# INSTRUCTION MANUAL S237-SA

**NOTICE** **S237-SA is designed for construction and maintenance applications where light weight, compactness, and low air consumption are prime factors. Ingersoll-Rand is not responsible for customer modification of pumps for applications on which Ingersoll-Rand was not consulted.**

**RELEASED: 5-31-19**
**(REV: A)**

## INSTRUCTIONS FOR MODELS S237-SA SUMP PUMPS

**IMPORTANT SAFETY INFORMATION ENCLOSED.**
**READ THIS MANUAL BEFORE OPERATING PUMP.**

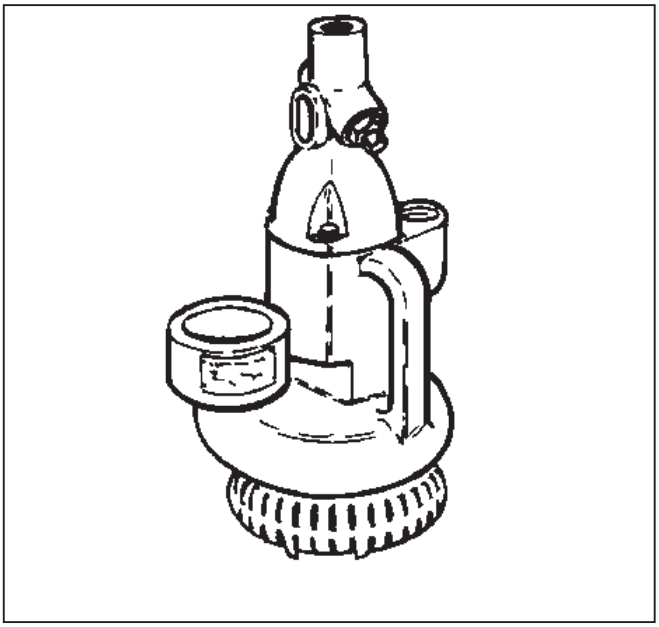
It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.
Failure to observe the following warnings could result in injury.

### PLACING PUMPS IN SERVICE

- Always operate, inspect and maintain this pump in accordance with all regulations (local, state, federal and country), that may apply to hand held/hand operated pneumatic pumps.
- For safety, top performance, and maximum durability of parts, operate this pump at 90 psig (6.2 bar/620 kPa) maximum air pressure at the inlet with 3/4" (19 mm) inside diameter air supply hose.
- Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this pump, or before performing any maintenance on this pump.
- Do not use damaged, frayed or deteriorated air hoses and fittings.
- Be sure all hoses and fittings are the correct size and are tightly secured.
- Always use clean, dry air at 90 psig maximum air pressure. Dust, corrosive fumes and/or excessive moisture can ruin the motor of an air pump.
- Do not lubricate pumps with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.
- This pump is not designed for working in explosive atmospheres.
- This pump is not insulated against electric shock.

### USING THE PUMP

- Always wear eye protection when operating or performing maintenance on this pump.
- Always wear hearing protection when operating this pump.
- Use accessories recommended by **Ingersoll-Rand.**
- Do not start or operate this pump unless it is submerged.



**NOTICE** The use of other than genuine Ingersoll-Rand replacement parts may result in safety hazards, decreased pump performance, and increased maintenance, and may invalidate all warranties.

Repairs should be made only by authorized trained personnel. Consult your nearest Ingersoll-Rand Authorized service center.

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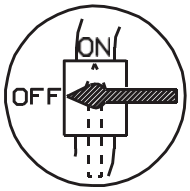
# WARNING LABEL IDENTIFICATION

**⚠WARNING FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.**

**⚠WARNING**

**Important information contained in Operation and Maintenance Manual for safe tool operation.**
**This material must be read prior to operating the tool.**




**⚠WARNING**

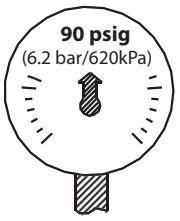
**Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.**

**⚠WARNING**

**Always wear eye protection when operating or performing mainenance on this tool.**

**⚠WARNING**

**Do not use damaged, frayed or deteriorated air hoses and fittings.**




**⚠WARNING**

**Operate at 90 psig**
**(6.2 bar/620 kPa)**
**Maximum air pressure.**

# PLACING TOOL IN SERVICE

## LUBRICATION

Ingersoll-Rand No. 50

Ingersoll-Rand No. 100

**Before placing a Pump in service:** Remove the Oil Chamber Plug and fill the oil chamber in the Backhead with oil. Inject about 3 cc of oil into the air inlet before attaching the air hose.

**After each four hours of operation,** Unless an air line lubricator is used, replenish the chamber in the Backhead with oil.

**The use of an air line lubricator is recommended for lubricating the Pump motor.**

**After each forty hours of operation,** or as experience indicates, pump 10 or 15 strokes of grease from No. P25-228 Grease Gun into the Grease Fitting on the Motor Housing.

Ingersoll-Rand Sump Pumps can be completely submerged but a watertight exhaust conduit to the surface of the sump liquid should be maintained at all times.

**Under no circumstance should hose smaller than 1" ID be used as it will restrict the exhaust and impair the efficiency of the Pump.**

When pumping from a ditch or sump, set the Pump on a board or flat stone or suspend it a few inches off the bottom of the sump. The less mud, sand and gravel pumped, the longer the Pump will last.

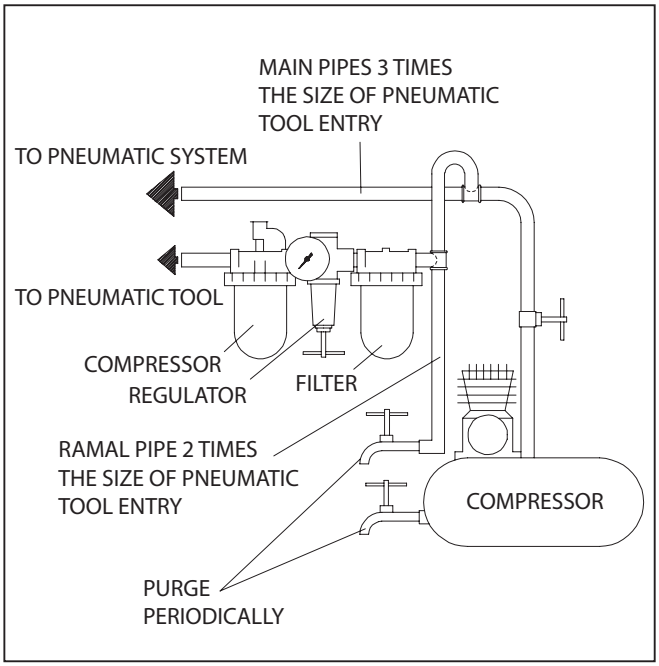
If the water is very dirty, protect the Pump by setting it in a mesh basket, or screen it in by some other method.

Should the Inlet become clogged, turn off the air supply and disconnect the air supply hose and lift the Pump from the water. Water running back through the discharge hose will usually flush the dirt from the Inlet.

## IMPELLER ADJUSTMENT

For the most efficient operation of the Pump, particularly against high heads, it is necessary that the clearance between the Impeller and the Impeller Cover be limited. This clearance is set at 0.010" at the factory. When, due to wear, this clearance has increased to about 1/32", an adjustment can be made by removing enough of the Impeller Cover Shims to obtain the original 0.010" clearance. This simple adjustment will prolong the life of the Impeller and maintain the high efficiency of the Pump. The Impeller Cover Shims are different colors to identify the various thicknesses. **White is 0.025", pink is 0.015", brown is 0.010", blue is 0.005" and green is 0.003".** Impeller Shims are used as required between the Impeller and the Impeller Spacer to provide running clearance between the Impeller and the Housing.

When assembling Pump, install only enough Impeller Shims to permit the Impeller to rotate without any drag.

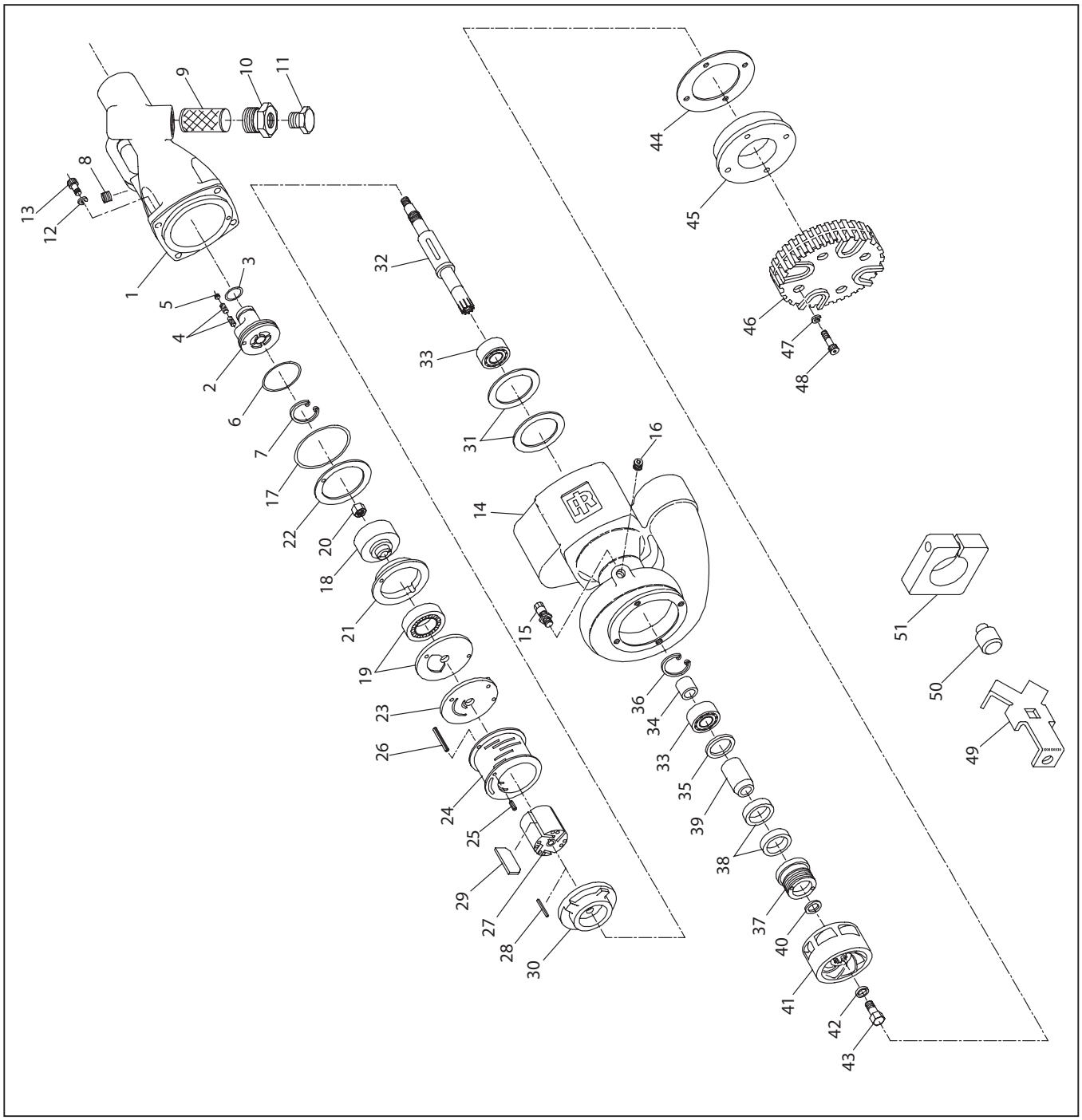



## SPECIFICATIONS

| Model | Size of Opening pump will pass through | | Material of Pump Housing | Sound Level dB (A) | | |
|---|---|---|---|---|---|---|
| | inches | mm | | Piped away Exhaust | Non-Piped away Exhaust | |
| | | | | ▪ Pressure | ▪ Pressure | • Power |
| S237-SA | 8-3/4 x 8-3/4 | 222 x 222 | Cast Iron | 74.9 | 104.4 | 117.4 |

▪ **Tested in accordance with ANSI SS.1-1971 at 100ft. (30.5m) of head (approximately 43.5 psig (3.0 bar / 300kPa) back pressure).**
• **IS03744.**

# PART LIST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# PART LIST

| Item | Description (size) | Qty | Part No. |
|---|---|---|---|
| 1 | Backhead Assembly (includes item 2, 7, 8, 9, 10 and 11) | (1) | S237-A102 |
| 2 | Oiler Body Assembly (includes item 3, 4, 5 and 6) | (1) | 88HL60-A198 |
| ✓3 | Oiler Body O-ring (Small) | (1) | 88L60-103 |
| 4 | Oiler Felt (2) | (1) | R1-75 |
| 5 | Oiler Adjusting Screw | (1) | R1-71A |
| ✓6 | Oiler Body O-ring (Large) | (1) | WFS182-210 |
| 7 | Oiler Body Retainer | (1) | 88HL60-298 |
| 8 | Oil Chamber Plug | (1) | R2-227 |
| 9 | Air Strainer Screen | (1) | P25-61A |
| 10 | Air Strainer Cap | (1) | P25-268 |
| 11 | Air Strainer Plug | (1) | P25-536 |
| 12 | Backhead Lock Washer | (4) | 34U-58 |
| 13 | Backhead Cap Screw | (4) | 834-638 |
| 14 | Housing | (1) | S237-A240 |
| 15 | Grease Fitting | (1) | 23-188 |
| 16 | Housing Plug | (1) | R2-227 |
| ✓17 | Housing Seal | (1) | P226-283A |
| 18 | Controller Assembly | (1) | 99V77-A524 |
| 19 | Rotor Bearing Seal Assembly | (1) | 99V60-A28A |
| 20 | Controller Retaining Nut | (1) | G8-120A |
| 21 | Rotor Bearing Cage | (1) | 99V60-107A |
| ✓22 | Rear End Plate Gasket | (1) | 99V60-739 |
| 23 | Rear End Plate | (1) | 99V60-A12 |
| 24 | Cylinder Assembly (includes item 25 and 26) | (1) | 99V60-A3 |
| 25 | End Plate Dowel | (1) | 5040-6 |
| 26 | Cylinder Dowel | (1) | 502B-120 |
| 27 | Rotor | (1) | 99V60-53 |
| 28 | Rotor Key | (1) | R43F-70 |
| ✓29 | Vane Packet (set of 4 Vanes) | (1) | 99V60-42-4 |

| Item | Description (size) | Qty | Part No. |
|---|---|---|---|
| 30 | Front End Plate | (1) | 99V60-11 |
| 31 | Motor Clamp Washer | (2) | 99V60-207 |
| 32 | Rotor Shaft | (1) | P226-204 |
| 33 | Shaft Bearing | (2) | G57E-24 |
| 34 | Bearing Spacer | (1) | P226-265 |
| 35 | Seal Spacer | (1) | P226-100 |
| 36 | Housing Snap Ring | (1) | S12-118 |
| 37 | Water Seal Cap Assembly (includes item 38 and 39) | (1) | P226-A115 |
| 38 | Water Seal | (2) | P225-153 |
| 39 | Impeller Spacer | (1) | P225-152 |
| 40 | Impeller Shim (as required) | | |
| | 0.010″ thick | (1) | P25-151-10 |
| | 0.025″ thick | (1) | P25-151-25 |
| 41 | Impeller | (1) | P225-143 |
| 42 | Impeller Retaining Washer | (1) | P225-157 |
| 43 | Impeller Retaining Screw | (1) | P225-156 |
| 44 | Impeller Cover Shim (as required) | | |
| | 0.005″ thick (blue) | (1) | P225-145-5 |
| | 0.010″ thick (brown) | (1) | P225-145-10 |
| | 0.015″ thick (pink) | (1) | P225-145-15 |
| | 0.025″ thick (white) | (1) | P225-145-25 |
| 45 | Impeller Cover | (1) | P225-144 |
| 46 | Inlet | (1) | SPS-01118 |
| 47 | Impeller Cover Lock Washer | (4) | P225-67 |
| 48 | Impeller Cover Cap Screw | (4) | P225-146 |
| 49 | Controller Wrench | (1) | 99V60-950 |
| 50 | Seal Pressing Tool for Controller | (1) | 99V60-951 |
| 51 | Bearing Clamp to release Controller | (1) | 99V60-A952 |
| ✶ | Nameplate | (1) | P25-99 |
| ✶ | Nameplate Screw | (4) | PS251-302 |

✓ To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

✶ Not illustrated.

**⚠ WARNING Always wear eye protection while performing maintenance on this pump. Always turn off the air supply and disconnect the air supply hose before installing, removing or adjusting any accessory on this pump or before performing any maintenance on this pump.**

## LUBRICATION

Each time a S237-SA Sump Pump is disassembled for maintenance and repair or replacement of parts, lubricate the Pump as follows:

1. Remove the Oil Chamber Plug (8) and fill the oil chamber in the Backhead (1) with Ingersoll-Rand No. 50 Oil.
2. Before attaching the air hose, inject about 3 cc of oil into the air inlet.
3. After each four hours of operation, unless an air line lubricator is used, fill the oil chamber in the Backhead with oil.
4. After each forty hours of operation, or as experience indicates, pump 10 or 15 strokes of Ingersoll-Rand Water Pump Grease No. 80 into the Grease Fitting (15) on the Motor Housing (14). Use the No. P25-228 Grease Gun.
5. We recommend the use of Ingersoll-Rand No. 8LUB12 Lubricator located in the air supply line as close to the Pump as practical. Keep the Lubricator filled with Ingersoll-Rand No. 50 Oil.

## AIR STRAINER

Periodically, clean the Air Strainer Screen (9) as follows:

1. Shut off the air supply to the Pump.
2. Unscrew the Air Strainer Plug (11).
3. If the Screen still appears clogged, unscrew the Air Strainer Cap (10) and withdraw the Screen. Clean the Screen in a suitable cleaning solution in a well ventilated area.

## DISASSEMBLY

**General Instructions**

1. Do not disassemble the Pump any further than necessary to replace or repair damaged parts.
2. Whenever grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
3. Do not remove any part which is a press fit in or on a sub assembly unless the removal of that part is necessary for repairs or replacement.

**Disassemble a S237-SA Pump as follows:**

1. If the Air Strainer Screen (9) is to be cleaned or replaced, unscrew the Air Strainer Cap (10) and withdraw the Screen.
2. Unscrew and remove the Backhead Cap Screws (13). Lift off the Backhead.
3. If the oiler is to be disassembled, remove the Oiler Body Retainer (7) and withdraw the Oiler Body Assembly (2) from the Backhead.
4. Unscrew the Impeller Cover Cap Screws (48) and remove the Inlet (46) and Impeller Cover (45).
5. Sprag the Impeller (41) against rotation by inserting a long screwdriver through one of the suction ports and into the discharge port in the Housing (14).
6. Unscrew the Impeller Retaining Screw (43) and remove the Impeller.
7. While grasping the Controller (18) in one hand, gently tap on the impeller end of the Rotor Shaft (32) with a plastic hammer and withdraw the motor from the Housing.
8. The upper Rotor Shaft Bearing (33) and Bearing Spacer (34) usually come out with the motor. Slide them off the Rotor Shaft.

**NOTICE The Controller Retaining Nut (20) has a right-hand thread.**

9. Grasp the Rotor Shaft vertically in copper-covered vise jaws, and unscrew the Controller Retaining Nut.

**NOTICE The Controller Assembly has a left-hand thread.**

10. Using the No. 99V60-950 Controller Wrench, unscrew the Controller Assembly.

**NOTICE Do not attempt to disassemble the Controller. It is available only as a unit.**

11. Lift off the Rear End Plate Gasket (22).
12. Set the Bearing Cage (21) on blocks on an arbor press. Using a metal sleeve that contacts only the outer race of the Rear Rotor Bearing (19), press off the Bearing Cage.
13. If it is necessary to remove the Rear Rotor Bearing, insert the Rear Rotor Bearing into the No. 99V60-A592 Bearing Clamp and tighten the nut on the fixture. Insert the No. 99V60-951 Seal Pressing Tool in the center.
14. Lift off the Rotor Bearing Seal (19) and Rear End Plate (23).
15. Lift off the Cylinder (24).
16. Remove the Vanes (29).
17. Withdraw the Rotor (27) and lift out the Rotor Key (28).
18. Lift off the Front End Plate (30).
19. Remove the Motor Clamp Washers (31).

**NOTICE The Water Seal Cap Assembly (37) has a left-hand thread. Do not remove the Water Seals (38) from within the Water Seal Cap unless you have two new Seals on hand for installation. The Water Seals are always damaged during the removal process. Always check the Water Seals for wear or leakage.**

20. Using a water seal cap spanner wrench, unscrew and remove the Water Seal Cap Assembly.
21. Withdraw the Seal Spacer (35).
22. The lower Shaft Bearing (33) can usually be pushed from the Housing with a wooden dowel. However, if the Water Seals were badly worn so that water got into and around the Bearing, it may be necessary to forcibly drive the Bearing from the Housing. If this is the case, make certain you have a new Bearing on hand for installation.

## ASSEMBLY

**General Instructions**

1. Always press on the inner ring of a ball-type bearing when installing the bearing on a shaft.
2. Always press on the outer ring of a ball-type bearing when pressing the bearing in a bearing recess.
3. Whenever grasping a part in a vise, always use leather-covered or copper-covered vise jaws. This is particularly true of threaded members and housings.
4. Except for bearings, always clean every part, and wipe every part with a thin film of oil before installation.
5. Check every bearing for roughness. If an open bearing must be cleaned, wash it thoroughly in a clean solution and dry with a clean cloth. **Sealed or shielded bearings should not be cleaned.**
6. Apply a film of O-ring lubricant to all O-rings before installation.

**Assemble a S237-SA Pump as follows:**

1. If the Water Seals (38) were removed from the Water Seal Cap (37), install new Seals as follows:
   a. Press the first Seal, lip side first, into the Water Seal Cap until it bottoms against the shoulder.
   b. Press the second Seal, lip side trailing, into the Water Seal Cap until the trailing edge of the Seal is flush with the face of the Water Seal Cap.
   c. Insert the Impeller Spacer (39), beveled end first, through both Seals until its beveled end is flush with the threaded end of the Water Seal Cap.
2. Install the lower Shaft Bearing (33) followed by the Seal Spacer (35) in the bottom of the Housing (14) until the Bearing seats against the Housing Snap Ring (36).
3. Using a water seal cap spanner wrench, install the Water Seal Cap Assembly (37). Tighten the Water Seal Cap to 20 to 25 ft-lb (27 to 34 N m) torque.
4. Grasp the large diameter end of the Rotor Shaft (32) in leather-covered or copper-covered vise jaws so that the small diameter end is upward.
5. Slide the Front End Plate (30), bearing recess first, down over the Rotor Shaft.
6. Place the Rotor Key (28) in the keyslot in the Rotor Shaft.
7. Slide the Rotor (27) down over the Rotor Shaft, engaging the Rotor Key.
8. Place a Vane (29) in each vane slot.
9. Place the Cylinder (24), small dowel first, down over the Rotor so that the small dowel engages the alignment hole in the Front End Plate.
10. Place the Rear End Plate (23) over the Rotor Shaft and against the Cylinder, so that it engages the Cylinder Dowel (26).
11. Check the outside diameter and large inside diameter of the Rotor Bearing Seal (19) for wear. If the outside diameter of the hub is worn to 1.76" (29.881 mm) or smaller, and/or the large inside diameter is worn to 0.910" (23.122 mm) or larger, install a new Rotor Bearing Seal.

**NOTICE** **Take all measurements 90 to the left of the dowel hole when facing the hub side of the Seal.**

Install the Rotor Bearing Seal (19), flat side first, so that the Cylinder Dowel engages the alignment hole in the Bearing Seal.

12. Press the Rear Rotor Bearing (19) onto the hub of the Controller (18).
13. Press the Controller Assembly into the hub side of the Rotor Bearing Cage (21) until it is within 1/8" (3 mm) of seating.

**NOTICE** **The Rotor Shaft has a left-hand thread; turn counterclockwise to install.**

14. Using the No. 99V60-950 Controller Wrench, install the assembled Controller, Bearing and Cage on the Rotor Shaft.

**NOTICE** **Tighten the Controller to 8 to 10 ft-lb (10.8 to 13.5 Nm) torque. Do not exceed 10 ft-lb (13.5 Nm) torque. The Controller may be damaged if this torque is exceeded.**

**NOTICE** **The Controller Retaining Nut has a right-hand thread.**

15. Install the Controller Retaining Nut (20). Tighten the Nut to 6 to 9 in-lb (0.67 to 1.07 Nm) torque.
16. Remove the assembled motor from the vise.
17. Slide the upper Rotor Shaft Bearing (33) on the large diameter end of the Rotor Shaft until it seats against the shoulder on the Shaft.
18. Slide the Bearing Spacer (34) on the Rotor Shaft until it contacts the Bearing.
19. Stand the Housing (14) upright on the workbench.
20. Place the two Motor Clamp Washers (31), concave side first, in the bottom of the housing bore, so that the outer rim of the leading Washer contacts the Housing.
21. Install the assembled motor shaft end first into the Housing until the Front End Plate seats against the Motor Clamp Washers.
22. Place the Rear End Plate Gasket (22) on the face of the Rear Rotor Bearing Cage, aligning the dowel hole in the Gasket with the Cylinder Dowel.
23. If the Oiler Body Assembly (2) was disassembled,

install two new Oiler Felts (4) in the Oiler Body, and retain them with the Oiler Adjusting Screw (5). Run the Screw in until its trailing face is flush with the face of the Oiler Body.

24. Install the Oiler Body O-rings (3) and (6) in their respective grooves on the Oiler Body.
25. Install the Oiler Body Assembly in the Backhead and retain it with the Oiler Body Retainer (7).
26. Place the Housing Seal (17) on the rim of the Housing.
27. Place the Backhead (1) on the Housing, making certain the Cylinder Dowel engages the dowel hole in the Backhead. Install the Backhead Cap Screws (13) and Lock Washers (12). Tighten them to 20 ft-lb (27 Nm) torque.
28. Lay the Pump on its side and slide the Impeller (41), hub side first, on the splined end of the Rotor Shaft. Manually rotate the Impeller. If it rubs against the Housing, install an Impeller Shim (40) or Shims as required to provide running clearance between the Impeller and Housing.
29. Install the Impeller Retaining Washer (42) and Screw (43). Tighten the Impeller Retaining Screw to 12 to 15 ft-lb (16.2 to 20.3 Nm) torque.
30. For the most efficient operation of the Pump, particularly against high heads, it is necessary that the clearance between the Impeller and Impeller Cover (45) be regulated at 0.010". Place the Impeller Cover on the base of the Housing, using the required Impeller Cover Shim (44) or Shims to obtain the desired clearance.
31. Place the Inlet (46) against the Impeller Cover and install the Impeller Cover Cap Screws (48) and Lock Washers (47). Tighten the Cap Screws to 9 to 12 ft-lb (12.2 to 16.2 Nm) torque.
32. Inject 10 or 15 strokes of Ingersoll-Rand No. 80 Water Pump Grease into the Grease Fitting (15) on the Motor Housing (14). Use the No. P25-228 Grease Gun.

## TROUBLESHOOTING GUIDE

| Trouble | Probable Cause | Solution |
|---|---|---|
| Low power or low free speed | Low air pressure at the Inlet | Check the air pressure at the Inlet. The pressure must not exceed 90 psig (6.2 bar/620 kPa). |
| | Plugged Inlet Bushing Screen or Air Strainer Screen | Clean the Screen in a clean, suitable, cleaning solution. If it cannot be cleaned, replace it. **⚠ WARNING** Never operate a Sump Pump without an Inlet Screen. Ingestion of dirt into the Sump Pump can, in some cases, cause an unsafe condition. |
| | Worn or broken Vanes | Replace the complete set of Vanes. |
| | Worn or broken Cylinder | Replace the Cylinder if it is worn or broken or if the bore is scored or wavy. |
| | Improper lubrication or dirt build -up in the motor. | Lubricate the Sump Pump as instructed in **LUBRICATION.** If lubrication does not result in satisfactory operation, disassemble the motor inspect and clean all parts. |
| Rough operation | Worn or broken Rear Rotor Bearing or Front Rotor Bearing | Examine each Bearing. Replace the Rear Rotor Bearing Seal Assembly if worn or damaged or replace the Front Rotor Bearing. |
| | Worn Rotor Key | Replace the Key. Check the Arbor and Rotor for keyslot wear and replace if necessary. |
| | Bent Arbor | Mount the Arbor on centers. Check the bearing diameter runout with an indicator. Replace the Arbor if runout exceeds 0.002" Total Indicator Reading. |
| Scoring of End Plates or Cylinder | Improper assembly | Make certain that all motor parts are properly aligned prior to clamping the motor assembly. |
| | Rotor Bearing Seal misalignment | Loosen the Cylinder Case Screws. Rotate the spindle by hand to align the seal. Re-tighten the Screws to 14 ft-lb (19 Nm) torque. The Spindle must rotate freely. |
| High free speed | Worn Rotor Bearing Seal | Replace the Rotor Bearing Seal if the outside high diameter of the hub is worn to 1.76" or smaller and/or the large inside diameter is worn 0.910" or larger. |