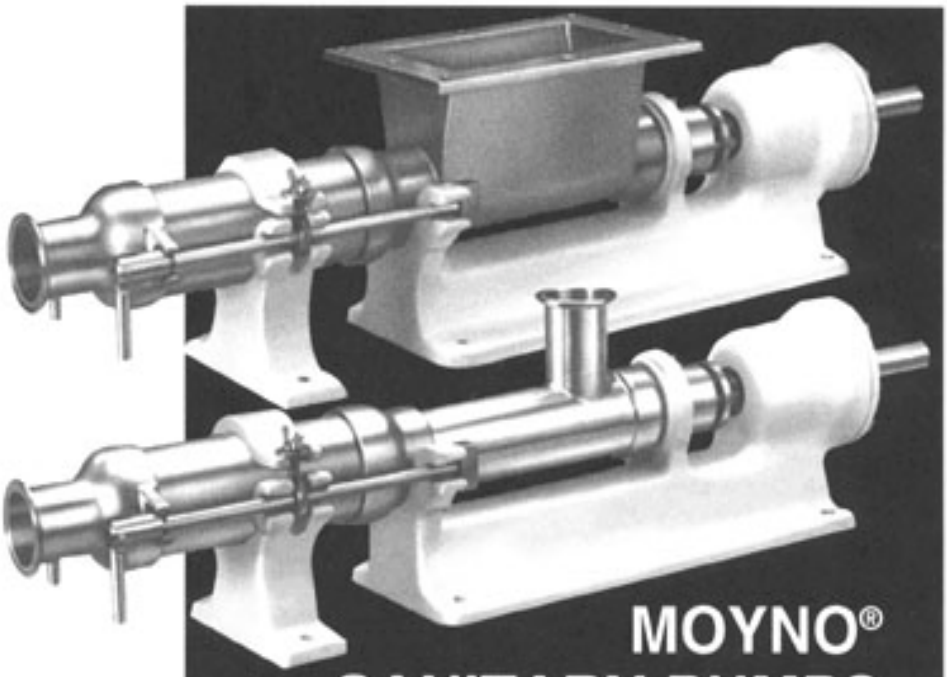
SERVICE MANUAL



MOYNO®
SANITARY PUMPS
FF, FG, FFC FGC, FFJ and FGJ Frame Types

MOYNO®
PROGRESSING CAVITY PUMPS

ROTATION →
FRAME/TYPE
TRIM CODE
MFG SERIAL
BRANCH SEAL
DO NOT START OR RUN PUMP WHEN DRY
MOYNO *Always the Right Solution™*

MOYNO

Always the Right Solution™

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MOYNO
Always the Right Solution™

SERVICE MANUAL

MOYNO® SANITARY PUMPS
FF, FG, FFC, FGC, FFJ and FGJ Frame Types

1-1. INTRODUCTION

1-2. GENERAL

The Robbins & Myers Moyno Pump is one of the most versatile pumps available, It has been proven in thousands of applications over the past 50 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 rolling eccentrically in the double threaded helix of the stator. In its revolution, the rotor forms in conjunction with the stator a series of sealed cavities 180 degrees apart. As the rotor turns, the cavities progress from the suction to the discharge end of the pump. As one cavity diminishes, the opposing cavity increases at exactly the same rate. Thus the sum of the two discharges is a constant volume. The result is a pulsation-free positive displacement flow with no valves.

The Moyno Sanitary Pump design, combined with the effective progressing cavity pumping principle, enables the food, chemical and pharmaceutical processing industries to comply with 3A sanitation requirements and FDA, USDA and BISSC sanitation standards (mechanical seal required; pumps with packing do not meet 3A approval). The standard sanitary flanged and gasketed clamp-style connections on the suction and discharge ports and the open throat design permit the Moyno Sanitary Pump to pump fluids with diverse handling characteristics. Easy disassembly of pumping elements, accomplished in a few short minutes, provides for quick cleanup between “lot” processing, line changeovers and shutdowns. An optional clean-in-place (CIP) capability enables the Moyno Sanitary Pump to be cleaned without being disassembled.

1-3. NAMEPLATE DATA

The Moyno Sanitary Pump is modular in design, consisting of two separate units: the pumping elements (rotor, stator and suction housing) and the drive end (drive shaft, bearings, housing, connecting rod and other parts). 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. To simplify this procedure, the model number for your pump has been recorded on the nameplate drawing on the front cover of this manual. Please carefully file this manual for further reference.

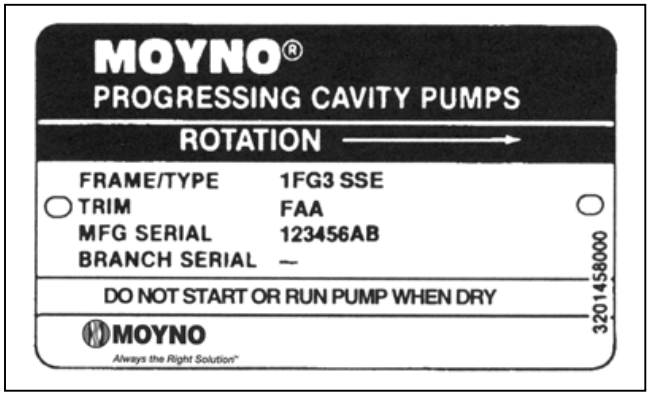


Figure 1-1. Typical nameplate showing rotation arrow, model and manufacturing serial numbers.

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.

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 1FG3 SSE FAA, as shown on the nameplate in Fig. 1-1.

1-6. Frame Designation. The frame designation consists of four to seven characters (e.g., 1FG3) sequenced to provide identification of the number of stages, type of frame and element size of the pump.

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

The second character, always the letter F, designates the pump as being the sanitary type.

The third character, either the letter F or G, designates the bearing configuration. The letter F designates the standard bearings configuration, and G designates a frame size larger bearings and bearing housing to handle increased loads.

The letter F or G is sometimes followed by the letter J or C. When present, J designates the open-throat hopper instead of the standard sanitary flanged and gasketed clamp-style connection suction port. C designates the clean-in-place (CIP) option.

The fourth through seventh characters (as used), all numeric or numeric with the letter H as a suffix, designate the size of the pumping elements.

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.,* 1FG3-SSE).

The first letter identifies the material of the body casting.

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 internals including drive shaft, pins, connecting rod, rotor, and other minor metallic parts in contact with the material being pumped
E = Nitrile rubber stator (70 durometer; food grade)

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

• FDA food grade
B— EPDM
E— Nitrile
S — Stainless steel (316 or 304)
T — Teflon* (PTFE)
V — Fluoroelastomer

• Non-food grade
J — 17-4 stainless steel
Q— Nitrile
F — Fluoroelastomer
A — Natural rubber
Z — Nitrile (white)
G — 416 stainless steel

1-8. Trim Code. Also included in the nameplate is the 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 4-33 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 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.

2-5. Discharge piping diameter should generally be as large as the pump port unless fluids conditions indicate otherwise.

An easily removable section of piping one to two times longer than the stator (see the following chart) should be mated to the discharge port. This will allow the rotor and stator to be removed without having to completely remove the pump from the base.

Pump	Suggested Discharge Piping Lengths and/or Clearance	Minimum Discharge Piping Lengths and/or Clearance
1FG3 1FGJ3	8 in.	2 in.
2FG3 2FGJ3	13 in.	2 in.
3FG3 3FGJ3	19 in.	2 in.
1FF4 1FFJ4	11 in.	2 in.
2FG4 2FGJ4	18 in.	2 in.
4FG4 4FGJ4	32 in.	2 in.
1FF6 1FFJ6	16 in.	2 in.
2FG6 2FGJ6	27 in.	2 in.
3FG6 3FGJ6	38 in.	2 in.
1FF8 1 FFJ8	20 in.	2 in.
2FG8 2FGJ8	33 in.	2 in.
3FG8 3FGJ8	45 in.	2 in.
1FF1O 1FFJ1 0	25 in.	2 in.
1FF10H 1FFJ1OH	25 in.	2 in.
1FF66 1FFJ66	31 in.	2 in.

2-6. FOUNDATION

For maximum pump-driver life, each unit should be mounted on a strong, fabricated-steel base plate which can be ordered from Robbins & Myers. The base plate should be mounted on a concrete foundation built on a solid base. The foundation should be approximately 4” longer and wider than the base on which it is built (see Fig. 2-1) and should be an overall size of 4” to 8” larger than the base plate once it is mounted. Anchor bolts for the base plate should be located in the foundation.

* Teflon is a registered trademark of E.I. duPont de Nemours & Co. Inc.

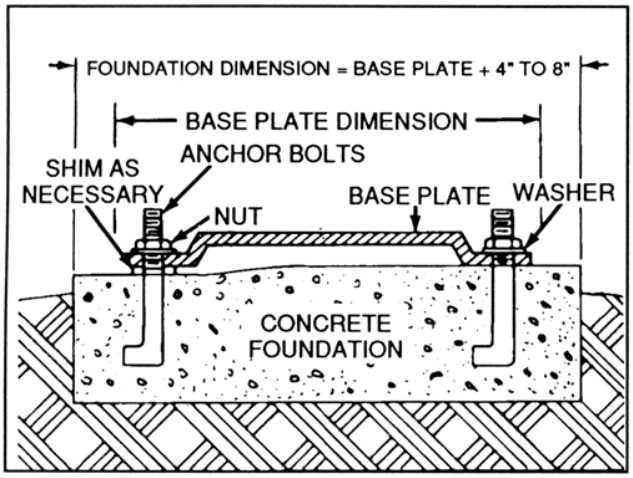


Figure 2-1. Typical Foundation Example

Check the base plate surface with a carpenter's level and place shims under the base plate 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 Robbins & Myers, 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.

For maximum rigidity and lower noise levels, the base plate should be grouted to the foundation after the anchor bolts have been evenly tightened. A good grade of nonshrink grout is recommended. The spaces between the base plate and the foundation around the shims and inside the bushings for the anchor bolts should also be filled with grout. Allow the grout to dry according to manufacturer's instructions. Then fully tighten the anchor bolts.

2-7. SHAFT ALIGNMENT

Although the base mounted units supplied by Robbins & Myers 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 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 PACKING

The packing may be either grease lubricated through a grease fitting in the packing retainer or have plumbing connected to the housing to allow a water flush.

When the material being pumped is abrasive in nature, it may be advantageous to flush the packing to prevent excessive shaft wear.

Clean water can be injected through a 1/8" NPT tapped hole that normally houses the grease fitting for lubricating the packing. The water can be permitted to leak axially along the shaft and be removed from the second tapped hole in the packing retainer. The discharge from the packing retainer should be throttled slightly to maintain a 10 to 15 psi higher pressure in the packing retainer than is present in the suction housing (see Fig. 2-2). Flow rate should be approximately 1/2 to 2 gpm.

If mechanical seals are to be used on the unit, consult the seal manufacturer's instructions for seal flush requirements.

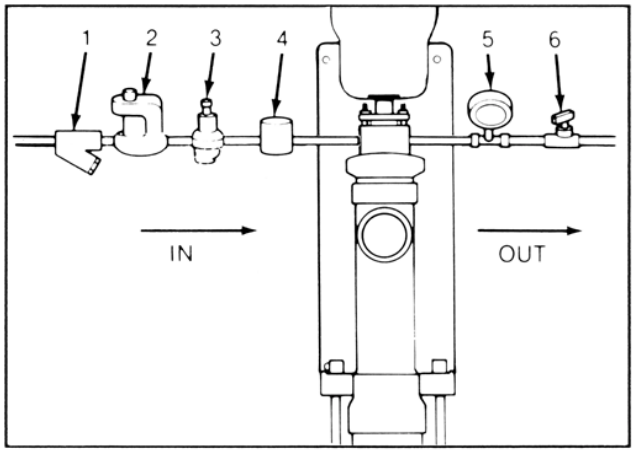


Figure 2-2. Typical water flush arrangement includes strainer valve (1), sight flow indicator (2), pressure regulating valve (3), solenoid valve (4), pressure gauge (5) and needle valve (6).

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 with a suction housing and reducer equipped for clean-in-place (CIP) operations. On a pump with the CIP option, additional ports in the suction housing and reducer permit a CIP bypass hookup. This bypass allows an extremely high rate of water to be supplied to the pump to create a turbulent condition which cleans pump parts such as flexible joints. Excess water passes through the bypass.

Two close-coupled valves should be installed in the bypass line, one at each end of the line, to close off the bypass during normal pumping operations. One of the valves should be a three-way valve so that one port is open to the atmosphere for drainage when the valves are closed.

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
- — 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.

1. In suction lift applications: 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.

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. In suction lift applications: When water flush is not utilized, it may be necessary to replace the zerk fitting at the packing retainer (in the suction housing) with a pipe plug to prevent loss of prime due to air leakage.

4. If applicable, turn on the seal water to the packing.

5. Start the pump.

3-4. PACKING LEAKAGE

A packed packing retainer is designed to control leakage, not stop it completely. Leakage is generally necessary to reduce friction and dissipate heat. The amount of leakage necessary will depend on the fluid pumped, the installation, and the pump speed and type. Refer to Section 4-3 for packing adjustment.

Moyno Sanitary Pumps have been designed for minimum packing retainer leakage when properly maintained. If leakage cannot be tolerated, a mechanical seal should be used.

4-1. MAINTENANCE

Note: In this section, the first reference to each pump part will be followed by a number or a letter in parentheses (). These numbers and letters identify the pump parts and hardware items in the foldout exploded view (Fig. 4-4).

4-2. GENERAL

The Moyno Sanitary Pump has been designed for a minimum of maintenance. It is only necessary to routinely adjust and lubricate the packing. 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 operating temperature, remove the intermediate 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. PACKING ADJUSTMENT

Packing gland nuts should be evenly adjusted so they are little more than fingertight. Overtightening of the packing gland may result in premature packing failure and possible damage to the intermediate drive shaft and gland.

When packing is new, frequent minor adjustments during the first few hours of operation are recommended in order to compress and seat the packing (see Fig. 4-1).

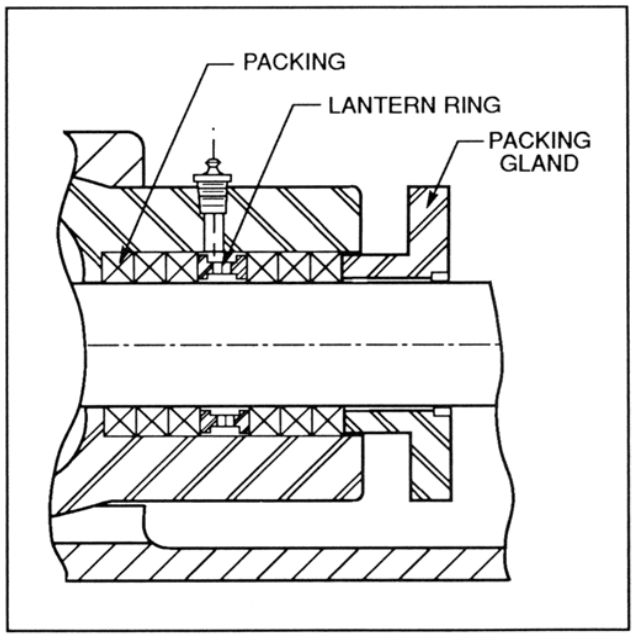


Figure 4-1. Cross Section of Packing Retainer

1. Upon initial startup of the pump, adjust the gland nuts (A) for a leakage rate of 1 to 2 drops per second until the packing (14) has seated and adjusted to the operating temperature (approximately 10 to 15 minutes).

2. If there is excessive leakage from the packing retainer (15) after 15 minutes of operation, tighten the gland nuts until a desired leakage rate is obtained.

CAUTION: Do not tighten until zero leakage is obtained. Overtightening of the packing gland may result In accelerated wear on the packing and damage to the shaft. In those situations where no packing leakage can be tolerated, consult your Moyno authorized service representative.

4-4. PACKING REPLACEMENT

When leakage can no longer be regulated by tightening the gland nuts, remove and replace the packing. The entire pump need not be disassembled to replace the packing. Briefly, replace the packing as follows:

1. Remove the gland nuts (A) and packing gland (13) from the packing retainer (15).

2. Use a pair of packing extractors (Fig. 4-2) to remove the first three packing rings (14), the lantern rings (19) and the last three packing rings.

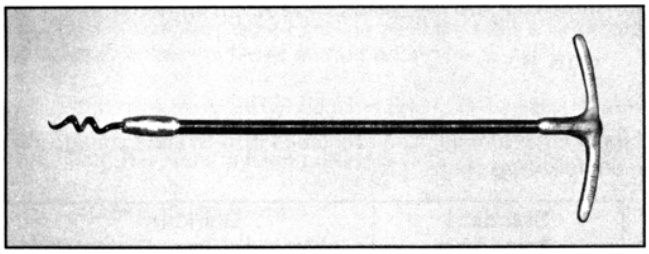


Figure 4-2. Packing Removal Tool

3. Inspect the surface of the intermediate drive shaft (7) for excessive wear or grooves due to packing rub, If the shaft is worn, or is badly scored or grooved, it should be replaced.

4. If the intermediate drive shaft is not worn, lubricate the six new packing rings with a good grade of packing grease (see Section 4-21).

5. Insert three rings of packing, the lantern ring halves (with flat sides facing packing) and the remaining three packing rings onto the shaft. Tamp each ring into the packing retainer with the packing gland. Be sure to stagger the packing ring joints at 90-degree increments (see Section 4-22).

All but one packing ring may fit into the packing retainer. As the pump operates, the packing will compress and the last packing ring can be added.

6. Position the packing gland on the gland studs (17) and secure with the gland nuts. Tighten the nuts evenly but only tight enough to seat packing and provide a good seal. Over-tightening will cause failure of the packing and shaft by overheating.

7. Adjust the packing per Section 4-3.

4-5. 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 location limitations will determine the method of component removal.

4-6. DIsconnect Pump

1. Operate the pump (preferably with clean water) to ensure that the rotor and stator are not dry.

2. Shut off the pump.

3. Close the suction and discharge valves.

4. If applicable, turn off the flush water to the packing (14) or mechanical seal.

5. Disconnect the power source.

4-7. Packing Removal

1. Stop the pump.

2. Complete Section 4-6, steps 3 through 5.

3. Complete Section 4-4, steps 1 through 3.

4-8. Stator Removal

1. Complete Section 4-6.

2. If applicable and necessary, remove the clean-in-place (CIP) pipe and valves.

3. Remove the section of discharge pipe attached to the reducer (3).

4. Loosen the wing nut (26) and swing the eyebolt (27) free from the stator clamp (4); then remove the stator clamp.

5. Loosen the two clamp nut assemblies (32) sufficiently to free the clamp studs (25); then remove the clamp studs.

6. Pull the reducer from the end of the stator (33) and pull the stator from the rotor (34); then remove the O-rings (28) from the stator.

Note: To assist with the removal of the stator on larger pumps, slide the pull-out sleeve (30) over the end of the stator. Align the threaded holes in the sleeve with the pilot holes in the stator and insert the two pull-out rods (31). With the rod tips seated in the pilot holes in the stator, grip the rods to twist and pull the stator from the rotor.

7. Inspect the stator for wear (see Section 4-19).

4-9. Rotor and/or Drive Train Removal

1. Complete Sections 4-6 and 4-8.

Note: Skip step 2 and proceed with step 3 if the Sanitary Pump is equipped with a mechanical seal.

2. Loosen the packing gland nuts (A) on the gland studs (17).

3. At the drive shaft (6) end of the pump, unseat the snap ring (24) and slide the snap ring and pin retainer (18) toward the pump driver.

4. Remove the pin (16) from the drive shaft, using a small punch, if necessary.

5. Pull the rotor (34), connecting rod (5) and intermediate drive shaft (7) as a unit from the housings.

Note: If end clearance is not available to pull this unit in one piece, disconnect the suction piping so that the suction housing (2) and the packing retainer (15) can be removed with the rotor/intermediate drive shaft assembly and then separated. Note that the packing retainer must be rotated before it can be removed so the zerk fitting will pass through the groove provided.

6. Inspect the rotor for wear (see Section 4-18).

4-10. Rotor, Connecting Rod and Intermediate Drive Shaft Disassembly

1. Complete Sections 4-6, 4-8 and 4-9.

2. Unseat the snap rings (24) at each end of the connecting rod (5) and slide the snap rings and pin retainers (18) onto the connecting rod.

3. Remove the pins (16) and separate the rotor (34) and intermediate drive shaft (7) from the connecting rod. Remove the snap rings and pin retainers from the connecting rod.

4-11. Drive Shaft and Bearings Removal

1. Complete Sections 4-6, 4-8 and 4-9.

2. Disconnect and remove the pump driver and the drive coupling.

3. Unbolt the bearing cover plate (11) from the bearing housing (1) and remove the cover plate and thrust grease seal (23).

4. Pull or press the bearings (8 and 9) and drive shaft (6) from the bearing housing.

5. Straighten the tab of the lockwasher (21) and remove the bearing locknut (20), lockwasher, radial bail bearing (8), spacer (10) and thrust ball bearing (9) from the drive shaft, It will be necessary to use a hydraulic press to remove bearings from drive shaft.

6. Remove the radial grease seal (22) from the bearing housing.

4-12. CLEANING

Clean all parts in a suitable cleaning solvent, being careful to observe all safety precautions regarding the use of solvent.

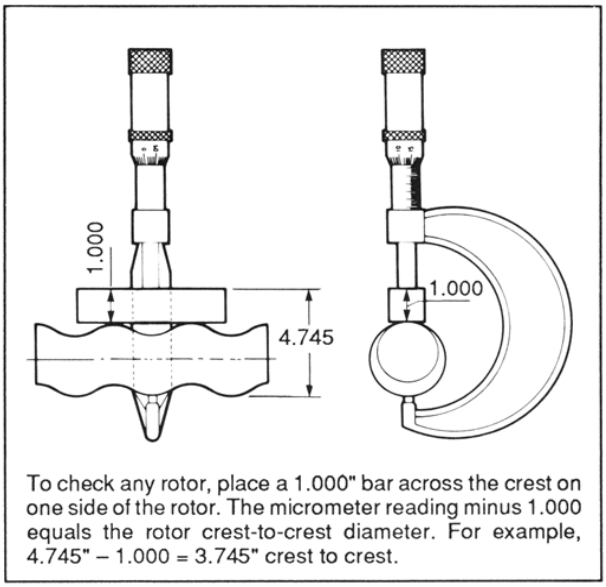
4-13. INSPECTION

4-14. Bearings. After cleaning, rotate the bearings (8 and 9) slowly, feeling for smoothness and even action. Check for cracks, galling, pitting, burrs, etc. Replace bearings if there is any doubt concerning complete serviceability.

4-15. Drive Shaft. Inspect the drive shaft (6) for scoring, burrs, cracks, etc. Replace as necessary.

4-16. Seals. It is good practice to always replace grease seals (22 and 23) whenever the drive shaft (6) and the bearings (8 and 9) are removed.

4-17. Packing. It is good practice to always replace packing (14) whenever the pump bearing housing (1) is disassembled.



To check any rotor, place a 1.000" bar across the crest on one side of the rotor. The micrometer reading minus 1.000 equals the rotor crest-to-crest diameter. For example, 4.745" – 1.000 = 3.745" crest to crest.

Figure 4-3. Measuring Rotor Dimension

4-18. Rotor

1. To check for excessive wear of the rotor (34), measure the rotor crest-to-crest diameter (see Fig. 4-3) and compare it with the following chart.

Standard Rotor Size	Standard *Crest-to-Crest Diameter
3	1.415 in.
4	1.888 in.
6	2.281 in.
8	3.139 in.
10	3.745 in.
10H	3.745 in.
66	4.385 in.

* These dimensions are applicable for FAA and SAA trim codes only.

2. If the measured crest-to-crest diameter is within 0.010* of the standard value and is free of deep nicks, gouges or other surface defects, the rotor is reusable.

3. Rotors with crest-to-crest values 0.011” to 0.050” under the standard values should be replaced. These rotors can be renewed by chrome plating to standard dimensions provided that:

a. the pin holes are not excessively worn.

b. the rotor surface is not cracked, pitted or deeply grooved (1/32” or more).

c. the base metal surface is not pitted or corroded.

4. Rotors may be sent to Robbins & Myers or any other competent plating shop. Rotors should be stripped and replated to standard dimensions, then buffed.

4-19. Stator. 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 Robbins & Myers sales or factory representative.

4-20. ASSEMBLY

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

1. While the pump is dismantled, check all O-rings, packing and snap rings. Replace all worn parts.

2. During the assembly process, cleanliness is important. To avoid premature failure, all components must be handled with care and kept clean.

4-21. Lubrication During Assembly

1. Bearings. Pack the bearings (8 and 9) prior to assembly into the bearing housing (1). After pressing bearings and spacer (10) on drive shaft (6) and tightening the bearing lock nut (20), fill the area between the two bearings with lubricant. Lubricant should be packed around all of the balls and should completely cover the faces of the bearing races.

2. Packing. Lubricate the packing rings (14) during assembly. Additional grease can be added after assembly through the zerk fitting (G) in the packing retainer (15).

3. Approved lubricants:

CAUTION: Do not mix different brands of lubricants.

Area to Lubricate	Approved Lubricant or Equivalent
Bearings	Mobilux EP2 Grease (Mobil Chemical Co.)
Packing	FGG 2 Grease (Dubois Chemical)

4-22. Packing Installation

1. The standard packing set (14) consists of six packing rings and two Teflon lantern ring halves (19).

2. Install packing and lantern ring halves into the packing retainer (15) in the following sequence:

a. Wipe a film of lubricant on each packing ring and install three rings. Push each ring firmly in place.

Note: Install the packing rings with the splits staggered at 90 degrees to the adjacent ring of packing.

CAUTION: Always use the packlng gland (13) or a proper packing tamper tool to install the packing. Do not use a pointed or sharp tool, as damage to the packing material or drive shaft could result. To assure proper shaft lubrication, never use a one-piece spiral wrap packing.

b. Install the two lantern ring halves with the flat sides against the packing.

c. Install the final three packing rings, firmly pushing each ring into place.

Note: On initial assembly, one ring of packing may not fit into the packing retainer. This final ring of packing should be installed after the pump has been started and packing is seated.

3. Install the packing gland and gland nuts (A). Tighten the nuts finger tight at this time.

4.23. Bearing-Drive Shaft Assembly

1. Press bearings (8 and 9) with spacer (10) onto the drive shaft (6), applying pressure to the inner races only. Make sure the bearings are seated fully on the shaft.

2. Install a new bearing lockwasher (21) on the shaft and bearing locknut (20). Tighten the locknut securely and bend the tab of the lockwasher down into the wrenching slot of the bearing locknut to prevent loosening of the locknut.

3. Install a new radial grease seal (22) in the bearing housing (1) and a new thrust grease seal (23) in the bearing cover plate (11).

4. Carefully insert the bearing shaft assembly into the bearing housing so as not to damage the radial grease seal.

5. Install the bearing cover plate with the thrust grease seal. Tighten all bearing cover screws (B)(C) evenly to prevent damage to the cover plate and grease seal.

4-24. Rotor, Connecting Rod and Intermediate Drive Shaft Assembly

1. Place one snap ring (24) and one pin retainer (18) over one end of the connecting rod (5).

2. Insert the connecting rod end into the bore of the rotor (34), aligning the pin holes and inserting a lightly lubricated pin (16).

3. Slide the pin retainer over the pin and seat the snap ring in the groove on the rotor.

Note: Two sets of holes are provided in the rotor and the intermediate drive shaft (7). Should one set of holes become elongated by wear, rotate the parts to align the connecting rod hole with the unused holes.

4. Assemble the connecting rod and rotor assembly to the intermediate drive shaft in the same manner.

4-25. Rotor, Connecting Rod and Intermediate Drive Shaft Installation

1. Position the O-ring (29) in the groove on the packing retainer (15), and install the gland studs (17), if removed.

2. Position the packing retainer in the support ring of the bearing housing (1), sliding the packing gland (13) onto the gland studs. Rotate the packing retainer so that the zerk fitting (G) is on top.

3. Position the suction housing (2) on the bearing housing, engaging the O-ring end of the packing retainer.

4. Insert the rotor-rod-shaft assembly through the suction housing and packing retainer, seating the end of the intermediate drive shaft (7) into the drive shaft (6). Rotate the shafts to align the pin holes and insert the pin (16).

5. Slide the pin retainer (18) in place on the drive shaft and seat the snap ring (24) in the groove provided.

4-26. Stator Installation

1. Install the stator O-rings (28) on the ends of the stator (33).

2. Coat the inside of the stator (33) and rotor (34) with lubricant compatible both with the stator material and the material to be pumped.

3. Thread the stator onto the rotor. Align the suction port of the suction housing (2) with the intake piping and seat the stator into the suction housing.

4. Position the reducer (3) on the end of the stator.

Note: If the pump is equipped with a pull-out sleeve (30) and pull-out rods (31), they may be used to assist in installing the stator into the rotor. Install the sleeve and rods as noted in Disassembly Section 4-8. When the stator is seated on the rotor, remove the rods and sleeve before installing the reducer.

5. Position the clamp studs (25) with the loosened clamp nut assemblies (32) and the eyebolt (27) in the slots of the reducer, stator support (12) and the bearing housing (1), aligning the eyebolt between the yokes of the stator support. Tighten the clamp nut assemblies sufficiently to seat and seal all O-ring joints.

6. Position the stator clamp (4) over the stator and stator support, hooking one side on the clamp stud and securing the other side with the eyebolt and wing nut (26).

7. Install the section of discharge pipe that attaches to the reducer.

4-27. Reconnect Pump

1. If applicable, close the clean-in-place (CIP) valves.

2. If applicable, turn on the flush water to the packing or mechanical seal.

3. Open the suction and discharge valves.

4. Reconnect the power source.

4-28. Mechanical Seal Installation

1. Complete Sections 4-20, 4-21,4-23 and 4-24.

2. Position the O-ring (29) in the groove on the seal retainer (15a).

3. Position the seal retainer in the support ring on the bearing housing (1).

4. Install the stationary component (carbon and O-ring) of mechanical seal (14a) in seat of seal retainer.

5. Slide the rotating component (spring and ceramic) onto the intermediate drive shaft (7a) so that the tab of the spring fits into the slot in the intermediate drive shaft. It may be necessary to wipe a small amount of lubricant around inside diameter of rotating component.

6. Position the suction housing (2) on the bearing housing, engaging the O-ring end of the seal retainer.

7. Complete Section 4-25, steps 4 and 5, to reinstall the rotor, connecting rod and intermediate drive shaft. Care should be taken not to damage carbon stationary component of seal.

4-29. STORAGE

4-30. 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. Loosen the packing gland and inject a liberal amount of lubricant into the packing retainer. Tighten the packing gland only hand tight. When water flush systems are used, do not use grease. A small amount of light oil is recommended, instead.

4. See drive manufacturer's instructions for motor and/or drive storage.

5. See OPERATION Sections 3-1 through 3-4 before startup. Be sure all lubricants are in good condition.

4-31. 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. Apply rust inhibitor to all unpainted cast iron surfaces.

3. If applicable, remove drive belts.

4-32. VARIATIONS OF STANDARD PARTS

4-33. 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.
  F — Braided Teflon food grade packing (white). Standard on all sanitary pumps.
  S — Single mechanical seal. Optional.
  X — Special to application.

- Internal Variations:
  A — Standard plated shaft
  B — Non-plated shaft
  E — Extension tube with extended auger
  G — Ceramic coating
  X — Special to application

- Rotor Variations:
  A — Standard size with chrome plating
  B — Non-plated (no plating)
  C — Standard undersize
  E — Standard oversize
  G — Ceramic coating
  X — Special to application

The trim code FAA represents a pump with standard features. Deviations from standard are indicated by substituting the appropriate character from the list above. For example, the trim code SAA identifies a pump with a single mechanical seal. The trim code FBE 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 F-A-EB identifies a pump with a non-plated, oversized rotor.

4-34. Packing on all Moyno Sanitary Pump consists of six solid braided Teflon packing rings and two Teflon lantern rings, with food grade lubricant or water flush (a pump with packing does not meet 3A approval). Single or double mechanical seals with or without water flush are available. Consult your Moyno representative.

4-35. Rotors identified on parts listing are standard size with hard chrome plated surface. Other variations of rotor size and finish may be ordered by selecting the standard rotor part number and changing the last digit of the rotor number as follows:

1 = Standard size, chrome plated
2 = Standard size, nonplated
3 = Undersize, chrome plated
4 = Undersize, nonplated

Do not change rotor sizes without consulting your Moyno sales office. These variations are used for certain specialized pumping conditions only.

4-36. Intermediate drive shaft shown has hard chrome plating on the packing wear area. If a nonplated intermediate drive shaft is required, select the standard part number and change the last digit to the next higher number *(e.g.,* F04281 to F04282).

4.37 STANDARD HARDWARE

REF.	DESCRIPTION	AMT.	FG3,FF4 FGJ3,FFJ4	FG4,FF6 FGJ4,FFJ6	FG6,FF8 FGJ6,FFJ8	FG8,FF10,FF10H, FF66 FGJ8,FFJ10, FFJ10H,FFJ66
A	Packing Gland Nut	2	1/4-20	1/4-20	1/2-13	1/2-13
B	Brg. Cover Screw (Hex Head)	4	5/16-18x3/4	318-16x1 ¼	½-13x1 1/2	—
C	Brg. Cover Screw (Hex Head)	5	—	—	—	1/2-13x1 1/2
D	Brg. Cover Lock Washer	4	5/16	3/8	1/2	—
E	Brg. Cover Lock Washer	5	—	—	—	1/2
F	Drive Shaft Key	1	1/4x1/4x2 1/4	1/4x1/4x2 1/4	3/8x3/8x2 1/8	1/2x1/2x3 3/4
G	Zerk Fitting	2	1/8 NPT	1/8 NPT	1/8 NPT	1/8 NPT

4.38 PARTS LIST

REF. NO.	DESCRIPTION	FG3/FF4 FGJ3/FFJ4 PART NO.	FG4/FF6 FGJ4/FFJ6 PART NO.	FG6/FF8 FGJ6/FFJ8 PART NO.	FG8/FF10 FGJ8/FFJ10 PART NO.	FF10H FFJ10H PART NO.	FF66 FFJ66 PART NO.
1	Bearing Housing	F04011	F06011	F08011	F10011	F10011	F10011
2	Suction Housing FG FGJ FF FFJ	 F04121 F04022 F04123 F04024	 F06121 F06022 F06121 F06022	 F08121 F08022 F08123 F08024	 F10121 F10022 F10123 F10024	 — — F10123 F10024	 — — F10123 F10024
2a	Suction Housing — CIP Option FGC FFC	 F04126 F04127	 F06126 F06126	 F08126 F08127	 F10126 F10127	 F10126 F10127	 F10126 F10127
3	Reducer FGJ/FG FFJ/FF	 F04191 F04192	 F06191 F06191	 F08191 F08192	 F10191 F10192	 — F10192	 — F10192
3a	Reducer — CIP Option FGC FFC	 F04193 F04194	 F06192 F06192	 F08193 F08194	 F10193 F10194	 F10193 F10194	 F10193 F10194
4	Stator Clamp FG/FGJ FF/FFJ	 F04201 F04202	 F06201 F06201	 F08201 F08202	 F10201 F10202	 — F10202	 — F10202
5	Connecting Rod FG/FF FGJ/FFJ	 F0425S F0425J	 F0625S F0625J	 F0825S F0825J	 F1025S F1025J	 F1025S F1025J	 F1025S F1025J
6	Drive Shaft	F04261	F06261	F08261	F10261	F10261	F10261
7	Intermediate Drive Shaft	F04281	F06281	F08281	F10281	F01281	F01281
7a	Intermediate Drive Shaft - Mechanical Seal	F04283	F06283	F08283	F10283	F10283	F10283
8	Ball Bearing Radial	A03291	A06291	F08291	A10291	A10291	A10291
9	Ball Bearing Thrust	A04301	F06301	F08301	F10301	F10301	F10301
10	Bearing Spacer	F04331	F06331	F08331	F1033l	F10331	F10331
11	Bearing Cover Plate	F04341	F06341	F08341	F10341	F10341	F10341
12	Stator Support FG/FGJ FF/FFJ	 F04381 F04382	 F06381 F06381	 F08381 F08382	 F10381 F10382	 — F10382	 — F10382
13	Packing Gland	F0441S	F0641S	F0841S	F1041S	F1041S	F1041S
14	Packing	F04425	F06425	F08425	F10425	F10425	F10425
14a	Mechanical Seal (FAQ) Single Seal-Nitrite	F0448E	F0648E	F0848E	F1048E	F1048E	F1048E
15	Packing Retainer	F04431	F06431	F08431	F10431	F10431	F10431
15a	Seal Retainer	F04432	F06432	F08432	F10432	F10432	F10432
16	Rotor Pin	F0445S	F0645S	F0845S	F1045S	F1045S	F1045S
17	Gland Stud	F04471	F04471	F08471	F08471	F08471	F08471

FOLD OUT FOR EXPLODED VIEW OF PUMP →

4-39. TROUBLESHOOTING CHART[1]

SYMPTOMS	POSSIBLE CAUSE OF TROUBLE (Each Number is Defined In the List Below)
Pump fails to discharge:	1, 2, 3, 4, 5, 6, 8, 9, 16
Pump is noisy:	6,10,11,17,18,19
Pump wears rapidly:	11, 12, 13,20,24
Pump not up to capacity:	3,5,6, 7, 9, 16,21,22
Pump starts, then loses suction:	1,2,6,7,10
Pump takes excessive power:	14, 15, 17, 20, 23
Suction Troubles: 1. Not properly primed 2. Suction pipe not submerged 3. Strainer clogged 4. Leaking foot valve 5. Suction lift too high 6. Air leaks in suction 7. Suction pipe too small	
System Problems: 8. **Wrong** direction of rotation 9. Low speed 10. Insufficient liquid supply 11. Excessive pressure 12. Grit or dirt in liquid 13. Pump runs dry 14. Viscosity higher than specified 15. Obstruction in discharge line	
Mechanical Troubles: 16. Pump worn 17. Bent drive shaft 18. Coupling out of balance or alignment 19. Relief valve chatter 20. Pipe strain on pump casing 21. Air leak at packing 22. Relief valve improperly seated 23. Packing too tight 24. Corrosion	

[1]From *PUMP HANDBOOK,* Igor J. Karassik, William C. Krutzsch, Warren H. Fraser, and Joseph P. Messina, editors, © 1976 by McGraw-Hill, Inc. Used with permission from the publisher.

Note: If further troubleshooting procedural information is needed, contact Technical Service at Robbins & Myers, Inc.

NOTES

PARTS LIST (CONT.)

REF. NO.	DESCRIPTION	FG3/FF4 FGJ3/FFJ4 PART NO.	FG4/FF6 FGJ4/FFJ6 PART NO.	FG6/FF8 FGJ6/FFJ8 PART NO.	FG8/FF10 FGJ8/FFJ10 PART NO.	FF10H FFJ10H PART NO.	FF66 FFJ66 PART NO.
18	Pin Retainer	F04501	F06501	F08501	F10501	F10501	F10501
19	Lantern Ring	F04571	F06571	F08571	F10571	F10571	F10571
20	Bearing Locknut	A04581	F06581	F08581	A10581	A10581	A10581
21	Bearing Lockwasher	A04591	F06591	F08591	A10591	A10591	A10591
22	Radial Grease Seal	A02611	F06611	F08611	A10611	A10611	F10611
23	Thrust Grease Seal	F04621	F06621	F08621	F10621	F10621	F10621
24	Snap Ring	F04661	F06661	F08661	F10661	F10661	F10661
25	Clamp Stud						
	1FG/FGJ3	F04131	—	—	—	—	—
	2FG/FGJ3	F04132	—	—	—	—	—
	3FG/FGJ3	F04133	—	—	—	—	—
	1FF/FFJ4	F04134	—	—	—	—	—
	2FG/FGJ4	—	F06131	—	—	—	—
	4FG/FGJ4	—	F06132	—	—	—	—
	1FF/FFJ6	—	F06133	—	—	—	—
	1FF/FFJ8	—	—	F08131	—	—	—
	2FG/FGJ6	—	—	F08132	—	—	—
	3FG/FGJ6	—	—	F08133	—	—	—
	2FG/FGJ8	—	—	—	F10131	—	—
	3FG/FGJ8	—	—	—	F10132	—	—
	1FF/FFJ10	—	—	—	F10133	F10133	—
	1FF/FFJ66	—	—	—	—	—	F66131
26	Wing Nut	F04741	F08741	F08741	F10741	F10741	F10741
27	Eye Bolt	F04801	F06801	F08801	F10801	F10801	F10801
28	Stator O-ring						
	FG	F04111	F06111	F08111	F08113	—	—
	FF	F04112	F06111	F08113	F10111	F10111	F10111
29	O-ring	F04111	F06111	F08113	F10112	F10112	F10112
30	Pull-out Sleeve						
	FF	—	F06391	F08392	F10391	F10391	F10391
	FG	—	F06391	F06391	F08392	—	—
31	Pull-out Rod						
	FF	—	F06401	F06401	F10401	F10401	F10401
	PG	—	F06401	F06401	F06401	—	—
32	Clamp Nut Assembly	F04141	F06141	F08141	F10141	F10141	F10141
33	Stator						
	1FG/FGJ: SSB,SSV, SSG,SSE,SSR,SST,SSZ	F5l03*	—	—	—	—	—
	2FG/FGJ: SSB,SSV, SSG,SSE,SSR,SST,SSZ	F5203*	F5204	F5206	F5208*	—	—
	3FG/FGJ: SSB,SSV, SSG,SSE,SSR,SST,SSZ	F5303	—	F5306*	F5308*	—	—
	4FG/FGJ: SSB,SSV,SSE,SSR,SSZ	—	F5404*	—	—	—	—
	1 FF/FFJ: SSB,SSV, SSG,SSE,SSR,SST,SSZ	F5104	F5106*	F5108	F5110*	F5111*	F5166*
34	**Rotor**						
	1 FG/FGJ†	F8103†	—	—	—	—	—
	1FF/FFJ†	F8104†	F8106†	F8108†	F8110†	F8111†	F8166†
	2FG/FGJ†	F8203†	F8204†	F8206†	F8208†	—	—
	3FG/FGJ†	F8303†	—	F8306†	F8308†	—	—
	4FG/FGJ†	—	F8404†	—	—	—	—

*Add the third letter of the type designation to complete the part number (e.g., for a type SSE pump, add E to the basic number of the stator).
† See page 9 for variations.

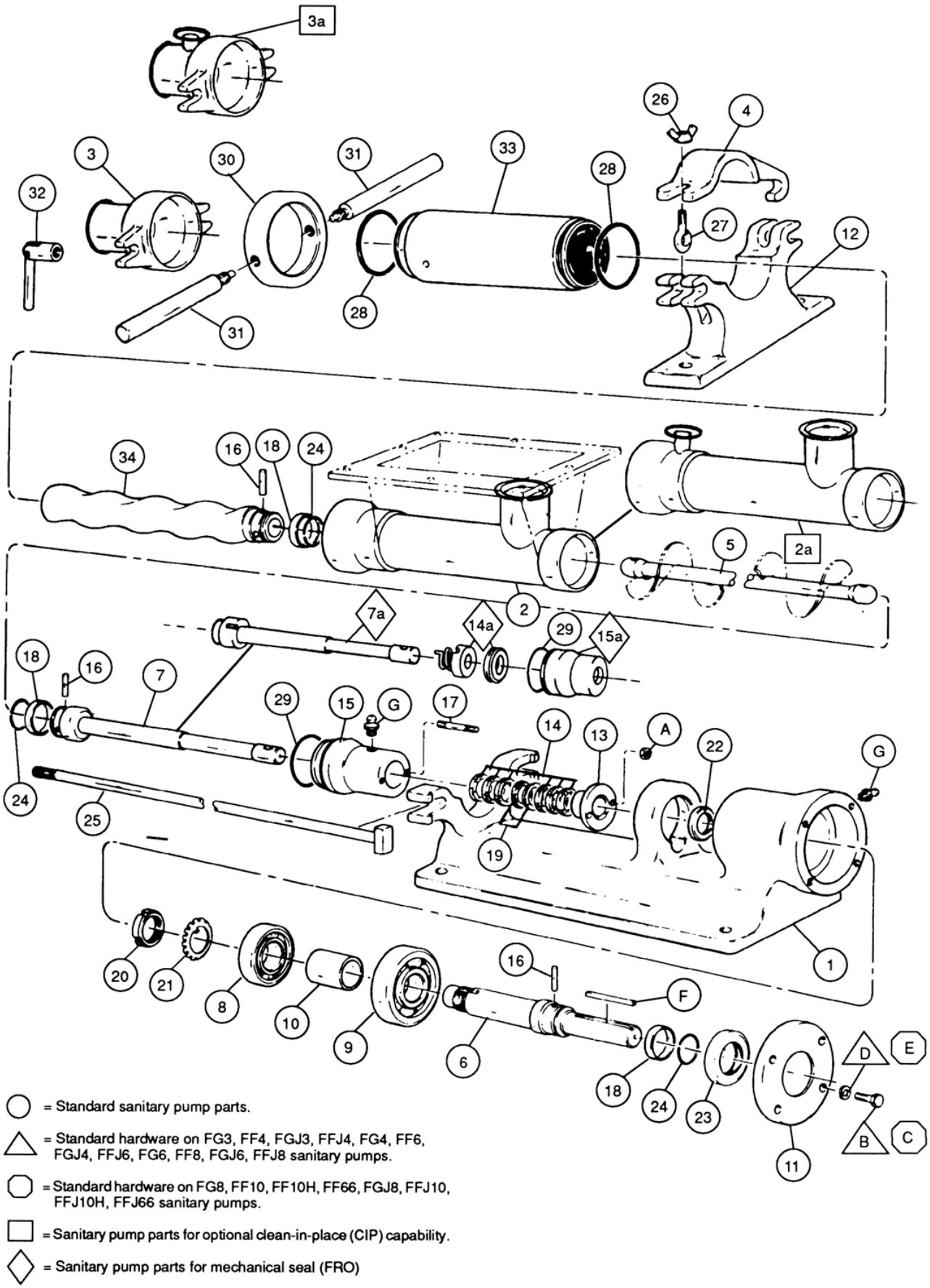


Figure 4-4. Pump Exploded View

Double The Length Of Your Moyno Pump Warranty For FREE!

For your *free* pump warranty extension, choose from one of the three options below:

1. Go to www.moyno.com and fill out the registration form online

2. Mail this form by placing it in an envelope and sending it to: **Moyno, Inc.**
Attn: Tish Wilson
P. O. Box 960
Springfield, OH 45501-0960
U.S.A.

3. Fax this form to 937-327-3177

Thank you for choosing a Moyno Pump. Please take the time to complete this warranty registration form. Upon receipt of your form, your standard limited warranty on defective material and workmanship will be extended to twice the standard period of time at no additional cost to you. We appreciate your business and look forward to serving you in the future.

LLOYD'S REGISTER QUALITY COMPANY ISO9001 NATIONAL ACCREDITATION OF CERTIFICATION BODIES
CERTIFICATE No. 101442

MOYNO
Always the Right Solution™

Always Insist on Genuine Moyno Replacement Parts!

Moyno® Pump Warranty Registration

Pump Model # _____ Pump Serial # _____
Purchased From _____ Date Purchased _____
Your Name _____ Your Title _____
Your Company Name _____
Address _____
City/State (Province)/Zip Code _____
Phone Number _____ Fax Number _____
E-mail _____

Application for Which This Pump Was Purchased

Material _____ Flow Rate _____ Process Temperature _____
Operating Speed _____ Viscosity _____ pH Value _____
Hours Operated per Day _____ Continuous _____ Intermittent _____
Discharge Pressure _____ Suction Pressure _____ NPSH Available _____
Percent of Solids _____ Particle Size _____ Abrasion Rating _____

How Did You First Hear of Moyno Pumps?

❑ Advertisement ❑ Postcard ❑ Trade Show ❑ Referral
❑ Distributor Salesperson ❑ Previous Experience With Moyno Pumps ❑ Other – Explain Below

Thank You!

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