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INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST

GORMAN-RUPP PUMPS

6500 SERIES® PUMP

MODEL
6512A31—B

GORMAN-RUPP PUMPS

www.grpumps.com

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Printed in U.S.A.

Register your new
Gorman-Rupp pump online at
www.grpumps.com

Valid serial number and e-mail address required.

RECORD YOUR PUMP MODEL AND SERIAL NUMBER

Please record your pump model and serial number in the spaces provided below. Your Gorman-Rupp distributor needs this information when you require parts or service.

Pump Model: _____

Serial Number: _____

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INTRODUCTION

Thank You for purchasing a Gorman-Rupp pump. **Read this manual** carefully to learn how to safely install and operate your pump. Failure to do so could result in personal injury or damage to the pump.

Because pump installations are seldom identical, this manual cannot possibly provide detailed instructions and precautions for every aspect of each specific application. Therefore, it is the responsibility of the owner/installer of the pump to ensure that applications not addressed in this manual are performed **only** after establishing that neither operator safety nor pump integrity are compromised by the installation. Pumps and related equipment **must** be installed and operated according to all national, local and industry standards.

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

The Gorman-Rupp Company
P.O. Box 1217
Mansfield, Ohio 44901—1217
Phone: (419) 755—1011
or:
Gorman-Rupp of Canada Limited
70 Burwell Road
St. Thomas, Ontario N5P 3R7
Phone: (519) 631—2870

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

HAZARD AND INSTRUCTION DEFINITIONS

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:

DANGER!

Immediate hazards which WILL result in severe personal injury or death. These instructions describe the procedure required and the injury which will result from failure to follow the procedure.

WARNING!

Hazards or unsafe practices which COULD result in severe personal injury or death. These instructions describe the procedure required and the injury which could result from failure to follow the procedure.

CAUTION

Hazards or unsafe practices which COULD result in minor personal injury or product or property damage. These instructions describe the requirements and the possible damage which could result from failure to follow the procedure.

NOTE

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

SAFETY – SECTION A

This information applies to 6500 Series® basic pumps. Gorman-Rupp has no control over or particular knowledge of the power source which will be used. Refer to the manual accompanying the power source before attempting to begin operation.

This manual will alert personnel to known procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel. However, this manual cannot possibly anticipate and provide detailed instructions and precautions for every situation that might occur during maintenance of the unit. Therefore, it is the responsibility of the owner/maintenance personnel to ensure that only safe, established maintenance procedures are used, and that any procedures not addressed in this manual are performed only after establishing that neither personal safety nor pump integrity are compromised by such practices.

WARNING!

Before attempting to open or service the pump:

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

WARNING!

This pump is designed to handle most non-volatile, non-flammable liquids containing specified entrained solids. Do not attempt to pump volatile, corrosive, or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

WARNING!

After the pump has been positioned, make certain that the pump and all piping connections are tight, properly supported and secure before operation.

WARNING!

Do not operate the pump without the guards in place over the rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

WARNING!

Death or serious personal injury and damage to the pump or components can occur if proper lifting procedures are not observed. Make certain that hoists, chains, slings or cables are in good working condition and of sufficient capacity and that they are positioned so that loads will be balanced and the pump or components will not be damaged when lifting. Suction and discharge hoses and piping must be re-

moved from the pump before lifting. Lift the pump or component only as high as necessary and keep personnel away from suspended objects.

WARNING!

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 casing to rupture or explode.

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.

CAUTION

This pump is designed for direct coupled drive only. Use of a V-belt drive will damage the pump and void the pump warranty.

INSTALLATION – SECTION B

Review all SAFETY information in Section A.

Since pump installations are seldom identical, this section offers only general recommendations and practices required to inspect, position, and arrange the pump and piping.

Most of the information pertains to a **flooded suction application** where the liquid is supplied to the pump under pressure. Since the pressure supplied to the pump is critical to performance and safety, **be sure** to limit the incoming pressure to 50% of the maximum permissible operating pressure as shown on the pump performance curve (see Section E, Page 1).

For further assistance, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

Pump Dimensions

See Figure 1 for the approximate physical dimensions of this pump.

OUTLINE DRAWING

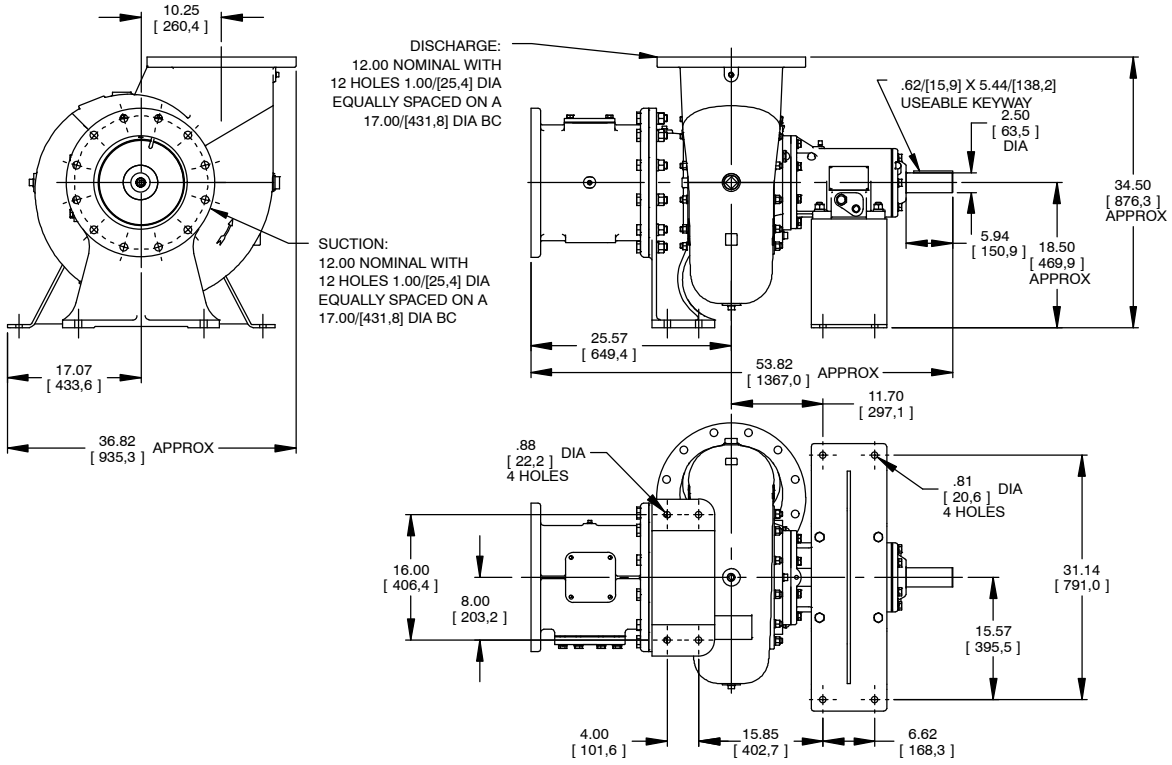


Figure 1. Pump Model 6512A31–B

PREINSTALLATION INSPECTION

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

a. Inspect the pump and engine for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose attaching hardware. Since gaskets tend to shrink after drying, check for loose hardware at mating surfaces.

c. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated.

d. Check levels and lubricate as necessary. Refer to **LUBRICATION** in the **MAINTENANCE**

AND REPAIR section of this manual and perform duties as instructed.

e. If the pump has been stored for more than 12 months, some of the components or lubricants may have exceeded their maximum shelf life. These **must be inspected or replaced** to ensure maximum pump service.

If the maximum shelf life has been exceeded, or if anything appears to be abnormal, contact your Gorman-Rupp distributor or the factory to determine the repair or updating policy. **Do not** put the pump into service until appropriate action has been taken.

POSITIONING PUMP

WARNING!

Death or serious personal injury and damage to the pump or components can occur if proper lifting procedures are not observed. Make certain that hoists, chains, slings or cables are in good working condition and of sufficient capacity and that they are positioned so that loads will be balanced and the pump or components will not be damaged when lifting. Suction and discharge hoses and piping must be removed from the pump before lifting. Lift the pump or component only as high as necessary and keep personnel away from suspended objects.

Lifting

Pump unit weights will vary depending on the mounting and drive provided. Check the shipping tag on the unit packaging for the actual weight, and use lifting equipment with appropriate capacity. Drain the pump and remove all customer-installed equipment such as suction and discharge hoses or piping before attempting to lift existing, installed units.

Mounting

Locate the pump in an accessible place as close as practical to the liquid being pumped. Level mounting is essential for proper operation.

Proper mounting of the pump, driver and base is critical to the performance of the pump. Improper mounting can result in vibration, which can cause damage to the pump and/or other system components.

The pumping unit must be securely mounted to a foundation that is heavy enough to absorb any vibration, strain or shock, while providing permanent, rigid support for the unit.

Because pump installations vary due to the specific application, this manual cannot possibly anticipate and provide detailed instructions for every installation. Therefore, it is recommended that the installer of the unit follow the recommendations provided by the Hydraulic Institute in their Rotodynamic Centrifugal Pump Design and Application manual when designing and fabricating the foundation upon which the pump, base and driver will be mounted.

SUCTION AND DISCHARGE PIPING

The following is provided as general information for suction and discharge piping. Because pump installations vary due to the specific application, this manual cannot possibly anticipate and provide detailed instructions for every installation. Therefore, it is recommended that the installer follow the recommendations provided by the Hydraulic Institute in their Pump Piping for Rotodynamic Pumps manual for layout, design and installation of the system piping.

Materials

Materials used in piping must be compatible with the liquid being pumped. Using piping 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 and/or couplings.

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.

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 not less than 18 inches (457,2 mm) from the suction and discharge ports and install the lines. Installation closer to the pump may result in erratic readings.

SUCTION LINES

To avoid air pockets which could affect pump priming, the suction line must be as short and direct as possible.

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 for isolation purposes, install it with the stem horizontal to avoid air pockets.

Strainers

A strainer or other device should be used to filter solids larger than the pump's capacity to avoid damage or decreased performance. Information about solids size handling can be found on the performance curve for your specific pump. When selecting or installing a strainer, 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 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 pump performance, all connections in the suction line should be sealed with pipe dope to ensure an airtight seal. Follow the sealant manufacturer's recommendations when selecting and applying the pipe dope. The pipe dope should be compatible with the liquid being pumped.

DISCHARGE LINES

Siphoning

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 to minimize friction losses. Never install a throttling valve in a suction line.

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

If the application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.

ALIGNMENT

This pump is designed for direct coupled drive only. Use of a V-belt drive will damage the pump and void the pump warranty.

The alignment of the pump and its power source is critical for trouble-free mechanical operation. The driver and pump must be mounted so that their shafts are aligned with and parallel to each other. It is imperative that alignment be checked after the pump and piping are installed, and before operation.

NOTE

Check **Rotation***, Section C, before final alignment of the pump.*

When mounted at the Gorman-Rupp factory, driver and pump are aligned before shipment. Misalignment will occur in transit and handling. Pumps **must** be checked and realigned before operation. Before checking alignment, tighten the foundation bolts. The pump casing feet and/or pedestal feet, and the driver mounting bolts should also be tightly secured.

WARNING!

When checking alignment, disconnect the power source to ensure that the pump will remain inoperative.

CAUTION

Adjusting the alignment in one direction may alter the alignment in another direction. check each procedure after altering alignment.

Coupled Drives

When using couplings, the axis of the power source must be aligned to the axis of the pump shaft in both the horizontal and vertical planes. Most couplings require a specific gap or clearance between the driving and the driven shafts. Refer to the coupling manufacturer's service literature.

Align spider insert type couplings by using calipers to measure the dimensions on the circumference of the outer ends of the coupling hub every 90°. The coupling is in alignment when the hub ends are the same distance apart at all points (see Figure 2A).

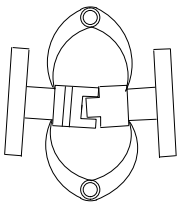


Figure 2A. Aligning Spider-Type Couplings

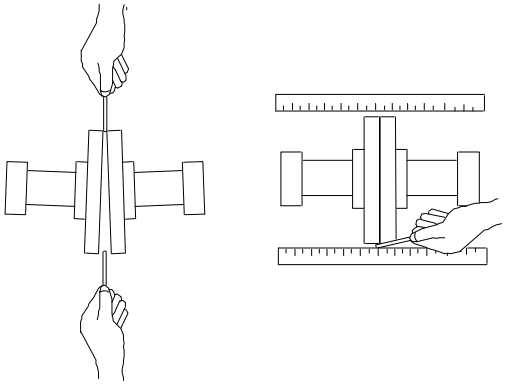


Figure 2B. Aligning Non-Spider Type Couplings

Align non-spider type couplings by using a feeler gauge or taper gauge between the coupling halves every 90°. The coupling is in alignment when the hubs are the same distance apart at all points (see Figure 2B).

Check parallel adjustment by laying a straightedge across both coupling rims at the top, bottom, and side. When the straightedge rests evenly on both halves of the coupling, the coupling is in horizontal parallel alignment. If the coupling is misaligned, use a feeler gauge between the coupling and the straightedge to measure the amount of misalignment.

DANGER!

Do not operate the pump without the guard in place over the rotating parts. exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

OPERATION – SECTION C

Review all SAFETY information in Section A.

Follow the instructions on all tags, labels and decals attached to the pump.

WARNING!

This pump is designed to handle most non-volatile, non-flammable liquids containing specified entrained solids. Do not attempt to pump volatile, corrosive, or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

STARTING

Consult the operations manual furnished with the power source.

OPERATION

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.

Liquid Temperature And Overheating

The **maximum** liquid temperature for this pump is 160°F (71°C). Do not apply it at a higher operating temperature.

Overheating can occur if operated with the valves in the suction or discharge lines 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 pump casing with cool liquid.

DANGER!

Allow an over-heated pump to cool before servicing. Do not remove plates, covers, gauges, or fittings from an overheated pump. Liquid within the pump can reach boiling temperatures, and vapor pressure within the pump can cause parts being disengaged to be ejected with great force. After the pump cools, drain the liquid from the pump by removing the casing drain plug. Use caution when removing the plug to prevent injury to personnel from hot liquid.

Strainer Check

If a suction strainer has been installed by the user, check the strainer regularly and clean it as necessary. The strainer should also be checked if pump flow rate begins to drop. If a vacuum suction gauge has been installed, monitor and record the readings regularly to detect strainer blockage.

Never introduce air or steam pressure into the pump casing or piping to remove a blockage. This could result in personal injury or damage to the equipment. If backflushing is absolutely necessary, **liquid pressure** must be limited to 50% of the maximum permissible operating pressure shown on the pump performance curve (see Section E, Page 1).

STOPPING

If the liquid being pumped is stopped abruptly, damaging shock waves can be transmitted to the pump and piping system. Soft-start systems with ramp up/ramp down starting and stopping capabilities are available where water hammer may be a problem.

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

Cold Weather Preservation

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 for more than a few hours, 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, insert a rod or stiff wire in the drain port, and agitate the liquid during the draining process. Clean out any remaining solids by flushing with a hose.

BEARING TEMPERATURE CHECK

Bearings normally run at higher than ambient temperatures because of heat generated by friction. Temperatures up to 160°F (71°C) are considered normal for bearings, and they can operate safely to at least 180°F (82°C).

Checking bearing temperatures by hand is inaccurate. Bearing temperatures can be measured accurately by placing a contact-type thermometer against the housing. Record this temperature for future reference.

A sudden increase in bearing temperatures is a warning that the bearings are at the point of failing to operate properly. Make certain that the bearing lubricant is of the proper viscosity and at the correct level (see **LUBRICATION** in Section E). Bearing overheating can also be caused by shaft misalignment and/or excessive vibration.

When pumps are first started, the bearings may seem to run at temperatures above normal. Continued operation should bring the temperatures down to normal levels.

TROUBLESHOOTING — SECTION D

Review all SAFETY information in Section A.

WARNING!

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Lock out or disconnect the power source to ensure that the pump will remain inoperative.**
3. **Allow the pump to completely cool if overheated.**
4. **Check the temperature before opening any covers, plates, or plugs.**
5. **Close the suction and discharge valves.**
6. **Vent the pump slowly and cautiously.**
7. **Drain the 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.
	Discharge head too high.	Check piping installation and install bypass line if needed. See **INSTALLATION**.
	Strainer clogged.	Check strainer and clean if necessary.
	Foot valve clogged or binding.	Clean valve.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Pump speed too high.	Check driver output.
	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.
	Strainer clogged.	Check strainer and clean if necessary.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE (cont.)	Pump speed too slow.	Check driver output; consult the operation manual.
	Impeller clogged.	Free impeller of debris.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Discharge head too high.	Install bypass line.
PUMP REQUIRES TOO MUCH POWER	Pump speed too high.	Check driver output.
	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 driver at maximum governed speed.
	Foot valve clogged or binding.	Clean valve.
EXCESSIVE NOISE	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.
	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.
BEARINGS RUN TOO HOT	Bearing temperature is high, but within limits.	Check bearing temperature regularly to monitor any increase.
	Low or incorrect lubricant.	Check for proper type and level of lubricant.
	Suction and discharge lines not properly supported.	Check piping installation for proper support.
	Drive misaligned.	Align drive properly.

PREVENTIVE MAINTENANCE

Since pump applications are seldom identical, and pump wear is directly affected by such things as the abrasive qualities, pressure and temperature of the liquid being pumped, this section is intended only to provide general recommendations and practices for preventive maintenance. Regardless of the application however, following a routine preventive maintenance schedule will help assure trouble-free performance and long life from your Gorman-Rupp pump. For specific questions concerning your application, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

Record keeping is an essential component of a good preventive maintenance program. Changes in suction and discharge gauge readings (if so equipped) between regularly scheduled inspections can indicate problems that can be corrected before system damage or catastrophic failure occurs. The appearance of wearing parts should also be documented at each inspection for comparison as well. Also, if records indicate that a certain part (such as the seal) fails at approximately the same duty cycle, the part can be checked and replaced before failure occurs, reducing unscheduled down time.

For new applications, a first inspection of wearing parts at 250 hours will give insight into the wear rate for your particular application. Subsequent inspections should be performed at the intervals shown on the chart below. Critical applications should be inspected more frequently.

Preventive Maintenance Schedule

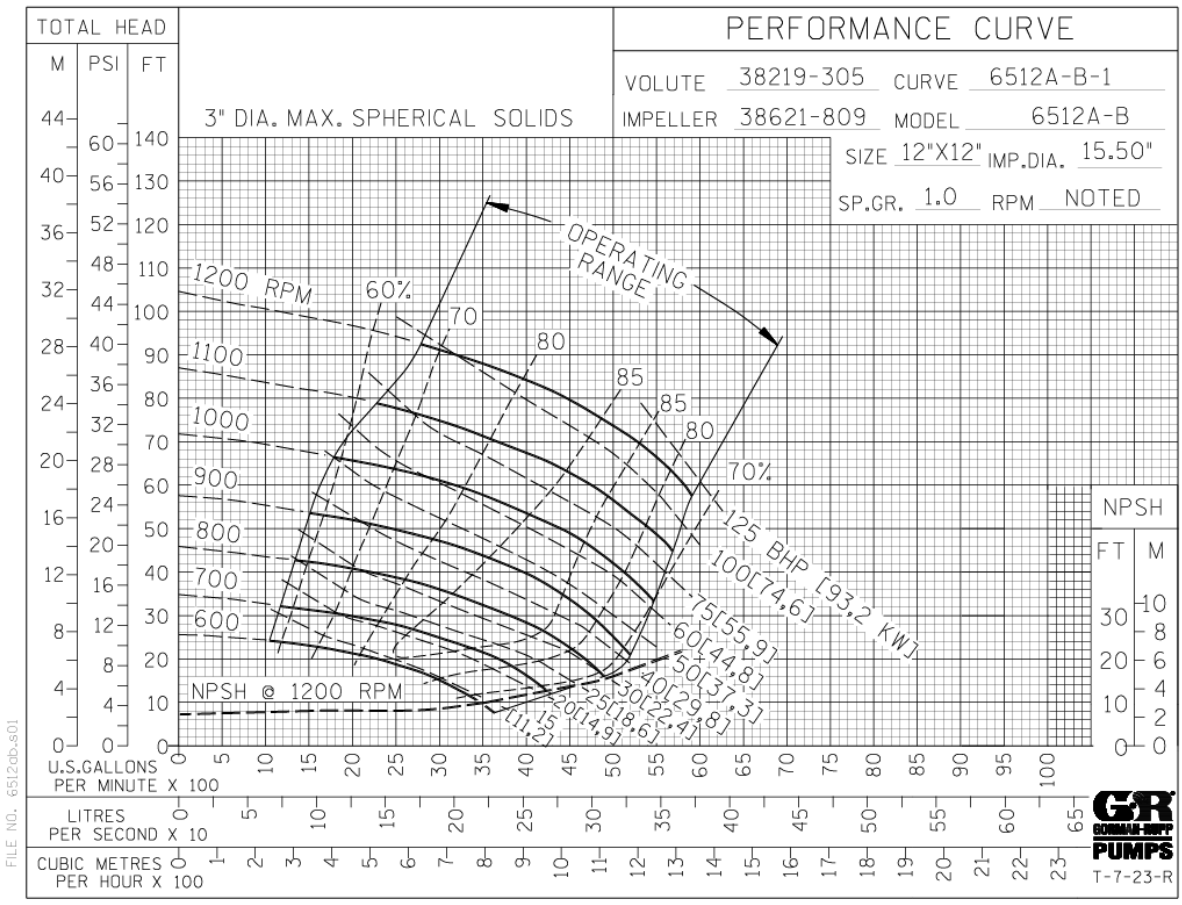
Item	Service Interval*				
	Daily	Weekly	Monthly	Semi-Annually	Annually
General Condition (Temperature, Unusual Noises or Vibrations, Cracks, Leaks, Loose Hardware, Etc.)	I				
Pump Performance (Gauges, Speed, Flow)	I				
Bearing Lubrication		I			R
Seal Lubrication (And Packing Adjustment, If So Equipped)		I			R
V-Belts (If So Equipped)			I		
Air Release Valve Plunger Rod (If So Equipped)			I	C	
Front Impeller Clearance (Wear Plate)				I	
Rear Impeller Clearance (Seal Plate)				I	
Check Valve					I
Pressure Relief Valve (If So Equipped)					C
Pump and Driver Alignment					I
Shaft Deflection					I
Bearings					I
Bearing Housing					I
Piping					I
Driver Lubrication — See Mfgr's Literature					

Legend:
I = Inspect, Clean, Adjust, Repair or Replace as Necessary
C = Clean
R = Replace

* Service interval based on an intermittent duty cycle equal to approximately 4000 hours annually. Adjust schedule as required for lower or higher duty cycles or extreme operating conditions.

PUMP MAINTENANCE AND REPAIR - SECTION E

MAINTENANCE AND REPAIR OF THE WEARING PARTS OF THE PUMP WILL MAINTAIN PEAK OPERATING PERFORMANCE.



✳ STANDARD PERFORMANCES FOR PUMP MODEL 6512A31—B

✳ Based on 70˚F (21˚C) clear water at sea level with minimum suction lift. Since pump installations are seldom identical, your performance may be difference due to such factors as viscosity, specific gravity, elevation, temperature, and impeller trim.

If your pump serial number is followed by an “N”, your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify performance or part numbers.

CAUTION

Pump speed and operating condition points must be within the continuous performance range shown on the curve.

ILLUSTRATION

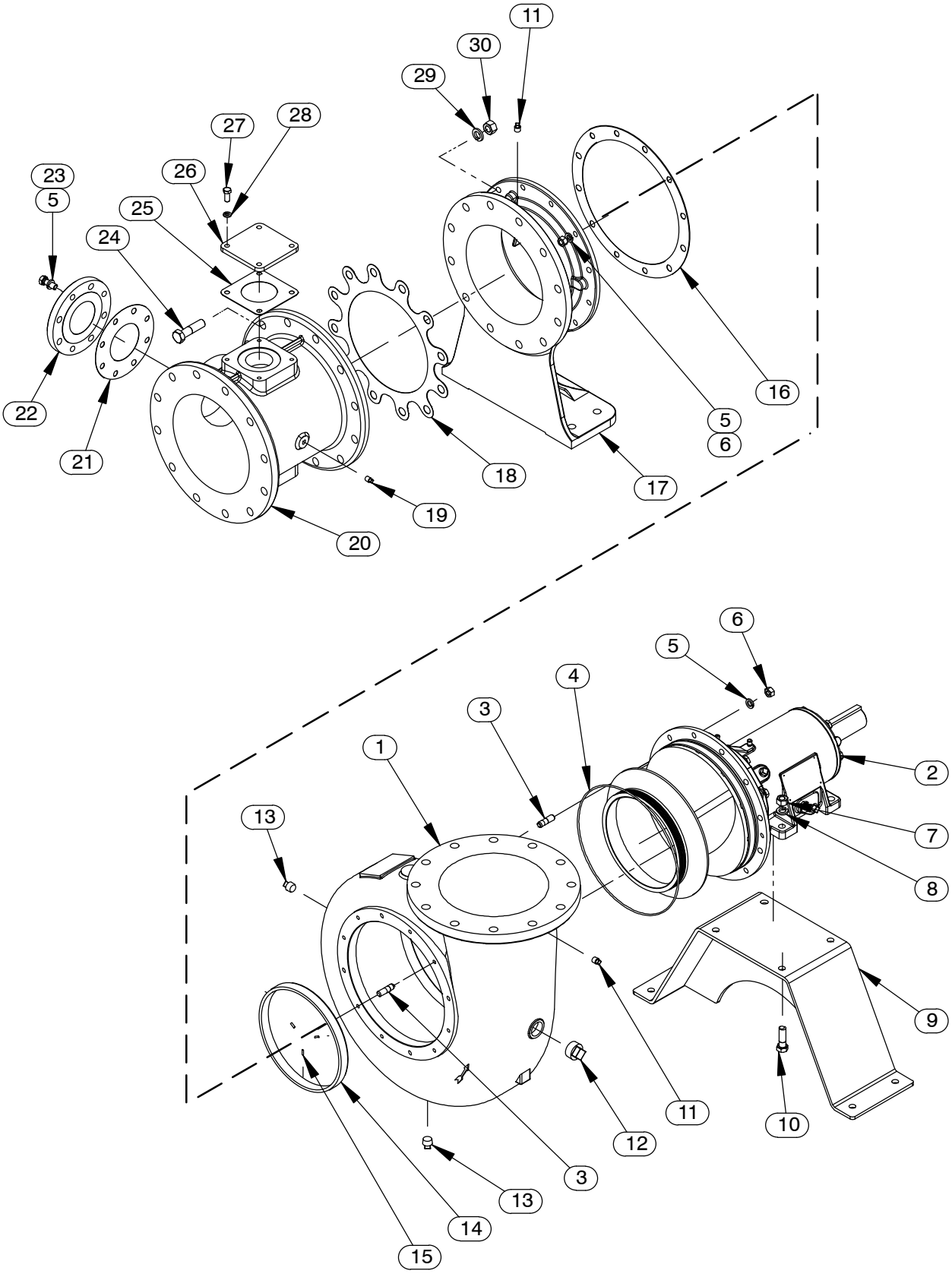


Figure 1. Pump Model 6512A31–B

PARTS LIST
Pump Model 6512A31–B
(From S/N 1826522 Up)

If your pump serial number is followed by an "N", your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify part numbers.

ITEM NO.		PART NAME	PART NUMBER	QTY
1		PUMP CASING	38219–305 11010	1
2		REPAIR ROTATING ASSEMBLY	44163–872	1
3		STUD	C1009 15991	24
4	✳	O–RING	25152–384	1
5		LOCK WASHER	J10 15991	32
6		HEX NUT	D10 15991	24
7		HEX NUT	D12 15991	4
8		LOCK WASHER	J12 15991	4
9		STAND ASSEMBLY	41321–531 24150	1
10		HEX HEAD CAP SCREW	B1210 15991	4
11		PIPE PLUG	P06 15079	2
12		PIPE PLUG	P24 15079	1
13		PIPE PLUG	P12 15079	2
14	✳	WEAR RING	4181A 14000	1
15		SPIRAL PIN	21137–123	3
16	✳	GASKET	4180G 18000	1
17		SUCTION HEAD	4180 11010	1
18	✳	GASKET	38685–808 18000	1
19		PIPE PLUG	P04 15079	1
20		12" SPOOL FLANGE	38642–622 11010	1
21	✳	GASKET	25113–034	1
22		4" BLIND FLANGE ASSEMBLY	42111–463	1
23		HEX HEAD CAP SCREW	B1007 15991	8
24		HEX HEAD CAP SCREW	B1414 15991	12
25	✳	GASKET	38687–053 19060	1
26		COVER PLATE	33541–045 15080	1
27		HEX HD CAP SCREW	B0805 15991	4
28		LOCK WASHER	J08 15991	4
29		LOCK WASHER	J14 15991	12
30		HEX NUT	D14 15991	12
NOT SHOWN:				
		NAMEPLATE BLANK	38819–002 13000	1
		DRIVE SCREW	BM#04–03 17000	4
		ROTATION DECAL	2613M	1
		SUCTION STICKER	6588AG	1
		DISCHARGE STICKER	6588BJ	1
		WARNING DECAL	2613FE	1
		G–R DECAL 6 IN	GR–06	1
		INSTRUCTION TAG	38817–104	1
		INSTRUCTION TAG	38817–011	1

✳ INDICATES PARTS RECOMMENDED FOR STOCK

ILLUSTRATION

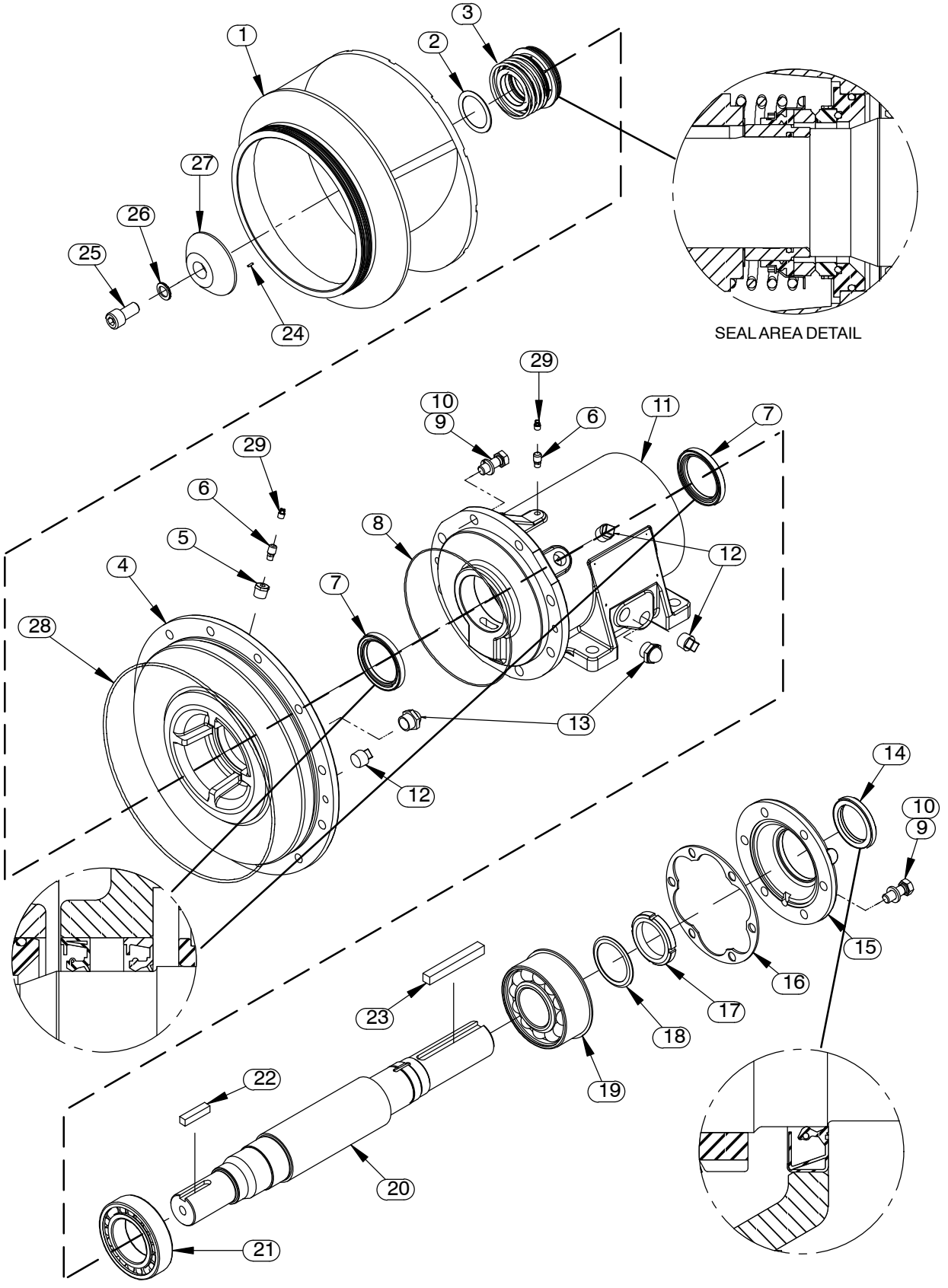


Figure 2. Repair Rotating Assembly

PARTS LIST

Repair Rotating Assembly

ITEM NO.		PART NAME	PART NUMBER	QTY
1		IMPELLER	38621—809 11010	1
2	✳	SHIM SET	48261—033	1
3	✳	2.75 DIA SEAL ASSEMBLY	46512—109	1
4		SEAL PLATE	38272—725 11010	1
5		REDUCER PIPE BUSHING	AP0802 15079	1
6		AIR VENT	S1530	2
7	✳	LIP SEAL	25227—856	2
8	✳	O—RING	25152—177	1
9		HEX HEAD CAP SCREW	B1007 15991	14
10		LOCK WASHER	J10 15991	14
11		PEDESTAL	38257—210 10000	1
12		PIPE PLUG	P12 15079	5
13		SIGHT GAUGE	S1471	4
14	✳	OIL SEAL	25258—845	1
15		BEARING CAP	38322—434 10000	1
16	✳	BEARING CAP GASKET	38683—664 19060	1
17		BEARING LOCKNUT	23962—015	1
18		LOCKING TAB COLLAR	23962—515	1
19	✳	BEARING	23422—417	1
20		IMPELLER SHAFT	38512—546 1600X	1
21	✳	ROLLER BEARING	23535—001	1
22	✳	IMPELLER KEY	N0809 15990	1
23	✳	SHAFT KEY	N1020 15990	1
24		ROLL PIN	S2197	1
25		SOCKET HEAD CAP SCREW	DM1206 15991	1
26		WASHER NORD—LOCK 3/4”	21177—224	1
27		IMPELLER WASHER	31167—012 15030	1
28	✳	O—RING	25152—384	1
29		SHIPPING PLUG	11495C 15079	2
NOT SHOWN:				
		INSTRUCTION TAG	6588U	1
		OIL LEVEL DECAL	38816—123	1
		LUBRICATION DECAL	11421A	1

✳ INDICATES PARTS RECOMMENDED FOR STOCK

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

Review all Safety information in Section A.

Follow the instructions on all tags, label and decals attached to the pump.

This pump requires little service due to its rugged, minimum-maintenance design. However, if it becomes necessary to inspect or replace the wearing parts, follow these instructions which are keyed to the illustrations (see Figures 1 and 2) and the accompanying parts lists.

Before attempting to service the pump, disconnect the power source or take other precautions to ensure that it will remain inoperative. Close all valves in the suction and discharge lines.

For power source disassembly and repair, consult the literature supplied with the power source, or contact your local power source representative.

WARNING!

This manual will alert personnel to known procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel. However, this manual cannot possibly anticipate and provide detailed instructions and precautions for every situation that might occur during maintenance of the unit. Therefore, it is the responsibility of the owner/maintenance personnel to ensure that only safe, established maintenance procedures are used, and that any procedures not addressed in this manual are performed only after establishing that neither personal safety nor pump integrity are compromised by such practices.

WARNING!

Before attempting to open or service the pump:

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

WARNING!

Death or serious personal injury and damage to the pump or components can occur if proper lifting procedures are not observed. Make certain that hoists, chains, slings or cables are in good working condition and of sufficient capacity and that they are positioned so that loads will be balanced and the pump or components will not be damaged when lifting. Suction and discharge hoses and piping must be removed from the pump before lifting. Lift the pump or component only as high as necessary and keep personnel away from suspended objects.

CAUTION

Use **Only Genuine Gorman−Rupp** replacement parts. Failure to do so may create a hazard and damage the pump or diminish optimal pump performance. Any such hazard, damage or diminished performance is not covered by the warranty.

NOTE

When appropriate recycling facilities are available, the user should recycle components and fluids when doing any routine maintenance / repairs and also at the end of the pump's useful life. All other components and fluids shall be disposed of according to all applicable codes and regulations.

Suction Head and Wear Ring Removal

(Figure 1)

Support the suction head using a suitable hoist and sling. Disengage the hardware (5 and 6) and separate the suction head (17) and wear ring (14) from the pump casing. Remove the suction head gasket (16) and clean the mating surfaces.

It is not necessary to separate the suction spool (20) from the pump casing unless the gasket (18) requires replacement. To remove the suction spool, disengage the hardware (24, 29 and 30). Remove the suction spool and gasket, and clean the mating surfaces.

Inspect the wear ring for excessive wear or scoring. The wear ring is a press fit into the suction head and is additionally secured with the spiral pins (15). If replacement is required, use a small bit to drill three holes horizontally, 180° apart, through the wear ring between each of the spiral pins. Use a chisel or other suitable tool to complete the cuts through the wear ring. **Use caution** not to damage the suction head bore. Remove the wear ring sections from the suction head. Pull the spiral pins from the suction head.

If no further disassembly is required, see **Suction Head and Wear Ring Installation**.

Impeller Removal

(Figure 2)

Before attempting to remove the impeller (1) position a **clean** container (2 gallons [8 liters] minimum capacity) under the seal cavity drain plug (12). Remove the plug and drain the oil from the seal cavity into the container. Clean and reinstall the drain plug. Inspect the oil for water, dirt or a cloudy condition which could indicate seal failure.

Use a long piece of heavy bar stock and the lathe dog on the drive end of the shaft as shown in Figure 4 to block shaft rotation. **Use caution** not to damage the shaft or keyway.

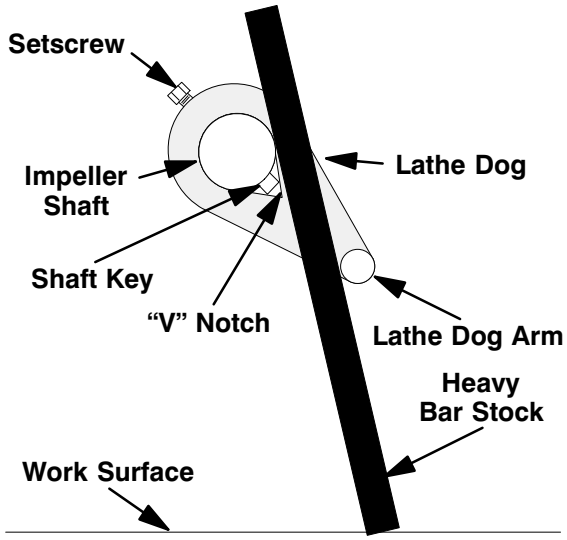


Figure 4. Blocking Shaft Rotation

Remove the impeller capscrew and washers (25, 26 and 27). Remove the lathe dog from the shaft.

Install two 3/8−16 UNC−2B capscrews (not supplied) in the tapped holes in the impeller. Attach a suitable puller to the capscrews and use the puller to remove the impeller and key (22) from the shaft. Remove the puller and the screws from the impeller.

Inspect the wear ring for excessive wear or scoring.

Seal Removal

(Figures 2 and 5)

Remove the impeller shims (2). Tie and tag the shims for ease of reassembly. Remove the seal spring. Slide the rotating portion of the seal (consisting of the shaft sleeve and O-ring, bellows and

retainer, and rotating element) off the shaft as a unit.

Apply oil to the sleeve and work it up under the rubber bellows. Slide the rotating portion of the seal off the sleeve.

Slide a pair of stiff wires with hooked ends along the shaft and hook the stationary seat from the back side. Pull the stationary seat and O-ring from the seal plate.

An alternate method of removing the stationary seal components is to remove the hardware (9 and 10) and separate the seal plate (4) from the pedestal (11). Position the seal plate on a flat surface with the impeller side down. Use a wooden dowel or other suitable tool to press on the back side of the stationary seat until the seat and O-ring can be removed.

Remove the seal plate O-ring (28).

If no further disassembly is required, refer to **Seal Installation**.

Shaft and Bearing Removal and Disassembly

(Figure 2)

When the pump is properly operated and maintained, the shaft and bearings should not require disassembly. Disassemble the shaft and bearings **only** when there is evidence of wear or damage.

CAUTION

Shaft and bearing disassembly in the field is not recommended. These operations should be performed only in a properly equipped shop by qualified personnel.

Before attempting to remove the shaft (20) and bearings (19 and 21), position a container (1 gallon [4 liters] minimum capacity) under one of the bearing cavity drain plugs (12). Remove the plug and drain the oil from the bearing cavity into the container. Clean and reinstall the drain plug.

Remove the shaft key (23). Disengage the hardware (9 and 10) and remove the bearing cap (15) and gasket (16). Press the oil seal (14) from the bearing cap.

Place a block of wood against the impeller end of the shaft, and tap the shaft until the outboard bearing (19) is free from the pedestal. Continue to slide the shaft and assembled bearing out of the pedestal until free.

Pry or press the oil seals (7) from the pedestal. Remove the pedestal O-ring (8).

After removing the shaft and bearings, clean and inspect the bearings **in place** as follows.

CAUTION

To prevent damage during removal from the shaft, it is recommended that bearings be cleaned and inspected **in place**. It is **strongly** recommended that the bearings be replaced **any** time the shaft and bearings are removed.

Clean the pedestal, shaft and all component parts (except the bearings) with a soft cloth soaked in cleaning solvent. Inspect the parts for wear or damage and replace as necessary.

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.

Clean the bearings thoroughly in **fresh** cleaning solvent. Dry the bearings with filtered compressed air and coat with light oil.

CAUTION

Bearings must be kept free of all dirt and foreign material. Failure to do so will greatly shorten bearing life. **Do not** spin dry bearings. This may scratch the balls or

races and cause premature bearing failure.

Rotate the bearings by hand to check for roughness or binding and inspect the bearing balls. If rotation is rough or the bearing balls are discolored, replace the bearings.

The bearing tolerances provide a tight press fit onto the shaft and a snug slip fit into the pedestal. Replace the bearings, shaft, or pedestal if the proper bearing fit is not achieved.

If bearing replacement is required, straighten the tab on the bearing lock washer (18) and use a suitable spanner wrench to remove the bearing lock nut (17). Use a bearing puller or a press to remove the bearings from the shaft.

Remove the retaining ring.

Shaft and Bearing Reassembly and Installation

(Figure 2)

Clean and inspect the bearings as indicated in **Shaft and Bearing Removal and Disassembly**.

CAUTION

To prevent damage during removal from the shaft, it is recommended that bearings be cleaned and inspected **in place**. It is **strongly** recommended that the bearings be replaced **any** time the shaft and bearings are removed.

Inspect the shaft (20) for distortion, nicks or scratches. Dress small nicks and burrs with a fine file or emery cloth. Replace the shaft if defective.

The bearings may be heated to ease installation. An induction heater, hot oil bath, electric oven, or hot plate may be used to heat the bearing. The bearings should **never** be heated with a direct flame or directly on a hot plate.

NOTE

*If a hot oil bath is used to heat the bearings, both the oil and the container must be **absolutely** clean. If the oil has been previously used, it must be **thoroughly** filtered.*

Heat the bearings to a uniform temperature **no higher than** 250°F (120°C) and slide them one at a time onto the shaft until fully seated against the shaft shoulders. This should be done quickly, in one continuous motion, to prevent the bearings from cooling and sticking on the shaft.

WARNING!

Use caution when handling hot bearings to prevent burns.

After the bearings have been installed and allowed to cool, check to ensure that they have not moved out of position in shrinking. If movement has occurred, use a suitably sized sleeve and a press to reposition the bearings.

If heating the bearings is not practical, use a suitably sized sleeve and a press to install the bearings on the shaft.

CAUTION

When installing the bearings onto the shaft, **never** press or hit against the outer race, balls, or ball cage. Press **only** on the inner race.

Secure the assembled shaft and bearings by clamping on the surface between the bearings. Use caution not to scratch or mar the part number on the shaft in this area. Install the bearing lock washer (18) and bearing lock nut (17). Torque the lock nut to 150 ft. lbs. (20,7 m. kg.). Locate the tab on the lock washer that aligns with a slot in the lock nut and bend the tab over into the slot.

Install the oil seal (7) in the pedestal with the lip positioned as shown in Figure 2. Make sure the oil seal is just flush with the machined face of the pedestal I.D.

Slide the shaft and assembled bearings into the pedestal until the outboard bearing seats against the pedestal.

CAUTION

When installing the shaft and bearings into the bearing bore, push against the outer race. **Never** hit the balls or ball cage.

Apply a light coating of oil to the lip of the oil seal (14) and press it into the bearing cap (15) with the lip positioned as shown in Figure 2. The face of the oil seal should be just flush with the outer face of the bearing cap. Inspect and remove any sealant shavings from the O.D. of the lip seal.

Apply "Loctite Threadlocker No. 242" or equivalent compound to the capscrews (9) and secure the bearing cap to the pedestal with the hardware (9 and 10). Torque the capscrews (9) in an alternating pattern to 80 ft. lbs. (11 m. kg.). Torque the capscrews again in an alternating pattern to 110 ft. lbs. (15 m. kg.), going around the bolt circle 1-1/2 times.

Seal Reassembly and Installation

(Figures 2 and 4)

Clean the seal cavity and shaft with a cloth soaked in fresh 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.

CAUTION

A new seal assembly should be installed **any time** the old seal is removed from the pump. Wear patterns on the finished faces cannot be realigned during reassembly. Reusing an old seal could result in premature failure.

Handle the seal parts with extreme care to prevent damage. Be careful not to contaminate precision finished faces; even fingerprints on the faces can shorten seal life. If necessary, clean the faces with a non-oil based solvent and a clean, lint-free tissue. Wipe **lightly** in a concentric pattern to avoid scratching the faces.

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. Clean and polish the shaft sleeve, or replace it if there are nicks or cuts on either end. If any components are worn, replace the complete seal; **never mix old and new seal parts**.

Remove the seal from the container and inspect the precision finished faces to ensure that they are free of any foreign matter.

To ease installation of the seal, lubricate the O-rings and bellows with water or a very **small** amount of oil, and apply a drop of "P–80® Emulsion" on the finished faces. Assemble the seal as follows, (see Figure 4).

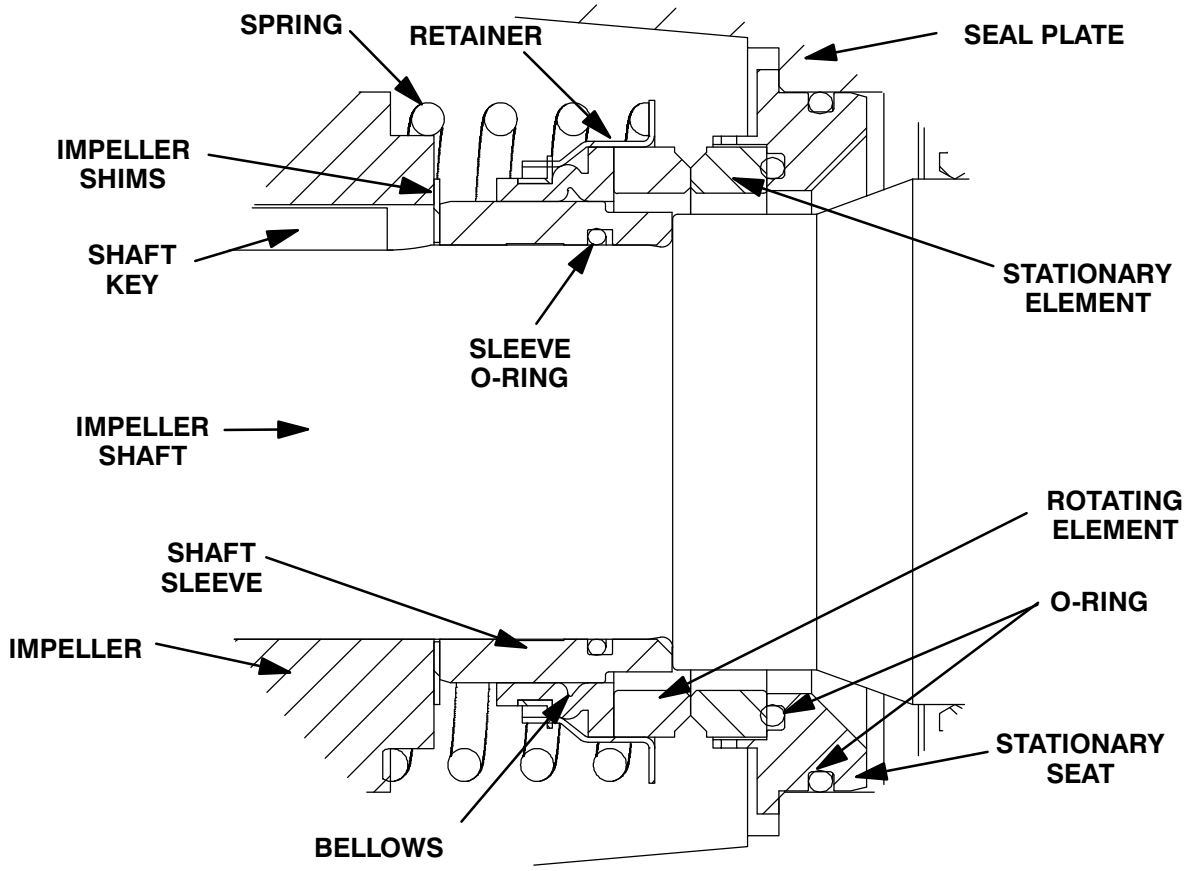


Figure 4. Seal Assembly

CAUTION

This seal is not designed for operation at temperatures above 160°F (71°C). Do not use at higher operating temperatures.

Lubricate the stationary seat O-rings with water or "P–80® Emulsion", and install them in the stationary seat. Install the stationary seal element in the stationary seat. Position the seal plate with the impeller side up and press this stationary subassembly into the front of the seal plate until it seats squarely against the bore shoulder.

Position the seal plate and stationary seat over the shaft, and temporarily secure it to the pedestal with three 1/2-inch by 2-inch long capscrews and nuts (not supplied). **Be careful** not to damage the stationary element or roll or cut the lip of the oil seal (7) on the shaft keyway.

Lubricate the seal sleeve O-ring with a **small** amount of "P–80® Emulsion" and install it in the groove in the I.D. of the sleeve.

Lubricate the seal sleeve with a **small** amount of light oil and slide the rotating subassembly (consisting of rotating element, bellows and retainer), onto the sleeve until the rotating element is **just flush** with the **turned** end of the sleeve.

Slide the sleeve and subassembled seal onto the shaft until the seal faces contact and the sleeve seats against the shaft shoulder.

Install the seal spring. Lubricate the seal as indicated in **LUBRICATION** after the impeller is installed.

Impeller Installation

(Figure 2)

Inspect the impeller, and replace it if cracked or badly worn. If the wear ring was removed, chill the impeller by refrigeration and use an induction heater or oven to heat the new wear ring. Slide the wear

ring onto the impeller until fully seated against the shoulder and allow it to cool.

CAUTION

The wear ring **must** seat squarely on the impeller; otherwise binding and/or excessive wear will occur. Use caution when handling hot parts to prevent burns.

Install the same thickness of impeller adjusting shims (2) as previously removed. Install the shaft key (23) and press the impeller assembly onto the shaft until fully seated.

A clearance of approximately .015 inch (0,38 mm) between the impeller and the seal plate is recommended for maximum pump efficiency. Measure this clearance, and add or remove impeller adjusting shims as required.

After the impeller clearance has been set, align the pin (24) in the impeller washer (27) with the hole in the impeller and install the washers (26 and 27). Apply “Never-Seez” or equivalent compound on the threads of the impeller capscrew (25). Immobilize the shaft and secure the the impeller by torquing the capscrew to 300 ft. lbs. (41,5 m. kg.).

Pump Casing Installation

(Figure 1)

Lubricate the O-ring (4) with light grease and install it in the groove in the O.D. of the seal plate.

Carefully position the pump casing over the impeller. Install the hardware (5 and 6) on the studs (3) and use the hardware to draw the pump casing over the seal plate shoulder until tight.

Suction Head And Wear Ring Installation

(Figure 2)

If the wear ring (14) was removed, chill the wear ring by refrigeration and heat the suction head. Slide the wear ring into the suction head until fully seated and allow it to cool.

CAUTION

The wear ring **must** seat squarely in the suction head; otherwise binding and/or excessive wear will occur. Use caution when handling hot parts to prevent burns.

The wear ring is secured to the suction head with the spiral pins (15). Drill three evenly spaced 3/16-inch diameter x 3/4-inch deep holes through the wear ring and into the suction head. Tap the spiral pins into the holes until fully seated.

Install the suction head gasket (16). Position the suction head over the studs (3) and secure it with the hardware (5 and 6).

Turn the impeller shaft by hand and check for any scraping or binding and correct it before putting the pump into service.

Final Pump Assembly

Install the suction and discharge lines and open all valves. Make certain that all piping connections are tight, properly supported and secure.

Be sure the pump has been properly lubricated, see **LUBRICATION**.

Before starting the pump, be sure the pump is fully primed.

LUBRICATION

Seal Assembly

(Figure 2)

Before starting the pump, remove the air vent and reducer bushing (5 and 6) and fill the seal cavity with approximately 143 ounces (4,2 liters) of SAE No. 30 non-detergent oil to the middle of the sight gauges (13) and maintain it at the middle of the gauges. Clean and reinstall the air vent and bushing. Maintain the oil at this level.

Bearings

(Figure 2)

The bearing housing was fully lubricated when shipped from the factory. Check the oil level regu-

larly through the sight gauges (13) and maintain it at the middle of the gauges. When lubrication is required, add SAE No. 30 non-detergent oil through the hole for the air vent (10). **Do not** over-lubricate. Over-lubrication can cause the bearings to overheat, resulting in premature bearing failure.

Under normal conditions, drain the bearing housing once each year and refill with approximately 50 ounces (1,5 liters) of clean oil. Change the oil more frequently if the pump is operated continuously or installed in an environment with rapid temperature change.

CAUTION

Monitor the condition of the bearing lubricant regularly for evidence of rust or moisture condensation. This is especially important in areas where variable hot and cold temperatures are common.

For cold weather operation, consult the factory or a lubricant supplier for the recommended grade of oil.

For Warranty Information, Please Visit
www.grpumps.com/warranty
or call:
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Canada: 519—631—2870
International: +1—419—755—1352