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October 26, 1984
Rev.B

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST

GORMAN-RUPP PUMPS

80 SERIES PUMP

MODEL

83C52-B

INCLUDING: /FM

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

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

Register your new
Gorman-Rupp pump online at
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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

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 an 80 Series, semi-open impeller, self-priming centrifugal model with a suction check valve. The pump is designed to handle most non-volatile, non-flammable liquids which contain entrained solids and abrasives. The basic material of construction for all wetted parts is gray iron and steel.

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

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 injury 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 80 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.

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 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 pump liquids which contain entrained solids and abrasives. Do not attempt to pump volatile, corrosive, or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

WARNING

After the pump has been positioned, make certain 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.

WARNING

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

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 servicing.

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.

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

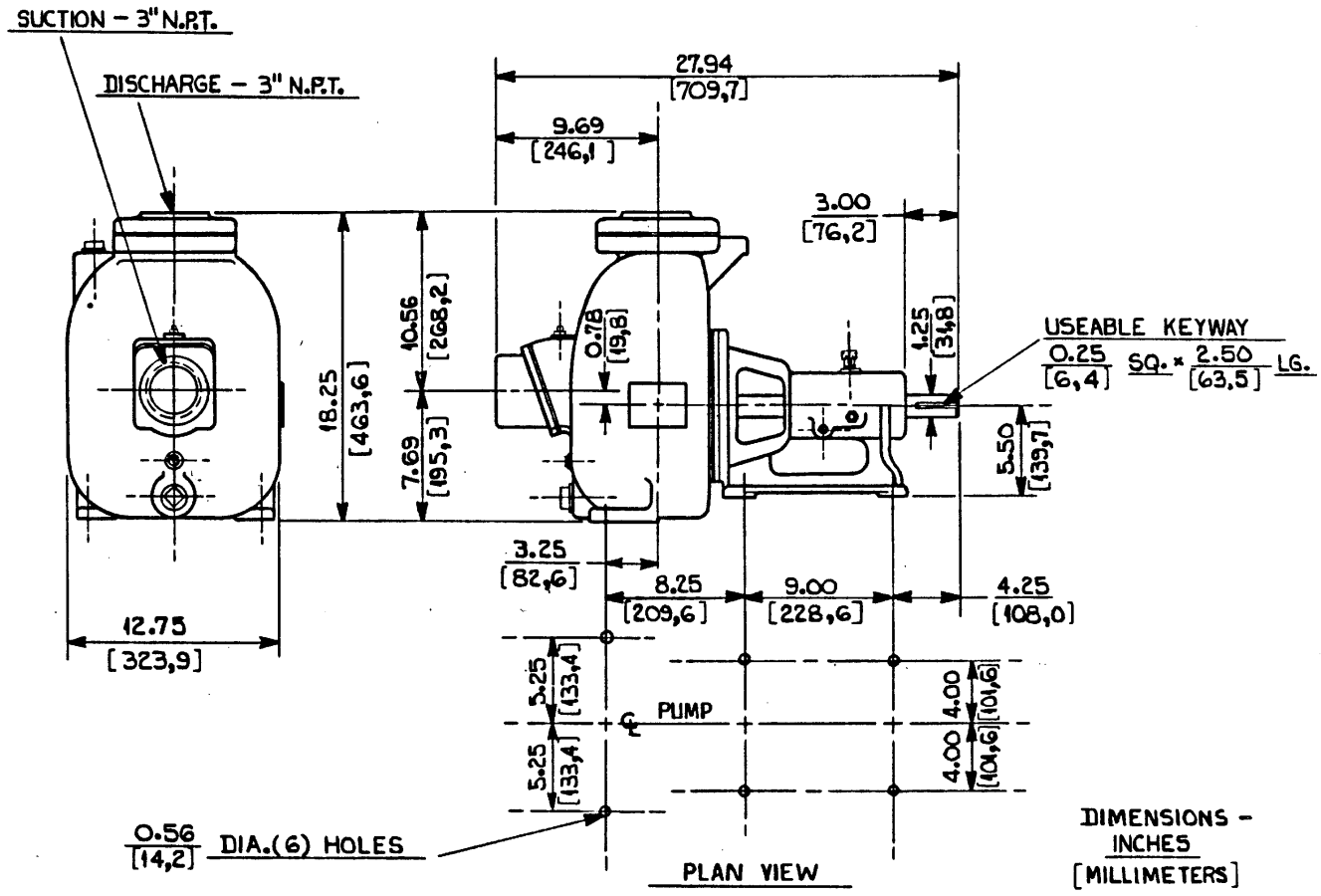


Figure 1. Pump Model 83C52-B

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

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

on the pump. Check that the pump shaft rotates in the required direction.

CAUTION

The impeller of the pump is threaded onto the pump shaft. Reverse rotation of the shaft can cause the impeller to unscrew and break the suction head or casing. Disconnect power source before checking for proper direction of rotation.

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 a least **1,000 pounds**. This pump weighs approximately **200 pounds**, not including the weight of accessories and suction and discharge piping. Customer installed equipment such as suction and discharge hoses **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

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

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.

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 7/8-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).

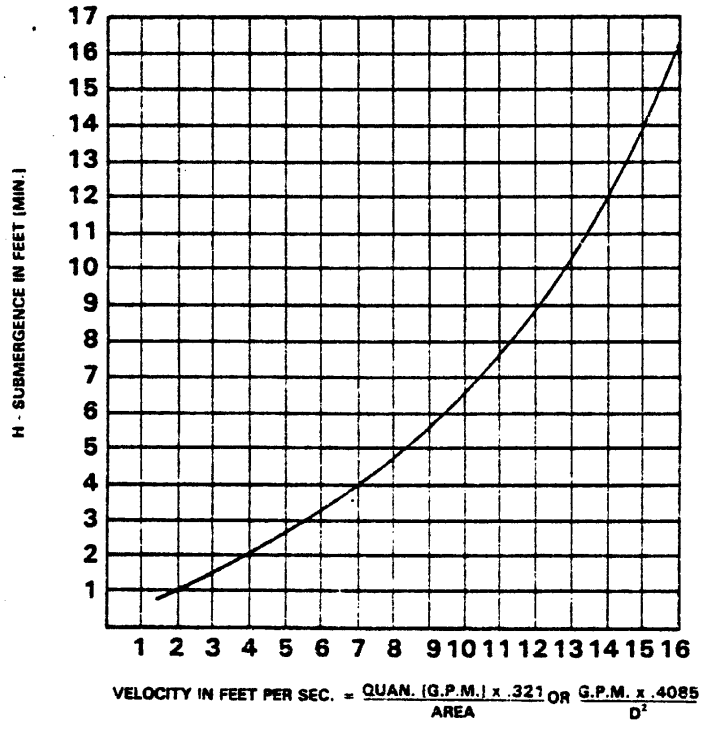


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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.

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.

Bypass Lines

If it is necessary to permit the escape of air to atmosphere during initial priming or in the repriming cycle, install a bypass line between the pump and the discharge check valve. The bypass line should be sized so that it does not affect pump discharge capacity.

It is recommended that a Gorman-Rupp Automatic Air Release Valve be installed in the bypass line. **Do not** install a manual shut-off valve in a bypass line. If a manual shut-off valve is installed to facilitate service of the Air Release Valve, the valve **must not** be left closed during operation. See the supplement at the end of this section for additional information on bypass lines and the Gorman-Rupp Automatic Air Release Valve.

NOTE

The bypass line may clog occasionally, particularly when pumping liquids containing large solids. If clogging occurs, locate and remove the clog. If the clog is located between the discharge check valve and the Air Release Valve, the valve will not close. If the clog is located in the Relief Valve itself, or in the line between the Relief Valve and the sump, the valve will not open.

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 could result, causing damage to the pump.

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 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).

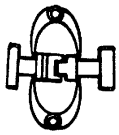


Figure 3a. Aligning Spider-Type Couplings

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.

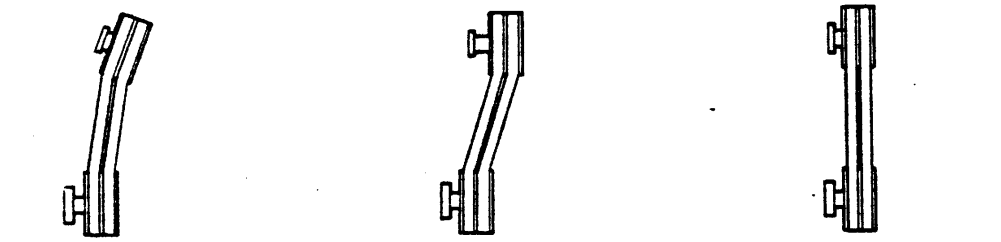


Figure 3c. Alignment of V-Belt Driven Pumps

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.

GORMAN-RUPP
AUTOMATIC AIR RELEASE VALVE

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 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 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.

In **low discharge head applications** (less than 30 feet), 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. The bypass line should be at least 1 inch in diameter to minimize the chance of plugging.The bypass line may be terminated with a six-to-eight foot length of 1 1/4 inch I.D. **smooth-bore** hose; air and liquid will then agitate the hose and break up any substances likely to cause clogging. It is also recommended that pipe unions be installed at each 90° elbow in a bypass line to ease disassembly and maintenance.

CAUTION

A BYPASS LINE THAT IS RETURNED TO A WET WELL MUST BE SECURED AGAINST BEING DRAWN INTO THE PUMP SUCTION INLET.

In **high discharge head applications** (more than 30 feet), 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.**

When properly installed and correctly adjusted to the application, the 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.

If the installation involves a flooded suction such as a below-ground lift station, a pipe union and manual shut-off valve may be installed in the bleed line to allow service of the valve without shutting down the station, and to eliminate the possibility of flooding. If a manual shut-off valve is installed **anywhere** in the air release piping, it **must** be a full-opening **ball type** valve to prevent plugging by solids.

WARNING

IF A MANUAL SHUT-OFF VALVE IS INSTALLED IN A BYPASS LINE, IT MUST NOT BE LEFT CLOSED DURING OPERATION. A CLOSED MANUAL SHUT-OFF VALVE MAY CAUSE A PUMP WHICH HAS LOST PRIME TO 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 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 COOLS, DRAIN THE LIQUID FROM THE PUMP BY REMOVING THE CASING DRAIN PLUG.

Theory of Operation

During the priming cycle, air from the pump casing is dicharged through the bypass line, passing through the Air Release Valve (Figure 1).When the pump is fully primed, pressure against the valve diaphragm compresses the spring and closes the valve (Figure 2). The valve will remain closed until the pump loses its prime or stops.

When the pump shuts down, the spring returns the diaphragm to its original position. Any solids that may have accumulated in the diaphragm chamber settle to the bottom and are flushed out during the next priming cycle.

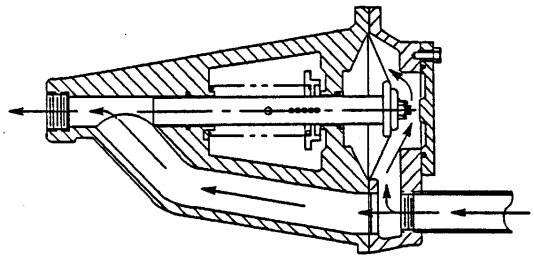


Figure 1. Valve in Open Position

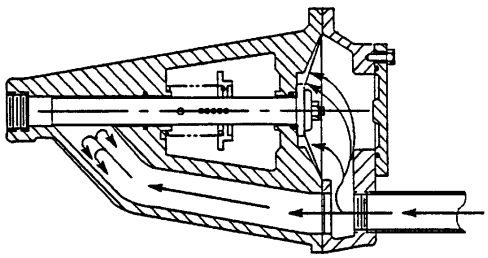


Figure 2. Valve in Closed Position

WARNING

SOME LEAKAGE (1 TO 5 GPM) 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.

NOTE

The valve will remain open if the pump does not reach its designed capacity or head. The range of the valve closing pressure is established by the tension rate of the spring as ordered from the factory, and by adjusting the spring retaining pin up or down the plunger rod to increase or decrease spring tension.

Air Release Valve Installation

The Automatic Air Release Valve must be independently mounted in a horizontal position between the pump discharge port and the non-pressurized side of the discharge check valve (see Figure 3). The valve inlet is at the large end of the valve body, and is provided with standard 1 inch NPT pipe threads.

NOTE

If the Air Release Valve is to be installed on a **staged** *pump application, contact the factory for specific installation instructions.*

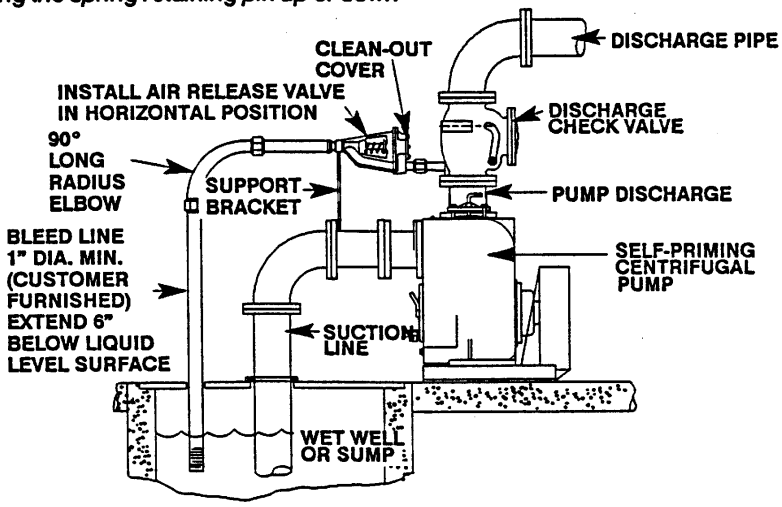


Figure 3. Typical Automatic Air Release Valve Installation

The valve outlet is located at the opposite end of the valve, and is also equipped with standard 1 inch NPT pipe threads. The outlet should be connected to a bleed line which slopes back to the wet well or sump. The bleed line must be the same size as the inlet piping, or larger. If **piping** is used for the bleed line, avoid the use of elbows whenever possible.

NOTE

It is recommended that each Air Release Valve be fitted with an independent bleeder line. However, if multiple Air Release Valves are installed in a system, the bleeder lines may be directed to a common manifold pipe. Contact the Gorman-Rupp Company for information about your specific application.

OPERATION - SECTION C

WARNING

//
// //
// This pump is designed to pump liquids which contain en- //
// trained solids and abrasives. Do not attempt to pump //
// volatile, corrosive, or flammable 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).

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

CAUTION

Never operate a self-priming 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.

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 at the top of the casing and add clean liquid until the pump 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 correct direction of pump rotation is indicated by an arrow on the pump body or accompanying decals. If the pump is operated in the wrong direction, the impeller could become loosened from the shaft and seriously damage the pump.

CAUTION

The pump must operate in the direction indicated by the arrow on the pump, or accompanying decals. Reverse rotation could loosen the impeller and seriously damage the pump.

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

It is recommended that a Gorman-Rupp Automatic Air Release Valve be installed in the bypass line. **Do not** install a manual shut-off valve in a bypass line. If a manual shut-off valve is installed to facilitate service of the Air Release Valve, the valve **must not** be left closed during operation. See the supplement in Section B for additional information on bypass lines and the Gorman-Rupp Automatic Air Release Valve.

When operating with a Gorman-Rupp Automatic Air Release Valve, close the throttling valve in the discharge line. The Automatic Air Release Valve will automatically open to allow the pump to prime, and automatically close when priming has been accomplished. After the pump has primed and liquid is flowing steadily from the bypass line, open the discharge throttling valve.

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. 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 servicing.

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.

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 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.

After stopping the pump, disconnect or lock out the power supply 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. Disconnect or 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.

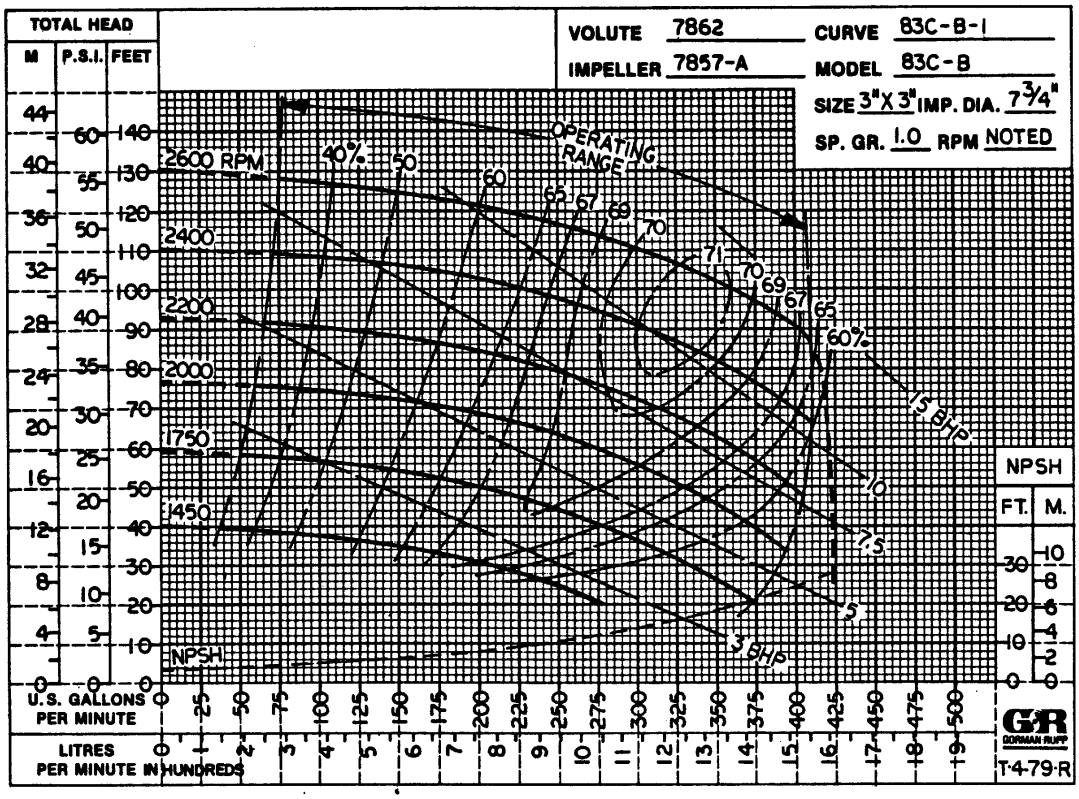
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Suction lift or discharge head too high.	Check 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 PRESSURE(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 .
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 83C52-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.

CAUTION

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

SECTIONAL DRAWING

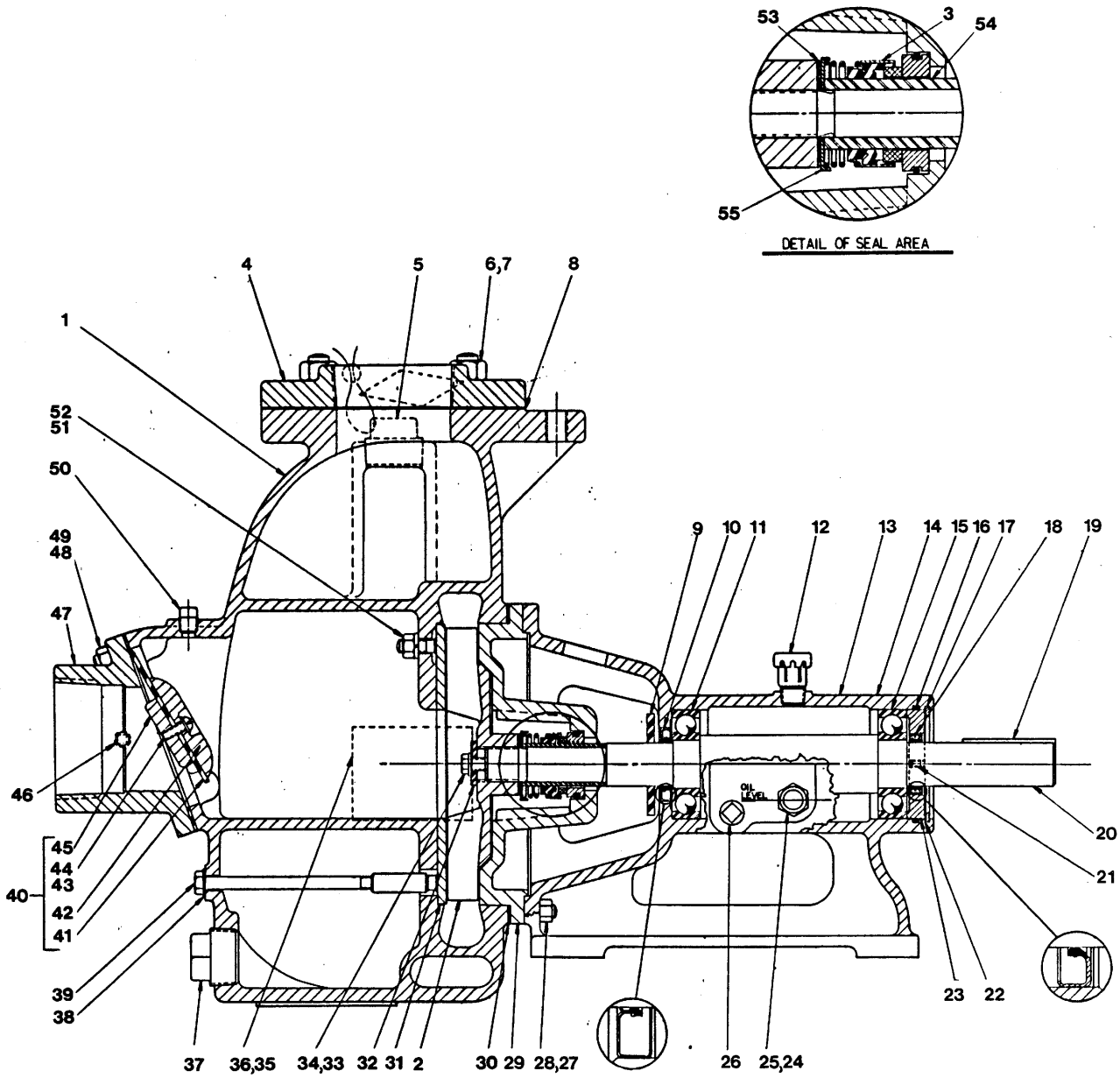


Figure 1. Pump Assembly 83C52-B

PARTS LIST

Pump Model 83C52-B

(From S/N 814600 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	MAT'L CODE	QTY
1	PUMP CASING	7862	10010	1
2 *	IMPELLER	7857-A	10010	1
3 *	SEAL ASSY	25284-951	---	1
4	DISCHARGE FLANGE	1753-A	10010	1
5	FILL PLUG ASSY	48271-064	---	1
6	DISCH FLANGE STUD	C1009	15991	4
7	HEX NUT	D10	15991	4
8 *	DISCH FLANGE GSKT	1674-GB	20000	1
9	SLINGER RING	3272	19120	1
10	OIL SEAL	25227-311	---	1
11 *	INBOARD BEARING	23275-008	---	1
12	AIR VENT	S1703	---	1
13	PEDESTAL	3114-C	10010	1
14	ROTATION DECAL	2613-M	---	1
15 *	OUTBRD BEARING	23275-008	---	1
16 *	O-RING	25152-235	---	1
17	RETAINING RING	S0247	---	1
18	OIL SEAL	25227-303	---	1
19	SHAFT KEY	N0410	15990	J1
20 *	IMPELLER SHAFT	38514-553	15010	1
21	SETSCREW	GA#10-01-S	15990	2
22 *	BRG SHIM SET	48261-009	---	1
23	BEARING RETAINER	38322-521	26000	1
24	PIPE PLUG	P06	15079	1
25	SIGHT GAUGE	26714-011	---	1
26	PED DRAIN PLUG	P06	15079	1
27	CASING STUD	C0608	15991	8
28	HEX NUT	D06	15991	8
29	SEAL PLATE ASSY	3751	10010	1
30 *	CASING GSKT SET	2958-G	18000	1
31 *	WEAR PLATE	2593-A	15990	1
32 *	IMPELLER WASHER	3118	15990	1
33 *	IMEPLLER SCREW	B0603	15991	1
34 *	IMP LOCKWASHER	AK06	15991	1
35	NAME PLATE	38818-022	13990	1
36	DRIVE SCREW	BM#04-03	15990	4
37	CASING DRAIN PLUG	P20	10009	1
38 *	FIBER WASHER	KF06	18040	1
39	WEAR PLT CAPSCREW	B0622	15991	1
40	CHECK VALVE ASSY	544-A	---	1
41 *	-CHECK VALVE GSKT	544-G	19070	1
42 *	-LARGE WEIGHT	1364	10010	1
43	-MACHINE SCREW	X0403	17090	1
44	-LOCKWASHER	J04	17090	1
45 *	-SMALL WEIGHT	18	10010	1
46	ACCESSORY PLUG	P04	15079	1
47	SUCTION FLANGE	2946	10010	1
48	SUCT FLANGE STUD	C0606	15991	4
49	HEX NUT	D06	15991	4
50	PIPE PLUG	P04	15079	1
51	HEX NUT	D06	15991	1
52	LOCKWASHER	J06	15991	1
53 *	IMPELLER SHIM SET	2-X	17090	1
54 *	SHAFT SLEEVE	3447	16000	1
55 *	SEAL WASHER	4894	17000	1
OPTIONAL:				
	SUCTION STRAINER	2645	24000	1
	SIL CARBIDE SEAL	25271-887	---	1
	-SPRING WASHER	25273-269	---	1
	/FM METRIC FLNG KIT	48213-075	---	1
	-SUCTION	38642-212	10000	1
	-FLANGE	38642-209	10000	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, take precautions to ensure that the power source will remain inoperative and close all valves in the suction and discharge lines.

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

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 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 Check Valve Removal

Before attempting to service the check valve assembly (40), remove the pump casing drain plug (37) and drain the pump. Clean and reinstall the drain plug.

For access to the check valve, remove the suction piping and the nuts (49) securing the suction flange (47) to the pump casing (1). Pull the check valve gasket (41) and weights (42 and 45) from the suction port and inspect all parts for wear or damage.

Pump Disassembly

To service the wear plate, impeller, or seal assembly, the pump casing must be removed from the base and pedestal.

Remove the base mounting hardware and nuts (28) securing the casing to the pedestal. Separate the casing and gasket set (30) from the seal plate (29). Tie and tag any shims under the mounting feet used to level the pump casing. Inspect the gasket set for wear or damage and replace as required.

Inspect the wear plate (31), and replace if badly scored or worn. To remove the wear plate, disengage the hardware (38, 39, 51, and 52) and pull the wear plate from the pump casing.

Impeller Removal

Remove the impeller capscrew (33) and washers (32 and 34). Immobilize the impeller by wedging a block of wood between the vanes. Install a lathe dog on the drive end of the shaft and turn it in a counterclockwise direction (as viewed from the drive end). **Be careful** not to damage the impeller vanes or shaft. Use caution when removing the impeller; tension on the seal spring will be released as the impeller is unscrewed.

Inspect the impeller and replace it if cracked or badly worn. Slide the impeller shims (53) from the shaft. To ease reassembly, tie and tag the shims or measure and record their thickness.

Seal Removal

Slide the seal plate and seal assembly from the shaft as a complete unit. Carefully push the rotating and stationary elements, spring, and shaft sleeve from the seal bore.

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

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 pedestal mounting hardware from the base. Tie and tag any shims under the mounting feet used for leveling. Drain the bearing lubricant by removing the pedestal drain plug (26). Clean and reinstall the drain plug.

Remove the slinger ring (9) and key (19) from the impeller shaft.

Use a pair of snap ring pliers to remove the bearing retaining ring (17) from the pedestal bore. Remove the bearing shim set (22); tie and tag the shims, or measure and record their thickness.

Remove the setscrews (21) from the bearing retainer (23) 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. Remove the machine screws and reinstall the setscrews.

Press the oil seal (18) from the bearing retainer, and remove the O-ring (16) from the pedestal bore.

Place a block of wood against the threaded end of the shaft and tap the shaft and bearings from the bore. **Be careful** not to damage the shaft threads.

Use a bearing puller or arbor press to remove the inboard bearing (11) and outboard bearing (15) from the impeller shaft.

Press the oil seal (10) from the pedestal.

Impeller Shaft And Bearing Reassembly

Clean the bore of the pedestal, all component parts (except the bearings), and the impeller shaft 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 precautions printed on solvent containers.

Inspect the shaft for damaged threads, distortion, or nicks and scratches. Dress small nicks and burrs with a fine file or honing stone. Replace the impeller shaft if severely damaged.

To prevent contamination, wash the bearings separately in **fresh** cleaning solvent. Dry the bearings with filtered compressed air and coat with light oil to ease reassembly.

Rotate the bearings by hand to check for roughness or binding. If rotation is rough, 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 snug push 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.

Dip the bearings in clean oil and then position them on the shaft. Using an arbor press, press against the inner races until the bearings seat squarely against the shaft shoulders.

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.

Slide the shaft and assembled bearings into the pedestal bore until the inboard bearing (11) bottoms against the bore shoulder.

CAUTION

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

Apply a light coat of oil on the inboard and outboard oil seals (10 and 18) and press them into their respective bores. **Be sure** the lip of the seals are positioned as shown in Figure 1.

Replace the bearing retainer O-ring (16). Lubricate the O-ring and pedestal bore with a coat of light oil. Push the bearing retainer into the bore until it seats against the bearing. **Be sure** the setscrews are positioned horizontally inline, and the oil seal lip points toward the bearing.

Install the required number of bearing shims. Reinstall the retaining snap ring and check the shaft travel.

NOTE

Shaft end play should be between .002 and .010 inch.

Slide the slinger ring onto the shaft to within a 1/4-inch from the pedestal. Install the shaft key.

Secure the pedestal to the base, and lubricate the pedestal as indicated in **LUBRICATION**, Section E.

Seal Installation

Slide the seal plate onto the shaft until fully seated against the pedestal. Align the seal lubrication hole with the opening in the pedestal and temporarily

secure the seal plate to the pedestal using two capscrews and nuts (3/8 UNC X 1-1/2 inch long, not supplied). Proceed to install the seal assembly.

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.

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 shaft sleeve, or replace it if there are nicks or cuts on either end. If any components are worn, replace the complete seal; **never mix old and new seal parts.**

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 2).

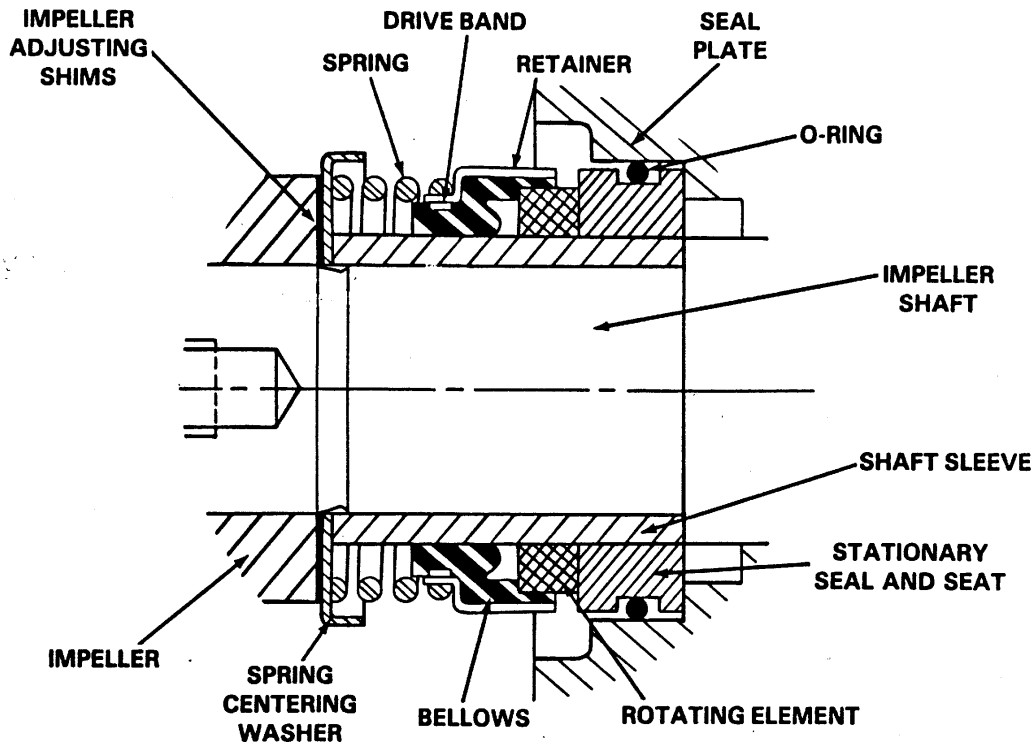


Figure 2. 25284-951 Seal Assembly

CAUTION

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

Install the stationary seat O-ring in the stationary seat. Press this assembly into the seal bore. Be careful not to damage the seal face.

Lubricate the shaft sleeve with water or light oil and subassemble the parts so that the rotating seal element is **just flush** with the **chamfered** end of the shaft.

Place the sleeve and subassembled seal on the shaft and push the sleeve through the seal until the chamfered end seats against the shaft shoulder. Install the seal washer (55).

Impeller Installation

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

With the seal completely installed and the seal plate temporarily secured to the pedestal, slide the same number of impeller adjusting shims as previously removed onto the shaft and screw the impeller on until tight.

A clearance of .020 to .040 inch between the impeller and seal plate is necessary for maximum pump efficiency. Use a feeler gauge to measure this clearance, and add or remove impeller shims until it is reached.

NOTE

After the seal and impeller have been properly installed, remove the two capscrews temporarily holding the seal plate, and install the same thickness of casing gaskets (30) as previously removed.

A clearance of .008 to .015 inch between the impeller and the wear plate is also required for maximum performance. This clearance must be set after installing the pump casing by adding or removing casing gaskets (30) until the impeller binds against the wear plate as the shaft is turned. After the impeller binds, add .010 inch of gaskets.

After the proper impeller clearances are set, secure the impeller by reinstalling the impeller locking hardware (32, 33, and 34).

Pump Reassembly

If the wear plate has been removed, clean any scale or debris from the seating surfaces and secure the replacement wear plate with mounting hardware (38, 39, 51, and 52). Be sure to replace the fiber washer (38) if it does not provide a good seal.

After the proper thickness of pump casing gaskets has been installed, secure the pump casing to the pedestal. Be sure to reinstall any leveling shims under the casing mounting foot before installing the base mounting hardware.

Suction Check Valve Installation

Inspect the check valve components, and replace them as required. Subassemble the check valve weights and gasket using the attaching hardware (43 and 44).

Position the check valve assembly in the suction port with the large valve weight (42) toward the interior of the pump. Install the suction flange and secure it with nuts (49).

Final Pump Reassembly

(Figure 1)

Be sure the pump is secured to the base.

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 cover plate and tighten it.

Refer to **OPERATION**, Section C, and start the pump.

LUBRICATION

Seal Assembly

The seal assembly is lubricated by the liquid being pumped.

Bearings

The pedestal was fully lubricated when shipped from the factory. Check the oil level regularly through the sight gauge (25) and maintain it at the mid-point of the gauge. When lubrication is required, add S.A.E. #30 non-detergent oil through the air vent opening (12).

NOTE

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

Under normal operating conditions, drain and refill the pedestal once each year with clean oil. **Do not** over lubricate. Excessive oil could cause preloading and over-heating of the bearings.

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

Power Source

Refer to the accompanying literature or contact your local power source representative for 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

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