

SERVICE MANUAL

MOYNO®

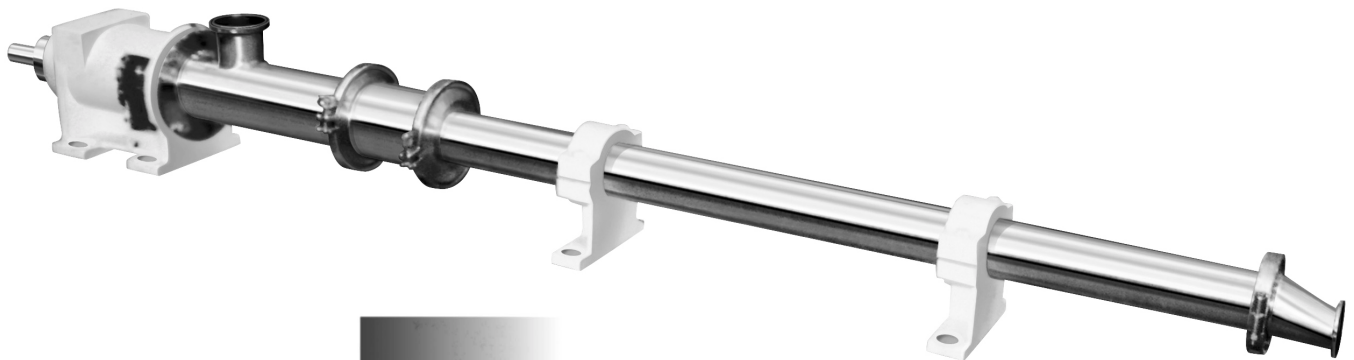
Sanitary High Pressure Pump

FRAME TYPES:

SF012, SG022, SH036, SH050

FRAME STYLE:

P1



MOYNO

Always the Right Solution™

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SERVICE MANUAL

MOYNO® HIGH PRESSURE SANITARY PUMPS

1-1. INTRODUCTION

1-2. GENERAL

The Moyno Pump is one of the most versatile pumps available. It has been proven in thousands of applications over the past 60 years and is backed by the experience gained during these years, both in application and manufacturing know-how.

The Moyno Pump is a progressing cavity pump. The pumping action is created by the single helical rotor rotating in the double threaded helix of the stator. As the rotor turns, it moves eccentrically up and down. This eccentric motion causes cavities to be created at the stator opening, at 180 degree increments. As the rotor turns, the cavities progress in a spiral fashion along the length of the rotor from the suction to the discharge. The interference compression fit between the rotor and the elastomeric stator creates a positive helical seal line. At the discharge side, the seal line ends and the cavity is released into the discharge piping. One cavity will diminish at exactly the same rate as the opposing cavity increases. Thus, the sum of the two discharges is a constant volume. The constant volume together with the continuous spiral seat line produces a pulseless, augered style, of positive displacement flow at 100% volumetric efficiency.

As process pressure increases, the flexible geometry of the pump allows for multiple stages to be used. With multiple stages, the Moyno pump can provide up to 9 positive seal lines between suction pressure and discharge pressure. This allows the pump to develop high pressures, with precise metering, at very low shear, and low product degradation.

The Moyno Sanitary Pump design is built to 3A standards. It is designed to handle a diverse array of products from clean, light viscosity liquids to highly viscous fluids with large particulates. Pinned drive components provide for quick and easy disassemble. An optional clean-in-place (CIP) capability enables the pump to be cleaned without being disassembled.

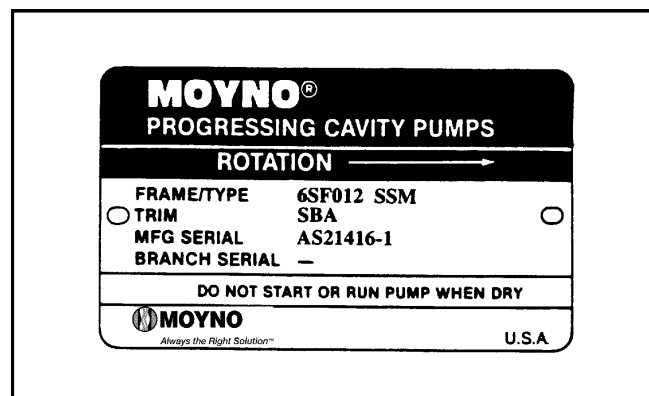


Figure 1-1. Typical nameplate showing a rotation arrow, model and manufacturing serial numbers.

1-3. NAMEPLATE DATA

The pump nameplate, located on the bearing housing, contains important information relating to the operation and servicing of the pump. This information includes the direction of rotation arrow and the pump model and serial numbers (see Fig. 1-1).

The pump model number must be used for reference when ordering spare parts. Please carefully file this manual for further reference.

1-4. Pump Rotation. The direction of rotation is indicated by a rotation arrow on the nameplate. Normal rotation of Moyno Sanitary Pumps is clockwise when viewed from the driven end of the pump. The elements are bi-directional, but the seal and other components in the suction housing have pressure limitations for reverse operation.

1-5. Model Number. The pump model number consists of three component parts: frame designations, type designations, and a trim code. A typical model number might be 6SF012P1 SJE SBA as shown on the nameplate in Fig. 1-1.

1-6. Frame Designation. The frame designation consists of 8 to 9 characters (e.g., 6SF012P1) sequenced to provide identification of the type of frame, number of stages, and element size of the pump.

The first number in the frame designation always indicates the number of stages of the pumping elements.

The second character is the letter “S,” designating the pump as the sanitary type. A “C” preceding the would indicate a clean-in-place (CIP) option. The next letter indicates the drive end used. The element size is designated by the three consecutive numbers which stand for the GPM at 100 RPM on water with no pressure. The P1 designates a standard pump type with pin joints.

1-7. Type Designation. Following the frame designation is the type designation, a series of three letters describing the materials from which the pump is constructed (e.g., 6SF012P1 **SSE** SBA).

The first letter identifies the material of the wetted housings.

The second letter identifies the material used in the drive shaft, connecting rod, rotor, and other wettable parts.

The third letter identifies the material of the stator. It identifies only the stator material and not the tube in which the stator is placed; the tube is stainless steel.

A typical type designation, such as SSE would result in the following:

- S = Stainless steel type #304 suction housing.
- S = Stainless steel type #316 or 17-4 pH internals including drive shaft, pins, connecting rod, rotor, and other minor metallic parts in contact with the material being pumps.
- E = Nitrile rubber stator (70 durometer, food grade dairy).

The following letters identify the actual materials that are used in standard construction:

<u>FDA Food Grade:</u>	<u>Non-Food Grade:</u>
B - EPDM	Q - Nitrile
E, M - Nitrile	F - Fluoroelastomer
S - Stainless Steel	R - Natural Rubber
Z - Nitrile (White)	

1-8. Trim Code. Also, included in the nameplate is a three-character trim code designation. The first letter identifies sealing methods, the second character identifies internal variations and the third letter identifies rotor variations. Consult Section 4.8 for a further explanation of trim code.

2-1. INSTALLATION

2-2. GENERAL

Moyno Pumps are lubricated and tested at the factory prior to shipment and require minimum pre-startup maintenance.

Accessibility to the pump and adequate clearance should be a prime consideration in any installation. Enough space should surround the unit so that pump maintenance can be carried out with ease.

2-3. PIPING

2-4. Suction Piping. Suction piping should be as short as possible. Normally, the suction line should be the same size as the pump suction. However, conditions such as high viscosity or required minimum flow velocities may dictate otherwise. Long-sweep 90-degree elbows or 45-degree elbows should be used instead of the standard elbow. Suction piping loops which trap air should be avoided. Piping should be pitched towards the pump.

2-5. Discharge Piping. Discharge piping diameter should **generally** be as large as the pump port unless fluids conditions indicate otherwise. The pump is disassembled from the discharge end. An easily removable section of piping of one stator length is suggested for simpler disassembly without removing the pump from the base.

2-6. FOUNDATION

For maximum pump driver life, each unit should be mounted on a strong, fabricated base which can be ordered from Moyno. Sanitary tubular, stainless steel designs are available as well as white epoxy painted, mild steel baseplates.

The baseplate should be mounted on a concrete foundation built on a solid base. The foundation should be approximately 4” (100mm) longer and wider than the base on which it is built (see Fig. 2-1) and should be an overall size of 4” (100mm) to 8” (200mm) larger than the baseplate once it is mounted. Anchor bolts for the baseplate should be located in the foundation.

Bases with angle bracket legs should be grouted and sealed to the foundation after anchor bolts have been tightened evenly. Tubular Moyno bases have options of adjustable feet, portable casters, and push handles.

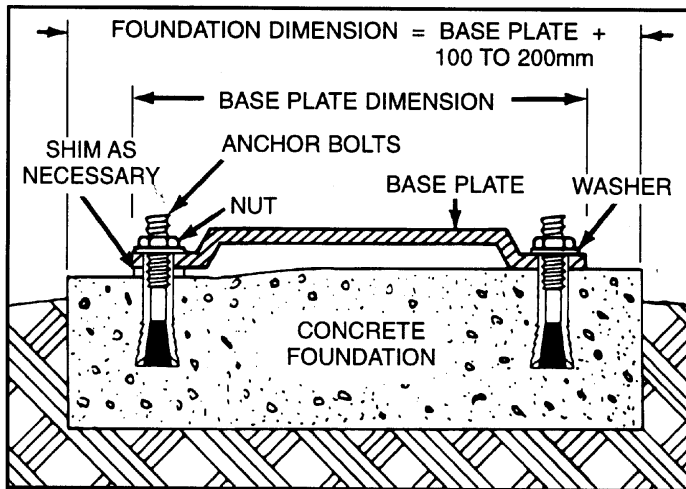


Figure 2-1. Typical Foundation Example

Check the baseplate surface with a carpenter's level and place shims under the baseplate at the places necessary to make it level. Then check the pump driver shafts and the pump ports to ensure that they are level. Complete base-mounted units supplied by Moyno, including pump driver, are leveled with respect to the base at the factory. Shifting may occur during shipment. The pump and driver should be realigned. Care should be exercised to ensure that all components are level and mounted in a direct line.

2-7. Shaft Alignment. Although the base-mounted units supplied by Moyno are leveled with respect to the base before shipping, most of the larger pump and driver units are shipped with the flexible coupling disconnected.

After the base has been bolted down to the foundation, check the following conditions:

2-8. On coupling connected units, be sure that the pump and driver shafts are realigned before the coupling is connected. Care should be exercised to ensure that all components are level and mounted in a direct line.

Check the gap between coupling halves (refer to the coupling manufacturer's recommendations). Adjustment can usually be accomplished by loosening the mounting bolts on either the pump or driver and moving the loosened component into alignment with the fixed component. On couplings with equal diameter hubs, it may be helpful to lay a straightedge axially across the coupling halves to check the alignment.

2-9. On the belt drive units, check to ensure that sheaves or sprockets are in alignment. Check belts

for proper tension. Tension requirements will vary with the type of belt, center distances, and belt speeds. Consult the belt manufacturer for specific recommendations.

2-10. WATER FLUSH OF SEAL

The standard seal arrangement is a single unbalanced inside seal with a single coil spring. The seal is located on the suction side of the pump which means it does not see the high discharge pressures. Various seal faces are available. Also available is a quench gland to provide a water flush to the above seal.

The water flush is used for abrasive products such as sugar solutions, for steam barriers in aseptic processes, and for water barriers in vacuum applications. Clean water or low pressure steam is supplied to the quench gland while the pump is in operation. A service valve, strainer, solenoid, flow indicator, and flow regulator, such as a needle valve, should be installed in the service media line. Low pressure water (approximately 1 GPM) or low pressure steam (less than 10 PSI) should be used to prevent infiltration into the product.

2-11. SHAFT BEARING

The bearings are lubricated at the factory and will only need to be relubricated when the shaft/bearing assembly is completely removed from the pump.

2-12. CLEAN-IN-PLACE (CIP) OPTION

The Moyno Sanitary Pump can be customized for clean-in-place (CIP) operations. On the 012 pump, an additional port is supplied in the extension tube for a bypass hookup. In the 022, 036, and 050 elements, two additional bypass ports are supplied. The bypass eliminates the flow restriction of the pumping elements so higher CIP velocities can be achieved in the critical suction housing and pin joint areas.

The vacuum at the inlet of the element will naturally pull the solution required for cleaning the rotor and stator. The excess flow is bypassed to the discharge side while maintaining full turbulent flow in the suction housing.

Two ports are used in the larger pumps to help divert CIP solution to all parts of the suction housing for full coverage. Two automatic butterfly valves or a single divert valve in the bypass line can be used to pulse flow between the two bypass ports. The control of the valves would be part of the CIP program. The port on the extension tube can be rotated for easier piping.

For fully automatic systems with no swing connections, three closed-coupled valves (two for the 012 element) should be installed in the bypass

line to close off the bypass during normal pumping operations. The valve on the discharge side should be a divert valve, installed on a tee after the pump, with one valve port normally open to atmosphere for drainage of the bypass line when the valves are closed. The other valve(s) should be a normally closed shut-off type directly connected to the CIP ports on the suction side of the pump. The bypass line and valves should be installed in the horizontal position with standard pitch towards the drain valve.

See Section 4-4.2 for additional CIP reference. All valving and bypass piping are customer-supplied unless otherwise requested.

3-1. OPERATION

3-2. INITIAL CHECK

Before putting the pump into operation, the following items should be checked to ensure that each piece of equipment is installed correctly:

- Pump, driver, coupling or sheave alignment.
- Electrical connections.
- Gauges and other instruments,
- Water flush connection (quench seal only).
- Pump rotation (normal rotation is indicated on the pump drive end).
- Belt tension on belt-driven units (there should be no appreciable deflection when first starting up)
- Suction and discharge valves (both valves should be open).

CAUTION: This is a positive displacement pump. Do not operate it against a closed valve.

3-3. STARTUP

CAUTION: DRY OPERATION IS HARMFUL TO THE PUMP! Never allow the pump to operate without liquid as dry operation will cause premature wear of the stator and possible damage. The stator is lubricated by the liquid which is pumped. Fill suction housing with water before checking for motor rotation.

1. Before operating the pump for the first time, fill it with liquid. If the liquid to be pumped is highly viscous, dilute it before filling the pump. The liquid fill-up will lubricate the stator for the initial startup.

Note: If the pump is shut down, temporarily, enough liquid will remain in the system to provide lubrication upon restarting. It is advisable to maintain the suction piping at a higher elevation than the center line of the pump in order to contain some liquid in the pump at the time of the shutdown. This is especially important in suction lift applications.

2. Once the pump has been filled with liquid, check the direction of the pump rotation by momentarily starting and stopping the drive. Check the rotation arrow on the pump nameplate for correct rotation.

3. If applicable, turn on the seal water to the quench gland.

4. Start the pump.

4-1. MAINTENANCE

Note: In this section, the first reference to each pump part will be followed by a number in parentheses (). These numbers identify the pump parts and hardware items in the cutaway view (Section 4-9).

4-2. GENERAL

The Moyno Sanitary Pump has been designed for a minimum of maintenance. Shaft bearings do not require periodic lubrication.

It is good practice to periodically touch the bearing housing to become familiar with the normal operating temperature of the bearings. If there is a sudden, rapid rise in temperature, remove the drive shaft and shaft bearings from the bearing housing and either clean and relubricate the bearings or replace them.

Inspect and either clean and relubricate or replace the shaft bearings every 8,000 to 10,000 operating hours.

4-3. DISASSEMBLY

Note: The following instructions cover **one** procedure for disassembling all pump components. Major pump components can be disassembled in various ways since specific installation limitations will determine the method of component removal.

1. Operate pump with clean lubricating liquid or water immediately before disassembly to ensure rotor and stator are lubricated.

2. Shut down pump and close suction and discharge valves.

3. Shut off seal water and disconnect CIP bypass piping, if applicable.

4. Electrically lock out power supply.

5. Disconnect suction and discharge fittings and drain pump.

6. Unbolt top half of stator supports.

4-3 1. Rotor and Stator Removal

7. Disconnect the discharge reducer (23) by removing the sanitary clamp (39).

8. If desired, unbolt stator clamp ring (34) from the stator adapter flange (22).

9. Remove the sanitary clamp (38) between the extension tube (21) and the stator (19).

10. Now remove the sanitary clamp (38) between the extension tube (21) and suction housing (20).

11. Remove the two halves of the split clamp ring (32) on the suction housing side of this connection.

12. The extension tube (21) can now be slid over the suction housing (20) to expose the rotor side pin joint connection. Check the two O-rings (45) on the extension tube and replace if necessary.

13. With a screwdriver, pry off the snap rings (18) and slide back the pin retainer (17) to access the pin.

Note: The SF012 element has a single pin connection while the SG022, SH036, and the SH050 have a double pin connection. Disregard instructions referencing the drive heads with the SF012 element.

14. Push out pin(s) (16) and check for wear. Replace if necessary.

15. Slide drive head (14) back onto the connecting rod (13).

16. The rotor and stator assembly can now be taken as a unit to the maintenance shop for easier disassembly.

There is a compression fit between the metal rotor and rubber stator which must be overcome to separate the two. This is most easily done by rotating the rotor in relationship to the stator where the helical design will allow the two parts to unscrew from one other. Disassembly is much easier if the parts are still wet with product or water.

17. Insert stator (19) into a sturdy vise with a rag wrapped around the stator to protect the finish. Close the vice and secure the stator. *Make sure the stator is adequately supported for the task.*

18. Insert a breaker bar or sturdy pipe completely through the rotor head pin hole. A bar that is the approximate diameter of the pin is suggested. Rotate the rotor (15) in a clockwise direction while providing a pull force. The rotor will unscrew from the stator. Care should be taken so the rotor head is not marred. *As the rotor is pulled from the stator, it must be supported so it does not fall.*

19. Inspect stator face, stator contour, and rotor for wear if necessary.

4-3.2. Connecting Rod and Intermediate Drive Shaft Removal

20. Slide the extension tube (21) off of the suction housing (20) and remove the drive head (14),

pin retainer (17), and snap rings (18) from the connecting rod (13).

21. With a screwdriver, remove the snap ring (9) from the pin joint connection behind the bearing housing.

22. Slide back the pin retainer (8) and remove the pin (7).

23. From the suction housing side, pull out the connecting rod (13) and intermediate drive shaft (12). Care must be taken when removing the drive train. The intermediate drive shaft fits through the brittle stationary seat of the seal (11). The intermediate shaft should be supported by fitting a hand through the suction inlet.

24. After removing the drive train from the suction housing, pull off the dynamic seal face and spring (11). Disassemble the pin joint between the two parts similar to steps 13, 14, and 15.

25. Reach through the suction housing (20) and remove the stationary seal face (11) from the seal housing (10). The seal face is held in place by the compression fit of an O-ring.

26. Unbolt the suction housing (20) and remove it. Pull the seal housing (10) from its seat in the bearing housing (1).

27. Inspect pin joints, O-rings, and seal faces for wear. Replace if necessary.

This concludes the disassembly of all product contact zones.

4-3.3. Drive Shaft and Bearing Removal

28. Disconnect and remove the pump driver and coupling.

29. Remove six hex screws (24) from bearing cover plate (4). Slide the bearing coverplate with radial grease seal (27) and the O-ring (44) from the drive shaft (6).

30. Pull drive shaft/bearing assembly out of bearing housing, taking steps to support the weight of the assembly as the bearings clear the housing. Remove grease seal (27) from the bearing housing (1).

CAUTION: The bearings (2) are pressed on the shaft during assembly. Care must be taken during disassembly to avoid damaging the bearings or shaft.

31. Remove bearing set screw (28) from the bearing lock nut (5). Using suitable spanner wrench or soft punch and hammer, thread lock nut off drive shaft (6). Do not use a pipe wrench to remove the lock nut.

32. Remove both halves of the bearing spacer (3) from the shaft, and using suitable bearing press and adapters, press bearings (2) off of the shaft.

4-4. CLEANING AND PASSIVATION

Cleaning chemicals to be used are based upon the product being pumped and is the responsibility of the chemical supplier. Cleaning chemicals need to be compatible with the elastomers used in the pump and the chrome plating of the rotor (except for unplated rotors). Chlorinated cleaners can pit the stainless steel housing if allowed to dry.

In passivating the system, it is extremely important to check with your chemical supplier that the chemicals are compatible with the elastomer and chrome plating of the rotor. Concentration, time of exposure, and temperature needs to be considered. **High acid solutions at elevated temperatures will strip the chrome plating or discolor it.** *The method of adding the chemicals also needs to be considered, so there are no initial slugs of high concentrated acids. If there is any doubt, disable the pump drive, remove the rotor from the pump, and passivate through the pump. Do not energize the pump during this cycle with the rotor removed.* If there is concern that the stator will be damaged, bypass the pump completely.

4-4.1. Manual Cleaning

Disassembled parts can be cleaned by hand with the appropriate cleaning solutions, high pressure washer, brushes, or COP tank. Cleaning temperature is not a concern for disassembled parts. All parts should be inspected for cleanliness before assembling.

Caution: Care must be used in handling hot metal parts.

4-4.2 CIP Cleaning

The Moyno pump can be cleaned in place with the optional CIP bypass port. This port allows for higher velocity cleaning solutions to be used for downstream equipment while maintaining the high velocity in the critical pin joint area. It is important that the pump is operated during CIP. The pumping element will pull whatever solution it needs and allow the rest of the solution to be bypassed. The wiping action of the rotor will thoroughly clean the stator.

The eccentric motion of the rotor will cause some turbulence in the suction housing for the pin joints. As viscosity of the product increases, higher turbulence is needed. Actual flow rate needed to clean the pump varies greatly with the product being pumped, cleaning chemicals, and temperature. Flow rates required to clean downstream equipment is usually sufficient for light viscosity products.

Suggested cleaning temperature is 160°F or below

at the pump *with a standard size (SAA trim code) rotor*. The CIP return temperature may be a better indicator of pump temperature than the CIP supply temperature. The elastomeric stator swells with increased temperature. Running the pump for long periods above 160° F with a standard size rotor will decrease the stator life. The stator can handle higher temperatures (below 185°) for standard length cleaning cycles. Running the pump at slower RPMs (below 100 RPM) may be required for VFD applications. Pulsing the pump instead of continuous running may be required for constant speed applications. Increased starting torque may be required over 160° F. Contact your local representative for long cleaning cycles above 160° F or hot water sanitizing above 180° F.

After installing the pump, the unit must be cleaned before running product. Moyno recommends the pump be disassembled and swabbed for the first several cleaning cycles after running product. This is to confirm the effectiveness of the CIP flow rates and concentrations. Adjust flow rates, temperatures, or concentrations if needed.

4-5. INSPECTION

4-5.1. Bearings

After cleaning, rotate bearings very slowly under hand pressure to feel for smoothness and even action. Never spin a dry bearing. Check for cracks, galling, pitting, burrs, etc. Replace bearings if there is any doubt concerning complete serviceability.

4-5.2. Drive Shaft

Inspect the drive shaft for scoring, burrs, cracks, etc. Replace as necessary.

4-5.3. O-Rings and Seals

It is good practice to always replace grease seals whenever the drive shaft and the bearings are removed.

4-5.4. Mechanical Seals

It is good practice to always replace the mechanical seal whenever the pump bearing housing is disassembled.

4-5.5. Pins

Pins should be checked monthly for wear. Replace if necessary.

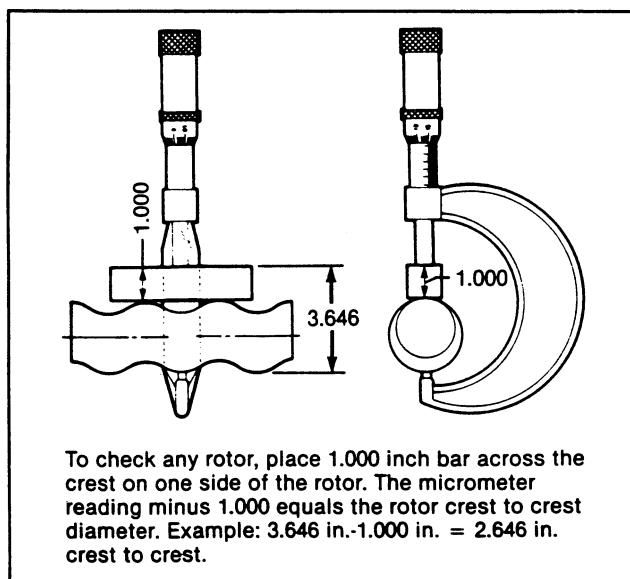


Figure 4-1. Measuring Rotor Dimension

4-5.6. Rotor

1. To check for excessive wear of the rotor, measure the rotor crest-to-crest diameter (see Fig. 4-3) and compare it with the following chart.

Rotor Size	*Standard Crest-To-Crest Diameter	
	Inches	MM
012	2.676	67.97
022	3.428	87.07
036,050	4.015	101.98

*These dimensions are applicable for SAA trim codes only.

2. If the measured crest-to-crest diameter is within 0.010" (.25mm) of the standard value and is free of deep nicks, gouges, and other surface defects, the rotor is reusable.

3. Rotors with crest-to-crest values of 0.011" (.28mm) to 0.050" (1.3 mm) under the standard values should be replaced. These rotors can be renewed by chrome plating to standard dimensions provided that:

- The pin holes are not excessively worn.
- The rotor surface is not cracked, pitted or deeply grooved 1/32" (.8mm) or more.
- The base metal surface is not pitted or corroded.

4. Rotors may be sent to Moyno for replating. Rotors should be stripped and replaced to standard dimensions, then buffed.

5. A worn stator may appear pitted and gouged, or it may appear smooth similar to when it was new. Performance is the best measure of rotor-to-stator fit. If you are unable to measure

performance adequately, suspected stator wear can be evaluated by a Moyno sales or factory representative.

4-6. ASSEMBLY

Moyno Sanitary Pumps are reassembled in reverse order of dismantling. The following suggestions are offered:

- While the pump is dismantled, check all O-rings, gaskets, and snap rings. Replace all worn parts.
- During the assembly process, cleanliness is important. To avoid premature failure, all components must be handled with care and kept clean.

4-6.1. Lubrication During Assembly

NOTE: The bearings are lubricated at the factory and will only need to be relubricated when the shaft/bearing assembly is completely removed from the pump.

1. **Bearings.** Pack bearings after installation on shaft (Section 4-6.2.). Lubricant should be packed around all of the rollers and should completely cover the faces of the races. The void inside the spacer between the bearings should be filled approximately halfway with lubricant.

2. Approved Lubricants

Caution: Do not mix different brands of lubricants.

Area to Lubricate	Approved Lubricant or Equivalent
Bearings	Mobilux EP2 Grease (Mobile Chemical Co.)

4-6.2. Bearing/Drive Shaft Assembly

1. Bearings must be pressed on the shaft in the following sequence (larger units [G drive end and larger] require heating of the bearings to 250°F before assembly).

A. Press bearing cone of shaft (6), making sure rollers face in proper direction to receive cup (Step B). Cone should be pressed firmly against shoulder on shaft.

B. Place cup on rollers.

C. Place bearing spacer (3) halves on cup.

D. Place second cup on spacers.

E. Press second bearing cone on shaft with rollers facing seat in cup. Cone should be pressed on until face of cone is flush or even with shoulder on shaft.

2. Thread bearing nut (5) on shaft (6) and tighten until it rests against the shoulder on the drive shaft. Install set screw (28) in bearing nut and tighten.

NOTE: The tapered bearings are designed such that when properly installed there may be a very slight end play in the bearings (bearing spacer halves may slip freely out of place) or they may have a slight pre-load (bearing spacer halves held tightly in place and bearings do not turn freely).

3. Remove bearing spacer halves (3). Thoroughly pack lubricant around rollers and on bearing races. Install one-half of bearing spacer. Fill area between bearings half-full of lubricant, and install other half of bearing spacer.

NOTE: Assuming the bearings are not too hot, an alternate method of lubricating bearings is as follows: Pack the rollers of the first cone immediately after it is pressed on shaft. Lubricate race of first cup spacer halves in place and fill it full of lubricant. Lubricate race of second bearing cup and place on spacer. Pack rollers of second cone with lubricant, and press on shaft until flush with shoulder.

NOTE: If too much grease is packed into the bearings during assembly, it may seep from the grease seals during the first few hours of operation until the proper lubricant level is achieved. This lubricant should be wiped from the seal area, when the pump is not operating, to prevent contaminants from collecting in the seal area.

4. Install (light press) grease lip seals (27) into bearing cover plate (4) and bearing housing (1) with Loctite. The lip of the drive side grease seal (27) should be facing outward with spring visible. The lip of the grease seal (27) on the suction housing side should be facing the bearings. the lips of both seals should be wiped with grease.

5. Install drive shaft with bearings in bearing housing, being careful to avoid damaging the first. The stationary seat of the grease seal (27).

6. Place O-ring (44) on bearing cover plate and bolt bearing cover plate to bearing housing using six hex head screws (24) and lock washers. The six screws should be tightened evenly, and care should be taken to ensure the O-ring becomes seated in the step in the bearing

housing. When the bearing cover plate is fully secured to the bearing housing, a small gap of 0.010 to 0.020 inch will exist between the bearing cover plate and the bearing housing.

4-6.3 Connecting Rod and Intermediate Drive Shaft Assembly

7. Install the stationary seal face (11) into the seal housing (10). Lubricate the seal O-rings. Install the seal spring and dynamic seal face onto the intermediate drive shaft (12).

8. Set the seal housing on the ledge of the bearing housing (1). Insert the intermediate drive shaft (12) through stationary seal face (11) and into the drive shaft (6) at the bearings. Care must be taken so the brittle seal faces are not damaged.

9. Secure the two shafts behind the bearings with the drive pin (7). Insert the drive pin, slide pin retainer (8) over pin, and lock in place with the snap ring (9).

10. Rotate the seal spring so the drive tab is inserted in the slot of the intermediate drive before it is installed. Place bearing shaft head.

11. Install the drive head (14) and connecting rod (13) onto intermediate drive shaft (12). Insert drive pins (16), slide on pin retainer (17), and secure with both snap rings (18). Rotate connecting rod so the pin hole is vertical.

Note: The SF012 element has a single pin connection while the SG022, SH036, and the SH050 have a double pin connection. Disregard instructions referencing the drive heads with the SF012 element.

12. Slide seal housing gasket (31) over connecting rod. Apply four dabs of food grade grease to the gasket and set it in its groove of the seal housing (10). The grease will provide cohesion to hold the gasket in place.

13. Slide the suction housing (20) over the connecting rod and bolt it to the bearing housing (1). Care should be taken so the seal housing gasket does not slip out of place. The connecting rod end may need to be temporarily supported while installing the suction housing.

Note: Alternatively, the seal housing, gasket and suction housing can then be installed in the seal housing by reaching through the suction housing. The intermediate drive shaft, drive head and connecting rod should be assembled separately. The dynamic seal face and spring can be inserted onto the

intermediate drive shaft. The drive assembly can then be inserted through the suction housing, stationary seal face, and the seal housing. The drive assembly can be supported by grabbing the intermediate drive shaft through the suction inlet port. Care should be taken so the brittle seal faces are not damaged.

14. Place the snap ring (18) onto the connecting rod (13). Install second drive head (14) onto the connecting rod. Insert the connecting rod drive pin (16), and slide the pin retainer (17) partially onto the drive head. The pin retainer should cover the connecting rod pin, but leave the rotor pin hole exposed.

15. Lubricate O-ring (45) with food grade grease and install onto the suction housing. Slide extension tube (21) over the suction housing (20) until it meets the suction inlet port.

4-6.4. Rotor/Stator Assembly

There is a compression fit between the metal rotor and rubber stator which must be overcome to insert the rotor. This is most easily done by rotating the rotor in relationship to the stator where the helical design will allow the rotor to screw into the stator. Assembly is much easier if the parts are sufficiently lubricated.

16. Insert stator (19) into a sturdy vise with a rag wrapped around the stator to protect the finish. Close the vice and secure the stator. *Make sure the stator is adequately supported for the task.*

17. Lubricate the rotor (15) with food grade grease, vegetable oil, or other food grade lubricant that is compatible with the stator elastomer.

18. Insert a breaker bar or sturdy pipe completely through the rotor head pin hole(s). A bar that is the approximate diameter of the pin is suggested. Insert the rotor end into the stator and push. After the rotor is 6" - 12" inside the stator, rotate the rotor in a counterclockwise direction while providing a push force. The rotor will screw into the stator. *The rotor will need to be supported at both ends until enough of the rotor is inserted into the stator for the stator to act as a support bearing. Care should be taken so the rotor head is not marred.*

19. Position the rotor in the stator, per Figure 4-2., so the head of the rotor sticks out of the stator not less than the **length** listed below:

012 = 6.40"	036 = 7.94"
022 = 6.70"	050 = 7.94"

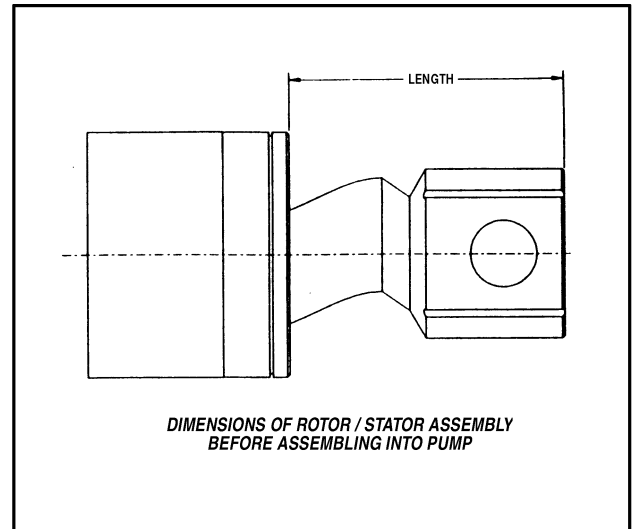


Figure 4-2. Rotor Installation

20. If not already done so, slide clamp rings (34 and 35) on each end of the stator. Secure both spiral retaining rings (33) in their respective slots.

21. Install the adapter flange (22) onto the clamp ring (34) of the suction side of the stator. Secure with lock washer (36) and high nut (37), and hand tighten only.

22. Place rotor/stator assembly on the stator supports (40).

23. Place the snap ring (18) onto the head of the rotor (15). Slide the rotor into the drive head (14) and insert the drive pin (16). Pull the pin retainer (17) over the drive head and secure with both snap rings (18).

24. Lubricate O-ring (45) with food grade grease and install onto the adapter flange (22).

25. Slide the extension tube (21) into position to cover the drive head. Position the split clamp ring (32) in the groove of the suction housing (20). Install the clamp (38) to secure the extension tube to the suction housing.

26. Install the clamp (38) to secure the adapter flange (22) to the extension tube (21). It may be necessary to loosen the high nuts (37) on the ring clamp (34) so the adapter flange is capable of being properly seated.

27. Tighten the high nuts (37) onto the adapter flange with a wrench to pull the stator into the final position.

4-6.5. Stator Support/Discharge Assembly

28. Replace the top halves of the stator supports (40) and bolt them to the bottom halves.

29. Install the discharge reducer (23) and secure to the clamp ring (35) with the sanitary clamp (39).

4-6.6. Final Assembly

30. Replace driver and coupling, if applicable. Check for alignment.

31. Replace product piping. Cap CIP port and replace seal water piping, if applicable.

Fill suction housing with liquid if the rotor stator assembly is not lubricated or the pump will be pulling a suction lift.

32. Connect electrical power supply.
33. Open suction and discharge valves.
34. Start pump.

4-7. Storage

4-7.1. Short-Term Storage

Storage of six months or less will not damage the sanitary type pump. However, to ensure the best possible protection, the following is advised:

1. Cover the pump with some type of protective covering. Do not allow moisture to collect around the pump.
2. Disassemble the pumping elements and thoroughly clean all components. Dry the components completely and reassemble.
3. See drive manufacturer's instructions for motor and/or drive storage.
4. See OPERATION, Section 3-1. through 3-3. before startup. Be sure all lubricants are in good condition.

4-7.2. Long-Term Storage

If the pump is to be in storage for more than six months, perform the above short-term storage procedures plus the following:

1. Periodically, rotate the pump manually a few revolutions to avoid a "set" condition of the rotor in the stator elastomer. This will prevent hard starting and excessive torque requirements when the pump is again put in operation.
2. If applicable, remove drive belts.

4-8. Variations of Standard Parts

4-8.1. Trim Code

Also included on the nameplate is the three-part trim code which is used to identify pump construction. Each character of the trim code identifies a specific aspect of pump construction. The first character identifies sealing variations; the second, internal variations; the third, rotor variations.

- Sealing Variations:

- D - Double Mechanical Seal (Optional)
- S - Single Mechanical Seal
- Q - Water Flush/Quench
- X - Special to Application

- Internal Variations:

- A - Standard Plated Shaft
- B - Non-plated Shaft
- X - Special to Application

- Rotor Variations:

- A - Standard Size With Chrome Plating
- B - Non-plated (No Plating)
- C - Standard Undersize
- E - Standard Oversize
- X - Special to Application

The trim code "SAA" identifies a pump with a single mechanical seal. Deviations from standard are indicated by substituting the appropriate character from the list above. For example, the trim code "DAA" represents a pump with double seals. The trim code "SBE" identifies a pump with non-plated shaft and an oversized rotor.

When two or more characters are combined to identify a variation, the three parts of the trim code are separated by dashes. For example, the trim code "S-A-EB" identifies a pump with a non-plated, oversized rotor.

Single mechanical seals are standard.

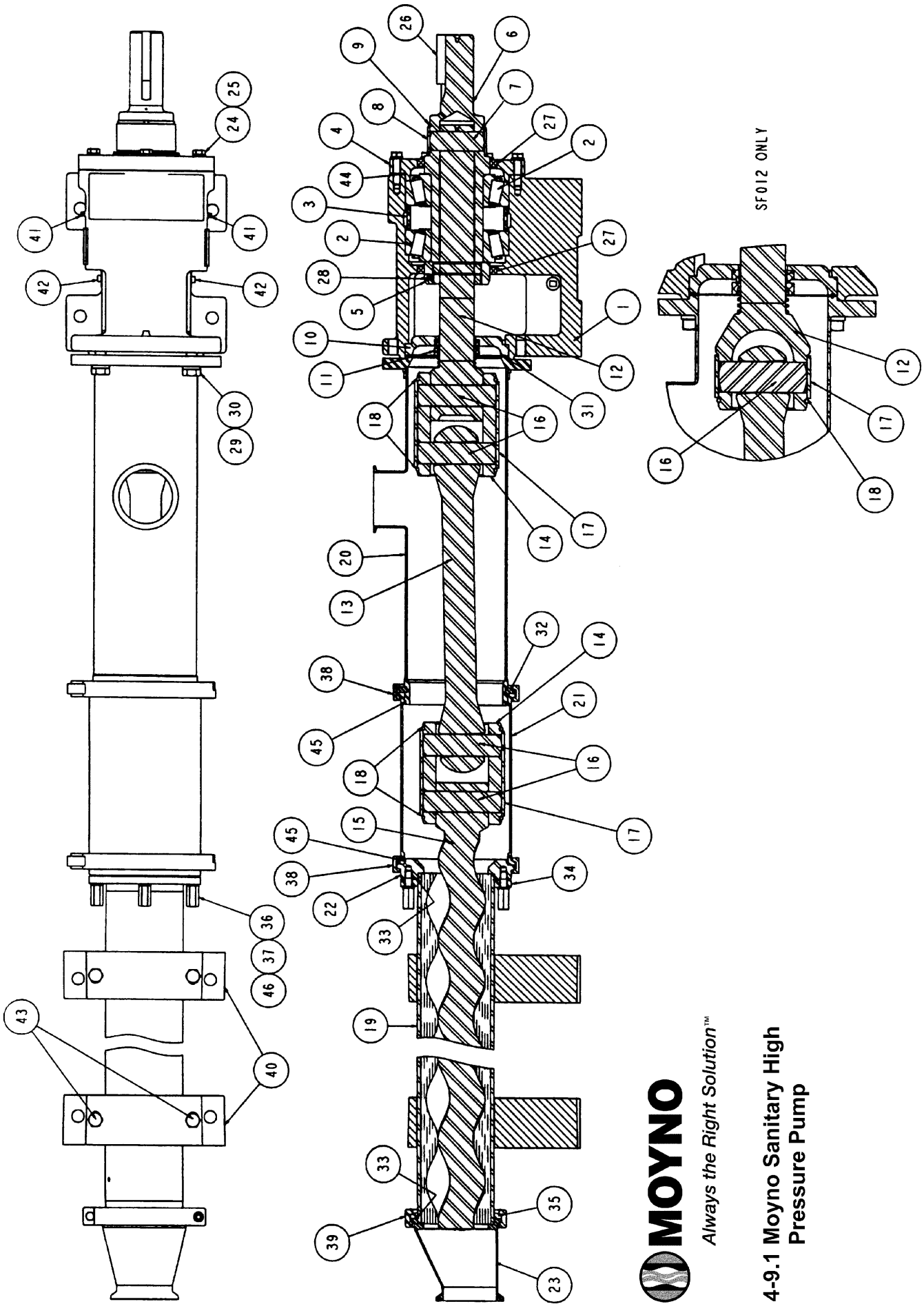
4-8.2. Rotors identified on parts listing are standard size with hard chrome plated surface. Other variations of rotor size and material may be ordered by selecting the standard rotor part number and changing the last digits of the rotor number as follows:

- 015 = Standard Size, Chrome Plated, 316 SS
- 152 = Undersize, Chrome Plated, 316 SS
- 153 = Oversize, Chrome Plated, 316 SS
- 017 = Standard Size, Chrome Plated, 17-4 pH SS
- 172 = Undersize, Chrome Plated, 17-4 pH SS
- 173 = Oversize, Chrome Plated, 17-4 pH SS

Do not change rotor sizes without consulting your Moyno sales office. These variations are used for certain specialized pumping conditions only. Unplated rotors are available. Please consult factory.

4-8.3. Standard drive shaft is unplated.

4-9. Replacement Parts



4-9.1 Moyno Sanitary High Pressure Pump

4-9.2 Moyno Sanitary High Pressure Pump Part List

Item	Description	012 Element		022 Element		036 Element		050 Element	
		Qty	Part Number	Qty	Part Number	Qty	Part Number	Qty	Part Number
1	Bearing Housing	1	4250003001	1	4250014001	1	4250019001	1	4250019001
2	Roller Bearing	2	4230007000	2	4230046000	2	4230054000	2	4230054000
3	Bearing Spacer	1	4230008000	1	4230047000	1	4230053000	1	4230053000
4	Bearing Cover	1	4250005001	1	4240069001	1	4250086001	1	4250086001
5	Bearing Lock Nut	1	4240015014	1	4240065014	1	4240075014	1	4240075014
6	Drive Shaft	1	4250835018	1	4250836018	1	4250837018	1	4250837018
7	Drive Pin	1	3207504017	1	4220498017	1	3621919017	1	3621919017
8	Pin Retainer	1	3201715015	1	4220423015	1	3621920001	1	3621920001
9	Snap Ring	1	3201719000	1	4220415000	1	3621921000	1	3621921000
10	Seal Housing	1	4250845001	1	4250846001	1	4250847001	1	4250847001
11	Shaft Seal	1		1		1		1	
	Carbon vs Ceramic	Nitrile	3207778000	Nitrile	4220594000	Nitrile	4220595000	Nitrile	4220595000
		EPDM	3207778003	EPDM	4220594003	EPDM	4220595003	EPDM	4220595003
	Silicone Carbon vs Silicone Carbon	Nitrile	4220608000	Nitrile	4220609000	Nitrile	4220610000	Nitrile	4220610000
		EPDM	4220608003	EPDM	4220609003	EPDM	4220610003	EPDM	4220610003
	Tungsten vs. Tungsten	Nitrile	4220611000	Nitrile	4220612000	Nitrile	4220613000	Nitrile	4220613000
		EPDM	4220611003	EPDM	4220612003	EPDM	4220613003	EPDM	4220613003
12	Inter. Drive Shaft	1	4250838017	1	4250839015	1	4250840015	1	4250840015
13	Connecting Rod	1	4240720017	1	4241172017	1	4241173017	1	4241173017
14	Drive Head	0	N/A	2	4241170017	2	4241171017	2	4241171017
15	Rotor	1		1		1		1	
	* 4 Stage - Std Size	17-4 PH	4250810017	316 SS	4250812015	316 SS	4250814015	316 SS	4250816015
	* - Und Size	17-4 PH	4250810172	316 SS	4250812152	316 SS	4250814152	316 SS	4250816152
	* - Ovr Size	17-4 PH	4250810173	316 SS	4250812153	316 SS	4250814153	316 SS	4250816153
	* 6 Stage - Std Size	17-4 PH	4250811017	316 SS	4250813015	316 SS	4250815015	316 SS	4250817015
	* - Und Size	17-4 PH	4250811172	316 SS	4250813152	316 SS	4250815152	316 SS	4250817152
	* - Ovr Size	17-4 PH	4250811173	316 SS	4250813153	316 SS	4250815153	316 SS	4250817153
16	Drive Pin	2	4220498017	4	4220599017	4	4220600017	4	4220600017
17	Pin Retainer	2	4220423015	2	4220602001	2	4220603001	2	4220603001
18	Snap Ring	2	4220415000	4	4220605000	4	4220606000	4	4220606000
19	Stator	1		1		1		1	
	* 4 Stage	Nitrile-E	4250841104	Nitrile-E	4250842104	Nitrile-E	4250843104	Nitrile-E	4250844104
		Natural	4250841204	Natural	4250842204	Natural	4250843204	Natural	4250844204
		EPDM	4250841304	EPDM	4250842304	EPDM	4250843304	EPDM	4250844304
		Nitrile-M	4250891404	Nitrile-M	4250892404	Nitrile-M	4250893404	Nitrile-M	4250894404
	* 6 Stage	Nitrile-E	4250841106	Nitrile-E	4250842106	Nitrile-E	4250843106	Nitrile-E	4250844106
		Natural	4250841206	Natural	4250842206	Natural	4250843206	Natural	4250844206
		EPDM	4250841306	EPDM	4250842306	EPDM	4250843306	EPDM	4250844306
		Nitrile-M	4250891406	Nitrile-M	4250892406	Nitrile-M	4250893406	Nitrile-M	4250894406
20	Suction Housing	1		1		1		1	
	Standard		4250826001		4250829001		4250832001		4250832001
	CIP Port		N/A		4250883001		4250884001		4250884001
21	Extension Tube	1		1		1		1	
	Standard		4250827001		4250830001		4250833001		4250833001
	CIP Port		4250885001		4250886001		4250887001		4250887001
22	Adapter Flange	1	4250873001	1	4250874001	1	4250875001	1	4250875001
23	Discharge Reducer	1	4250828001	1	4250831001	1	4250834001	1	4250834001
24	Hex Screw	6	6191552280	6	6191552320	6	6191572360	6	6191572360
25	Lock Washer	6	6230012430	6	6230012430	6	6230012450	6	6230012450
26	Key	1	6110080480	1	6110100560	1	6110120680	1	6110120680
27	Grease Seal	2	4102009800	2	4220014000	2	4220016000	2	4220016000
28	Set Screw	1	6060062060	1	6060062060	1	6060062060	1	6060062060
29	Hex Screw	4	6191582320	4	6191582320	4	6191582320	4	6191582320
30	Lock Washer	4	6230012470	4	6230012470	4	6230012470	4	6230012470
31	Gasket	1		1		1		1	
	Nitrile		4240722109		4240722105		4240722110		4240722110
	EPDM		4240722309		4240722305		4240722310		4240722310
32	Split Clamp Ring	1	4241174000	1	4241175000	1	4241176000	1	4241176000
33	Retaining Ring	2	4052000215	2	4062000215	2	4072000415	2	4072000415
34	Clamp Ring	1	4230614000	1	4230615000	1	4230616000	1	4230616000
35	Clamp Ring	1	4241177000	1	4241178000	1	4241179000	1	4241179000
36	Lock Washer	4	6230012430	4	6230012430	4	6230012430	4	6230012430

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4-9.2 Moyno Sanitary High Pressure Pump Part List (continued)

Item	Description	012 Element		022 Element		036 Element		050 Element	
		Qty	Part Number	Qty	Part Number	Qty	Part Number	Qty	Part Number
37	High Nut	4	4220596001	4	4220596001	4	4220596001	4	4220596001
38	Ext. Tube Clamp	2	3308815008	2	3308815008	2	3308815010	2	3308815010
39	Discharge Clamp	1	4230605006	1	4230605006	1	4230605008	1	4230605008
40	Stator Support								
	4 Stage	2	4241206002	2	4241207000	2	4241208000	2	4241208000
	6 Stage	2	4241206002	2	4241207000	2	4241208000	3	4241208000
41	Pipe Plug	2	4220485001	2	4220485001	2	4220485001	2	4220485001
42	Drain Pipe Plug	2	4052006002	2	4052006002	2	4052006002	2	4052006002
43	Hex Screw	4	6191572480	4	6191572480	4	6191572560	4	6191572560
44	O-Ring	1	3207902256	1	3207902264	1	3207902267	1	3207902267
45	O-Ring	2		2		2		2	
	Nitrile		3207903257		3207903263		3207903270		3207903270
	EPDM		3207904257		3207904263		3207904270		3207904270
46	Stud	4	4220597001	4	4220597001	4	4220597001	4	4220597001

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