

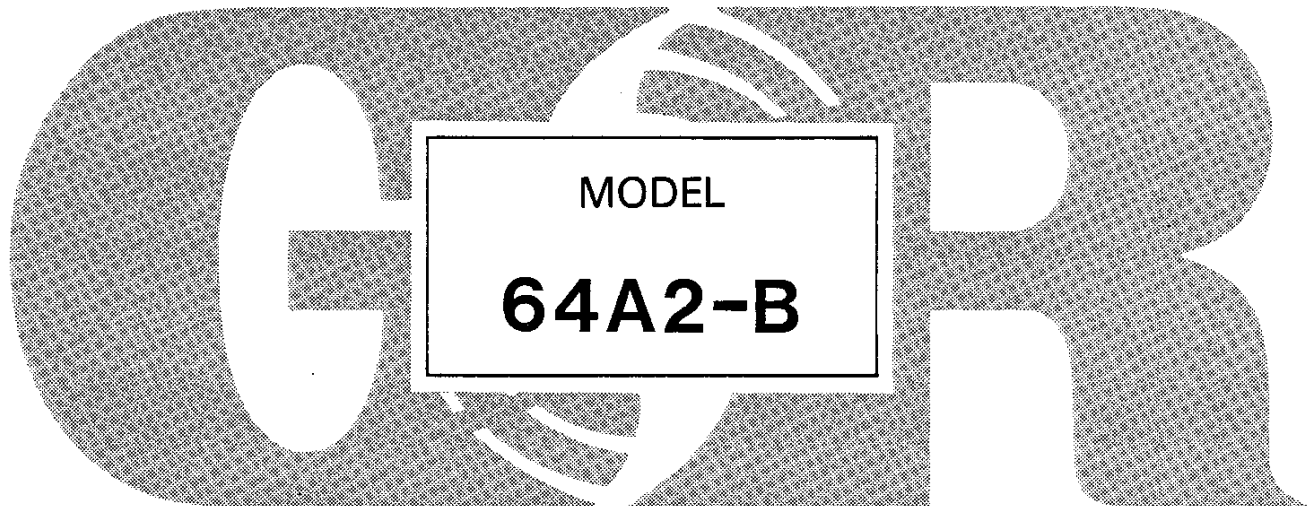
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60SERIES

INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

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TABLE OF CONTENTS

INTRODUCTION	I-1
WARNINGS - SECTION A	A-1
INSTALLATION - SECTION B	B-1
Pump Dimensions	B-1
PREINSTALLATION INSPECTION	B-2
POSITIONING PUMP	B-3
Lifting	B-3
Mounting	B-3
SUCTION AND DISCHARGE PIPING	B-4
Materials	B-4
Line Configuration	B-4
Connections to Pump	B-4
Gauges	B-4
SUCTION LINES	B-4
Fittings	B-5
Strainers	B-5
Sealing	B-5
Suction Lines In Sumps	B-5
Suction Line Positioning	B-6
DISCHARGE LINES	B-6
Siphoning	B-6
Valves	B-7
ALIGNMENT	B-7
Coupled Drives	B-8
V-Belt Drives	B-8
OPERATION - SECTION C	C-1
PRIMING	C-1
Hand Primers	C-2
Exhaust Primers	C-2
Auxiliary Ejectors	C-3
Vacuum Pumps	C-3
STARTING	C-3
Rotation	C-3
OPERATION	C-4
Leakage	C-4
Liquid Temperature And Overheating	C-4
Strainer Check	C-4
Pump Vacuum Check	C-5
STOPPING	C-5
Cold Weather Preservation	C-5
BEARING TEMPERATURE CHECK	C-6
PUMP TROUBLESHOOTING - SECTION D	D-1
PUMP MAINTENANCE AND REPAIR - SECTION E	E-1
PERFORMANCE CURVE	E-1
PUMP MODEL - PARTS LIST	E-3
PUMP AND SEAL DISASSEMBLY AND REASSEMBLY	E-4
Suction Head Removal	E-4
Impeller Removal	E-4
Seal Removal	E-5
Pump Disassembly	E-5
Impeller Shaft And Bearing Disassembly	E-5
Shaft and Bearing Reassembly And Installation	E-6
Pump Reassembly	E-8
Seal Installation	E-8
Impeller Installation	E-10
Suction Head Installation	E-11

Final Pump Reassembly	E-11
LUBRICATION	E-11
Seal Assembly	E-11
Bearings	E-12
Power Source	E-13

INTRODUCTION

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

This pump is a 60 Series, centrifugal model with an enclosed impeller. This pump is designed for high pressure distribution of liquids containing specified entrained solids. The basic material of construction for wetted parts is gray iron with brass wearing parts. Be sure the liquid being pumped is compatible with these materials.

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 write:

The Gorman-Rupp Company
P.O. Box 1217
Mansfield, Ohio 44901-1217

or

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

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

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

NOTE

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

CAUTION

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

WARNING

```
////////////////////////////////////  
//  
// These instructions must be followed to avoid causing in-  
// jury or death to personnel, and describe the procedure  
// required and the injury which could result from failure  
// to follow the procedure.  
//  
////////////////////////////////////
```


WARNINGS - SECTION A

THESE WARNINGS APPLY TO 60 SERIES BASIC PUMPS. REFER TO THE MANUAL ACCOMPANYING THE POWER SOURCE BEFORE ATTEMPTING TO BEGIN OPERATION.

WARNING

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

WARNING

```
//////////////////////////////////////  
//  
// This pump is designed to handle liquids containing spec- //  
// ified entrained solids. Do not attempt to pump //  
// volatile, flammable or corrosive liquids which may dam- //  
// age 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 shields and/or guards in //  
// place over rotating parts. Exposed rotating parts can //  
// catch clothing, fingers, or tools, causing severe injury //  
// to personnel. //  
//  
//////////////////////////////////////
```

WARNINGS

WARNING

```
////////////////////////////////////  
//  
// Overheated pumps can cause severe burns and injury. If //  
// overheating of the pump occurs: //  
// //  
// 1. Stop the pump immediately. //  
// 2. Allow the pump to cool. //  
// 3. Refer to instructions in this manual before re- //  
// starting the pump. //  
// //  
////////////////////////////////////
```

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 servic- //  
// ing. //  
// //  
////////////////////////////////////
```

INSTALLATION - SECTION B

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). If the pump is fitted with a Gorman-Rupp double grease lubricated seal, the maximum incoming pressure must be reduced to 10 p.s.i..

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

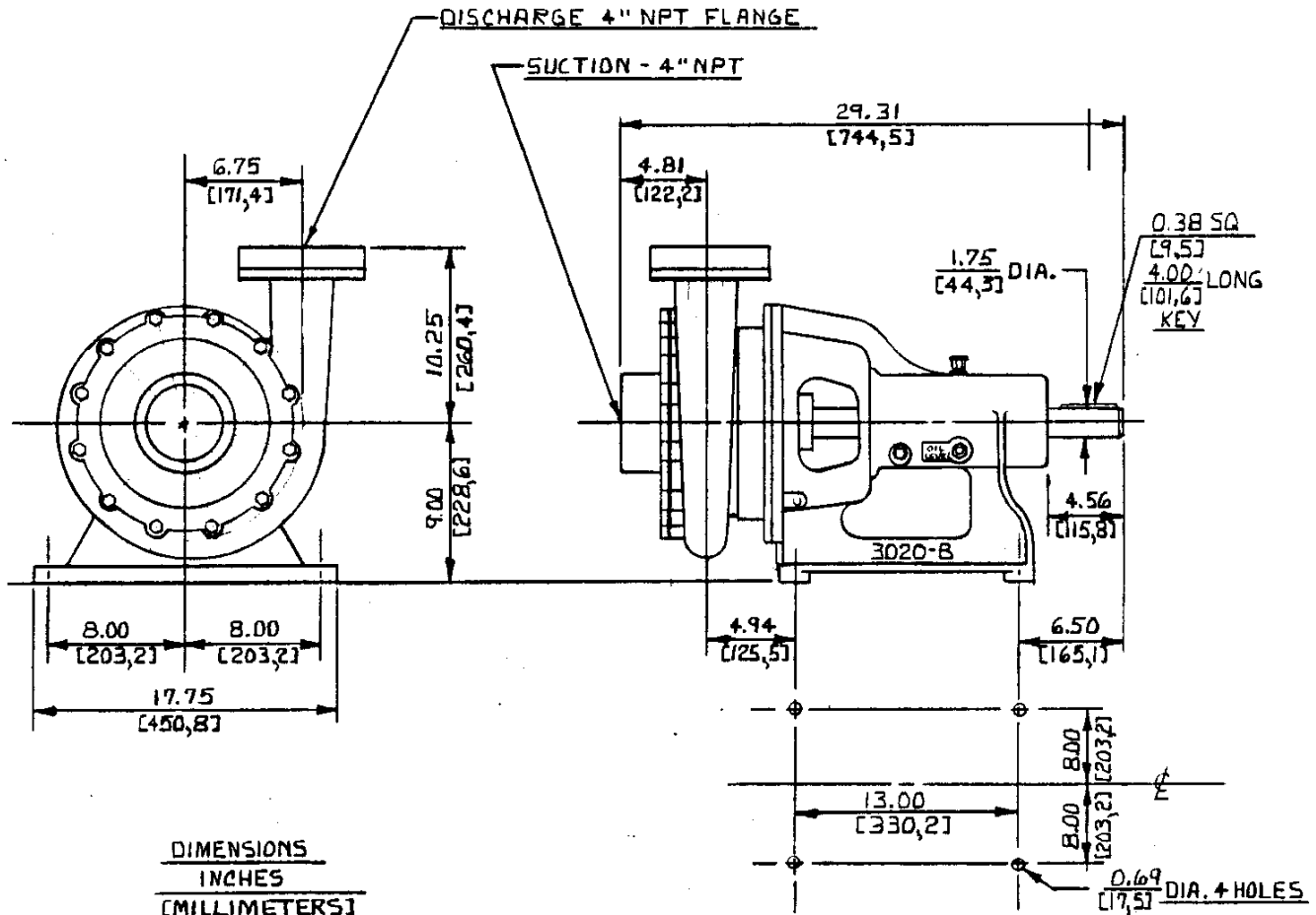


Figure 1. Pump Model 64A2-B

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:

- Inspect the pump for cracks, dents, damaged threads, and other obvious damage.
- Check for and tighten loose bolts, nuts, capscrews, and other attaching hardware. Since gaskets tend to shrink after drying, check for and tighten loose nuts and capscrews securing mating surfaces.
- Carefully read all warning and cautions contained in this manual, and perform all duties indicated. Note the direction of rotation indicated

INSTALLATION

on the pump. Check that the pump shaft rotates counterclockwise facing the pump suction.

CAUTION

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

- d. Check all lubricant levels and lubricate as necessary. Refer to LUBRICATION in the MAINTENANCE AND REPAIR section of this manual and perform duties as instructed.
- e. If the pump and power source have 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

Use lifting equipment with a capacity of at least **1,250 pounds**. This pump weighs approximately **250 pounds**, not including the weight of accessories and mounting base with power source. Customer installed equipment such as suction and discharge piping **must** be removed before attempting to lift.

CAUTION

The pump assembly can be seriously damaged if the cables or chains 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

Materials

Either pipe or hose may be 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 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.

INSTALLATION

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 3/8 inch 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 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.

Suction Lines In Sumps

If a single suction line is installed in a sump, it should be positioned away from the wall of the sump at a distance equal to one and one-half times the diameter of the suction 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 one and one-half times the diameter of the suction pipe. The baffle will allow entrained air to escape from the liquid before it is drawn into the suction inlet.

If two 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 three times the diameter of the suction pipe.

Suction Line Positioning

The depth of submergence of the suction line is critical to efficient pump operation. Figure 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).

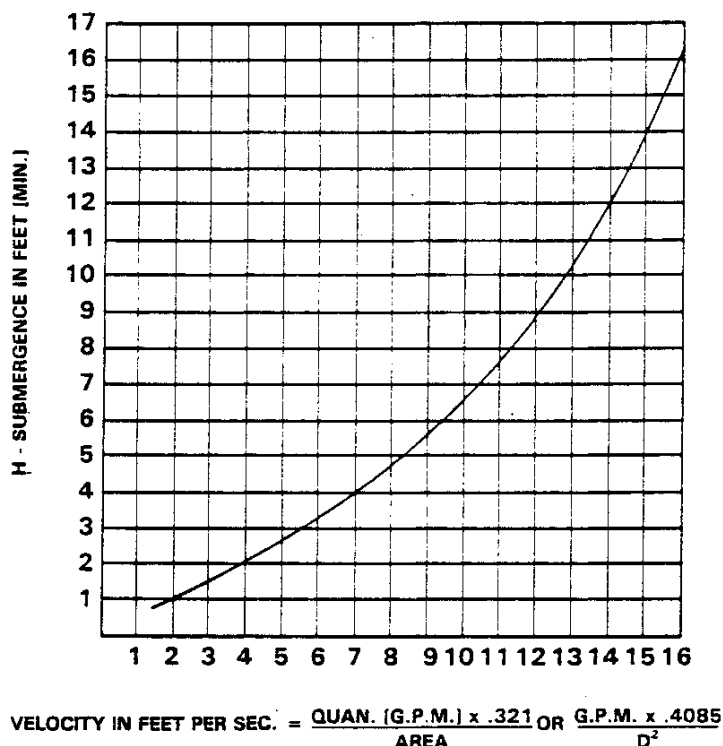


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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.

INSTALLATION

Valves

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

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.

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.

INSTALLATION

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 degrees. The coupling is in alignment when the hub ends are the same distance apart at all points (see Figure 3A).

Align non-spider type couplings by using a feeler gauge or taper gauge between the coupling halves every 90 degrees. The coupling is in alignment when the hubs are the same distance apart at all points (see Figure 3B).

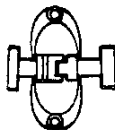


Figure 3A. Aligning Spider-Type Couplings



Figure 3B. 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.

V-Belt Drives

When using V-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 3C). In drive systems using two or more belts, make certain that the belts are a matched set; unmatched sets will cause accelerated belt wear.

INSTALLATION

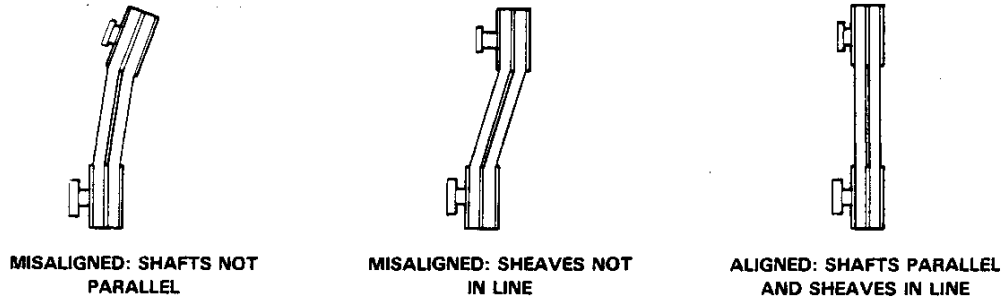


Figure 3C. Alignment of V-Belt Driven Pumps

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 shields and/or guards in //  
// place over rotating parts. Exposed rotating parts can //  
// catch clothing, fingers, or tools, causing severe injury //  
// to personnel. //  
// //  
////////////////////////////////////
```


OPERATION

OPERATION - SECTION C

WARNING

```
////////////////////////////////////  
//  
// This pump is designed to handle liquids containing spec- //  
// ified entrained solids. Do not attempt to pump //  
// volatile, flammable or corrosive liquids which may dam- //  
// age 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).

Since this is not a self-priming pump, it will require an external priming device when installed in a **static lift application**. Many standard centrifugal models are equipped with a hand operated vacuum pump, exhaust primer, or ejector for this purpose. If a priming device was not furnished with the pump, it may be ordered from the factory as an option.

Before attempting to operate the priming device, close the discharge throttling valve. (Installation of a spring-loaded check valve is also recommended to facilitate priming.) Once the pump is fully primed, close the valve between the priming device and pump to preserve the prime. Start the pump, if not already in operation, and open the discharge valve slowly and fill the discharge line.

When installed in a **flooded suction application**, simply open the system valves and permit the incoming liquid to evacuate the air. After the pump and piping system have completely filled, evacuate any remaining air pockets in the pump or suction line by loosening pipe plugs or opening bleeder valves.

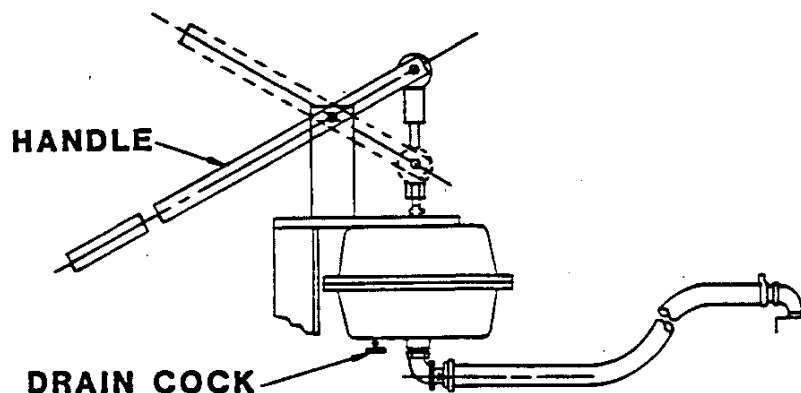
CAUTION

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

Hand Primers

Hand-operated primers are usually mounted on the pump and, when operated, draw air out of the suction line and casing.

To prime a pump with a hand vacuum pump open the cock on the pump priming line. Operate the hand pump until liquid flows out of the check valve on the bottom of the primer pump. Once the pump is primed, close the valve located between the primer and the pump so that the prime will not be lost.

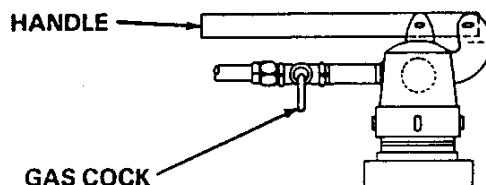


1. Hand Primer Assembly

Exhaust Primers

Engine driven pumps normally take advantage of the engine exhaust gases by using them to operate an exhaust primer. The exhaust is directed through a venturi which creates a vacuum in the pump casing in order to fill the suction line and casing with liquid.

To prime a pump using an exhaust primer, open the gas cock in the priming line and engage the exhaust primer until liquid is thrown out of the ejector nozzle.



2. Exhaust Primer Assembly

Auxiliary Ejectors

Ejectors function much like exhaust primers. They may be operated by steam, compressed air, water or exhaust gases. To prime a pump using an ejector, open the gas cock in the priming line and operate the ejector until liquid is thrown out the ejector nozzle.

Vacuum Pumps

Air can be exhausted to prime a pump by using a vacuum pump. Either a wet type or a dry type vacuum pump may be used; however, a wet type is preferred since it will not be damaged if liquid enters it. If a dry vacuum pump is used, provisions must be made to keep liquid from entering it.

STARTING

Consult the operations manual furnished with the power source.

Rotation

The correct direction of pump rotation is counterclockwise when facing the impeller. If the pump is operated in the wrong direction, the impeller could become loosened from the shaft and seriously damage the pump.

CAUTION

Before starting the pump, check to make sure rotation is in the proper direction. Otherwise, the impeller could become loosened from the shaft and seriously damage the pump.

Consult the operating manual furnished with the 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

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 110°F. 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.

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 servic- //  
// ing. //  
//  
////////////////////////////////////
```

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). If the pump is fitted with a Gorman-Rupp double grease lubricated seal, the maximum incoming pressure must be reduced to 10 p.s.i..

Pump Vacuum Check

Since this pump does not have a suction check valve, the discharge line must be fitted with a check valve if a pump vacuum reading is to be taken.

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 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 pump is driven by an engine, reduce the throttle speed slowly and allow the engine to idle briefly before stopping.

CAUTION

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

After stopping the pump, lock out 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 are considered normal for bearings, and they can operate safely to at least 180°F.

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 MAINTENANCE AND REPAIR). 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.

PUMP TROUBLESHOOTING - SECTION D

WARNING

```

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

```

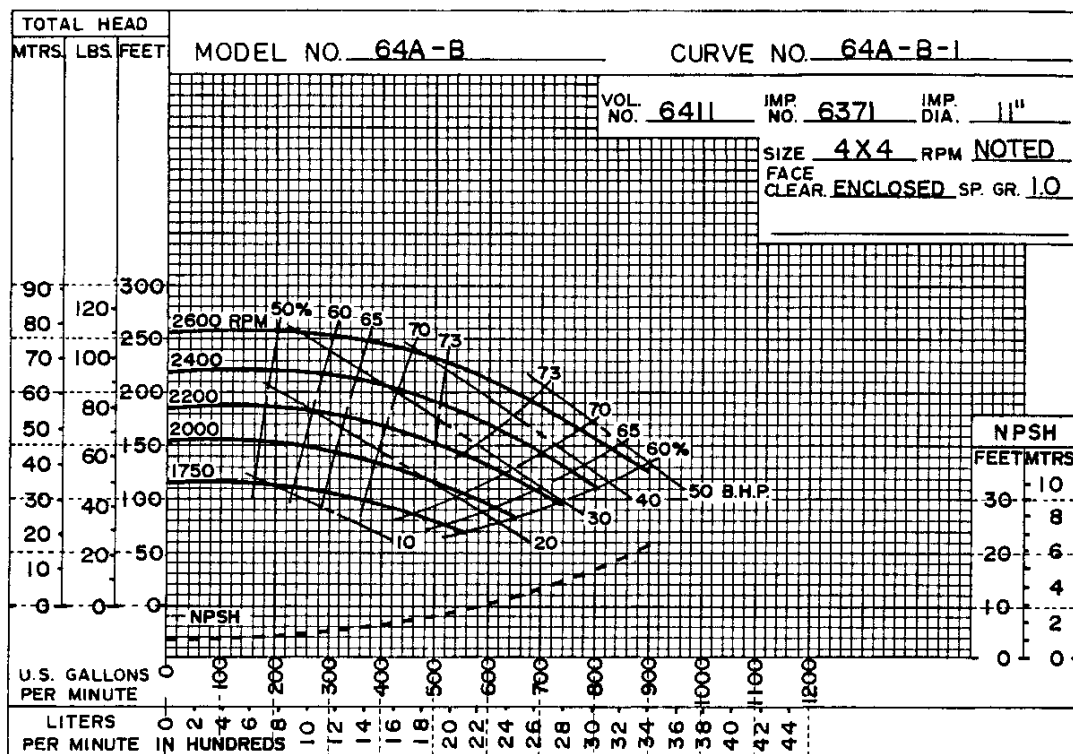
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See INSTALLATION.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct submergence as needed.
	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.
	Impeller clogged.	Free impeller of debris.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRES-SURE(cont.)	Pump speed too slow.	Check driver output; check belts or couplings for slippage.
	Discharge head too high.	Install bypass line.
	Suction lift too high.	Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.
	Leaking or worn seal or pump gasket..	Check pump vacuum. Replace leaking or worn seal or gasket.
	Liquid being pumped too thick.	Dilute liquid or heat if possible.
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.
	Suction and discharge lines not properly supported.	Check piping installation for proper support.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
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.
	Pump speed too high.	Reduce speed of power source.
	Bearing(s) frozen.	Disassemble pump and check bearing(s).

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 64A2-B

*Based on 70°F 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.

SECTIONAL DRAWING

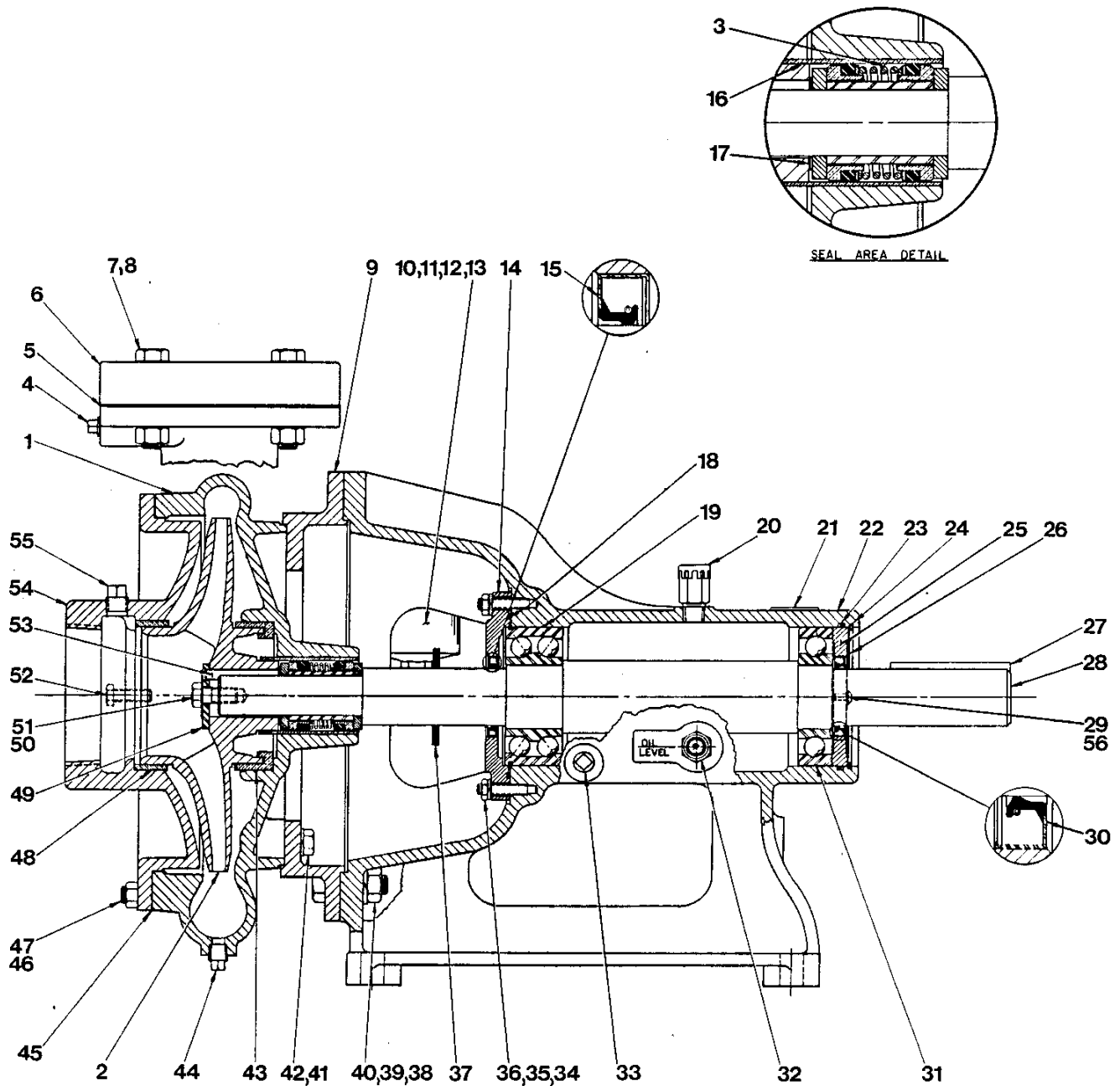


Figure 1. Pump Model 64A2-B

PARTS LIST
Pump Model 64A2-B
 (From S/N 818301 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	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP CASING	6411	10010	1	33	PED DRAIN PLUG	P00006	11990	1
2	*IMPELLER	6371	10010	1	34	STUD	C00607	15991	6
3	*SEAL ASSY	GS01250	-----	1	35	HEX NUT	D00006	15991	6
4	ACCESSORY PLUG	P00004	11990	1	36	LOCKWASHER	J00006	15991	6
5	*DISCH FLANGE GSKT	1674-G	18000	1	37	SLINGER RING	3209	19120	1
6	DISCHARGE FLANGE	00271	10010	1	38	HX HD CAPSCREW	B00808	15991	8
7	HX HD CAPSCREW	B01011	15991	4	39	HEX NUT	D00008	15991	8
8	HEX NUT	D00010	15991	4	40	LOCK WASHER	J00008	15991	8
9	PEDESTAL ADAPTOR	7730	10010	1	41	HEX HD CAPSCREW	B00805	15991	4
10	GREASE CUP	S01509	-----	1	42	LOCKWASHER	J00008	15991	4
11	PIPE NIPPLE	T00418	15070	1	43	*WEAR RING	6520	14000	1
12	ST ELBOW	AGS00004	11990	1	44	CASING DRAIN PLUG	P00004	11990	1
13	PIPE ELBOW	R00004	11990	1	45	*PUMP CASING GSKT	2202-G	18000	1
14	BEARING CAP	38322-418	10010	1	46	STUD	C00807	15991	12
15	*OIL SEAL	25227-534	-----	1	47	HEX NUT	D00008	15991	12
16	*SEAL LINER	2205-A	14080	REF	48	*WEAR RING	6402	14000	1
17	*IMP ADJ SHIM SET	37-J	17090	REF	49	*IMPELLER WASHER	6403	15990	1
18	*O-RING	25152-248	-----	1	50	*IMP CAPSCREW	B00805	15990	1
19	*BALL BEARING	S01030	-----	1	51	*LOCKWASHER	AK00008	15991	1
20	AIR VENT	S01703	-----	1	52	HEX HD CAPSCREW	B00604	15991	2
21	ROTATION DECAL	2613-CU	00000	1	53	*IMPELLER KEY	N00409	15991	1
22	PEDESTAL	3020-B	10010	1	54	SUCTION HEAD	6407	10010	1
23	*O-RING	25152-245	-----	1	55	ACCESSORY PLUG	P00006	11990	1
24	BRG RETAINING RING	S01165	-----	1	NOT SHOWN:				
25	BEARING RETAINER	38322-522	26000	1		PIPE PLUG	P00012	11990	1
26	*BRG SHIM SET	8546	15990	1		PIPE PLUG	P00006	11990	2
27	*SHAFT KEY	N00612	15990	1		NAME PLATE	2613-R	13990	1
28	*IMPELLER SHAFT	38512-517	16040	1		DRIVE SCREW	BM#04-03	15990	4
29	SETSCREW	GA#10-01-S	15990	2		STRAINER	S01528	-----	1
30	*OIL SEAL	25227-534	-----	1		SUCT STICKER	6588-AG	00000	1
31	*BALL BEARING	S01077	-----	1		DISCH STICKER	6588-BJ	00000	1
32	SIGHT GAUGE	S01471	-----	1					

*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO AND UP

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

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

Before attempting to service the pump, lock out the power source or take other precautions to ensure the power source will remain inoperative, and close all valves in the suction and discharge lines.

WARNING

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

Suction Head Removal

Remove the suction and discharge piping. Remove the pump casing drain plug (44) and drain the pump. Clean and reinstall the drain plug.

For access to the wear rings (43 and 48) or impeller (2), the suction head (54) must be separated from the pump casing (1). Remove the nuts (47) and force the suction head out of the pump casing by turning the two jacking screws (52). Turn the screws evenly to prevent binding. Remove the pump casing gasket (45) and clean the mating surfaces.

Inspect the wear ring (48) for excessive wear or scoring and replace as required. The wear ring is secured in the suction head by a press fit.

Impeller Removal

Before removing the impeller (2), turn the cross arm on the automatic lubricating grease cup (10) clockwise until it rests against the cover (see Figure 4 in LUBRICATION). This will prevent grease in the cup from escaping as the impeller is removed.

Remove the impeller capscrew and washers (49, 50 and 51). To remove the impeller, install 3/8-16 NC capscrews (not supplied) in the threaded holes in the impeller. Use a wheel puller (or other suitable tool) to remove the

impeller and key (53) from the shaft. Inspect the impeller and replace it if cracked or badly worn.

Slide the impeller adjusting shims (17) from the shaft. To ease reassembly, tag and tie the shims or measure and record their thickness.

Seal Removal

Remove the outer rotating element, stationary seat, packing ring, seal washer and seal spring. Remove the shaft sleeve, inner seal washer, packing ring, stationary seat and rotating element. Use a stiff wire with a hooked end if necessary.

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

Pump Disassembly

Inspect the wear ring (43) for wear or damage and replace as required. The wear ring is secured in the pump casing by a press fit.

Inspect the seal liner (16) for wear or grooves that could cause leakage or damage to the seal packing rings. The seal liner is a press fit into the pump casing (1) and does not normally require replacement. If replacement is required, remove the automatic lubricating grease cup and piping (10, 11, 12 and 13) from the pump casing. Remove the hardware (41 and 42) and separate the pump casing from the pedestal adaptor (9). Refer to **Pump Reassembly** for replacement of the seal liner.

Impeller Shaft And Bearing 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.

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.

Remove the slinger ring (37) and shaft key (27) from the shaft.

Use snap ring pliers to remove the bearing retaining ring (24) from the pedestal bore. Remove the bearing shim set (26); tie and tag the shims, or measure and record their thickness.

Remove the setscrews (29) from the bearing retainer (25) and install two machine screws (#10-32 X 1" long). Pry the retainer from the pedestal bore using a

screwdriver against the head of the machine screws. **Do not** use the machine screws to jack against the ball bearing. Remove the machine screws and reinstall the setscrews.

Press the oil seal (30) from the bearing retainer, and remove the O-ring (23) from the pedestal bore.

Disengage the hardware (35 and 36) and remove the bearing cover (14) and oil seal (15). Remove the bearing cover O-ring (18). Press the oil seal (15) from the bearing cover.

Place a block of wood against the drive end of the shaft and tap the shaft and assembled bearings (19 and 31) out of the pedestal.

Use a bearing puller to remove the inboard and outboard bearings from the impeller shaft.

Shaft and Bearing Reassembly And Installation

Clean the impeller shaft, pedestal bore, and all component parts (except bearings) with a soft cloth soaked in cleaning solvent. Inspect the parts for wear 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 prec- //  
// autions printed on solvent containers. //  
//  
////////////////////////////////////
```

Inspect the shaft for distortion, nicks or scratches and for thread damage on the impeller end. Dress small nicks and burrs with a fine file or honing stone. Replace the impeller shaft if defective.

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

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

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.

The bearing tolerances provide a tight press fit onto the impeller shaft and a snug slip fit into the pedestal. If the bearings slip on and off easily, the

shaft is worn and must be replaced. The pedestal must be replaced if the bearings do not fit snugly.

Lubricate the shaft with light oil and position the outboard bearing (31) on the shaft. Press the bearing onto the shaft until it seats squarely against the shaft shoulder.

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.

Position the inboard bearing (19) on the shaft with the retaining ring facing toward the impeller end of the shaft. Press the bearing onto the shaft until it seats squarely against the shaft shoulder.

Slide the shaft and assembled bearings into the pedestal until the retaining ring on the inboard 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.

Install the oil seal (15) in the bearing cover (14) with the lip positioned as shown in Figure 1. Install the bearing cover O-ring (18) in the bearing cover.

Slide the assembled bearing cover and oil seal over the shaft and secure it with the hardware (35 and 36). Be careful not to damage the oil seal lip on the shaft threads.

Install the oil seal (30) in the bearing retainer (25) with the lip positioned as shown in Figure 1. Replace the bearing retainer O-ring (23) in the pedestal and press the bearing retainer into the pedestal until it seats against the bearing. Be careful not to cut the oil seal lip on the shaft keyway. **Be sure** the setscrews in the bearing retainer are positioned horizontally inline.

Install the required number of bearing shims (26). Reinstall the retaining ring (24) and check the shaft endplay.

NOTE

Shaft endplay should be between .002 and .010 inch. Add or remove bearing adjusting shims to obtain this endplay.

Secure the pedestal to the base, and lubricate the bearings as indicated in LUBRICATION.

Pump Reassembly

If removed for replacement, press the wear ring (43) into the pump casing until it seats squarely against the shoulder bore.

CAUTION

When replacing the wear ring, the wear ring **MUST** seat squarely in the pump casing. Otherwise, binding and/or excessive wear will occur as the shaft turns.

Before securing the pump casing to the pedestal adaptor, inspect the bore of the seal liner (16) for wear or grooves that might cause leakage or damage to the seal packing rings. If the seal liner must be replaced, position the pump casing on the bed of an arbor (or hydraulic) press and use a new sleeve to force the old one out. After the new liner is properly installed, a 1/4 inch diameter hole must be drilled through it to permit the flow of lubricant to the seal assembly. **Be careful** to center the drill in the threaded grease pipe hole and not damage the threads. Deburr the hole from the inside of the seal liner after drilling.

Align the threaded seal lubricant hole in the pump casing with the pedestal opening and secure the casing to the pedestal adaptor with the hardware (41 and 42). Reinstall the automatic lubricating grease cup and piping (10, 11, 12 and 13).

Seal Installation

(Figures 1 and 2)

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 prec- //  
// autions printed on solvent containers.                //  
//                                                        //  
////////////////////////////////////
```

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. Clean and polish the seal spacer 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.**

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 packing rings and seal liner 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 2).

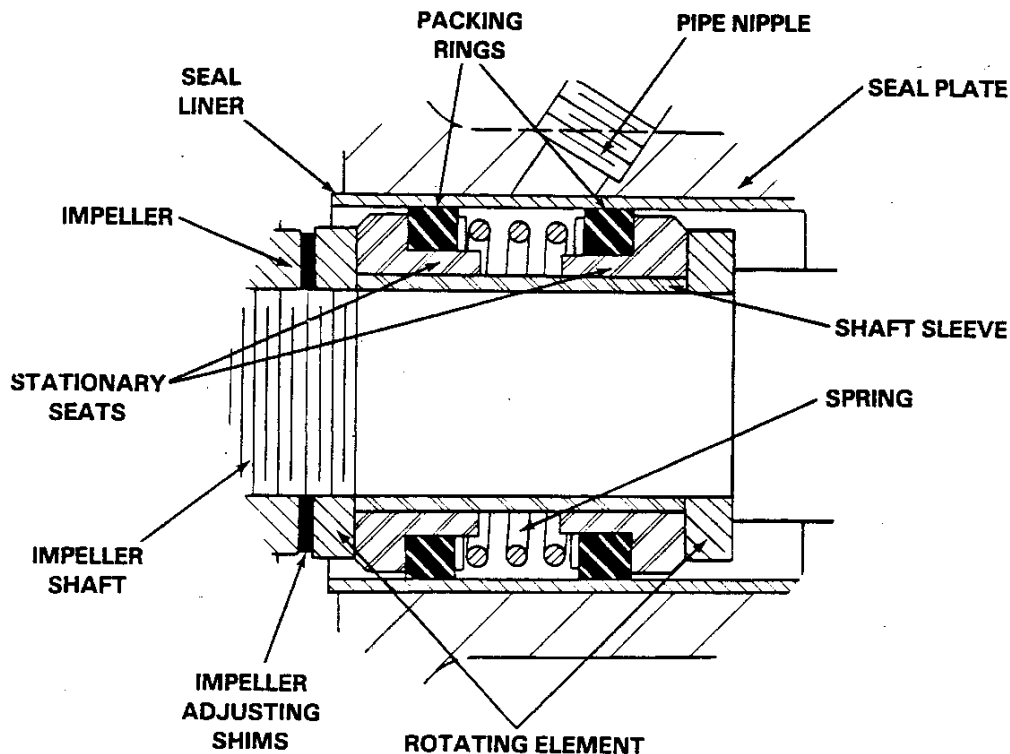


Figure 2. GS01250 Seal Assembly

CAUTION

This seal is not designed for operation at temperatures above 110°F. Do not use at higher operating temperatures.

Position the chamfered side of the inboard rotating element toward the shaft shoulder and slide it onto the shaft until it seats against the shoulder.

Subassemble the inboard stationary seat, packing ring and spring washer and press the unit into the lubricated seal liner. A push tube cut from a length of plastic pipe would aid this installation. The O.D. of the tube should be slightly smaller than the I.D. of the seal liner.

Install the shaft sleeve and spring.

Subassemble the outboard stationary seat, packing ring and spring washer. Press this unit into the seal liner.

Install the outboard rotating element with the chamfered side facing the impeller. After the impeller has been installed, lubricate the seal as indicated in **LUBRICATION**.

Impeller Installation

Inspect the impeller, and replace it if cracked or badly worn.

Slide the same number of impeller adjusting shims (17) as previously removed onto the shaft.

For maximum pump efficiency, the impeller vanes must be centered within the volute scroll. Verify the impeller positioning as described below and press the impeller and key (53) onto the shaft until fully seated.

To verify the impeller positioning, measure the pump casing and impeller as shown in Figure 3. Use these measurements to calculate the required impeller location (dimension E). Add or remove impeller adjusting shims until dimension E is obtained.

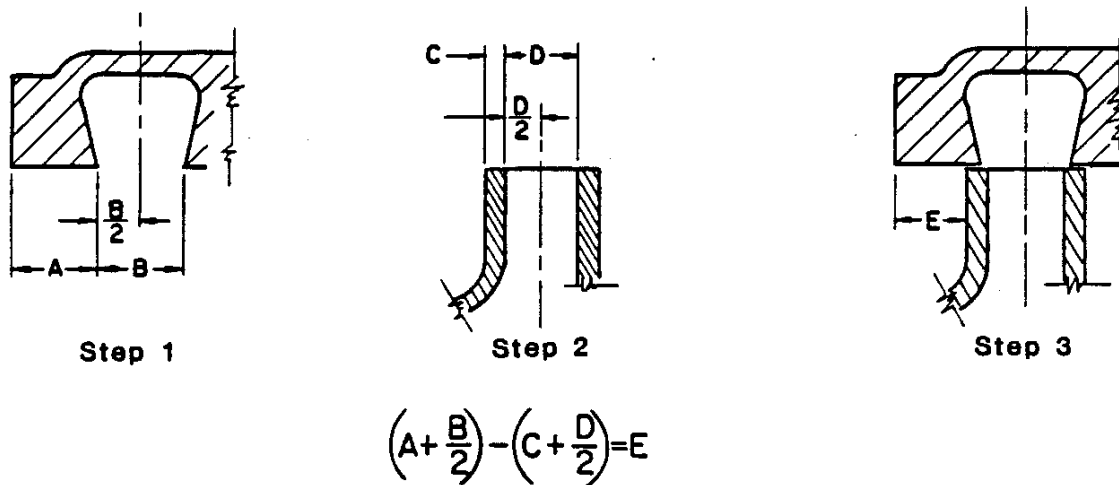


Figure 3. Centering Impeller Within Volute Scroll

NOTE

After the impeller has been properly positioned, check for free rotation. Correct any scraping binding before further reassembly.

Turn the shaft by hand to make sure that the impeller is not binding or scraping. If it does, check the installation of the wear ring (43) to be sure it is square in the pump casing.

Suction Head Installation

If removed for replacement, press the wear ring (48) in the suction head until it seats squarely against the shoulder bore.

CAUTION

When replacing the wear ring, the wear ring **MUST** seat squarely in the suction head. Otherwise, binding and/or excessive wear will occur as the shaft turns.

Replace the gasket (45) and secure the suction head to the pump casing using the hardware (47). **Be sure** the jacking screws (52) do not prevent the suction head from seating properly against the casing shoulder.

Turn the shaft by hand to make sure the impeller is not binding or scraping. If it does, check the installation of the wear ring (48) in the suction head.

Final Pump Reassembly

Be sure the pump is secure to the base and power source.

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 and power source have been properly lubricated, see LUBRICATION.

Fill the pump casing with clean liquid. Reinstall the fill plug and tighten it.

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

LUBRICATION

Seal Assembly

Before starting the pump, fill the grease cup (10) through the grease fitting with a good grade of No.2 pressure gun grease until grease escapes from the relief hole. Turn the grease cup arm counterclockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see Figure 4).

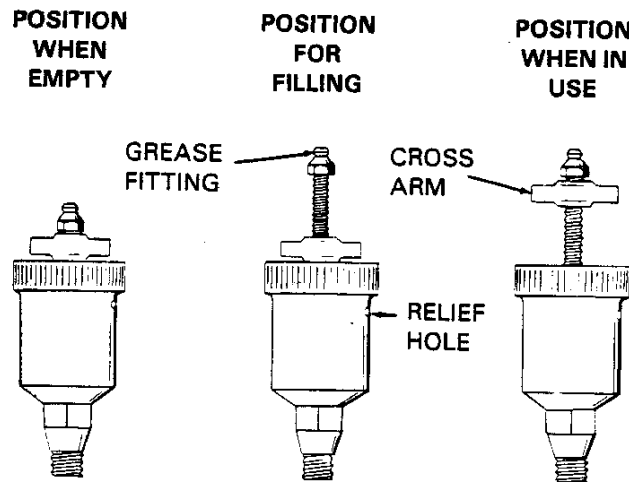


Figure 4. Automatic Lubricating Grease Cup

Bearings

The pedestal was fully lubricated when shipped from the factory. Check the oil level regularly through the sight gauge (32) and maintain it at the midpoint of the gauge. When lubrication is required, remove the air vent (20) and add SAE No. 30 non-detergent oil through the opening. **Do not** over-lubricate. Over-lubrication can cause the bearings to overheat, resulting in premature bearing failure.

NOTE

The white reflector in the sight gauge must be positioned horizontally to provide proper drainage.

Under normal conditions, drain the pedestal once each year and refill with 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.

Power Source

Refer to the literature accompanying the power source or contact your local power source representative for the manufacturer's recommendations.

**For U.S. and International Warranty Information,
Please Visit www.grpumps.com/warranty
or call:**

U.S.: 419-755-1280

International: +1-419-755-1352

**For Canadian Warranty Information,
Please Visit www.grcanada.com/warranty
or call:**

519-631-2870