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INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST

GORMAN-RUPP PUMPS

10 SERIES PUMP

MODEL

112A20—B

GORMAN-RUPP PUMPS

www.grpumps.com

Printed in U.S.A.

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

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 10 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.

Because pump installations are seldom identical, this manual cannot possibly provide detailed instructions and precautions for each specific application. Therefore, it is the owner/installer's responsibility 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.

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!

This pump is designed to handle wastewater, mud and slurries 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!

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.

WARNING!

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

WARNING!

Do not operate the pump against a closed discharge valve for long periods of time. If operated against a closed discharge valve, pump components will deteriorate, and the liquid could come to a boil, build pressure, and cause the pump casing to rupture or explode.

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 operate the pump without shields and/or guards in place over the drive shafts, belts, and/or couplings, or other rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

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 standard **static lift** application where the pump is positioned above the free level of liquid to be pumped.

If installed in a **flooded suction application** where the liquid is supplied to the pump under pressure, some of the information such as mounting, line configuration, and priming must be tailored to the specific application. 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 B—1 for the approximate physical dimensions of this pump.

OUTLINE DRAWING

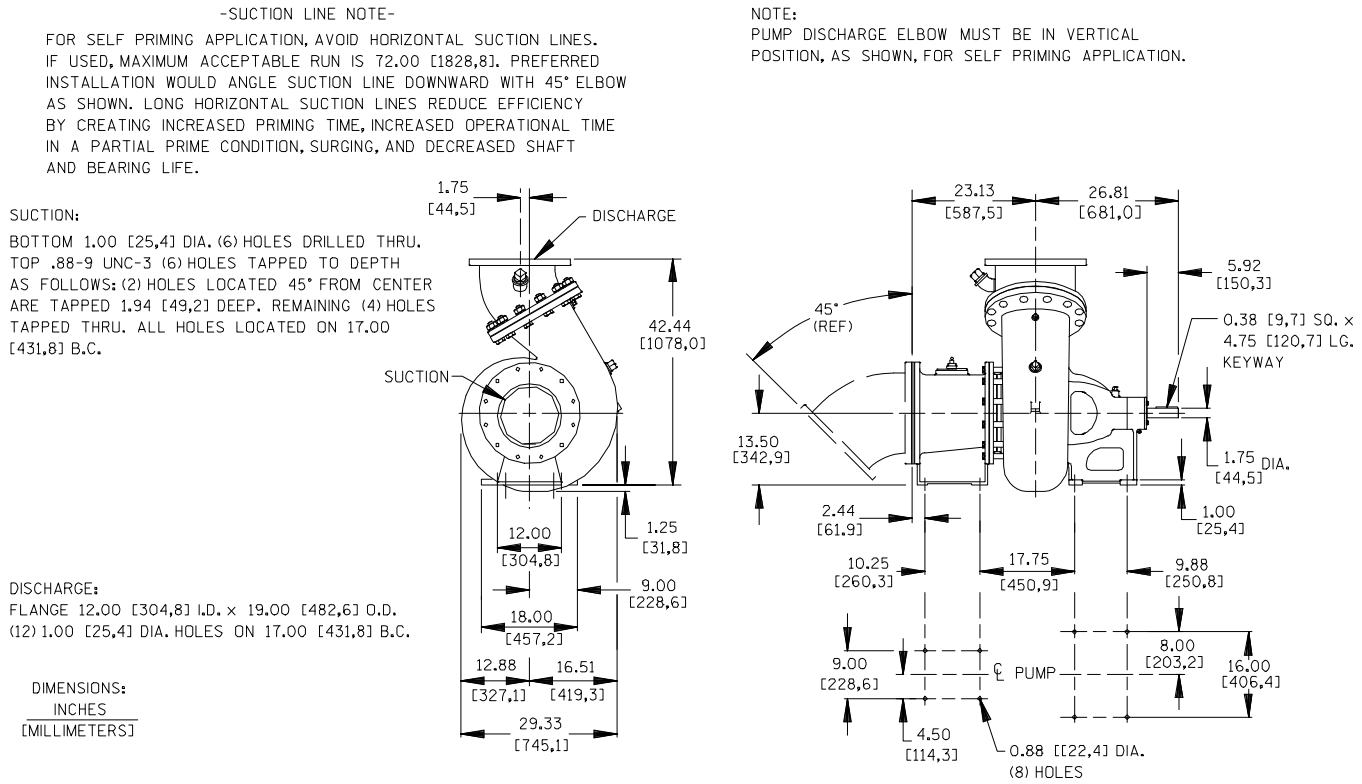


Figure B—1. Pump Model 112A20—B

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 for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose attaching hardware. Since gaskets tend to shrink after dry-

ing, check for loose hardware at mating surfaces.

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

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.

CAUTION

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

The pump may have to be supported or shimmed to provide for level operation or to eliminate vibration.

SUCTION AND DISCHARGE PIPING

Pump performance is adversely effected by increased suction lift, discharge elevation, and friction losses. See the performance curve on Page E-1 to be sure your overall application allows pump to operate within the safe operation range.

Materials

Either pipe or hose maybe used for suction and discharge lines; however, the 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 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. 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 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. 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.

Never use a suction line smaller than the pump inlet connection. This pump is designed to accept a standard 12 inch pipe flange.

If a horizontal suction line must be used, the **maximum** acceptable length is 6 feet. The preferred installation would angle the suction line down to the source of the liquid at a 45° angle.

Use of long horizontal suction lines increase partial prime operation time which results in erratic performance and reduced pump life.

The **maximum** vertical suction lift for this pump is 15 feet. The pump is not designed to prime or operate at a higher lift.

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 horizontal to avoid air pockets.

Strainers

If a strainer is furnished with the pump, be certain to use it; any spherical 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.

This pump is designed to handle up to 1—7/8 inch (47 mm) diameter spherical solids.

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 air-tight 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.

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 1—1/2 times the diameter of the suction line.

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 1—1/2 times the diameter of the suction pipe. The baffle will allow en-

trained air to escape from the liquid before it is drawn into the suction inlet.

If two suction 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 3 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 B—2 shows recommended minimum submergence vs. velocity.

NOTE

The pipe submergence required may be reduced by installing a standard pipe increaser fitting at the end of the suction line. The larger opening size will reduce the inlet velocity. Calculate the required submergence using the following formula based on the increased opening size (area or diameter).

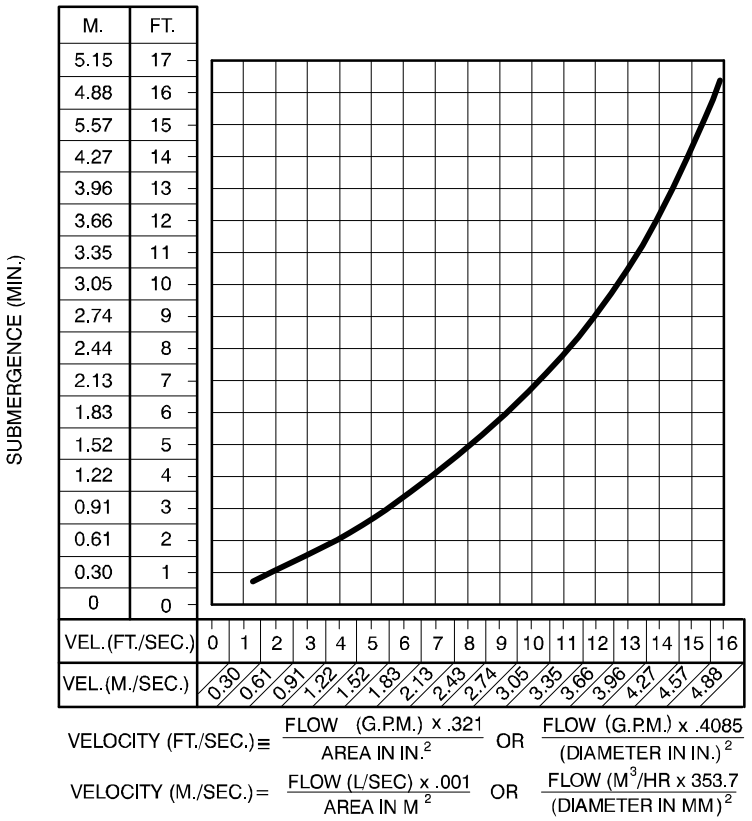


Figure B—2. Recommended Minimum Suction Line Submergence vs. Velocity

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.

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

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.

CAUTION

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

Bypass Lines

Self-priming pumps are not air compressors. During the priming cycle, air from the suction line must be vented to atmosphere on the discharge side. If the discharge line is open, this air will be vented through the discharge. However, if a check valve has been installed in the discharge line, the discharge side of the pump must be opened to atmospheric pressure through a bypass line installed between the pump discharge and the check valve. A self-priming centrifugal pump **will not prime** if there is sufficient static liquid head to hold the discharge check valve closed.

NOTE

The bypass line should be sized so that it does not affect pump discharge capacity; however, the bypass line should be at least 1 inch (25,4 mm) in diameter to minimize the chance of plugging.

In **low discharge head applications** (less than 30 feet (9,1 m)), it is recommended that the bypass line be run back to the wet well, and located 6 inches below the water level or cut-off point of the low level pump. In some installations, this bypass outline may be terminated with a six-to-eight foot (1,8 to 2,4 m) length of 1–1/4 inch (31,8 mm) I.D. **smooth-bore** hose; air and liquid vented during the priming process will then agitate the hose and break up any solids, grease, or other substances likely to cause clogging.

CAUTION

A bypass line that is returned to a wet well must be secured against being drawn into the pump suction inlet.

It is also recommended that pipe unions be installed at each 90° elbow in a bypass line to ease disassembly and maintenance.

In **high discharge head applications** (more than 30 feet (9,1 m), an excessive amount of liquid may be bypassed and forced back to the wet well under the full working pressure of the pump; this will reduce overall pumping efficiency. **Therefore, it is recommended that a Gorman-Rupp Automatic Air Release Valve be installed in the bypass line.**

Gorman-Rupp Automatic Air Release Valves are reliable, and require minimum maintenance. Consult your Gorman-Rupp distributor, or contact the Gorman-Rupp Company for selection of an Automatic Air Release Valve to fit your application.

CAUTION

Except in certain specific applications (to prevent flooding during service of an automatic air release valve in a below-ground lift station), if a manual shut-off valve is installed **anywhere** in a bypass line, it **must** be a full-opening, **ball-type** valve to prevent plugging by solids.

WARNING!

A manual shut-off valve should not be installed in any bypass line. A manual shut-off valve may inadvertently be left closed during operation. A pump which has lost prime may continue to operate without reaching prime, causing dangerous overheating and possible explosive rupture of the pump casing. Personnel could be severely injured.

Allow an over-heated pump to completely cool before servicing. Do not re-

move plates, covers, gauges, or fittings from an over-heated 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 completely 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.

AUTOMATIC AIR RELEASE VALVE

When properly installed, a Gorman-Rupp Automatic Air Release Valve will permit air to escape through the bypass line and then close automatically when the pump is fully primed and pumping at full capacity.

WARNING!

Some leakage (1 to 5 gallons [3.8 to 19 liters] per minute) will occur when the valve is fully closed. Be sure the bypass line is directed back to the wet well or tank to prevent hazardous spills.

Consult the manual accompanying the Air Release Valve for additional information on valve installation and performance.

ALIGNMENT

The alignment of the pump and its power source is critical for trouble-free mechanical operation. In either a flexible coupling or V-belt driven system, 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 B—3).

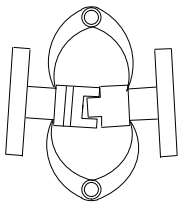


Figure B—3. Aligning Spider-Type Couplings

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 B—4).

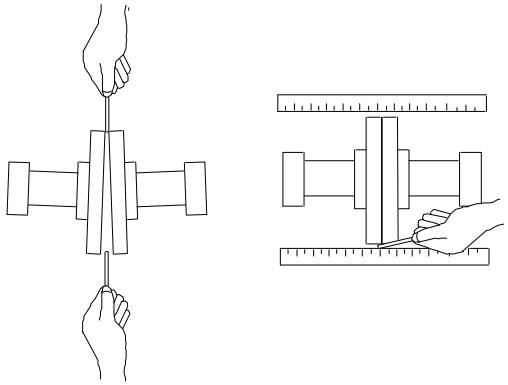


Figure B—4. Aligning Non-Spider-Type Couplings

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.

Belt Drives

When using belt drives, the power source and the pump must be parallel. Use a straightedge along the sides of the pulleys to ensure that the pulleys are properly aligned (see Figure B—5). In drive systems using two or more belts, make certain that the belts are a matched set; unmatched sets will cause accelerated belt wear.

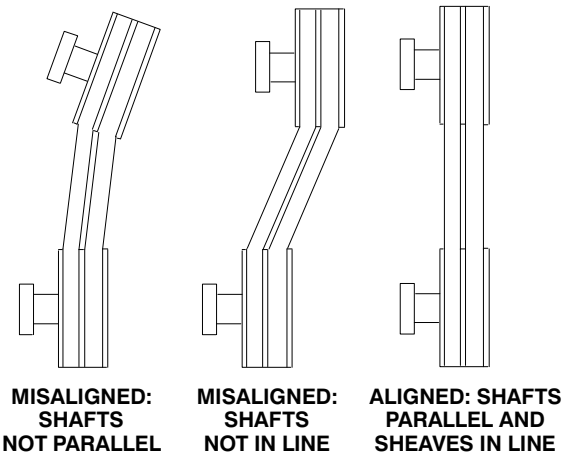


Figure B—5. Alignment of V-Belt Driven Pumps

Tighten the belts in accordance with the belt manufacturer's instructions. If the belts are too loose, they will slip; if the belts are too tight, there will be excessive power loss and possible bearing failure. Select pulleys that will match the proper speed ratio; overspeeding the pump may damage both pump and power source.

WARNING!

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 wastewater, mud and slurries 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.

CAUTION

Pump speed and operating condition points must be within the continuous performance range shown on the curve (see Section E, Page 1).

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 self-priming, but the pump should never be operated unless there is liquid in the pump casing.

CAUTION

Never operate this pump unless there is liquid in the pump casing. The pump will not prime when dry. Extended operation of a dry pump will destroy the seal assembly.

Add liquid to the pump casing when:

1. The pump is being put into service for the first time.
2. The pump has not been used for a considerable length of time.
3. The liquid in the pump casing has evaporated.

Once the pump casing has been filled, the pump will prime and reprime as necessary.

WARNING!

After filling the pump casing, reinstall and tighten the fill plug. Do not attempt to operate the pump unless all connecting piping is securely installed. Otherwise, liquid in the pump forced out under pressure could cause injury to personnel.

To fill the pump, remove the pump casing fill cover or fill plug in the top of the casing, and add clean liquid until the casing is filled. Replace the fill cover or fill plug before operating the pump.

STARTING

Consult the operations manual furnished with the power source.

Rotation

The pump could be damaged and performance adversely affected by incorrect rotation. If pump performance is not within the specified limits (see the curve on page E-1), check the direction of power source rotation before further troubleshooting.

CAUTION

The pump must operate in the direction indicated by the arrow on the pump, or accompanying decals.

Consult the operating manual furnished with the pump power source before attempting to start the power source.

If an electric motor is used to drive the pump, remove V-belts, couplings, or otherwise disconnect the pump from the motor before checking motor rotation. Operate the motor independently while observing the direction of the motor shaft, or cooling fan.

If rotation is incorrect on a three-phase motor, have a qualified electrician interchange any two of the three phase wires to change direction. If rotation is incorrect on a single-phase motor, consult the literature supplied with the motor for specific instructions.

OPERATION

Lines With a Bypass

If a Gorman-Rupp Automatic Air Release Valve has been installed, the valve will automatically open to allow the pump to prime, and automatically close after priming is complete (see **INSTALLATION** for Air Release Valve operation).

If the bypass line is open, air from the suction line will be discharged through the bypass line back to the wet well during the priming cycle. Liquid will then continue to circulate through the bypass line while the pump is in operation.

Lines Without a Bypass

Open all valves in the discharge line and start the power source. Priming is indicated by a positive reading on the discharge pressure gauge or by a quieter operation. The pump may not prime immediately because the suction line must first fill with liquid. If the pump fails to prime within five minutes, stop it and check the suction line for leaks.

After the pump has been primed, partially close the discharge line throttling valve in order to fill the line slowly and guard against excessive shock pressure which could damage pipe ends, gaskets, sprinkler heads, and any other fixtures connected to the line. When the discharge line is completely filled, adjust the throttling valve to the required 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.

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 completely cool before servicing. Do not remove plates, covers, gauges, or fittings from an over-heated 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 completely 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.

As a safeguard against rupture or explosion due to heat, this pump is equipped with a pressure relief valve which will open if vapor pressure within the pump casing reaches a critical point. If overheating does occur, stop the pump immediately and allow it to cool before servicing it. **Approach any overheated pump cautiously**. It is recommended that the pressure relief valve assembly be replaced at each overhaul, or any time the pump casing overheats and activates the valve. **Never** replace this valve with a substitute which has not been specified or provided by the Gorman-Rupp Company.

Strainer Check

If a suction strainer has been shipped with the pump or 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).

Pump Vacuum Check

With the pump inoperative, install a vacuum gauge in the system, using pipe dope on the threads. Block the suction line and start the pump. At operating speed the pump should pull a vacuum of 20 inches (508,0 mm) or more of mercury. If it does not, check for air leaks in the seal, gasket, or discharge valve.

Open the suction line, and read the vacuum gauge with the pump primed and at operating speed. Shut off the pump. The vacuum gauge reading will immediately drop proportionate to static suction lift, and should then stabilize. If the vacuum reading falls off rapidly after stabilization, an air leak exists. Before checking for the source of the leak, check the point of installation of the vacuum gauge.

STOPPING

Never halt the flow of liquid suddenly. If the liquid being pumped is stopped abruptly, damaging shock waves can be transmitted to the pump and piping system. Close all connecting valves slowly.

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

After stopping the pump, disconnect the power source or lock it out 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. **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.**

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Not enough liquid in casing.	Add liquid to casing. See **PRIMING**.
	Suction check valve contaminated or damaged.	Clean or replace check valve.
	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.
	Lining of suction hose collapsed.	Replace suction hose.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct submergence as needed.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE (cont.)	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Impeller clogged.	Free impeller of debris.
	Pump speed too slow.	Check driver output; check belts or couplings for slippage.
	Pump running backwards.	Check direction of rotation and correct by interchanging any two motor leads at control box. (See **Pump Rotation**, Section C).
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See **INSTALLATION**.
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 power source at maximum governed speed.
	Suction check valve or 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

Routine preventive maintenance of the pump will maintain peak operating performance. 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.

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.

Preventive Maintenance Schedule

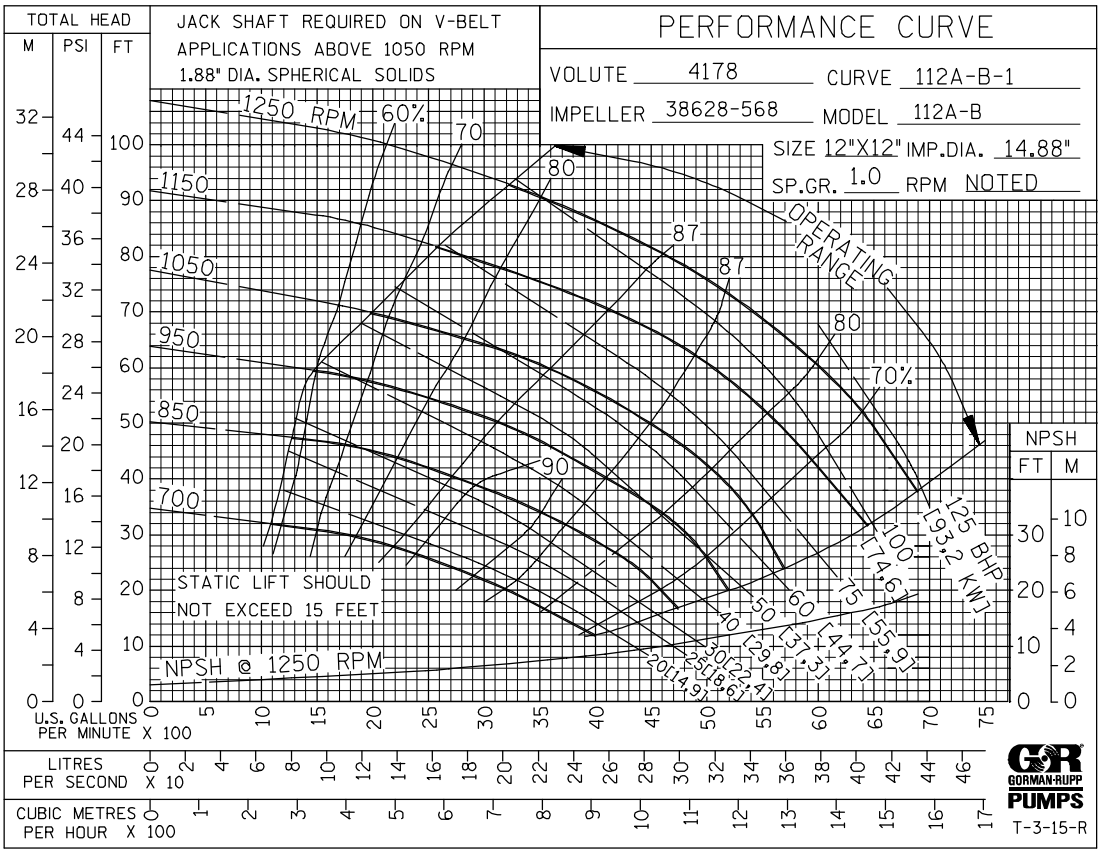
Item	Service Interval*				
	Daily	Weekly	Monthly	Semi-Annually	Annually
General Condition (Temperature, Unusual Noises or Vibrations, Cracks, Leaks, Loose Hardware, Etc.)	I				
Pump Performance (Gauges, Speed, Flow)	I				
Bearing Lubrication		I			R
Seal Lubrication (And Packing Adjustment, If So Equipped)		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 PERFORMANCE FOR PUMP MODEL 112A20—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 different 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

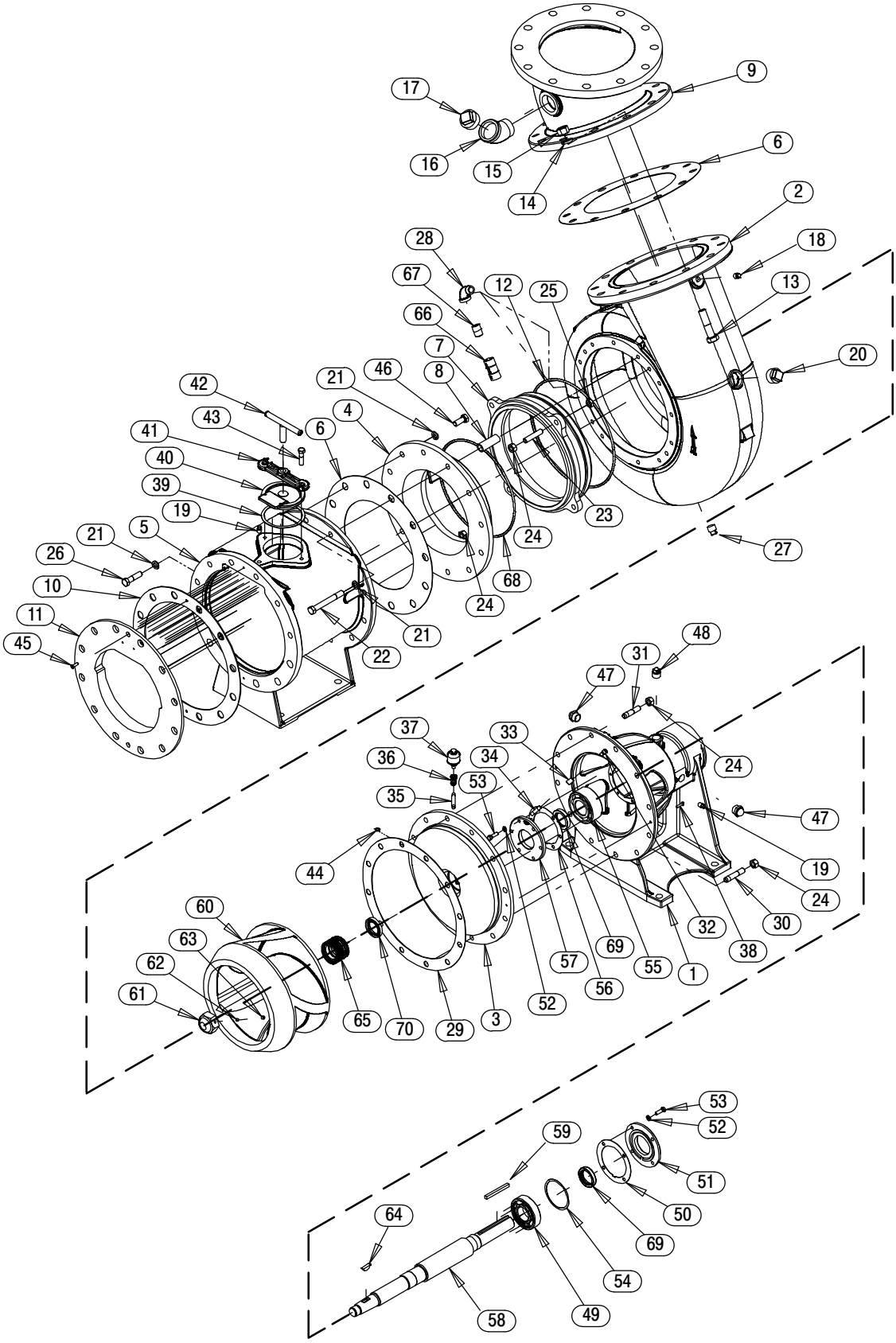


Figure E–1. Pump Model 112A20–B

PARTS LIST
Pump Model 112A20−B
(From S/N 814882 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		PEDESTAL	3233D 10010	1
☞ 2		PUMP CASING	SEE NOTE BELOW	1
3		SEAL PLATE	4179F 10010	1
4		SUCTION PLATE	12737A 11030	1
5		CHECK VALVE FLANGE	14270 10010	1
6		FLANGE GASKET	4991G 18000	2
7	✳	ADJUSTABLE WEAR RING	12736 11030	1
8		SPACER	14278 15079	8
9		DSCHRG ADAPTER FLNG	14275 10010	1
10	✳	GASKET	14273G 20000	1
11		CHECK VALVE ASSY	14284	1
		−BTN HD CAPSCREW	CM0403 15990	2
		−BTN HD CAPSCREW	CM0404 15990	2
		−LOCK WASHER	J04 15991	4
		−DRY SLEEVE BRG	S2282	4
		−FLANGED SEAT	14273A 10010	1
		−BEARING PIVOT	14274 17070	2
		−CHECK VALVE	14281 24010	1
		−CHECK VALVE SHAFT	14282 17010	2
		−VALVE PLATE	14283 15990	1
		−GROOVED PIN	21142−433	4
12	✳	O-RING	S1914	1
13		HEX HEAD CAP SCREW	B1415 15991	12
14		LOCK WASHER	J14 15991	12
15		HEX NUT	D14 15991	12
16		STREET ELBOW	AGS32 11999	1
17		PIPE PLUG	P32 10009	1
☞18		PIPE PLUG	P06 15079	1
19		PIPE PLUG	P04 15079	2
☞20		PIPE PLUG	P24 10009	1
21		LOCK WASHER	J10 15991	12
22		HEX HD CAP SCREW	14432 15990	8
☞23		STUD	12739 15000	4
24		HEX NUT	D10 15991	18
25		HEX JAM NUT	AT10 15991	4
26		HEX HEAD CAP SCREW	B1010 15991	2
☞27		PIPE PLUG	P12 15079	1
28		STREET ELBOW	RS12 11999	1
29	✳	GASKET	4180G 18000	1
☞30		STUD	C1013 15991	2
☞31		STUD	C1011 15991	10
32		AIR VENT	S2162	1
33		PIPE CPLG 1/8	AE02 15079	1
34		PIPE NIPPLE	T0206 15079	1
35		PIPE NIPPLE	T0212 15079	1
36		PIPE ELBOW	R02 11999	1
37		BOTTLE OILER	S1933	1
38		MACHINE SCREW	X0404 17090	2
39	✳	GASKET	38681−817 20000	1
40		COVER PLATE ASSY	48271−020	1
41		CLAMP BAR	12370 11010	1
42		CLAMP SCREW	8618 24000	1
43		HEX HEAD CAP SCREW	B0808 15991	2
44		PIPE PLUG	P02 15079	1
45		FLAT HEAD CAP SCREW	F0404 15990	2
46		HEX HEAD CAP SCREW	B1006−1/2 15991	2
47		SIGHT GAUGE	S1471	2
48		VENTED PIPE PLUG	38649−009 15079	1
49	✳	BALL BEARING	S1077	1
50		BEARING GASKET	5413G 18000	1
51		BEARING CAP	4185A 10010	1
52		LOCK WASHER	J06 15991	10
53		HEX HEAD CAP SCREW	B0605 15991	10
54		BEARING SHIM SET	8546 15990	1
55	✳	DBL ROW BALL BEARING	23421−461	1
56	✳	BEARING CAP GASKET	4184G 18000	1
57		BEARING CAP	4184A 10010	1
58	✳	IMPELLER SHAFT	38516−202 1706H	1
59		KEY	N0616 15990	1
60	✳	IMPELLER	38628−568 11030	1
61		SHAFT NUT	4190B 11010	1
62		INSERT	31111−003 23050	2
63		A HD SET SCREW	GA0601−1/2 17090	2
64	✳	WOODRUFF KEY	AV1210 15990	1
65	✳	SEAL ASSY	12590B	1
66		CHECK VALVE	S2283	1
67		CLOSE PIPE NIPPLE	T12 15079	1
68	✳	O-RING	S1991	1
69	✳	OIL SEAL	25227−629	2
70	✳	OIL SEAL	25217−601	1
NOT SHOWN:				
		DRIVE SCREW	BM#40−03 17000	4
		STRAINER 12 INCH	4990A	1
		NAME PLATE	2613D 13990	1
		ROTATION DECAL	2613M	1
		G-R DECAL	GR−06	1
		INSTRUCTION LABEL	2613DK	1
		WARNING DECAL	2613FE	1
		LUBE DECAL	38816−079	1
		INSTRUCTION TAG	38817−011	1
		INSTRUCTION TAG	38817−024	1
		SUCTION STICKER	6588AG	1
		DISCHARGE STICKER	6588BJ	1
		FILL TO PRM STICKER	6588AH	1

✳ INDICATES PARTS RECOMMENDED FOR STOCK

☞	INCLUDED WITH REPAIR PUMP CASING ASSY	46474−307	1

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 illustration (Figure E—1) and the accompanying parts list.

Before attempting to service the pump, disconnect or lock out the power source to ensure that the pump 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.**

Suction Check Valve Removal

Before attempting to service the check valve assembly (11), remove the casing drain plug (27) and drain the pump. Clean and reinstall the drain plug.

Remove the suction piping and gasket (not shown) from the check valve flange (5).

Remove the flat head capscrews (45) and separate the check valve assembly (11) and gasket (10) from the check valve flange (5).

Suction Plate and Wear Ring Removal

Disengage the hardware (21 and 26), and separate the check valve flange (5), gasket (6) and spacers (8) and wear ring (7) from the pump casing (2).

Remove the hardware (21 and 46) and separate the suction plate (4) from the check valve flange.

Disengage the nuts (24) and use the jam nuts (25) to “jack” the wear ring out of the pump casing.

Inspect the wear ring and O-rings (12 and 68) for excessive wear or damage and replace as required.

Pump Casing Removal

The impeller (60) and seal assembly (65) may be removed through the suction port without removing the discharge piping. However, due to the weight of the impeller and the tight fit through the

suction port, it is recommended that the discharge piping be removed and the pump casing (2) be separated from the pedestal to provide better access.

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.

Support the pump casing using a suitable hoist and sling.

Remove the hardware (24) securing the pump casing (2) to the pedestal (1). Pull the casing straight away from the pedestal to prevent binding on the impeller. Remove the pump casing gasket (6) and clean the mating surfaces.

Impeller Removal

Before removing the impeller, remove the bottle oiler and piping (35, 36 and 37). Remove the pipe plug (19) and drain the seal cavity. This will prevent oil from escaping when the impeller is removed. Clean and reinstall the pipe plug.

To loosen the impeller nut, the impeller shaft must first be disconnected from the power source. With the power source disengaged, install the key (59) in shaft keyway. Install a lathe dog on the drive end of the shaft with the "V" notch positioned over the shaft key.

Use a long piece of heavy bar stock and the lathe dog as shown in Figure E—2 to block shaft rotation. **Use caution** not to damage the shaft or keyway.

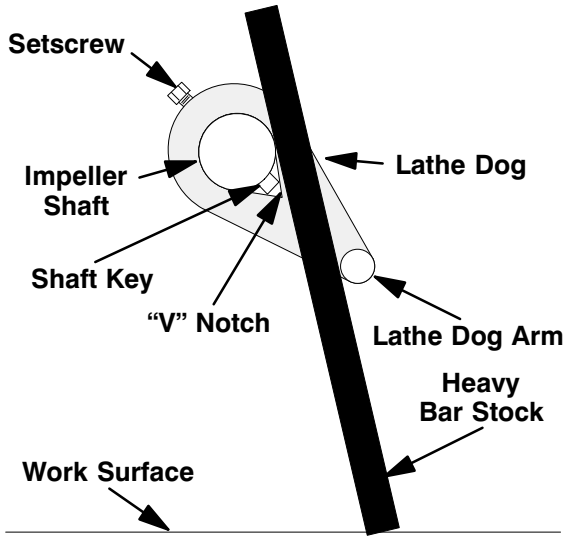


Figure E—2. Blocking Shaft Rotation

Loosen the two setscrews (63) and remove the impeller nut (61).

NOTE

If necessary, heat the impeller with a torch to aid removal.

CAUTION

The impeller is very heavy and could be damaged and/or could injure personnel if it is dropped. Use extreme caution when performing the following procedure to prevent dropping the impeller when it breaks loose from the shaft.

The impeller is secured to the shaft by the woodruff key (64) and a taper fit.To remove the impeller, install two 3/8-16 UNC capscrews (not supplied) in the tapped holes in the impeller. Use a gear puller to preload the impeller. Strike the gear puller shaft with a hammer to break the impeller loose. Remove the impeller and woodruff key.

NOTE

An alternate method of removing the impeller is to

install two wedges 180° apart between the impeller and the seal plate. Tap the wedges alternately until the impeller breaks loose. If necessary, position a piece of round bar stock against the end of the impeller shaft and strike the bar stock with a hammer to loosen the taper fit between the impeller and the shaft.

Seal Removal and Disassembly

This pump is designed with two seals; a primary mechanical seal (65) located directly behind the impeller, and a secondary oil seal (69) located at the back of the seal oil cavity. If the liquid being pumped begins to leak past the oil seal, both seals should be replaced as soon as possible.

Remove the air vent and piping (32, 33 and 34) from the seal plate (3).

Remove the seal spring. Apply oil to the shaft in the area of the mechanical seal bellows. Slide the rotating portion of the seal off the shaft.

Remove the machine screws (38) and slide the seal plate, remaining stationary mechanical seal components, and oil seal off the shaft as a unit. **Be careful** not to drop or damage the seal components when removing the seal plate.

Use a dowel or other suitable tool to press the stationary element, seat and O-rings out of the seal plate from the back side.

Use a screwdriver or other suitable tool to press or pry the oil seal (70) out of the seal plate. Be careful not to scratch or damage the seal plate bore.

If no further disassembly is required, see **Seal Reassembly and Installation**.

Shaft and Bearing Removal and Disassembly

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

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

Remove the pedestal drain plug (19) and drain the pedestal. Clean and reinstall the plug.

Remove the hardware securing the pedestal (1) to the base. Remove the shaft key (59).

Remove the hardware (52 and 53) and slide the outboard bearing cap and oil seal (51 and 69) off the shaft as a unit. Remove the bearing cap gasket (50) and bearing adjusting shims (54). Tie and tag the shims or measure and record their thickness for ease of reassembly.

Press the oil seal out of the bearing cap.

Remove the hardware (52 and 53) and slide the inboard bearing cap and oil seal (57 and 69) off the shaft as a unit. Remove the bearing cap gasket (56).

Press the oil seal out of the bearing cap.

Place a block of wood against the impeller end of the shaft and tap the shaft and assembled bearings (49 and 55) from the pedestal bore. **Be careful** not to damage the shaft.

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

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, use a bearing puller to remove the bearings from the shaft.

Shaft and Bearing Reassembly and Installation

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 for distortion, nicks or scratches, or for thread damage on the impeller end. 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 bearings. 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.*

WARNING!

Use caution when handling hot bearings to prevent burns.

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

NOTE

Position the inboard bearing (55) on the shaft as indicated by the following illustrations.

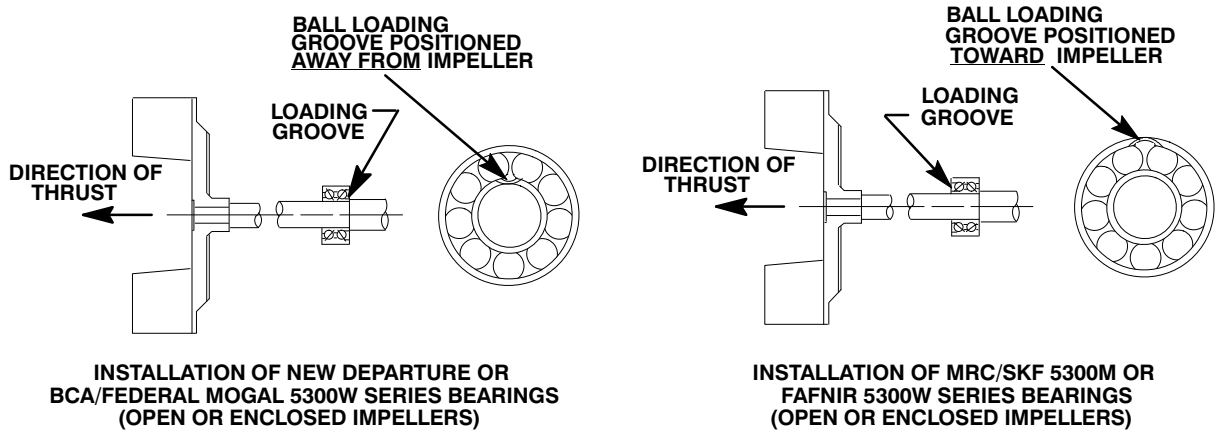


Figure E—3. Bearing Installation

After the bearings have been installed and allowed to cool, check to ensure that they have not moved away from the shaft shoulders in shrinking. If movement has occurred, use a suitably sized sleeve and a press to reposition the bearings against the shaft shoulders.

If heating the bearings is not practical, use a suitably sized sleeve and an arbor (or hydraulic) 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.

Press the oil seal (69) into the inboard bearing cap (57) with the lip positioned as shown in Figure E—1. Center the seal in the bearing cap. Replace the bearing cap gasket (56) and secure the bearing cap to the pedestal with the hardware (52 and 53).

Slide the shaft and assembled bearings into the pedestal until the inboard bearing is fully seated against the bearing cap. **Be careful** not to roll or damage the oil seal lip.

CAUTION

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

Press the oil seal (69) into the outboard bearing cap (51) with the lip positioned as shown in Figure E—1. Center the seal in the bearing cap. Replace the bearing cap gasket (50). Install the same thickness of bearing adjusting shims (54) as previously removed and secure the bearing cap to the pedestal with the hardware (52 and 53). **Be careful** not to roll or damage the oil seal lip on the shaft keyway.

NOTE

Shaft endplay should be between .002 and .010 inch (0,05 and 0,25 mm). Add or remove adjusting shims to establish the correct endplay.

Secure the pedestal to the base with the previously removed hardware. Install the shaft key (59). Be sure to reinstall any leveling shims used under the pedestal mounting feet.

Lubricate the bearings and pedestal as indicated in **LUBRICATION** at the end of this section.

Seal Reassembly and Installation

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.

Inspect the impeller shaft for damage. Small scratches or nicks may be removed with a fine file or emery cloth. If excessive wear exists, the shaft will have to be replaced.

The seal is not normally reused because wear patterns on the finished faces cannot be realigned during reassembly. This could result in premature failure. If necessary to reuse an old seal in an emergency, **carefully** wash all metallic parts in **fresh** cleaning solvent and allow to dry thoroughly.

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. If any components are worn, replace the complete seal; **never mix old and new seal parts**.

If a replacement seal is being used, remove it 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 light lubricating oil on the finished faces. Assemble the seal as follows (see Figure E—4).

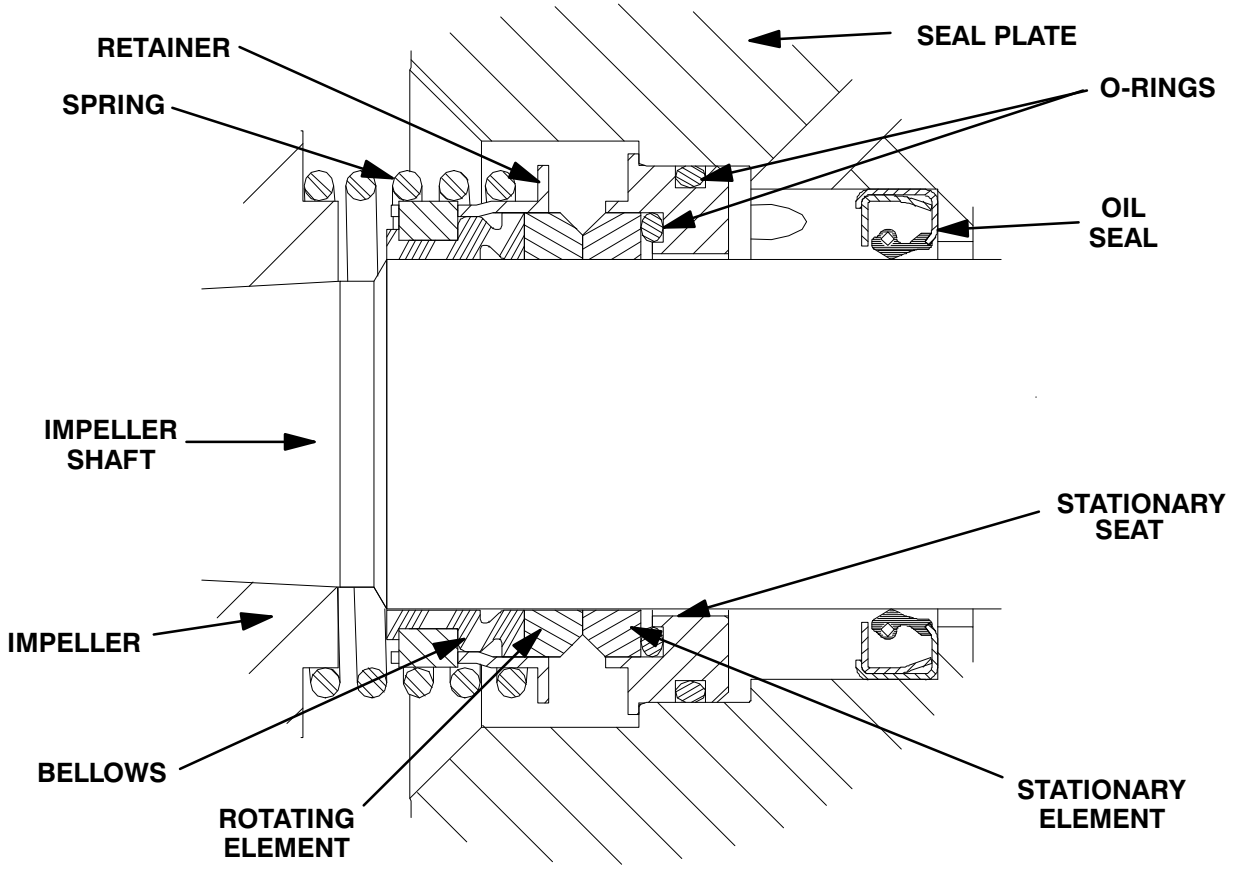


Figure E—4. Seal Assembly

CAUTION

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

Lay the seal plate on a flat surface with the impeller side up. Press the oil seal (70) into the seal plate with the lip positioned as shown in Figure E—1.

Press the stationary subassembly (consisting of the stationary seat, O-rings and stationary element) into the seal plate until fully seated.

Slide the seal plate onto the shaft and secure it to the pedestal (1) with the round head machine screws (38). **Use caution** not to damage the stationary portion of the seal on the shaft shoulders.

Slide the rotating subassembly (consisting of the rotating element, retainer and bellows) onto the lubricated shaft until the seal elements contact. Install the seal spring.

Reinstall the air vent and piping (32, 33 and 34) and bottle oiler and piping (35, 36 and 37). Lubricate the seal assembly as indicated in **LUBRICATION**, after the impeller is installed.

Impeller Installation

Install the woodruff key (64) and press the impeller onto the shaft until fully seated.

Remove the setscrews (63) from the impeller nut (61). Apply “Never-Seez” or equivalent compound to the shaft threads and screw the impeller nut onto the shaft. Immobilize the impeller as shown in Figure E—2, and torque the impeller nut to 300 ft. Lbs. (42 m. kg.).

Apply “Loctite No. 242” or equivalent compound to the setscrews (63). Install new inserts (62), and torque the setscrews to 18 ft. lbs. (216 in. lbs. or 2,5 m. kg.).

Pump Casing Installation

Replace the pump casing gasket (6). Slide the pump casing over the impeller and secure it to the seal plate and pedestal with the hardware (24).

Suction Plate and Wear Ring Installation and Adjustment

Replace the wear ring O-ring (12) and lubricate it with light oil or grease. Slide the wear ring (7) into the pump casing and secure it with the hardware (24).

Replace the suction plate O-ring (68) and lubricate it with light oil or grease. Install the gasket (6) and secure the suction plate (4) to the check valve flange (5) with the hardware (21 and 26).

Slide the assembled suction plate and check valve flange into the wear ring. Install the spacers (8) and secure the suction plate to the pump casing with the hardware (21 and 46).

A clearance approximately .015 inch (35 mm) between the impeller and the wear ring (42) is recommended for maximum pump efficiency. This clearance may be measured through the suction port with feeler gauges and can be adjusted using the jam nuts (25) and hex nuts (24).

Loosen the hex nuts (24) and tighten the jam nuts (25) until the war ring touches evenly around the suction plate. Loosen the jam nuts until they contact the volute. Tighten the hex nuts evenly, not more than 1/2 turn at a time, until the wear ring touches the impeller when the shaft is turned by hand. Loosen the hex nuts 1/2 turn, then tighten the jam nuts until the wear ring is pushed back against the hex nuts. This will provide the recommended .015 inch (35 mm) clearance.

Suction Check Valve Installation

Replace the check valve gasket (10) and secure the check valve (11) with the hardware (21 and 26).

Final Pump Assembly

Be sure the pump and power source are securely mounted to the base and that they are properly aligned. If used, remove the eye bolt used to lift component parts.

Fill the pump casing with clean liquid.

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

Be sure the pump and power source have been properly lubricated, see **LUBRICATION**.

Refer to **OPERATION**, Section C, before putting the pump back into service.

LUBRICATION

Seal Assembly

Fill the seal bottle oiler (37) with SAE No. 30 non-detergent oil. Check the oil level regularly and refill as required.

Periodically clean and reinstall the seal cavity air vent (32).

Bearings

The pedestal was fully lubricated when shipped from the factory. Check the oil level regularly and maintain it at the midpoint of the sight gauge (47). When lubrication is required, unscrew the vented plug (48) and fill the pedestal with SAE No. 30 non-detergent oil to the middle of the sight gauge (47). **Do not** overfill. Over-lubrication can cause the bearings to over-heat, resulting in premature bearing failure. Clean and reinstall the vented plug.

Under normal conditions, change the oil each 5000 hours of operation, or at twelve month intervals, which ever occurs first. 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
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