INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL

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GORMAN-RUPP

OM-01417-0M01

June 10, 1980

Motor Driven Centrifugal Pump

Model 63F3-E60 3P

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA Printed in U.S.A.

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This Installation, Operation, and Maintenance Manual is designed to help you get the best performance and longest life from your Gorman-Rupp pump.

This pump is a 60 Series, semi-enclosed impeller model, with straight-in suction without a suction check valve, and is suitable for pumping liquids which do not contain large entrained solids. For specific service, consult your Gorman-Rupp distributor or the Gorman-Rupp Company.

If there are any questions regarding the pump which are not covered in this manual or in other literature accompanying the unit, please contact your Gorman-Rupp distributor, or write:

The Gorman-Rupp Company
P.O. Box 1217
Mansfield, Ohio 44902

or

Gorman-Rupp of Canada Limited
70 Burwell Road
St. Thomas, Ontario N5P 3R7

For information or technical assistance on the power source, contact the power source manufacturer's local dealer or representative.

The following are used to alert maintenance personnel to procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel:

NOTE

Instructions to aid in installation, operation, or maintenance or which clarify a procedure.

CAUTION

Instructions which must be followed to avoid causing damage to the product or other equipment incidental to the installation. These describe the procedure required and the damage which could result from failure to follow the procedure.

WARNING

Instructions which must be followed to avoid causing injury or death to personnel. These describe the procedure required and the injury which could result from failure to follow the procedure.

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WARNINGS

THESE WARNINGS APPLY TO 60 SERIES PUMPS WITH ELECTRIC MOTOR DRIVE.

Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Disconnect the motor to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Vent the pump slowly and cautiously.
5. Close the suction and discharge valves.
6. Check the temperature before opening any covers, plates, or plugs.
7. Drain the pump.

Do not attempt to pump any liquids for which this pump has not been designed.

This pump is usually installed in a permanent configuration. After the pump has been installed, make certain that the pump and all piping connections are secure before attempting to operate it.

Do not operate the pump without shields and/or guards in place over drive shafts, belts and/or couplings, or other rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

Do not operate the pump against a closed discharge valve for long periods of time. This could bring the liquid to a boil, build pressure, and cause the pump to rupture or explode.

Overheated pumps can cause severe burns and injury. If overheating of the pump casing occurs:

1. Stop the pump immediately.
2. Allow the pump to cool.
3. Refer to instructions in this manual before restarting the pump.

Do not remove plates, covers, gauges, pipe plugs, or fittings from an overheated pump. Vapor pressure within the pump can cause parts being disengaged to be ejected with great force. Allow the pump to cool before servicing.

Do not install and operate a non-explosion proof motor in an explosive atmosphere. Install, connect, and operate the motor in accordance with the National Electric Code and all local codes. If there is a conflict between the instructions in the manual accompanying the unit and the National Electric Code or the applicable local code, the National or local code shall take precedence. All electrical equipment supplied with this pump conformed to applicable federal regulations and national codes in effect on the date of manufacture.

The electric power applied to the motor unit is high enough to cause injury or death. Ground the unit before connecting it to the electrical power supply; never use gas piping as an electrical ground. Be sure to connect the motor to the correct phase and voltage. Do not run the pump if the voltage is not within limits. If the circuit breaker or fuse is tripped, examine the problem before restarting the pump.

INSTALLATION

Since pump installations vary, this section is intended only to summarize recommended installation practice. If there are any questions concerning a specific installation, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

PREINSTALLATION INSPECTION

The pump assembly was inspected and tested before it was shipped from the factory. Before installation, inspect the pump for damage which may have occurred during shipment.

a. Check the pump assembly for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose bolts, nuts, capscrews, and other attaching hardware. Since gaskets tend to shrink after drying, check for and tighten loose nuts and capscrews securing mating surfaces.

c. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated. Note the direction of rotation indicated on the pump. Check that the pump shaft rotates in the required direction.

CAUTION

Only operate this pump in the direction indicated by the arrow on the pump body and on the accompanying decal. Otherwise, the impeller could become loosened from the shaft and seriously damage the pump.

d. Check all lubricant levels and lubricate as necessary. Refer to the MAINTENANCE AND REPAIR section of this manual.

POSITIONING THE PUMP

Mounting

Locate the pump in an accessible place as close as practical to the liquid being pumped. Level mounting is essential for proper operation. It may be necessary to support or shim the pump for level operation.

Lifting

WARNING

Use lifting and moving equipment in good repair and with adequate capacity to prevent injuries to personnel or damage to equipment.

Make sure that hoists and other lifting equipment are of sufficient capacity to safely handle the pumping assembly. If chains and cables are used in lifting, make certain that they are positioned so that they will not damage the pump, and so that the load will be balanced.

CAUTION

The pump assembly can be seriously damaged if the cables or chains used to lift and move the unit are improperly wrapped around it.

SUCTION AND DISCHARGE PIPING

Materials

This pump is usually installed in a permanent piping configuration, but either pipe or hose may be used for suction and discharge lines. Piping materials must be compatible with the liquid being pumped. If hose is used in suction lines, it must be the rigid-wall, reinforced type to prevent collapse under suction. Using pipe couplings in suction lines is not recommended.

Line Configuration

Keep suction and discharge lines as straight as possible to minimize friction losses. Make minimum use of elbows and fittings, which substantially increase friction loss. If elbows are necessary, use the long-radius type to minimize friction loss.

Connections to Pump

Before tightening a connecting flange, align it exactly with the pump port. Never pull a pipe line into place by tightening the flange bolts.

Lines near the pump must be independently supported to avoid strain on the pump which could cause excessive vibration, decreased bearing life, and increased shaft and seal wear. If hose-type lines are used, they should have adequate support to secure them when filled with liquid and under pressure.

Gauges

Most pumps are drilled and tapped for installing discharge pressure and vacuum suction gauges. If these gauges are desired for pumps that are not tapped, drill and tap the suction and discharge lines close to the pump before installing the lines.

SUCTION LINES

To avoid air pockets which could affect pump priming, the suction line must be as short and direct as possible. When operation involves a suction lift, the line must always slope upward to the pump from the source of the liquid being pumped; if the line slopes down to the pump at any point along the suction run, air pockets will be created.

Fittings

Suction lines should be the same size as the pump inlet. If reducers are used in suction lines, they should be the eccentric type, and should be installed with the flat part of the reducers uppermost to avoid creating air pockets. Valves are not normally used in suction lines, but if a valve is used, install it with the stem down or to either side to avoid air pockets.

Strainers

This pump is designed primarily for liquids which do not need straining, and a strainer is not usually furnished with the pump when it is shipped from the factory. If a strainer is furnished with the pump, however, be certain to use it. Any entrained solids which pass through a strainer furnished with the pump will also pass through the pump itself.

If a strainer is not furnished with the pump, but is installed by the pump user, make certain that the total area of the openings in the strainer is at least three or four times the cross section of the suction line, and that the openings will not permit passage of solids larger than the solids handling capability of the pump.

Sealing

Since even a slight leak will affect priming, head, and capacity, especially when operating with a high suction lift, all connections in the suction line should be sealed with pipe dope to ensure an airtight seal. In volatile and/or corrosive service, the pipe dope should be compatible with the liquid being pumped.

Suction Lines In Sumps

If a single suction line is installed in a sump, it should be positioned away from the wall of the sump at a distance equal to one and one-half times the diameter of the suction pipe.

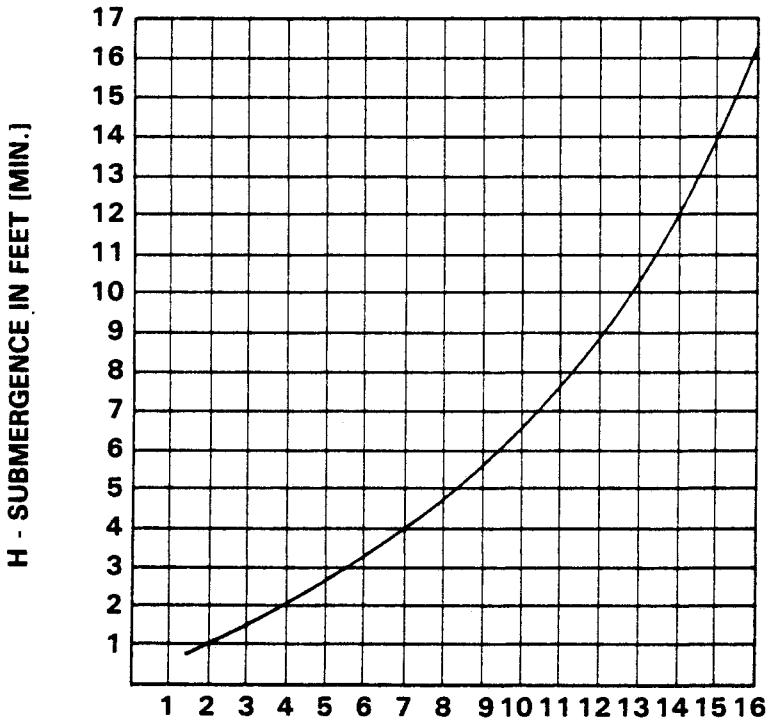
If there is a liquid flow from an open pipe into the sump, the flow should be kept away from the suction inlet because the inflow will carry air down into the sump, and air entering the suction line will reduce pump efficiency.

If it is necessary to position inflow close to the suction inlet, install a baffle between the inflow and the suction inlet at a distance one and one-half times the diameter of the suction pipe. The baffle will allow entrained air to escape from the liquid before it is drawn into the suction inlet.

If two section lines are installed in a single sump, the flow paths may interact, reducing the efficiency of one or both pumps. To avoid this, position the suction inlets so that they are separated by a distance equal to at least three times the diameter of the suction pipe.

Suction Line Positioning

The depth of submergence of the suction line is critical to efficient pump operation. Figure 1 shows recommended minimum submergence vs. velocity.



$$\text{VELOCITY IN FEET PER SEC.} = \frac{\text{QUAN. [G.P.M.]} \times .321}{\text{AREA}} \text{ OR } \frac{\text{G.P.M.} \times .4085}{D^2}$$

Figure 1. Recommended Minimum Suction Line Submergence Vs. Velocity

DISCHARGE LINES

Do not terminate the discharge line at a level lower than that of the liquid being pumped unless a siphon breaker is used in the line. Otherwise, a siphoning action causing damage to the pump could result.

Valves

If a throttling valve is desired in the discharge line, use a valve as large as the largest pipe in the line to minimize friction losses. Never install a throttling valve in a suction line.

A check valve in the discharge line is normally recommended, but is not necessary in low discharge head applications.

With high discharge heads, it is recommended that a throttling valve and a check valve be installed in the discharge line to protect the pump from excessive shock pressure and reverse rotation when it is stopped.

ALIGNMENT

When this pump is shipped from the Gorman-Rupp factory, the pump and motor are securely attached. The attaching hex nuts may become loosened in transit and handling, however, and should be checked before the pump is put into service.

CAUTION

Before operating this pump, make certain that the hex nuts securing the motor to the intermediate are fully tightened.

OPERATION

WARNING

Do not attempt to pump volatile or corrosive materials for which this pump has not been designed.

PRIMING

Install the pump and piping as described in INSTALLATION. Make sure that the piping connections are tight, and that the pump is securely mounted. Check that the pump is properly lubricated (see LUBRICATION in MAINTENANCE AND REPAIR).

This pump is not self-priming, and will normally require an external priming device.

If this pump is equipped with a hand-operated vacuum priming pump, see below.

Hand-Operated Priming Pump

The hand-operated priming pump — usually mounted directly on the pump — is designed to draw air out of the suction line and the volute.

Hand-operated priming pumps can be used while the pump is either stopped or operating.

Close the discharge line throttling valve.

If this pump is equipped with a spring-loaded check valve, close the check valve before engaging the priming device.

To prime the pump, open the cock in the priming line. Operate the handle of the pump until liquid flows from the check valve (see figure 1).

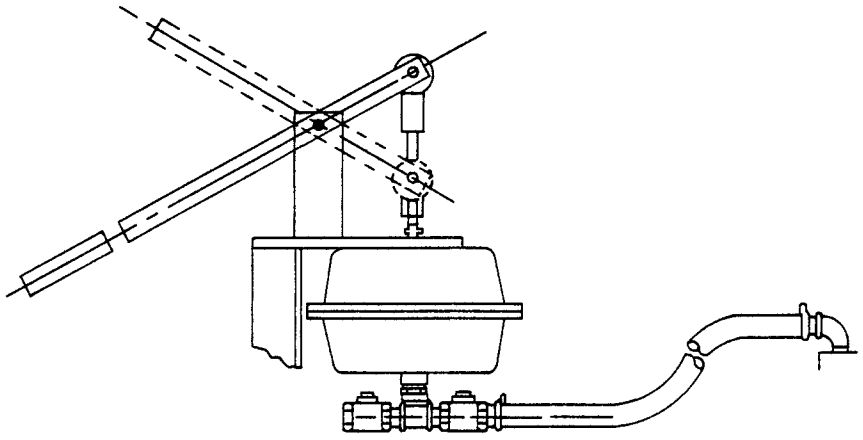


Figure 1. Hand Primer Assembly

Once the pump is fully primed, close the cock in the priming line. If this pump is equipped with a spring-loaded check valve, open the check valve after the pump has been primed.

STARTING

Rotation

The correct direction of pump rotation is indicated by an arrow on the pump body, and on the accompanying decal. If the pump is operated in the wrong direction, the impeller could become loosened from the shaft and seriously damage the pump.

CAUTION

Only operate this pump in the direction indicated by the arrow on the pump body and on the accompanying decal. Otherwise, the impeller could become loosened from the shaft and seriously damage the pump.

Consult the operating manual furnished with the motor before attempting to start the motor.

If a three-phase electric motor is being used, check rotation by starting the pump for a moment to see if the rotation is correct. Rotation can usually be determined by observing the motor cooling fan. If the rotation is incorrect, have qualified personnel interchange any two of the three-phase wires to change direction.

OPERATION

Partially open the discharge throttling valve so that the discharge line fills slowly to prevent damage to piping, gaskets, and other devices in the line which could be affected by shock resulting from rapid filling of the line. When the discharge line is completely filled, adjust the discharge throttling valve to the desired flow rate.

Leakage

No leakage should be visible at pump mating surfaces, or at pump connections or fittings. Keep all line connections and fittings tight to maintain maximum pump efficiency.

Overheating

Overheating can occur if the valves in the suction or discharge lines are closed. Operating against closed valves could bring the liquid to a boil, build pressure, and cause the pump to rupture or explode. If overheating occurs, stop the pump and allow it to cool before servicing it. Refill the volute casing with cool liquid.

WARNING

Do not remove plates, covers, gauges, pipe plugs, or fittings from an overheated pump. Vapor pressure within the pump can cause parts being disengaged to be ejected with great force. Allow the pump to cool before servicing.

Strainer Check

Check the suction strainer regularly during pump operation, or if the pump flow rate begins to drop, and clean it as necessary. Be especially alert for unusual noises when pumping liquids containing solids.

Pump Vacuum Check

Install a vacuum gauge in the system, using pipe dope on the threads.

The pump should pull a vacuum of 20 inches or more of mercury at operating speed with the suction line blocked. If it does not, check for air leaks in the seals or gaskets.

With the pump primed and at operating speed, and the suction line open, read the vacuum gauge. Shut off the pump, keep the vacuum line open, and read the gauge again to see if the vacuum remains at the maximum developed by the pump. If the vacuum falls off rapidly, an air leak exists. If the liquid level at the source of supply remains at a constant level, check to make certain that the air leak is not from the vacuum gauge connection.

STOPPING

After stopping the pump, disconnect the power source to ensure that the pump will remain inoperative.

In below freezing conditions, drain the pump to prevent damage from freezing. Also, clean out any solids by flushing with a hose. Operate the pump for approximately one minute; this will remove any remaining liquid that could freeze the pump rotating parts.

If the pump will be idle, or if it has been pumping liquids containing a large amount of solids, drain the pump, and flush it thoroughly with clean water. To prevent large solids from clogging the drain port and preventing the pump from completely draining, operate the pump during the draining process. Clean out any remaining solids by flushing with a hose.

TROUBLESHOOTING

WARNING

Before attempting to open or service the pump:

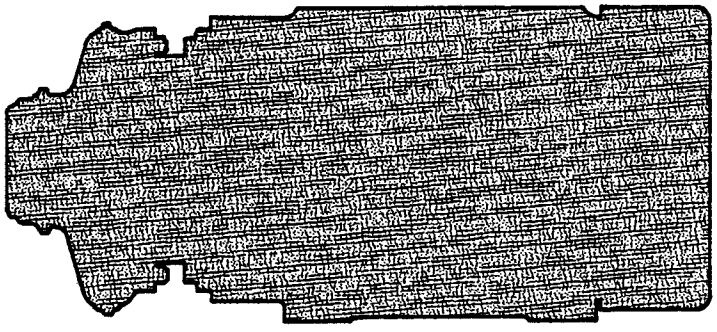
1. Consult pump service manual.
2. Disconnect the power source to ensure that the pump will remain inoperative.
3. Allow pump to cool if overheated.
4. Close suction and discharge valves.
5. Drain pump.

Trouble	Possible Cause	Probable Remedy
PUMP FAILS TO PRIME	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See INSTALLATION.
	Strainer clogged.	Check strainer and clean if necessary.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct as needed. Check submergence chart (Section B, page 4).
	Lining of suction hose collapsed.	Replace suction hose.
	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.
	Impeller clogged.	Free impeller of debris.
	Pump speed too slow.	Check driver output; check belts or couplings for slippage.
	Discharge head too high.	Install bypass line.
	Suction lift too high.	Reduce suction lift.
	Strainer clogged.	Check strainer and clean if necessary.

Trouble	Possible Cause	Probable Remedy
PUMP STOPS OR FAILS TO DE-LIVER RATED FLOW OR PRESSURE (cont)	Leaking or worn seal or pump gaskets.	Check pump vacuum. Replace leaking or worn seal or pump gaskets.
PUMP REQUIRES TOO MUCH POWER	Pump speed too high.	Check driver output; check that sheaves or couplings are correctly sized.
	Discharge head too low.	Adjust discharge valve.
	Liquid solution too thick.	Dilute if possible.
PUMP CLOGS FREQUENTLY	Discharge flow too slow.	Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.
EXCESSIVE NOISE	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line.
	Pumping entrained air.	Locate and eliminate source of air bubble.
	Pump or drive not securely mounted.	Secure mounting hardware.
	Impeller clogged or damaged.	Clean out debris; replace damaged parts.

Motor Driven Centrifugal Pump

Model 63F3-E60 3P



The only moving parts of this pump are the impeller, seal rotating elements, and the shaft. The wear rings, impeller, and seal, which receive the most wear, are easily accessible and can be replaced without disturbing the piping. Maintenance and replacement of these three parts will maintain the peak operating efficiency of the pump.

SECTIONAL DRAWING

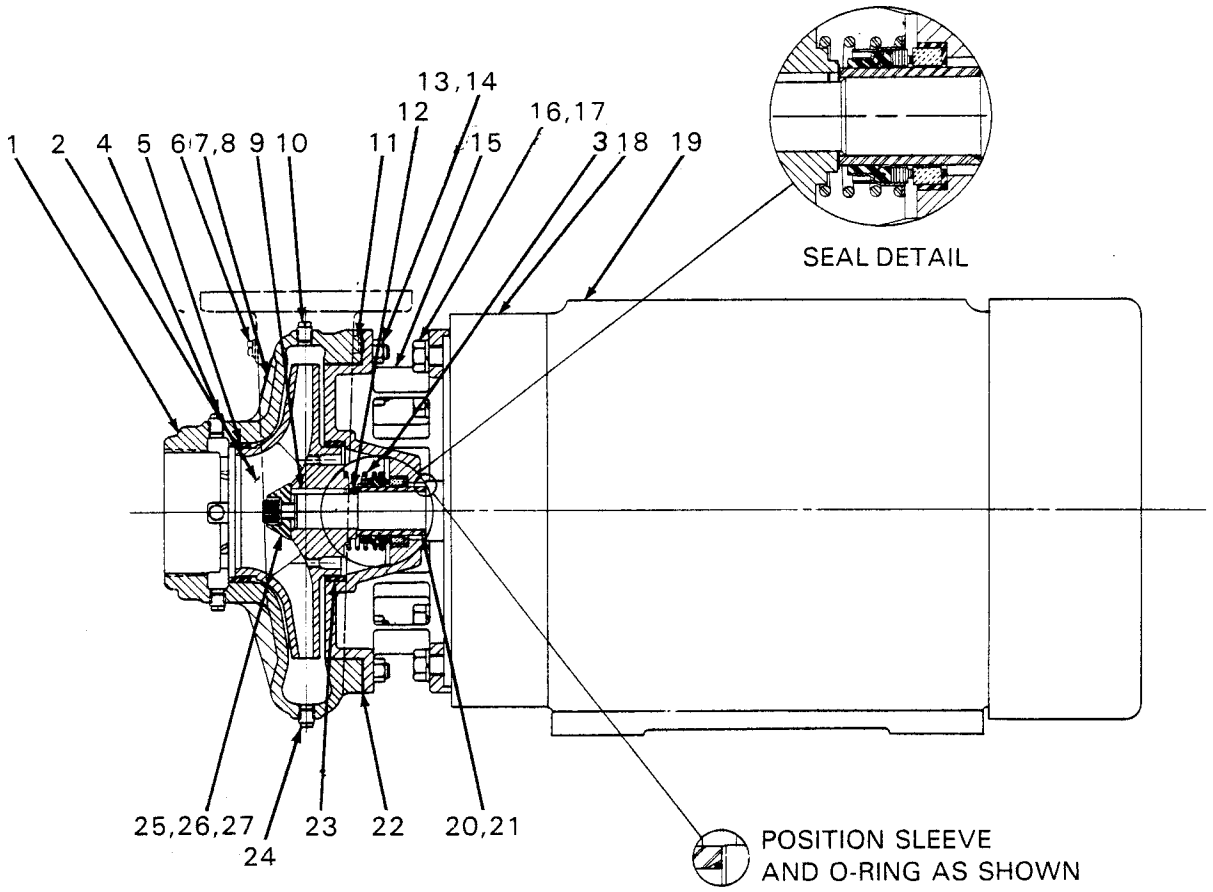


Figure 1. Pump Model 63F3-E60 3P

PARTS LIST

PUMP MODEL 63F3-E60 3P

(From S/N 684198 up)

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	VOLUTE HOUSING	38216-003	—	1
2	★IMPELLER	38625-536	—	1
3	★SEAL ASSEMBLY	S-1172-A	—	1
4	PIPE PLUG	P-06	11990	4
5	★VOLUTE WEAR RING	31134-064	—	1
6	PIPE PLUG	P-06	11990	1
7	★NAME PLATE	2613-ED	13990	1
8	DRIVE SCREW	BM#04-03	15990	2
9	IMPELLER KEY	N-0608	15990	1
10	PIPE PLUG	P-04	11990	2
11	PIPE PLUG	P-06	11990	1
12	★IMPELLER ADJUSTING SHIMS	37-J	17090	1
13	STUD	C-0806	15991	12
14	HEX NUT	D-08	15991	12
15	★INTERMEDIATE ASSEMBLY	42111-729	—	1
16	HEX HEAD CAPSCREW	B-1006	15991	8
17	LOCKWASHER	J-10	15991	8
18	★ROTATION DECAL	2613-BM	00000	1
19	MOTOR, 60HP 3P	28169-210	—	1
20	★SHAFT SLEEVE	31441-006	—	1
21	★SHAFT SLEEVE O-RING	25152-028	—	1
22	★VOLUTE HOUSING GASKET	38674-201	—	1
23	INTERMEDIATE WEAR RING	31134-064	—	1
24	VOLUTE HOUSING DRAIN PLUG	P-04	11990	1
25	IMPELLER CAPSCREW	DM-0806	15991	1
26	IMPELLER LOCKWASHER	J-08	15991	1
27	IMPELLER WASHER	31167-002	—	1
NOT SHOWN:				
	STRAINER	S-1528	—	1
	SLINGER RING	3209	19120	1
OPTIONAL:				
	DISCHARGE CHECK VALVE	GRP14-1A	—	1
	DISCHARGE FLANGE	1753-A	10010	1
	HAND PRIMER ASSEMBLY	GRP43-08	—	1

★INDICATES PARTS RECOMMENDED FOR STOCK

Above Serial Numbers Do Not Apply To Pumps Made In Canada.

CANADIAN SERIAL NO. . . . . AND UP

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

This pump requires little service due to its rugged, minimum-maintenance design. If it becomes necessary to inspect or replace components in and adjacent to the rotating assembly, however, follow these instructions, which are keyed to the sectional view (see figure 1) and the accompanying parts list.

Pump Disassembly

WARNING

Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Disconnect the power source to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Vent the pump slowly and cautiously.
5. Close the suction and discharge valves.
6. Check the temperature before opening any covers, plates, or plugs.
7. Drain the pump.

Disconnect the power source, making certain that it will remain inoperative while the pump is being serviced, and close all connecting valves.

Remove the volute housing drain plug (24) to drain the pump. Clean and reinstall the plug after the pump has been drained.

For access to the impeller (2) and seal assembly (3) the pump must be opened at the point where the volute housing (1) and the intermediate (15) are joined. Remove hex nuts (14) securing the volute housing to the intermediate and separate the assemblies. The impeller is now accessible.

To remove the impeller, immobilize it by placing a block of wood between the vanes, disengage the impeller capscrew (25), and remove the impeller washers (26 and 27).

Slide the impeller off the shaft, retaining the impeller key (9). Use caution when sliding the impeller off the shaft; tension on the seal spring will be released as the impeller is removed.

Remove the impeller adjusting shims (12). For ease of reassembly, tag and tie the shims, or measure and record their thickness.

Seal Disassembly

Remove the seal spring. Using a stiff wire with a hooked end if necessary, remove the remainder of the seal components. Remove the shaft sleeve (20) and shaft sleeve O-ring (21).

Clean the seal cavity and the shaft with a soft cloth soaked in cleaning solvent.

WARNING

Most cleaning solvents are toxic and flammable. Use them only in a well-ventilated area free from excessive heat, sparks, and flame. Read and follow all precautions printed on solvent containers.

Seal Reassembly

The seal is not normally reused because of the high polish on its lapped faces, but if it is necessary to reuse the old seal, wash all metallic parts in cleaning solvent and dry thoroughly.

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. If any components are worn, replace the complete seal; never mix old and new seal parts.

CAUTION

This seal is not designed for operation at temperatures above 160°F. Do not use at higher operating temperatures.

See figure 2 for the correct order of installation of seal components.

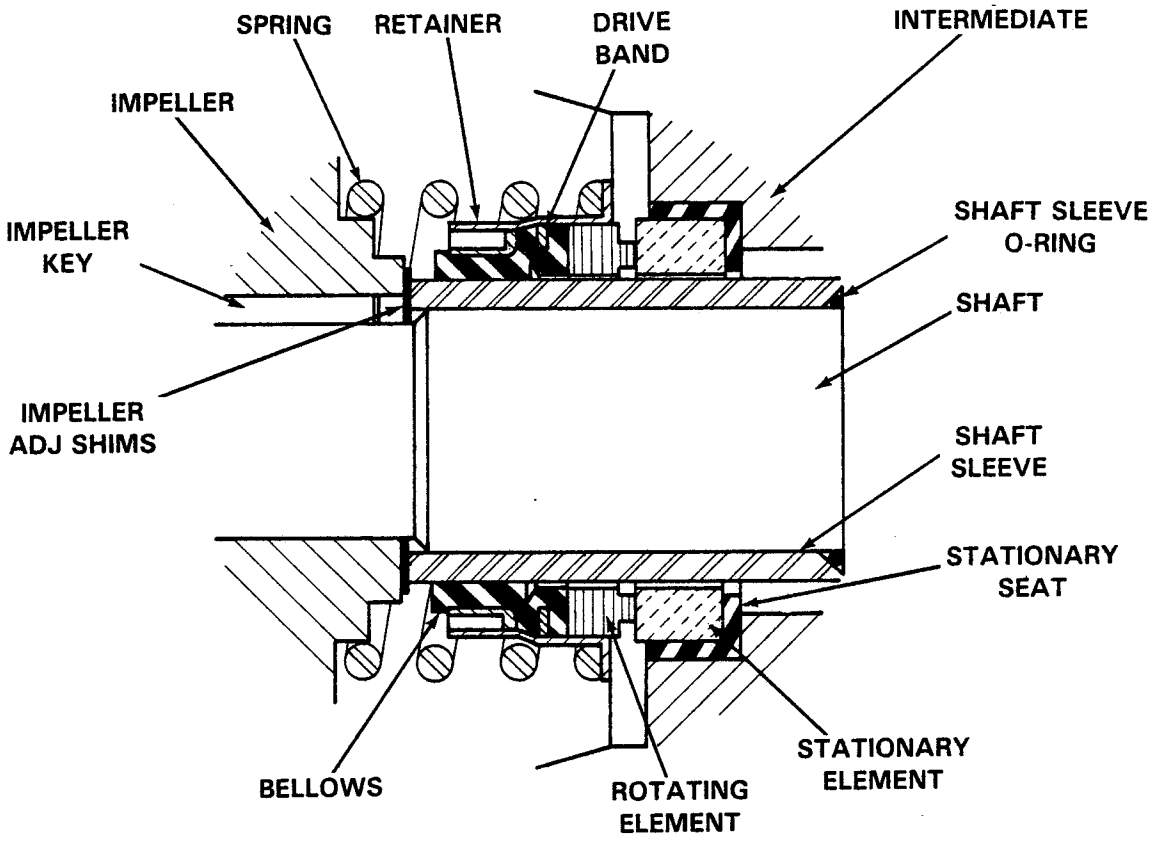


Figure 2. S-1172-A Seal Assembly

Lubricate the shaft sleeve O-ring with soft grease or oil and install the O-ring on the shaft. Clean and polish the shaft sleeve, or replace it if there are nicks or cuts on the end. Reinstall the shaft sleeve with the chamfered end facing the O-ring.

Place a drop of light lubricating oil on the lapped faces of the seal, and install the stationary seat and stationary and rotating elements. Lubricate the bellows with soft grease or oil, and install the bellows assembly. Install the seal spring, making certain that all components of the seal are seated squarely.

Pump Reassembly

Inspect the intermediate wear ring (23), which is a press fit, and replace it if scored or worn.

Inspect the volute wear ring (5), which is a press fit, and replace it if scored or worn. Make certain that the sharp corner, on the I.D., is facing away from the impeller.

Reinstall the impeller adjusting shims. Inspect the impeller, and replace it if cracked or badly worn. Reinstall the impeller key, and slide the impeller on the shaft. Reinstall the impeller washers. Apply Loctite Keyfit, or equivalent, to the threads of the impeller capscrew. Engage the capscrew, and torque it to 55 ft. lbs.

For maximum pump efficiency, the impeller should be centered with the volute scroll. If the same number and thickness of shims were reinstalled as were removed, the impeller should be centered.

Replace the volute housing gasket (22) and reassemble the volute housing and the intermediate, securing the attaching hex nuts.

Turn the shaft to check that the impeller rotates freely. If it does not, remove impeller shims until the shaft rotates freely when the pump is turned.

If a discharge check valve is installed by the pump user, the check valve must be positioned so that the handle is directed toward the center of the suction plumbing.

CAUTION

The discharge check valve may be seriously damaged by vibration if it is not installed so that the handle is directed toward the center of the suction plumbing.

Fill the volute with clean liquid. Make certain that all piping is securely tightened before starting the pump.

LUBRICATION

Seal Assembly

The seal assembly is lubricated by the medium being pumped.

For U.S. and International Warranty Information,
Please Visit www.grpumps.com/warranty
or call:
U.S.: 419—755—1280
International: +1—419—755—1352

For Canadian Warranty Information,
Please Visit www.grcanada.com/warranty
or call:
519—631—2870

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