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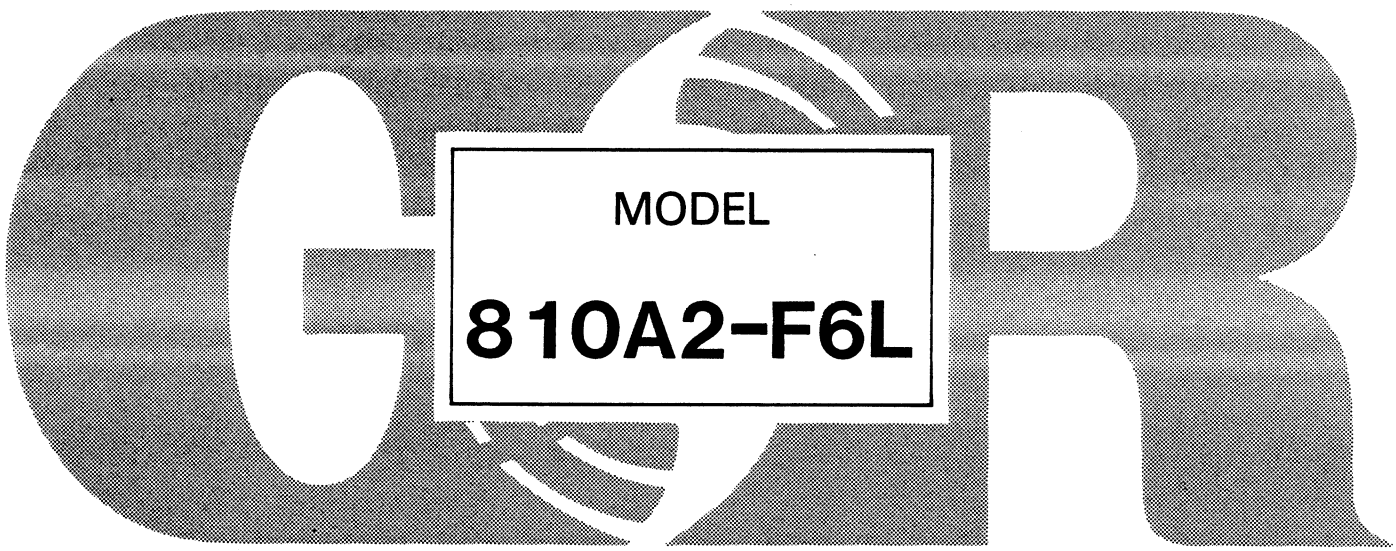
Rev. A

80 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 an 80 series, semi-open impeller, self-priming centrifugal model with a suction check valve. The pump is designed for handling dirty water containing specified entrained solids. The basic material of construction for wetted parts is gray iron.

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<br>P.O. Box 1217<br>Mansfield, Ohio 44901-1217 | or | Gorman-Rupp of Canada Limited<br>70 Burwell Road<br>St. Thomas, Ontario N5P 3R7 |

For information or technical assistance on the engine, contact the engine 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 ENGINE DRIVEN PUMPS. REFER TO THE MANUAL ACCOMPANYING THE ENGINE BEFORE ATTEMPTING TO BEGIN OPERATION.**

**WARNING**

Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Switch off the engine ignition and remove the key 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 dirty water containing specified entrained solids. Do not attempt to pump corrosive, volatile or flammable liquids which may damage 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 tight, properly supported and secure before 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.

**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.

**WARNING**

Do not operate an internal combustion engine in an explosive atmosphere. When operating internal combustion engines in an enclosed area, make certain that exhaust fumes are piped to the outside. These fumes contain carbon monoxide, a deadly gas that is colorless, tasteless, and odorless.

**WARNING**

Never tamper with the governor to gain more power. The governor establishes safe operating limits that should not be exceeded. The maximum continuous operating speed is 1900 RPM.

**WARNING**

Fuel used by internal combustion engines presents an extreme explosion and fire hazard. Make certain that all fuel lines are securely connected and free of leaks. Never refuel a hot or running engine. Avoid overfilling the fuel tank. Always use the correct type of fuel.

**WARNING**

Use lifting and moving equipment in good repair and with adequate capacity to prevent injuries to personnel or damage to equipment. The bail is intended for use in lifting the pump assembly only. Suction and discharge hoses and piping MUST be removed from the pump when lifting the pump by the bail.

# 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

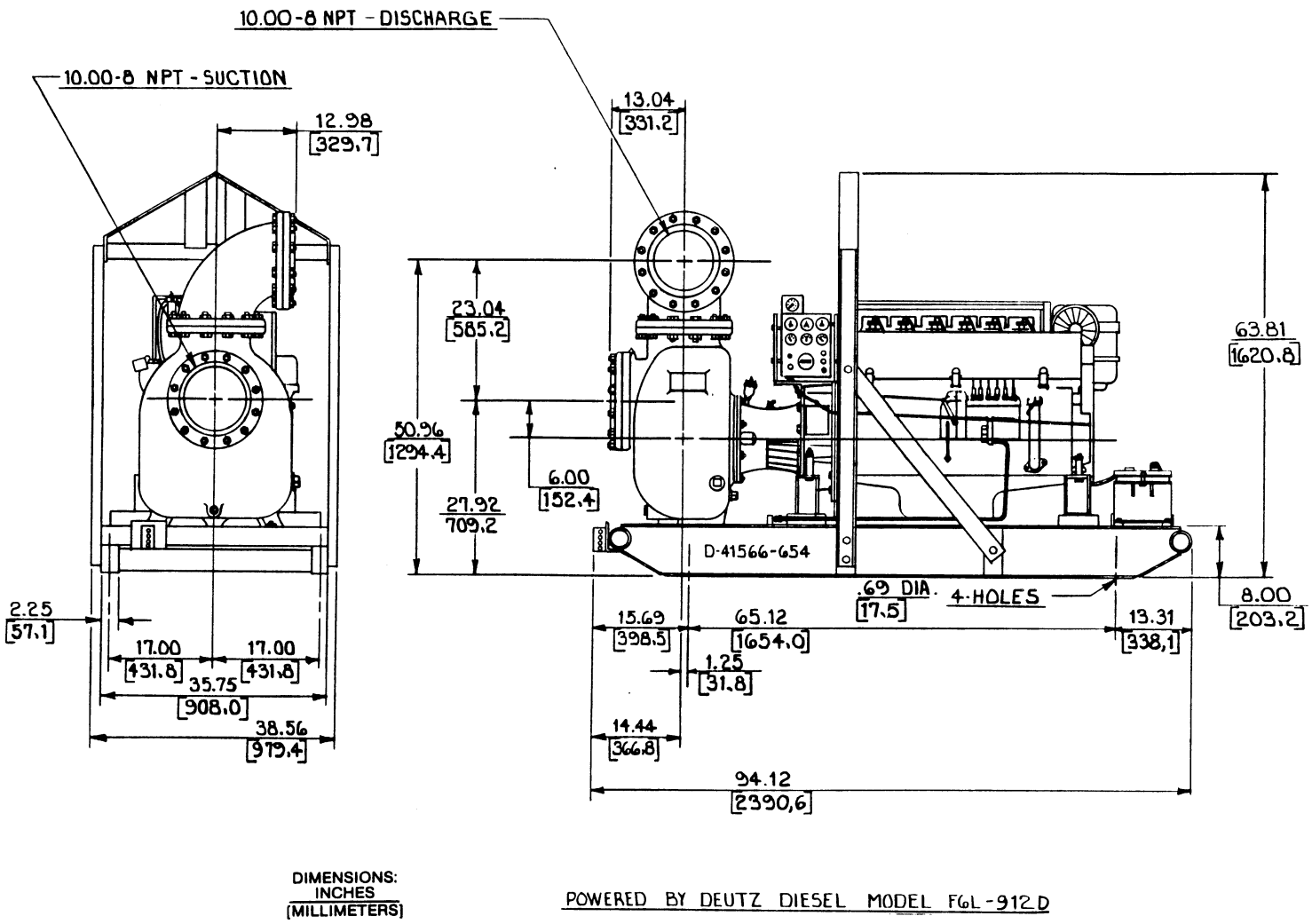



**Figure 1. Pump Model 810A2-F6L**

## 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 follow the instructions indicated.

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 engine 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 **15,000 pounds**. This pump weighs approximately **2,980 pounds**, not including the weight of accessories and base and engine. 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.

If the pump has been mounted on a moveable base, make certain the base is stationary by setting the brake and blocking the wheels before attempting to operate the pump.

To ensure sufficient lubrication and fuel supply to the engine, **do not** position the pump and engine more than 15° off horizontal for continuous operation. The pump and engine may be positioned up to 30° off horizontal for **intermittant operation only**; however, the engine manufacturer should be consulted for continuous operation at angles greater than 15°.

## 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.

## 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.

This pump is designed to handle up to 2 1/2 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).

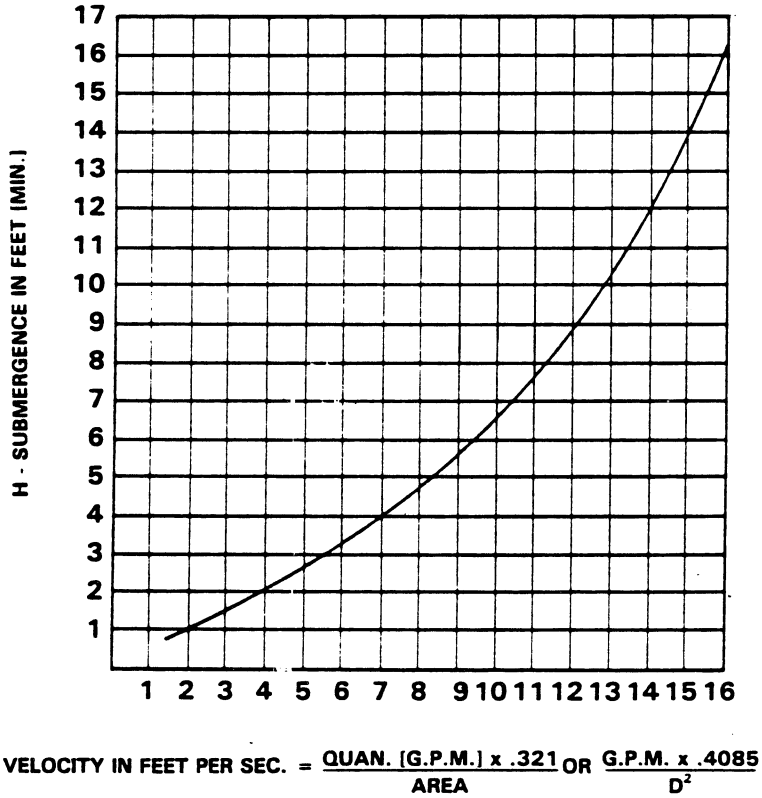



Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

## 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.

**CAUTION**

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

### 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.

Either a Gorman-Rupp automatic air release valve - which will automatically open to allow the pump to prime, and automatically close when priming is accomplished - or a hand-operated shutoff valve should be installed in the bypass line.

**NOTE**

The bypass line may clog frequently, particularly if the valve remains closed. If this condition occurs, either use a larger bypass line or leave the shutoff valve open during the pumping operation.

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 the engine is critical for trouble free mechanical operation. See Section E, **Securing Intermediate and Drive Assembly To Engine** for detailed information.

# OPERATION - SECTION C

**WARNING**

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

**WARNING**

Never tamper with the governor to gain more power. The governor establishes safe operating limits that should not be exceeded. The maximum continuous operating speed is 1900 RPM.

## 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 engine.

## OPERATION

**CAUTION**

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

### Lines With a Bypass

Either a Gorman-Rupp automatic air release valve or a hand operated shutoff valve may be installed in a bypass line.

If a Gorman-Rupp automatic air release valve has been installed, close the throttling valve in the discharge line. The Gorman-Rupp valve will automatically open to allow the pump to prime, and automatically close when priming has been accomplished. After the pump has been primed, and liquid is flowing steadily from the bypass line, open the discharge throttling valve.

If a hand operated shutoff valve has been installed, close the throttling valve in the discharge line, and open the bypass shutoff valve so that the pump will not have to prime against the weight of the liquid in the discharge line. When the pump has been primed, and liquid is flowing steadily from the bypass line, close the bypass shutoff valve and 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 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 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. (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

This pump is equipped with a vacuum suction gauge; however, more accurate readings may be obtained by installing a vacuum gauge away from the pump in the suction piping.

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. On engine driven pumps, 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, switch off the engine ignition and remove the key 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. Switch off the engine ignition and remove the key 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.

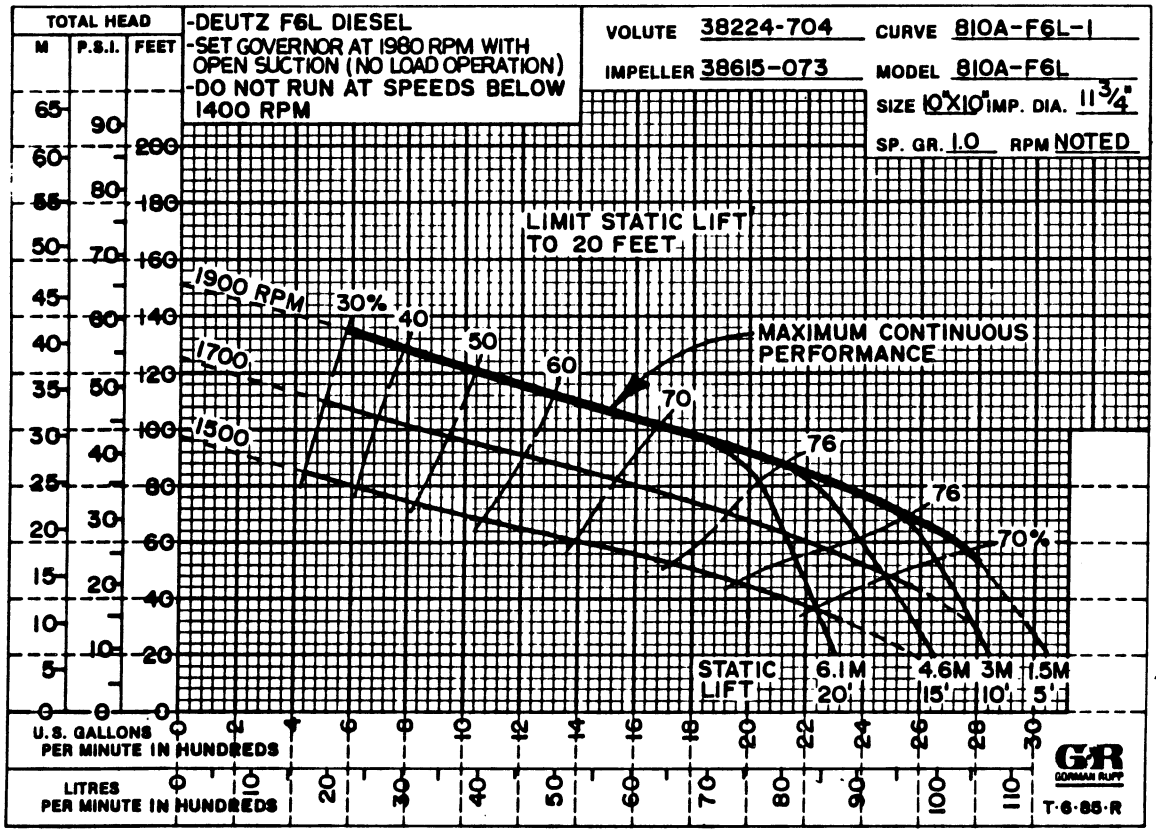
| TROUBLE | POSSIBLE CAUSE | PROBABLE REMEDY |
|---|---|---|
| PUMP FAILS TO PRIME | Air leak in suction line. | Correct leak. |
| | Lining of suction hose collapsed. | Replace suction hose. |
| | Suction check valve or foot valve clogged or binding. | Clean valve. |
| | Leaking or worn seal or pump gasket. | Check pump vacuum. Replace leaking or worn seal or gasket. |
| | Discharge head too high. | Install bypass line. |
| | Strainer clogged. | Check strainer and clean if necessary. |
| | Suction lift too high. | Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line. |
| 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. |
| | Lining of suction hose collapsed. | Replace suction hose. |

| TROUBLE | POSSIBLE CAUSE | PROBABLE REMEDY |
|---|---|---|
| PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE(cont.) | Impeller or other wearing parts worn or damaged. | Replace worn or damaged parts. Check that impeller is properly centered and rotates freely. |
| | Impeller clogged. | Free impeller of debris. |
| | Pump speed too slow. | Check engine output; consult engine operation manual. |
| | 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. |
| PUMP REQUIRES TOO MUCH POWER | Pump speed too high. | Check engine output. |
| | Discharge head too low. | Adjust discharge valve. |
| | Liquid solution too thick. | Dilute if possible. |
| PUMP CLOGS FREQUENTLY | Discharge flow too slow. | Open discharge valve fully to increase flow rate, and run engine at maximum governed speed. |
| | Suction check valve or foot valve clogged or binding. | Clean valve. |
| | Liquid being pumped too thick. | Dilute liquid if possible. |
| 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. |

| 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. |
| | Suction and discharge lines not properly supported. | Check piping installation for proper support. |
| | Drive misaligned. | Align drive properly. |

## 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 810A2-F6L

*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

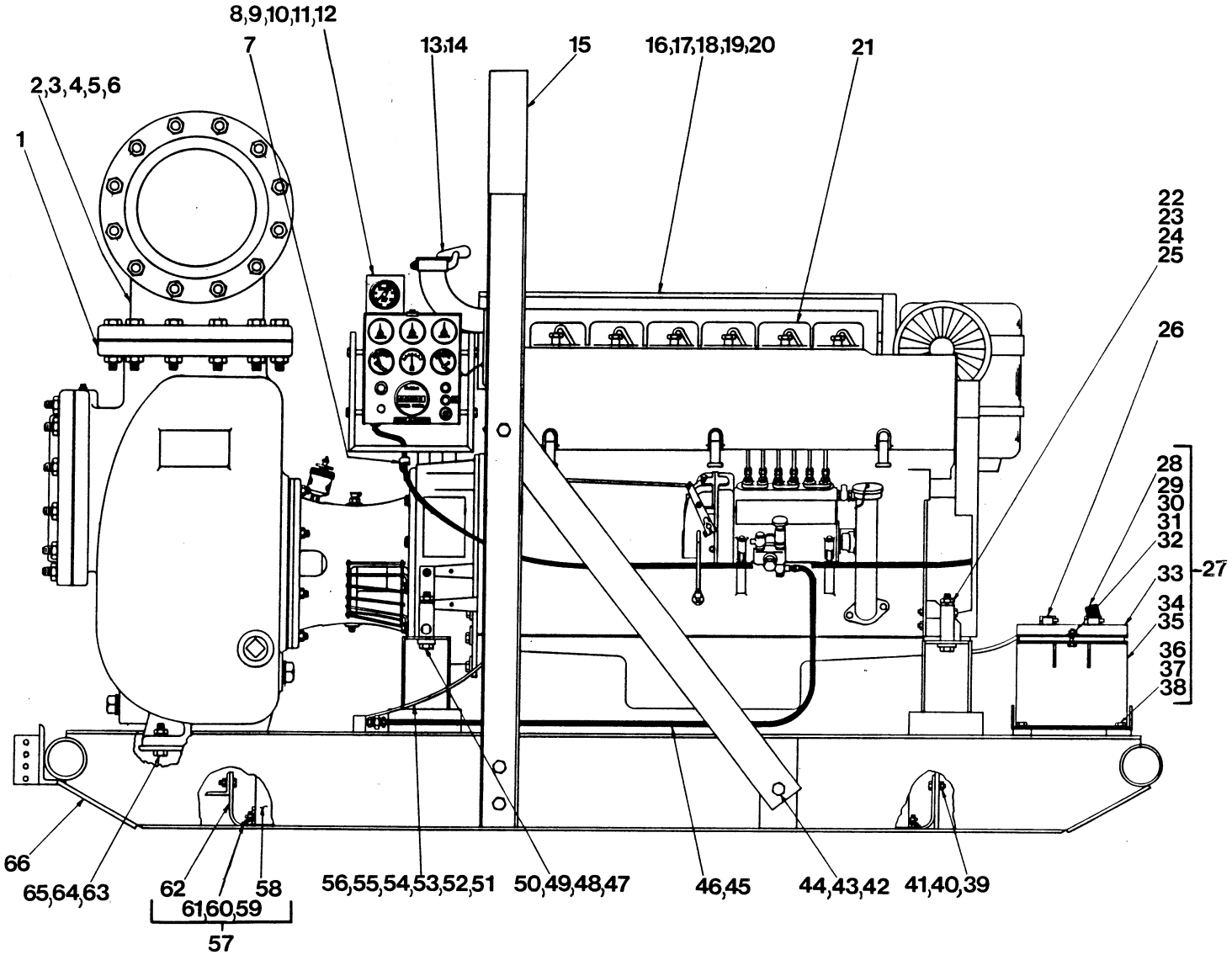



Figure 1. Pump Model 810A2-F6L

# PARTS LIST
## Pump Model 810A2-F6L
(From S/N 839250 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 |
|---|---|---|---|---|
| 1 | PUMP END ASSY | (SEE FIG 2) | ----- | 1 |
| 2 | FLANGED ELBOW | RF00160 | 10990 | REF |
| 3 | FLANGE GSKT | 2751-G | 18000 | REF |
| 4 | HEX HD CAPSCREW | B01415 | 15991 | REF |
| 5 | HEX NUT | D00014 | 15991 | REF |
| 6 | HEX HD CAPSCREW | B01414 | 15991 | REF |
| 7 | CLIP | 6006 | 15990 | 1 |
| 8 | HOUR/TACHOMETER | 29277-004 | ----- | 1 |
| 9 | HEX HD CAPSCREW | B00405 | 15991 | 2 |
| 10 | LOCKWASHER | J00004 | 15991 | 2 |
| 11 | WELL NUT | 21757-036 | ----- | 2 |
| 12 | TACH BRACKET | 34123-014 | 15020 | 1 |
| 13 | EXHAUST ELBOW | 29334-333 | ----- | 1 |
| 14 | WEATHER CAP | S01387 | ----- | 1 |
| 15 | HOIST BAIL ASSY | 13351-AZ | 24000 | 1 |
| 16 | MUFFLER GRD ASSY | 42331-021 | 24150 | 1 |
| 17 | HEX HD CAPSCREW | B00404 | 15991 | 1 |
| 18 | LOCKWASHER | J00004 | 15991 | 1 |
| 19 | FLAT WASHER | K00004 | 15991 | 1 |
| 20 | HEX NUT | D00004 | 15991 | 1 |
| 21 | DEUTZ F6L ENGINE | 29217-111 | ----- | 1 |
| 22 | LOCKWASHER | J00008 | 15991 | 2 |
| 23 | HEX HD CAPSCREW | B00816 | 15991 | 2 |
| 24 | HEX NUT | D00008 | 15991 | 2 |
| 25 | BEVELED WASHER | 21167-011 | ----- | 2 |
| 26 | *CABLE ASSY - POS | 6926-Q | 24040 | 1 |
| 27 | BATTERY BOX ASSY | GRP40-08-B | ----- | 1 |
| 28 | * -CABLE ASSY - NEG | 5795-AC | 24040 | 1 |
| 29 | -HEX HD CAPSCREW | B00605 | 15991 | 2 |
| 30 | -LOCKWASHER | J00006 | 15991 | 2 |
| 31 | -HEX NUT | D00006 | 15991 | 2 |
| 32 | -FLAT WASHER | K00006 | 15991 | 2 |
| 33 | -BATTERY FRAME | 42113-012 | 24150 | 1 |
| 34 | -BATTERY BOX | 42431-030 | 24150 | 1 |
| 35 | * -12V BATTERY | 29331-506 | ----- | 1 |
| 36 | -HEX HD CAPSCREW | B00605 | 15991 | 4 |
| 37 | -LOCKWASHER | J00006 | 15991 | 4 |
| 38 | -HEX NUT | D00006 | 15991 | 4 |
| 39 | HEX HD CAPSCREW | B00604 | 15991 | 10 |
| 40 | LOCKWASHER | J00006 | 15991 | 10 |
| 41 | HEX NUT | D00006 | 15991 | 10 |
| 42 | HEX HD CAPSCREW | B01006 | 15991 | 8 |
| 43 | LOCKWASHER | J00010 | 15991 | 8 |
| 44 | HEX NUT | D00010 | 15991 | 8 |
| 45 | FUEL LINE ASSY | 9072-K | ----- | 1 |
| 46 | CONNECTOR | S01447 | ----- | 1 |
| 47 | LOCKWASHER | J00008 | 15991 | 2 |
| 48 | HEX HD CAPSCREW | B00816 | 15991 | 2 |
| 49 | HEX NUT | D00008 | 15991 | 2 |
| 50 | BEVELED WASHER | 21167-011 | ----- | 2 |
| 51 | FUEL LINE | 11308-A | ----- | 1 |
| 52 | HOSE CLAMP | 26518-642 | ----- | 2 |
| 53 | HOSE CONNECTOR | 26523-402 | ----- | 1 |
| 54 | REDUCING ELBOW | Q00402 | 11990 | 1 |
| 55 | FUEL RETURN ASSY | 14294 | 24030 | 1 |
| 56 | HOSE BARB | 26523-441 | ----- | 1 |
| 57 | FUEL TANK AND GUARD ASSY | 46711-041 | ----- | 1 |
| 58 | -FUEL TANK ASSY | 46711-042 | 24150 | 1 |
| 59 | -HEX NUT | D00006 | 15991 | 6 |
| 60 | -FLAT WASHER | K00006 | 15991 | 6 |
| 61 | -LOCKWASHER | J00006 | 15991 | 6 |
| 62 | -GUARD ASSY | 42381-046 | 24150 | 1 |
| 63 | HEX HD CAPSCREW | B01209 | 15991 | 2 |
| 64 | LOCKWASHER | J00012 | 15991 | 2 |
| 65 | HEX NUT | D00012 | 15991 | 2 |
| 66 | COMBINATION BASE | 41566-654 | 24150 | 1 |
| NOT SHOWN: | | | | |
| | BATTERY TAG | 6588-S | 00000 | 1 |
| | CAUTION DECAL | 2613-FJ | ----- | 1 |
| | WARNING DECAL | 2613-FE | ----- | 1 |

*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO ..... AND UP

## SECTIONAL DRAWING

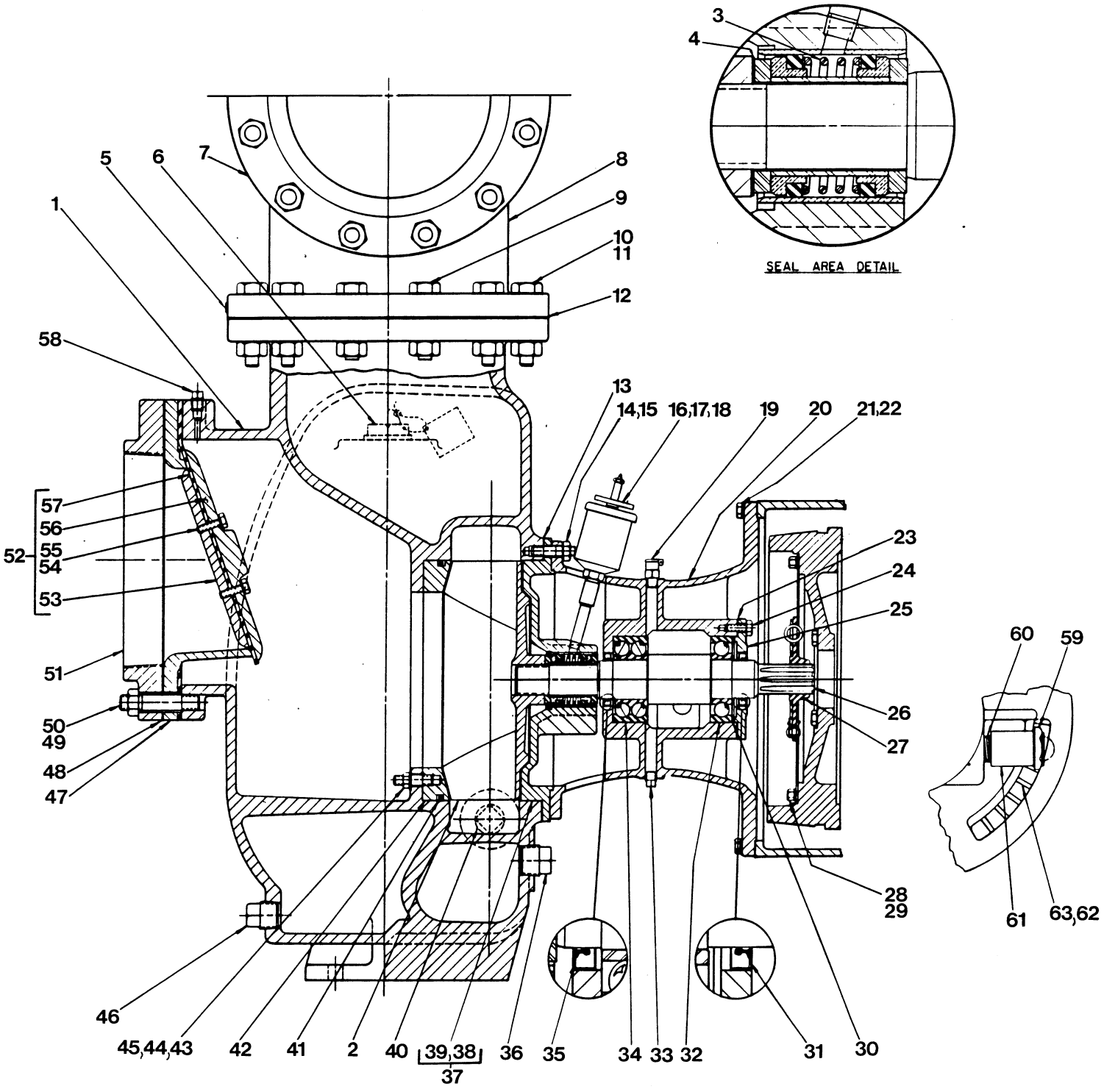



Figure 2. Pump End Only Model 810A2-F6L

# PARTS LIST
## Pump End Only Model 810A2-F6L

| ITEM NO. | PART NAME | PART NUMBER | MATL CODE | QTY |
|---|---|---|---|---|
| 1 | PUMP CASING | 38224-704 | 10010 | 1 |
| 2 | *IMPELLER | 38615-073 | 10010 | 1 |
| 3 | *GREASE SEAL ASSY | GS01500 | ----- | 1 |
| 4 | *IMP ADJ SHIM SET | 5091 | 17090 | REF |
| 5 | DISCH STICKER | 6588-BJ | 00000 | 1 |
| 6 | FILL PLUG ASSY | 48271-069 | ----- | 1 |
| 7 | DISCH FLANGE | 2751 | 10010 | 1 |
| 8 | FLANGED ELBOW | RF00160 | 10990 | 1 |
| 9 | HEX HD CAPSCREW | B01414 | 15991 | 2 |
| 10 | HEX HD CAPSCREW | B01415 | 15991 | 22 |
| 11 | HEX NUT | D00014 | 15991 | 24 |
| 12 | *FLANGE GSKT | 2751-G | 18000 | 2 |
| 13 | *GASKET SET | 48211-051 | ----- | 1 |
| 14 | STUD | C00809 | 15991 | 8 |
| 15 | HEX NUT | D00008 | 15991 | 8 |
| 16 | GREASE CUP | S01509 | ----- | 1 |
| 17 | PIPE COUPLING | AE00004 | 11990 | 1 |
| 18 | PIPE NIPPLE | THA00412 | 15070 | 1 |
| 19 | OIL HOLE COVER | 26717-068 | ----- | 1 |
| 20 | INTERMEDIATE | 38263-718 | 10010 | 1 |
| 21 | LOCKWASHER | 21171-511 | ----- | 12 |
| 22 | HEX HD CAPSCREW | 22645-164 | ----- | 12 |
| 23 | *BEARING CAP GSKT | 5413-G | 18000 | 1 |
| 24 | HEX HD CAPSCREW | B00604 | 15991 | 4 |
| 25 | BEARING CAP | 4185-A | 10010 | 1 |
| 26 | *IMPELLER SHAFT | 38525-001 | 16040 | 1 |
| 27 | DRIVE PLATE ASSY | 24521-165 | ----- | 1 |
| 28 | LOCKWASHER | 21171-511 | ----- | 8 |
| 29 | HEX HD CAPSCREW | 22645-158 | ----- | 8 |
| 30 | WAVY WASHER | 23963-327 | ----- | 1 |
| 31 | *OIL SEAL | 25258-622 | ----- | 1 |
| 32 | *BALL BEARING | S01077 | ----- | 1 |
| 33 | INT DRAIN PLUG | P00006 | 11990 | 1 |
| 34 | *BALL BEARING | 23421-461 | ----- | 1 |
| 35 | *OIL SEAL | 25258-622 | ----- | 1 |
| 36 | CASING DRAIN PLUG | P00024 | 11990 | 1 |
| 37 | SEAL PLATE ASSY | 42111-068 | ----- | 1 |
| 38 | -SEAL PLATE | 38274-501 | 10010 | 1 |
| 39 | * -SEAL LINER | 7408 | 14010 | 1 |
| 40 | PIPE PLUG | P00024 | 11990 | 1 |
| 41 | O-RING | S01865 | ----- | 1 |
| 42 | *WEAR PLATE | 38691-860 | 10010 | 1 |
| 43 | STUD | C00808 | 15991 | 3 |
| 44 | LOCKWASHER | J00008 | 15991 | 3 |
| 45 | HEX NUT | D00008 | 15991 | 3 |
| 46 | CASING DRAIN PLUG | P00020 | 11990 | 1 |
| 47 | CHK VALVE SEAT | 3286 | 10010 | 1 |
| 48 | *SUCT FLANGE GSKT | 2751-G | 18000 | 1 |
| 49 | STUD | C01216 | 15991 | 12 |
| 50 | HEX NUT | D00012 | 15991 | 12 |
| 51 | SUCT FLANGE | 2751 | 10010 | 1 |
| 52 | CHK VALVE ASSY | 3289 | ----- | 1 |
| 53 | -WEIGHT | 3287 | 10010 | 1 |
| 54 | -HEX HD CAPSCREW | B00605 | 17000 | 2 |
| 55 | -LOCKWASHER | J00006 | 17000 | 2 |
| 56 | -WEIGHT | 3288 | 11000 | 1 |
| 57 | * -CHK VALVE GSKT | 3290 | 19080 | 1 |
| 58 | ACCESSORY PLUG | P00004 | 11990 | 1 |
| 59 | SIGHT GAUGE | S01471 | ----- | 1 |
| 60 | PIPE NIPPLE | T00012 | 15070 | 1 |
| 61 | PIPE COUPLING | AE00012 | 11990 | 1 |
| 62 | INTERMEDIATE GRD | 42381-506 | 24150 | 1 |
| 63 | INTERMEDIATE GRD | 42381-507 | 24150 | 1 |
| NOT SHOWN: | | | | |
| | SUCTION STICKER | 6588-AG | 00000 | 1 |
| | STRAINER | 3756 | ----- | 1 |
| | NAME PLATE | 38818-024 | 13990 | 1 |
| | DRIVE SCREW | BM#04-03 | 15990 | 4 |

*INDICATES PARTS RECOMMENDED FOR STOCK

## 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 views (see Figures 1 and 2) and the accompanying parts lists.

Before attempting to service the pump, take precautions to ensure that the engine will remain inoperative and close all valves in the suction and discharge lines.

The pump is powered by an air-cooled Deutz diesel engine, model F6L-912D. For engine disassembly and repair, consult the literature supplied with the engine or contact your local Deutz representative.

**WARNING**

Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Switch off the engine ignition and remove the key 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

**(Figure 2)**

Before attempting to service the check valve assembly (52), remove the pump casing drain plug (46) and drain the pump. Clean and reinstall the drain plug.

For access to the check valve, remove the suction piping. Remove the nuts (50) securing the suction flange and gasket (48 and 51) to the pump casing (1).

Inspect the suction flange gasket for wear or damage, and replace as required.

Pull the check valve seat (47), and check valve assembly (52) from the suction port.

Remove the hardware (54 and 55) securing the check valve (57) and weights (53 and 56) and inspect all parts for wear or damage.

## Pump Disassembly

### (Figure 2)

To service the wear plate, impeller, seal assembly, or seal plate, the pump end must be removed from the base and intermediate. See Figure 1, and remove the hardware (63, 64 and 65) securing the pump casing to the base.

Remove the nuts (15) securing the pump casing (1) to the seal plate assembly (37) and intermediate (20). Separate the pump casing and gasket set (13) from the seal plate assembly and intermediate. Inspect the gasket set for wear or damage and replace as required. Tie and tag any leveling shims used under the pump mounting feet.

**WARNING**

Use lifting and moving equipment in good repair and with adequate capacity to prevent injuries to personnel or damage to equipment.

Inspect the wear plate (42), and replace if badly scored or worn. To remove the wear plate, disengage the hardware (44 and 45) and pull the wear plate and O-ring (41) from the pump casing. Remove the wear plate O-ring.

## Impeller Removal

### (Figure 2)

Before removing the impeller, turn the cross arm on the seal grease cup (16) clockwise until it rests against the cover (see Figure 4, in **LUBRICATION**). This will prevent the grease in the cup from escaping after the impeller is removed.

Use an impeller wrench to remove the impeller. If an impeller wrench is not available, place a block of wood against one of the vanes and strike it sharply with a hammer. **Be careful** not to damage the vane. The impeller will unscrew in a counterclockwise direction (when facing the impeller). Use caution when removing the impeller; tension on the seal spring will be released as the impeller is unscrewed.

Inspect the impeller, and replace if cracked or badly worn. Slide the impeller adjusting shims (4) off the shaft. To ease reassembly, tag and tie the shims or measure and record their thickness.

## Seal Removal

### (Figure 2)

Before attempting to remove the seal plate assembly (37), remove the seal cavity grease cup and piping (16, 17, and 18).

Carefully remove the outer rotating element, stationary seat, packing ring, spring washer and the seal spring. Slide the seal plate and remaining seal parts off the shaft as a single unit. Remove the shaft sleeve, and use hand pressure to press the inner packing ring, stationary seat, spring washer, and rotating element from the seal plate bore.

Inspect the seal liner (39) for wear or grooves that could cause leakage or damage to the seal packing rings. The seal liner is a press fit into the seal liner and does not normally require replacement. If replacement is required, see **Seal Installation**.

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

## Separating Intermediate And Drive Assembly From Engine

**(Figure 2)**

If necessary to separate the intermediate and drive assemblies from the engine, support the intermediate using a suitable hoist and sling. Remove the hardware (21 and 22) securing the intermediate (20) to the engine bellhousing. Separate the assemblies by pulling straight away from the engine.

It is not necessary to remove the drive plate assembly (27) from the engine flywheel unless damage is apparent. To remove the drive plate assembly, remove the hardware (28 and 29) securing it to the flywheel.

## Impeller Shaft And Bearing Disassembly

**(Figure 2)**

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

**CAUTION**

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

Before attempting to disassemble the intermediate, remove the drain plug (33) and drain the intermediate. Clean and reinstall the drain plug.

Disengage the hardware (24) securing the bearing cap (25) to the intermediate, and remove the bearing cap and gasket (23). Remove the wavy washer (30). Press the oil seal (31) from the bearing cap.

Place a block of wood against the impeller end of the shaft (26), and tap the shaft and assembled bearings out of the intermediate. **Be Careful** not to damage the shaft.

Use a bearing puller to remove the inboard and outboard bearings (30 and 34) from the impeller shaft.

Press the inboard oil seal (35) from the intermediate.

## Shaft and Bearing Reassembly And Installation

### (Figure 2)

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

**WARNING**

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

Inspect the shaft for distortion, nicks or scratches or thread damage on the impeller end. Dress small nicks and burrs with a fine file or emery cloth. Replace the 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 bearing 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 shaft and a snug slip fit into the intermediate. Replace the shaft or intermediate if the proper bearing fit is not achieved.

Position the inboard bearing on the shaft with the loading groove facing **toward** the impeller end of the shaft. Use an arbor (or hydraulic) press to install the bearing on 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 outboard bearing on the shaft and press it on the shaft until it seats against the shaft shoulder.

Slide the assembled shaft and bearings into the intermediate until the inboard bearing seats 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.

Install the inboard oil seal (35) in the intermediate with the lip positioned as shown in Figure 2. Install the outboard oil seal (31) in the bearing cap with the lip positioned as shown in Figure 2.

Slide the wavy washer (30) onto the shaft. Install the bearing cap and gasket (23 and 25) and secure with the hardware (24).

Lubricate the intermediate as indicated in **LUBRICATION**.

## Securing Intermediate And Drive Assembly To Engine

### (Figure 2)

If the drive plate assembly was removed, secure it to the engine flywheel with the attaching hardware.

Slide the splined end of the shaft into the drive plate. Position the intermediate with the oil hole cover at the top and secure it to the engine bellhousing with the hardware (21 and 22).

## Seal Reassembly

### (Figure 2 and 3)

Before securing the seal plate to the pump casing, inspect the bore of the seal liner (39) for wear or grooves that might cause leakage or damage to the seal packing rings. If the seal liner must be replaced, position the seal plate 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 installed, drill a 1/4 inch diameter hole through it to permit the flow of lubricant to the seal. **Be careful** to center the drill in the threaded hole so not to damage the threads. Deburr the hole from the inside of the seal liner after drilling.

Slide the seal plate onto the shaft and against the intermediate. Align the lubrication hole in the seal plate with the opening in the intermediate. Temporarily secure the seal plate to the intermediate using two capscrews and nuts (1/2 UNC X 1 1/2 inch long, not supplied).

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 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 3).

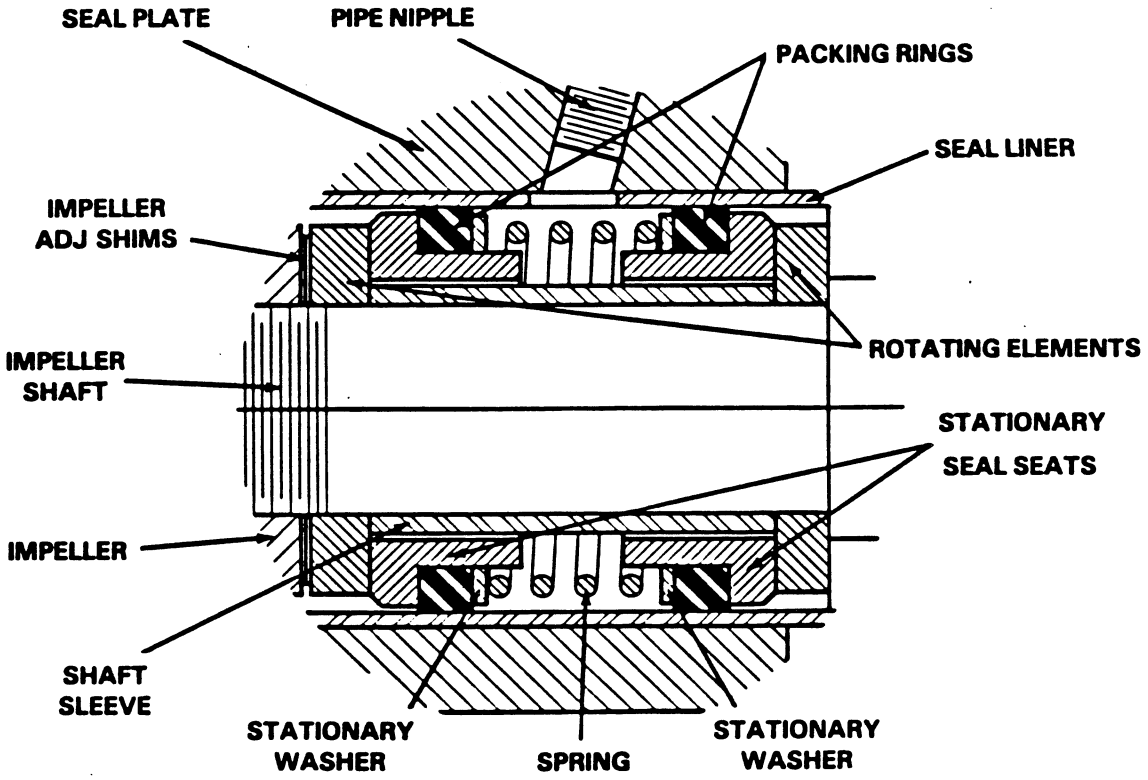



Figure 3. GS01500 Seal Assembly

CAUTION

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

Slide the inboard rotating element onto the shaft until the chamfered side seats against the shaft shoulder.

Subassemble the inboard stationary seat, packing ring, and spring washer and press the unit into the lubricated seal liner.

Install the shaft sleeve and spring.

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

Install the outboard rotating element with chamfered side facing the impeller.

Lubricate the seal as indicated in LUBRICATION, after the impeller has been installed.

## Pump Reassembly

### (Figure 2)

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

Slide the same number of impeller adjusting shims (4) as previously removed onto the shaft and screw the impeller on until tight.

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

**NOTE**

The seal plate must be tight against the intermediate while setting the back impeller clearance.

If the wear plate was removed for replacement, install the O-ring (41) and secure the wear plate to the pump casing using the attaching hardware.

Remove the two capscrews temporarily holding the seal plate and install the same thickness of pump casing gaskets (13) as previously removed. Secure the pump casing to the intermediate.

A clearance of .010 to .020 inch between the impeller and the wear plate is also recommended for maximum pump efficiency. This clearance can be measured by reaching through the suction port with a feeler gauge. Add or subtract pump casing gaskets (13) until the proper impeller clearance is attained.

Reinstall the automatic grease cup and piping (16, 17, and 18) into the seal plate.

Install any leveling shims used under the pump casing mounting feet and secure the casing to the base with the hardware (63, 64 and 65, Figure 1).

## Suction Check Valve Installation

### (Figure 2)

Inspect the check valve components and replace as required. Subassemble the check valve weights and gasket using the attaching hardware.

Secure the check valve, valve seat, and suction flange and gasket to the suction port with the hardware (49 and 50). Check the operation of the check valve to ensure proper seating and free movement.

## Final Pump Reassembly

### (Figure 1)

**Be sure** the pump is secure to the base and engine.

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

**Be sure** the pump and engine 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

Fill the grease cup through the grease fitting with No. 2 lithium base grease until grease escapes from the relief hole. Turn the grease cup arm counter-clockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see Figure 4).

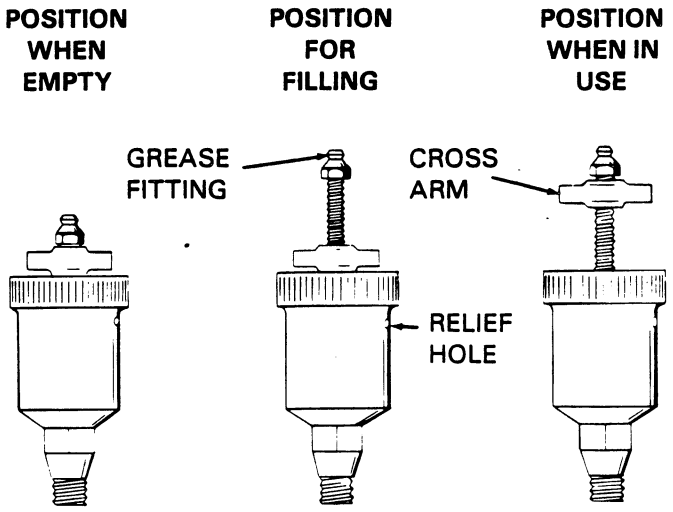



**Figure 4. Automatic Lubricating Grease Cup**

### Bearings

### (Figure 2)

The intermediate was fully lubricated when shipped from the factory. Check the oil level regularly through the sight gauge (59) and maintain it at the midpoint of the gauge. When lubrication is required, add SAE No. 30 non-detergent oil through the oil hole cover (19). **Do not** over lubricate. Over-lubrication can cause the bearings to over-heat, resulting in premature bearing failure.

Under normal conditions, drain the intermediate 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.

## Engine

Consult the literature supplied with the engine, or contact your local Deutz representative.

**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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GORMAN-RUPP OF CANADA LIMITED ● ST. THOMAS, ONTARIO, CANADA