 510) into the groove on the inside of the suction nozzle. Replace if brittle, damaged or misshapen. The pump will operate without this o-ring, but will lose 1-2psi of pressure.
12. Enclosed impellers 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. Open Impellers 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. Open Impellers only: Check the impeller to case clearance per the following instructions for setting impeller clearance and adjust as needed.
17. Install and tighten any bolts used to secure the motor base.

Setting Impeller Clearance for Open Impellers:

- **Impeller clearance to the case is critical to pump performance for 2900 or 3500 rpm pumps**.
- You will get maximum performance and efficiency (and maximum amp draw) with near to zero clearance. Factory standard clearance is 8 to 15 mils. Spacer/Washers to adjust clearances are available in 10 mil and 15 mil thickness. Since the tolerances of the motor shaft and pump parts can stack up, some pumps may need more or less than this standard.
- You can have more or less than normal flow and head by changing this clearance.
    - **Metal shims behind the impeller**:
        - To increase clearance, remove impeller spacer/washers between the impeller and motor shaft shoulder.
        - 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. You may also prevent the impeller from rotating, which will cause it to overload.***
- Some special OEM assemblies will not have any spacers when the customer elects to accept reduced performance in return for ease of assembly. The following are several possible methods for setting the clearance:

1. If the pump discharge piping is removed, you can look in the discharge port with a flashlight and see the impeller to case clearance, and possibly measure it with a feeler gauge.
2. If you haven't changed the impeller, the motor or the case, you can simply replace or duplicate the spacer/washer pack that was installed when you disassembled the pump and have the same performance you had originally.
3. For a rough spacer measurement, place 7/16" or 1/2" washers behind the impeller. Stand the pump vertically with the impeller facing up. Center the case over the impeller by eye and measure the gap between the case and seal plate flanges at four points, then average. Remove and measure the washers' total thickness. Subtract the gap from the total washer thickness to estimate the required spacer thickness for zero clearance, then subtract 10 mil for standard factory clearance.
4. If you measure the total thickness of a 4.38" diameter impeller, from the face of the vanes at the tips to the back of the hub behind the impeller, you should get a total thickness of about 0.900 inches. This impeller thickness will require a washer/spacer pack of approximately 50 mils to get a factory clearance of 10 mils. A larger or smaller impeller thickness will require fewer or more washer/spacers.

- **Always check to make sure the impeller is not rubbing on the case prior to turning on the motor.** Turn shaft by hand and listen for a scraping sound. If you hear scraping, you need to remove washer/spacers from behind the impeller.
- If setting clearances near zero, note that the case and impeller flex as pump pressures change. Higher pressure near shutoff causes slight expansion and flexing. Pumps may rub at shutoff or runout, and piping loads or poorly mounted motors can cause rubbing. Adjust piping loads or increase clearances to compensate.
- Pump cases and impellers are not always perfectly aligned. You may have clearance at the top of the case where you can measure it through the discharge port and have a rub at the bottom of the case. If you want to run at low clearances, you may have to put different amounts of spacers on different bolts to correct for this misalignment.

Limited Warranty:

See www.aspumps.com for the most updated Warranty Policy