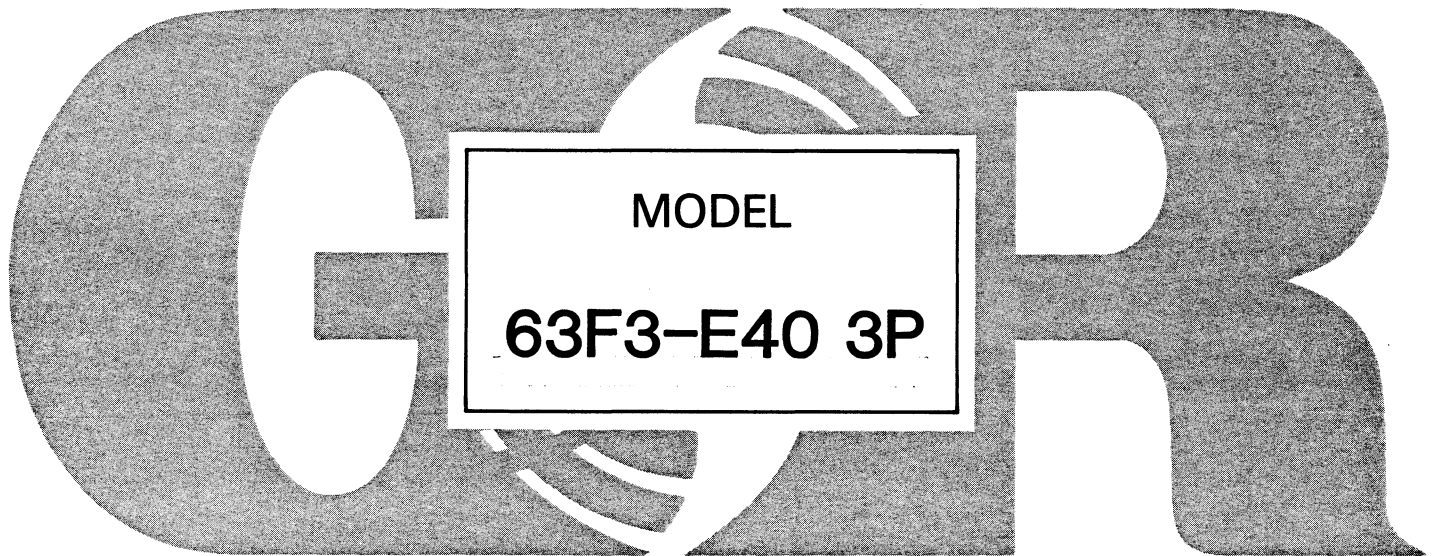

60 SERIES

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

If there are any questions regarding the pump 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	or	Gorman-Rupp of Canada Limited
P.O. Box 1217		70 Burwell Road
Mansfield, Ohio 44901		St. Thomas, Ontario N5P 3R7

For information or technical assistance on the MOTOR, contact the MOTOR 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

WARNINGS - SECTION A

THESE WARNINGS APPLY TO 60 SERIES MOTOR DRIVEN PUMPS. REFER TO THE MANUAL ACCOMPANYING THE MOTOR BEFORE ATTEMPTING TO START THE MOTOR.

WARNING

```

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

```

WARNING

```

////////////////////////////////////
//
// This pump is designed to pump most liquids which do not
// contain large entrained solids. 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.
//
////////////////////////////////////

```

WARNING

```

////////////////////////////////////
//
// After the pump has been installed, make certain that the
// pump and all piping or hose connections are secure be-
// fore operation.
//
////////////////////////////////////

```

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.
//
////////////////////////////////////

```

WARNINGS

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. //
// //
////////////////////////////////////

```

WARNING

```

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

```

WARNING

```

////////////////////////////////////
//
// The electrical power used to operate this pump is high //
// enough to cause injury or death. Obtain the services of //
// a qualified electrician to make all electrical con- //
// nections. //
// //
////////////////////////////////////

```

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 pressure developed by the pump. (See Section E, Page 1.) If the pump is fitted with a 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

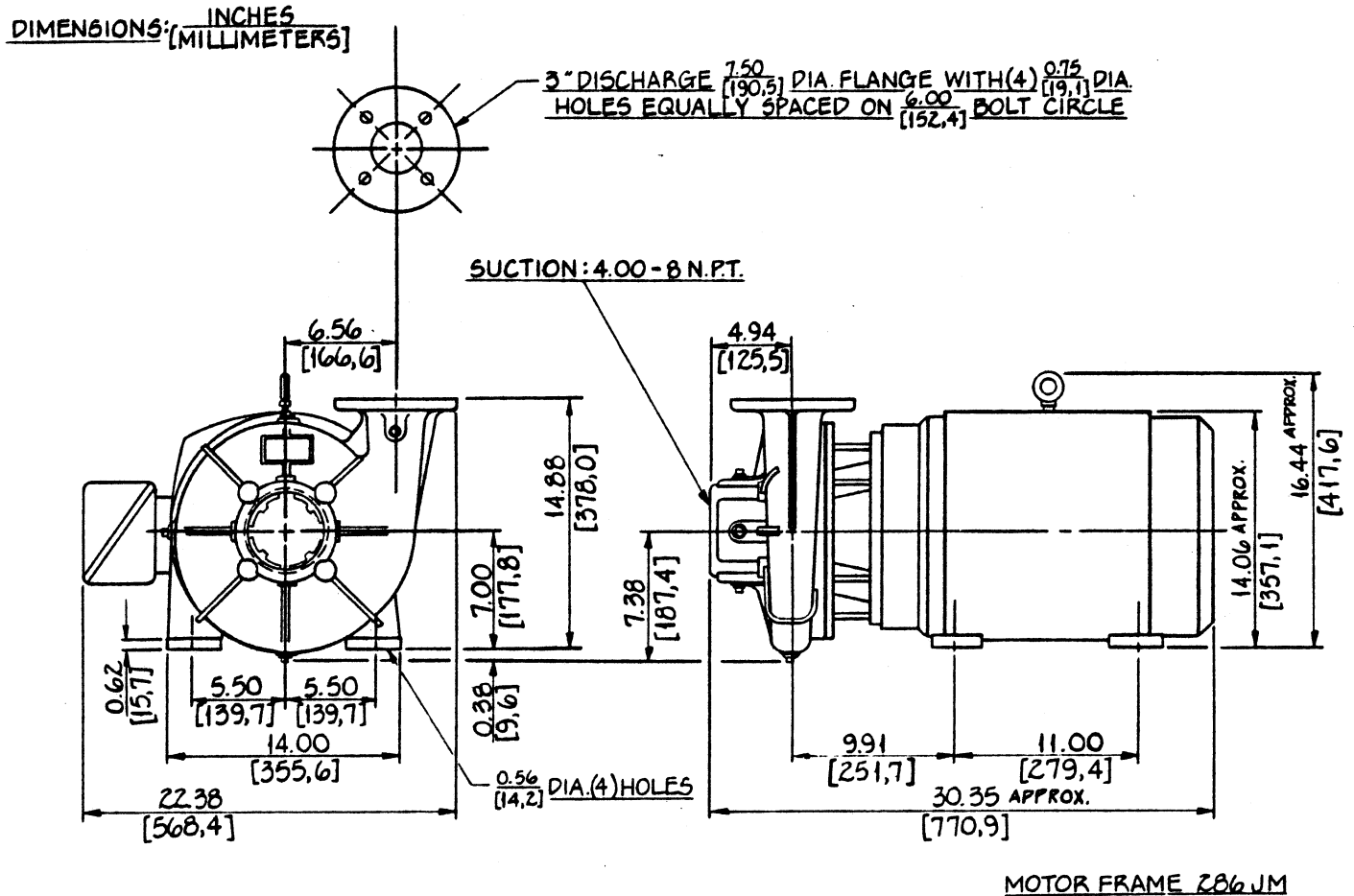


Figure 1. Pump Model 63F3-E40 3P

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 assembly 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 tags, decals, and markings on the pump assembly, and follow the instructions indicated.

INSTALLATION

- 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 MOTOR 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 insure 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

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.

Lifting

Use lifting equipment with a capacity of a least **3000 pounds**. This pump weighs approximately **640 pounds**, not including the weight of accessories and piping.

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.

SUCTION AND DISCHARGE PIPING

Materials

Either pipe or hose may be used for suction and discharge lines. Piping materials must be compatible with the liquid being pumped. If hose is used in suction lines, it must be the rigid-wall, reinforced type to prevent collapse under suction. Using 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 close to the pump before installing the lines.

SUCTION LINES

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

Fittings

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

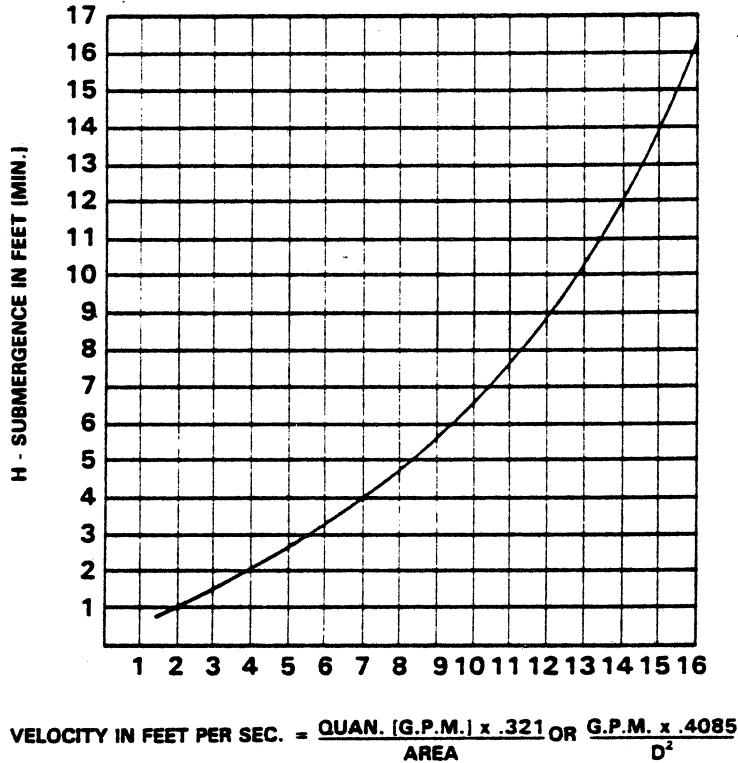


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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

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

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

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

OPERATION

OPERATION - SECTION C

WARNING

```

////////////////////////////////////
//
// This pump is designed to pump most liquids which do not
// contain large entrained solids. 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.
//
////////////////////////////////////

```

WARNING

```

////////////////////////////////////
//
// After the pump has been installed, make certain that the
// pump and all piping or hose connections are secure be-
// fore operation.
//
////////////////////////////////////

```

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 valve. The spring-loaded check valve type is recommended to provide automatic closing. Once the pump is fully primed, close the valve between the priming device and pump, to preserve the prime. Start the pump and open the discharge valve slowly.

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

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

Hand-Operated Priming Pump

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

The hand-operated priming pump can be used while the pump is either stopped or operating.

Close the discharge line throttling valve, and close the spring-loaded check valve before engaging the priming device.

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

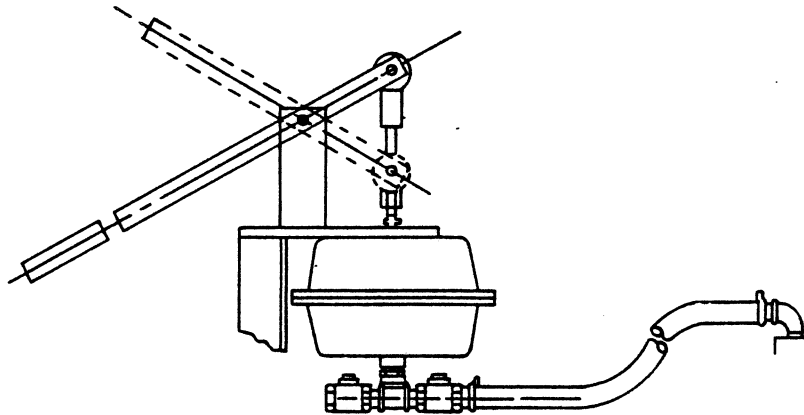


Figure 1. Hand Primer Assembly

Once the pump is fully primed, close the cock in the priming line, and open the spring-loaded check valve.

STARTING

Consult the operations manual furnished with the MOTOR.

OPERATION

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

OPERATION

Leakage

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

Liquid Temperature And Overheating

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

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

WARNING

Warning text enclosed in slashes: 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.

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 operation 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.

CAUTION

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

After stopping the pump, take appropriate action 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.

TROUBLESHOOTING - SECTION D

WARNING

```

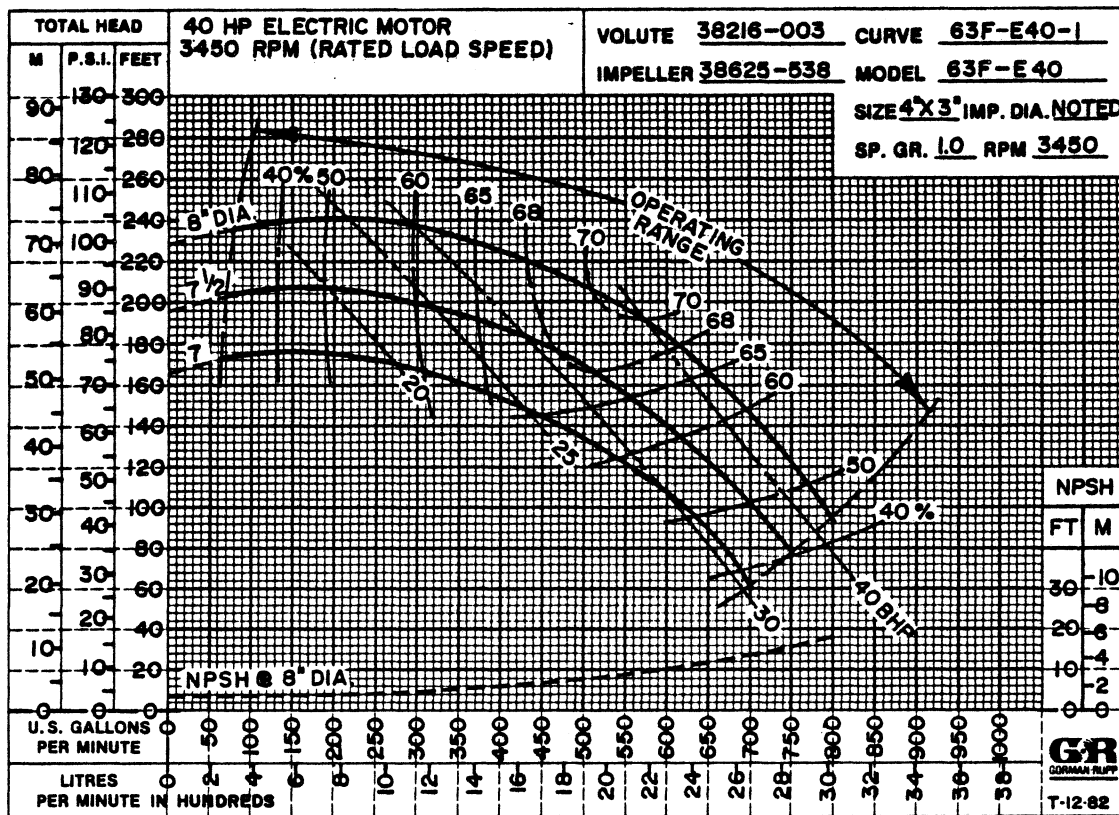
////////////////////////////////////
//
// Before attempting to open or service the pump:
//
// 1. Familiarize yourself with this manual.
// 2. Disconnect the MOTOR to ensure that the pump will
//    remain inoperative.
// 3. Allow the pump to cool if overheated.
// 4. Vent the pump slowly and cautiously.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

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Auxiliary priming device faulty or improperly installed.	Repair priming device or check installation.
	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See INSTALLATION.
	Strainer clogged.	Check strainer and clean if necessary.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct as needed. Check submergence chart (Section B).
	Lining of suction hose collapsed.	Replace suction hose.
	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE (cont.)	<p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Discharge head too high.</p> <p>Suction lift too high.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Strainer clogged.</p>	<p>Free impeller of debris.</p> <p>Check driver output; check belts or couplings for slippage.</p> <p>Install bypass line.</p> <p>Reduce suction lift.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check strainer and clean if necessary.</p>
PUMP REQUIRES TOO MUCH POWER	<p>Pump speed too high.</p> <p>Discharge head too low.</p> <p>Liquid solution too thick.</p>	<p>Check driver output; check that sheaves or couplings are correctly sized.</p> <p>Adjust discharge valve.</p> <p>Dilute if possible.</p>
PUMP CLOGS FREQUENTLY	<p>Pump speed too slow.</p>	<p>Check driver output; check belts or couplings for slippage.</p>
EXCESSIVE NOISE	<p>Cavitation in pump.</p> <p>Pumping entrained air.</p> <p>Pump or drive not securely mounted.</p> <p>Impeller clogged or damaged.</p>	<p>Reduce suction lift and/or friction losses in suction line.</p> <p>Locate and eliminate source of air bubble.</p> <p>Secure mounting hardware.</p> <p>Clean out debris; replace damaged parts.</p>

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 63F3-E40 3P

*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

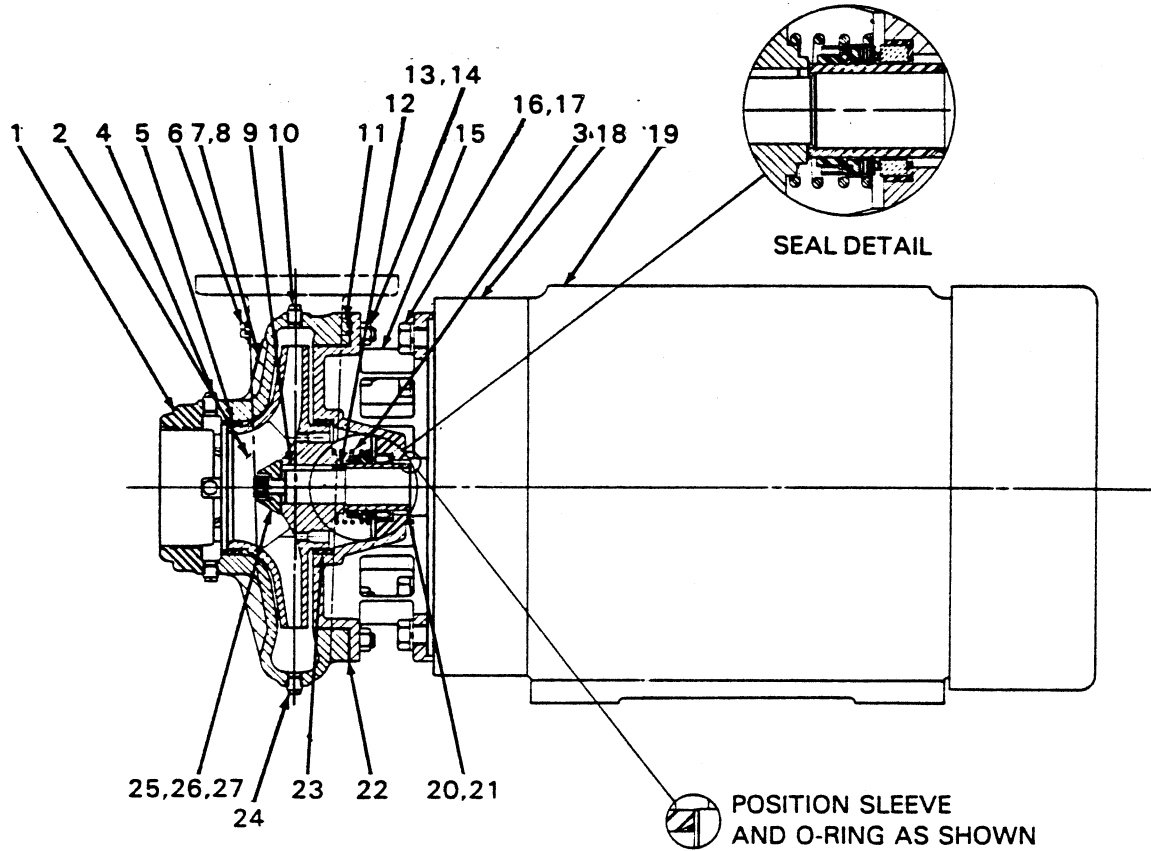


Figure 1. Pump Model 63F3-E40 3P

PARTS LIST
PUMP MODEL 63F3-E40 3P
 (From S/N 778548 up)

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	VOLUTE HOUSING	38216-003	10120	1
2	* IMPELLER	38625-538	10010	1
3	* SEAL ASSY	S01172-A	-----	1
4	PIPE PLUG	P00006	11990	4
5	* VOLUTE WEAR RING	31134-064	23050	1
6	PIPE PLUG	P00006	11990	1
7	NAME PLATE	2613-ED	13990	1
8	DRIVE SCREW	BM#04-03	15990	4
9	IMPELLER KEY	N00608	15990	1
10	PIPE PLUG	P00004	11990	2
11	PIPE PLUG	P00006	11990	1
12	* IMPELLER ADJUSTING SHIMS	37-J	17090	1
13	STUD	C00806	15991	12
14	HEX NUT	D00008	15991	12
15	* INTERMEDIATE ASSY	42111-729	-----	1
16	HEX HD CAPSCREW	B01006	15991	8
17	LOCKWASHER	J00010	15991	8
18	ROTATION DECAL	2613-BM	00000	1
19	MOTOR, 40 HP 3P	28168-810	-----	1
20	* SHAFT SLEEVE	31441-006	17030	1
21	* SHAFT SLEEVE O-RING	S01921	-----	1
22	* VOLUTE HOUSING GSKT	38674-201	20000	1
23	INTERMEDIATE WEAR RING	31134-064	23050	1
24	DRAIN PLUG	P00004	11990	1
25	* SOCKET HD CAPSCREW	DM00806	15991	1
26	IMPELLER LOCKWASHER	J00008	15991	1
27	* IMPELLER WASHER	31167-002	15010	1
NOT SHOWN:				
	SLINGER RING	3209	19120	1
	STRAINER	S01528	-----	1
OPTIONAL:				
	DISCHARGE CHECK VALVE	GRP14-01A	-----	1
	DISCHARGE FLANGE	1753-A	10010	1
	HAND PRIMER ASSY	GRP43-08	-----	1

*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO. AND UP

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

This pump requires little service due to its rugged, minimum-maintenance design. However, if it becomes necessary to inspect or replace the wearing parts follow these instructions which are keyed to Figure 1 in this section.

Before attempting to service the pump, take precautions to insure that the motor will remain inoperative while the pump is being serviced and close all valves in the suction and discharge line.

For motor disassembly and repair, consult the literature supplied or contact your local motor representative.

Pump Disassembly

Remove the suction and discharge piping. Remove the volute drain plug (24) to drain the pump. Clean and reinstall the plug after draining.

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

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

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

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

Seal Disassembly

Carefully remove the spring, retainer, rotating and stationary seal rings. Use a stiff wire with a hooked end if necessary. Slide the sleeve (20) and O-ring (21) from the shaft.

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

WARNING

```

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

```

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

Seal Reassembly

The seal assembly is not normally reused because damage to the precision finished faces could result in premature failure. If it is necessary to reuse an old seal in an emergency, **carefully** wash all metallic parts in fresh cleaning solvent and allow them to dry thoroughly.

Inspect the seal components for wear, scoring, grooves or other damage which might cause leakage. If any components are worn, replace the complete seal. **Never mix old and new seal parts.** Handle the seal parts with extreme care to prevent damage. Be careful not to contaminate the precision finished seal faces, even finger prints on the faces can shorten seal life.

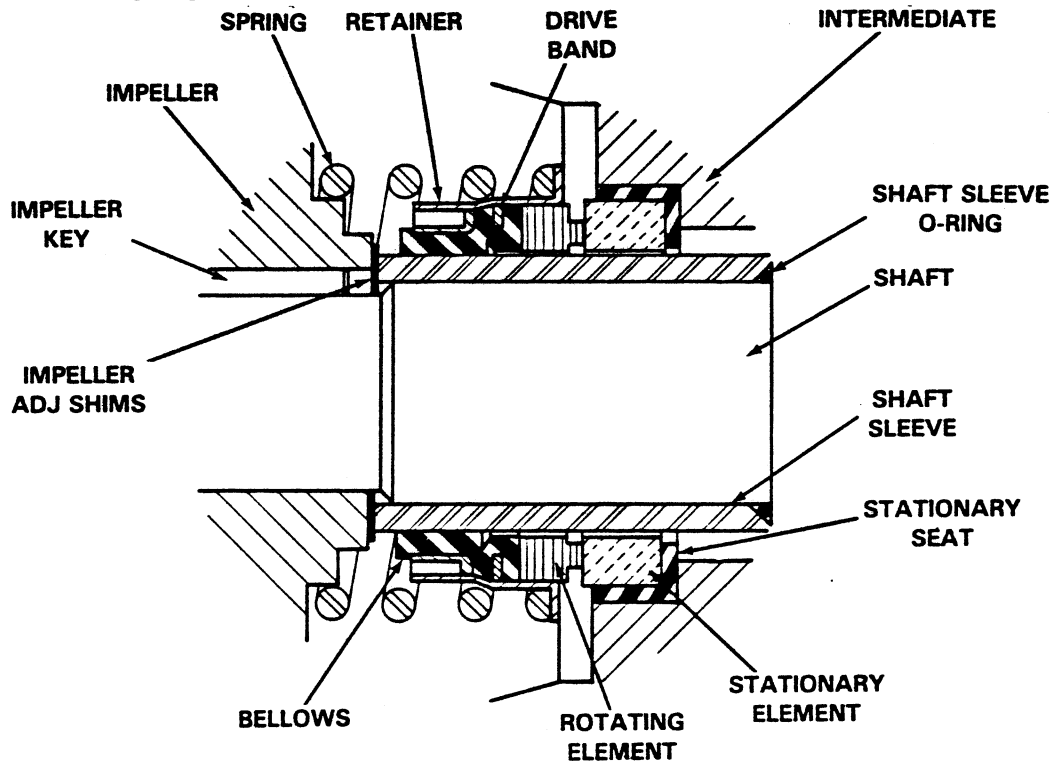


Figure 2. S01172-A Seal Assembly

CAUTION

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

Clean and polish the shaft sleeve to remove small scratches and nicks. Replace it if badly worn. **Do not** install it at this time.

Lubricate the rubber stationary seat with petroleum jelly or light oil before installing it in the stationary seat. Press this assembly squarely into the intermediate bore. Be careful not to damage the seal face.

Lubricate the shaft sleeve with petroleum jelly or light oil and subassemble the seal parts (see Figure 2 for correct order) so that the rotating seal element is **just flush** with the **chamfer** end of the shaft.

Place a drop of light oil on each of the precision seal faces, **never** use grease. Place the sleeve and subassembled seal onto the shaft and push the sleeve through the seal until the chamfered end seats against the shaft shoulder.

Install the spring and impeller shims.

Pump Reassembly

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

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

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

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

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

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

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

CAUTION

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

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

LUBRICATION

Seal Assembly

The seal assembly is lubricated by the liquid being pumped.

Bearings

The rotating parts of the pump are connected directly to the motor shaft. The motor bearings are permanently lubricated.

Consult the literature supplied with the motor, or contact your local motor representative for their 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

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