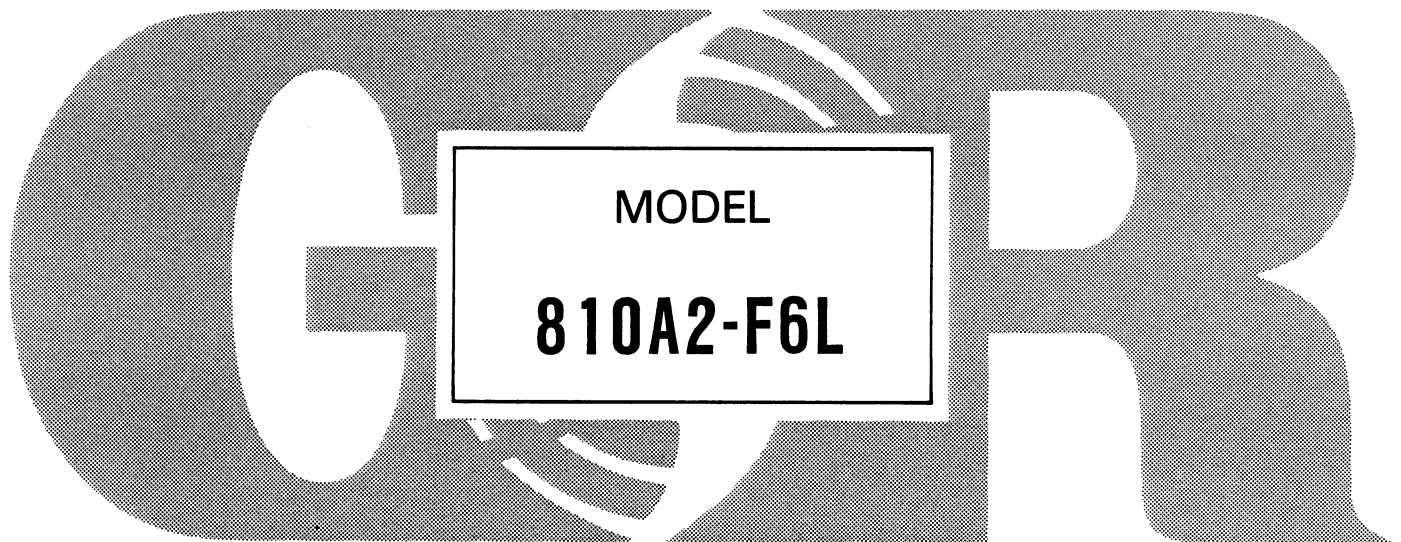




INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL



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. The pump is powered by an air-cooled Deutz diesel engine, model F6L-912D.

If there are any questions regarding the pump or its application which are not covered in this manual or in other literature accompanying this unit, please contact your Gorman-Rupp distributor, or write:

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

or

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

For information or technical assistance on the 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 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 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 cor-
// rosive, volatile or flammable liquids which may damage
// the pump or endanger personnel as a result of pump fail-
// ure.
//
////////////////////////////////////
```

WARNING

```
////////////////////////////////////
//
// After the pump has been installed, make certain that the
// pump and all piping or hose connections are tight, prop-
// erly 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.
//
////////////////////////////////////
```

WARNINGS

WARNING

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

WARNING

```
//////////////////////////////////////  
//  
// Do not remove plates, covers, gauges, pipe plugs, or //  
// fittings from an overheated pump. Vapor pressure within //  
// the pump can cause parts being disengaged to be ejected //  
// with great force. Allow the pump to cool before servic- //  
// ing. //  
// //  
//////////////////////////////////////
```

WARNING

```
//////////////////////////////////////  
//  
// Do not operate an internal combustion engine in an ex- //  
// plosive 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. //  
// //  
//////////////////////////////////////
```

WARNINGS

WARNING

```
////////////////////////////////////  
//  
// Fuel used by internal combustion engines presents an ex- //  
// treme 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

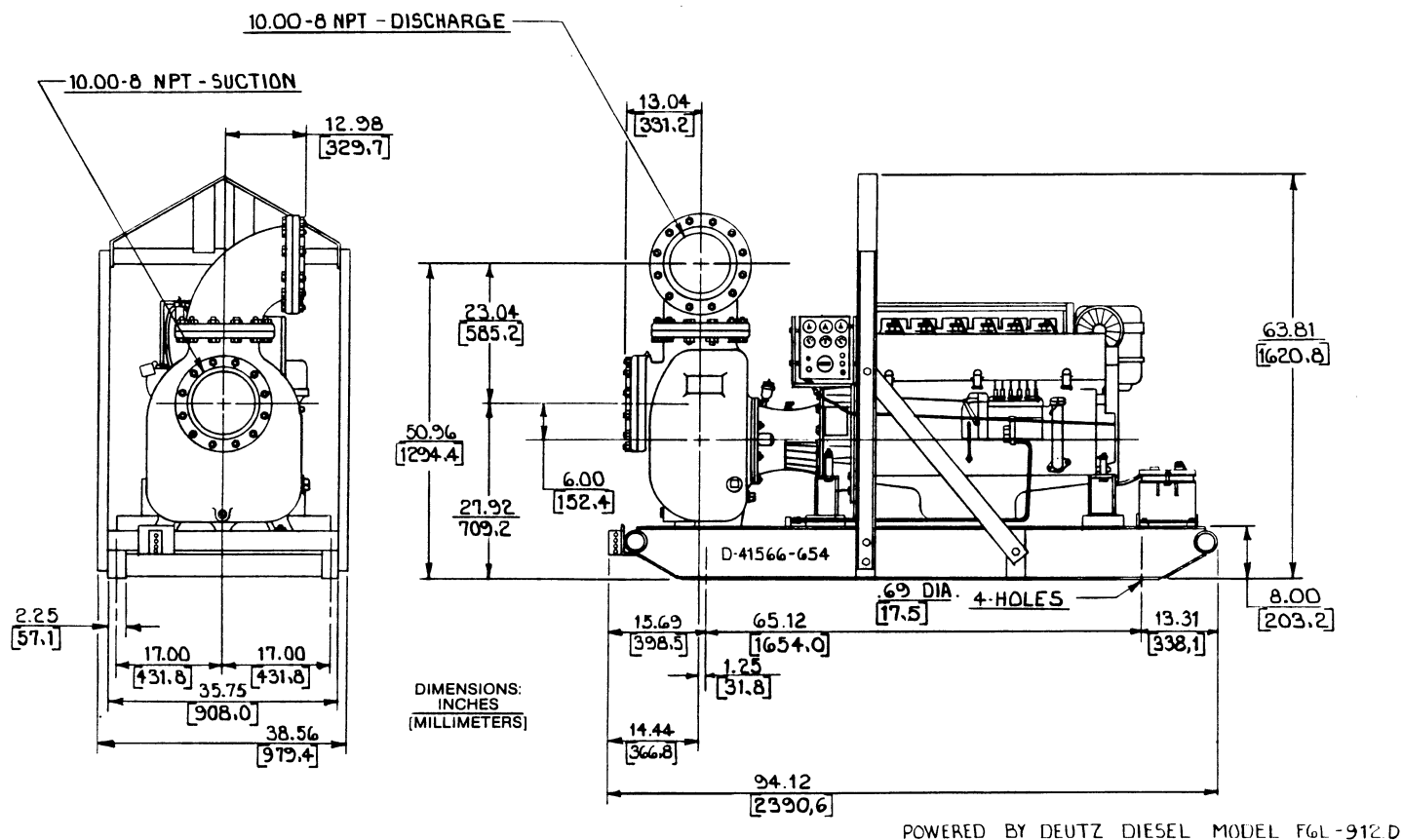


Figure 1. Pump Model 810A2-F6L

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 attaching hardware. Since gaskets tend to shrink after drying, check for loose hardware at 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 at 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

INSTALLATION

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 **intermittent 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).

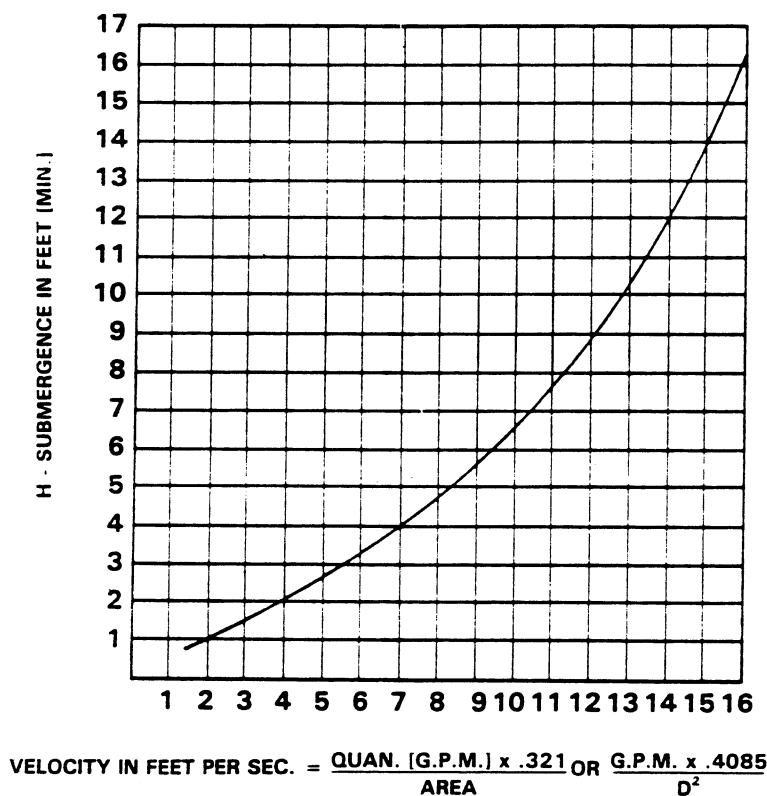


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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.

INSTALLATION

Valves

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

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

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

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

OPERATION - SECTION C

WARNING

```
////////////////////////////////////  
//  
// This pump is designed to handle dirty water containing //  
// specified entrained solids. Do not attempt to pump cor- //  
// rosive, volatile or flammable liquids which may damage //  
// the pump or endanger personnel as a result of pump fail- //  
// ure. //  
// //  
////////////////////////////////////
```

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.

OPERATION

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.

OPERATION

Lines Without a Bypass

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

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

Leakage

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

Liquid Temperature And Overheating

The **maximum** liquid temperature for this pump is 110°F. Do not apply it at a higher operating temperature.

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

WARNING

```
////////////////////////////////////  
//  
// Do not remove plates, covers, gauges, pipe plugs, or //  
// fittings from an overheated pump. Vapor pressure within //  
// the pump can cause parts being disengaged to be ejected //  
// with great force. Allow the pump to cool before servic- //  
// ing. //  
// //  
////////////////////////////////////
```

Strainer Check

If a suction strainer has been shipped with the pump or installed by the user, check the strainer regularly, and clean it as necessary. The strainer should also be checked if pump flow rate begins to drop. If a vacuum suction gauge has been installed, monitor and record the readings regularly to detect strainer blockage.

OPERATION

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.

OPERATION

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

```

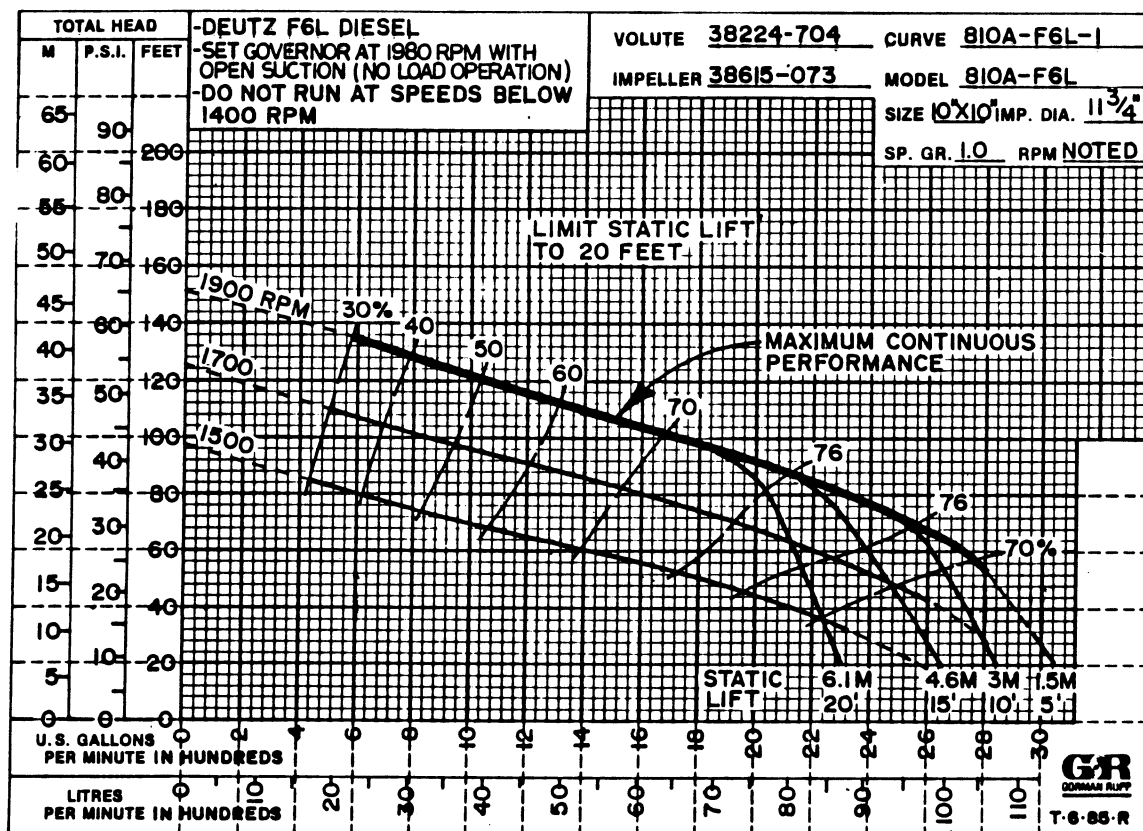
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Not enough liquid in casing.	Add liquid to casing. See PRIMING.
	Suction check valve contaminated or damaged.	Clean or replace check valve.
	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Discharge head too high.	Install bypass line.
	Strainer clogged.	Check strainer and clean if necessary.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRES-SURE	Suction lift too high.	Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.
	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. Impeller clogged. Pump speed too slow. Discharge head too high. Suction lift too high.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely. Free impeller of debris. Check engine output; consult engine operation manual. Install bypass line. Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.
PUMP REQUIRES TOO MUCH POWER	Pump speed too high. Discharge head too low. Liquid solution too thick.	Check engine output. Adjust discharge valve. Dilute if possible.
PUMP CLOGS FREQUENTLY	Discharge flow too slow. Suction check valve or foot valve clogged or binding. Liquid being pumped too thick.	Open discharge valve fully to increase flow rate, and run engine at maximum governed speed. Clean valve. Dilute liquid if possible.
EXCESSIVE NOISE	Cavitation in pump. Pumping entrained air. Pump or drive not securely mounted. Impeller clogged or damaged.	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory. Locate and eliminate source of air bubble. Secure mounting hardware. 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

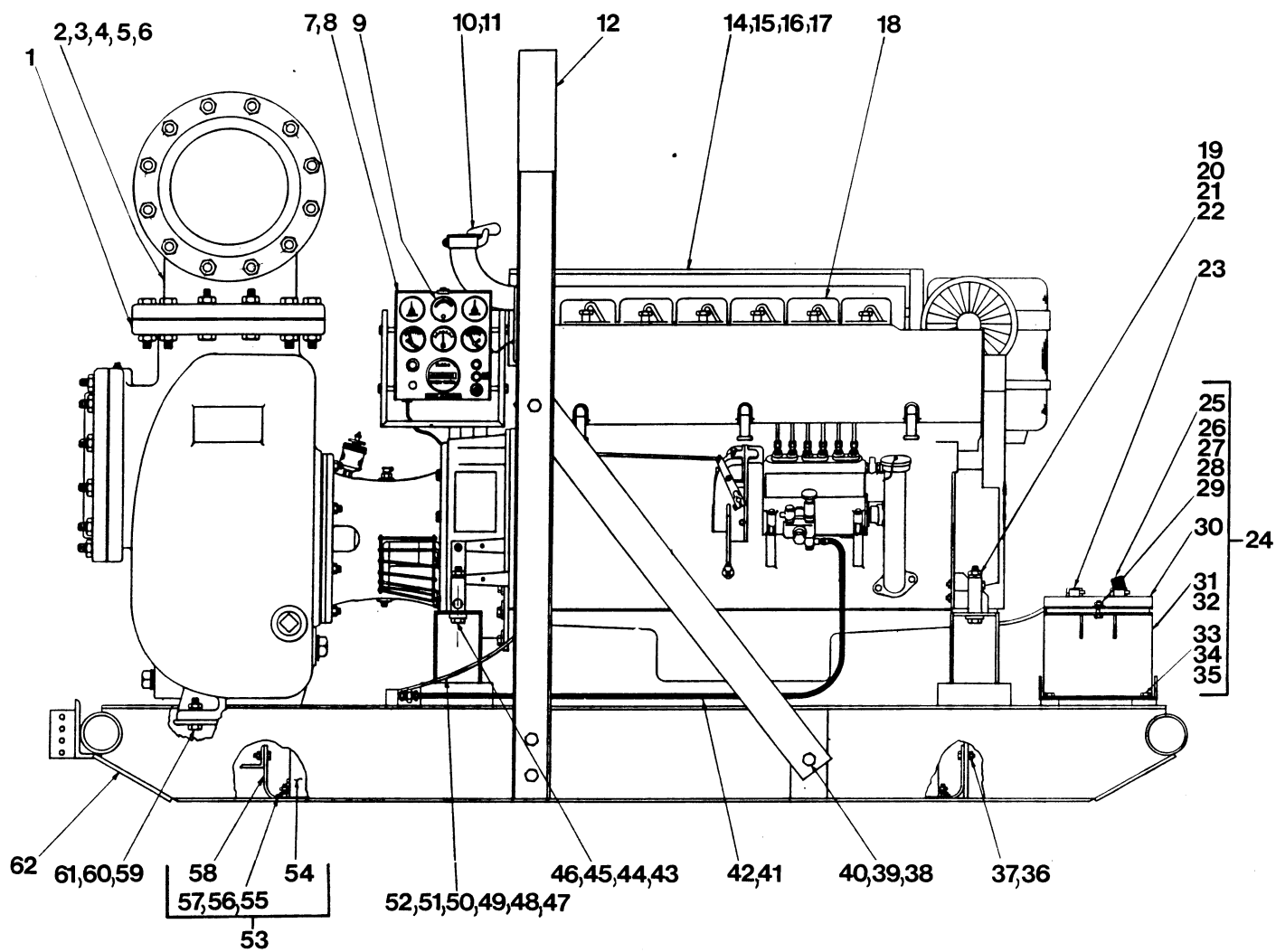


Figure 1. Pump Model 810A2-F6L

PARTS LIST
Pump Model 810A2-F6L
 (From S/N 861130 up)

If your pump serial number is followed by an "N", your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify part numbers.

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP END ASSY	(SEE FIG 2)	-----	1	34	-LOCKWASHER	J06	15991	4
2	FLANGED ELBOW	RF160	10990	REF	35	-HEX NUT	D06	15991	4
3	FLANGE GSKT	2751-G	18000	REF	36	HEX HD CAPSCREW	B0604	15991	10
4	HEX HD CAPSCREW	B1415	15991	REF	37	HEX NUT	21765-314	-----	10
5	HEX NUT	D14	15991	REF	38	HEX HD CAPSCREW	B1006	15991	8
6	HEX HD CAPSCREW	B1414	15991	REF	39	LOCKWASHER	J10	15991	8
7	WARNING DECAL	2613-FE	-----	1	40	HEX NUT	D10	15991	8
8	CAUTION DECAL	2613-FJ	-----	1	41	FUEL LINE ASSY	9072-K	-----	1
9	TACHOMETER KIT	48312-606	-----	1	42	CONNECTOR	S1447	-----	1
	-ELECTRIC TACH	26861-021	-----	1	43	LOCKWASHER	J08	15991	2
10	EXHAUST ELBOW	29334-333	-----	1	44	HEX HD CAPSCREW	B0816	15991	2
11	WEATHER CAP	S1387	-----	1	45	HEX NUT	D08	15991	2
12	HOIST BAIL ASSY	13351-AZ	24000	1	46	BEVELED WASHER	21167-011	-----	2
13	MUFFLER GRD ASSY	42331-021	24150	1	47	FUEL LINE	11308-A	-----	1
14	HEX HD CAPSCREW	B0404	15991	1	48	HOSE CLAMP	26518-642	-----	2
15	LOCKWASHER	J04	15991	1	49	HOSE CONNECTOR	26523-402	-----	1
16	FLAT WASHER	K04	15991	1	50	REDUCING ELBOW	Q0402	11990	1
17	HEX NUT	D04	15991	1	51	FUEL RETURN ASSY	14294	24030	1
18	DEUTZ F6L ENGINE	29217-111	-----	1	52	HOSE BARB	26523-441	-----	1
19	LOCKWASHER	J08	15991	2	53	FUEL TANK AND	46711-041	-----	1
20	HEX HD CAPSCREW	B0816	15991	2		GUARD ASSY			
21	HEX NUT	D08	15991	2	54	-FUEL TANK ASSY	46711-042	24150	1
22	BEVELED WASHER	21167-011	-----	2	55	-HEX NUT	D06	15991	6
23	*POS CABLE ASSY	6926-Q	24040	1	56	-FLAT WASHER	K06	15991	6
24	BATTERY BOX ASSY	GRP40-08-B	-----	1	57	-LOCKWASHER	J06	15991	6
25	* -GRND CABLE ASSY	5795-AC	24040	1	58	-GUARD ASSY	42381-046	24150	1
26	-HEX HD CAPSCREW	B0605	15991	2	59	HEX HD CAPSCREW	B1209	15991	2
27	-LOCKWASHER	J06	15991	2	60	LOCKWASHER	J12	15991	2
28	-HEX NUT	D06	15991	2	61	HEX NUT	D12	15991	2
29	-FLAT WASHER	K06	15991	2	62	COMBINATION BASE	41566-654	24150	1
30	-BATTERY FRAME	42113-012	24150	1					
31	-BATTERY BOX	42431-030	24150	1					
32	* -12V BATTERY	29331-506	-----	1	NOT SHOWN:				
33	-HEX HD CAPSCREW	B0605	15991	4	BATTERY TAG	6588-S	00000	1	

*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO AND UP

SECTIONAL DRAWING

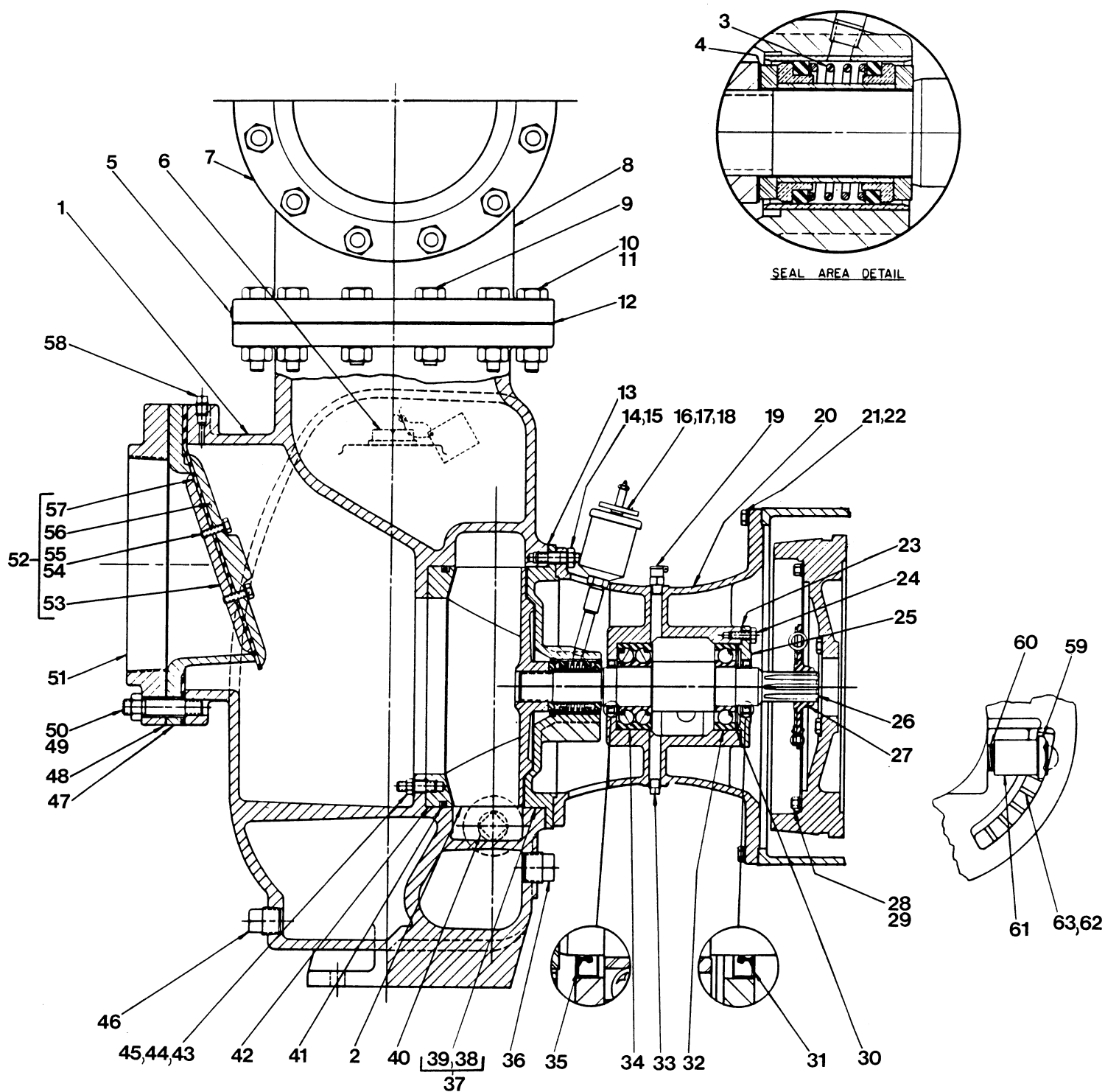


Figure 2. Pump End Only Model 810A2-F6L

PARTS LIST
Pump End Only Model 810A2-F6L

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP CASING	38224-704	10010	1	35	*OIL SEAL	25258-622	-----	1
2	*IMPELLER	38615-073	10010	1	36	CASING DRAIN PLUG	P24	11990	1
3	*GREASE SEAL ASSY	GS1500	-----	1	37	SEAL PLATE ASSY	42111-068	-----	1
4	* -IMP ADJ SHIM SET	5091	17090	REF	38	-SEAL PLATE	38274-501	10010	1
5	DISCH STICKER	6588-BJ	00000	1	39	* -SEAL LINER	7408	14010	1
6	FILL PLUG ASSY	48271-069	-----	1	40	PIPE PLUG	P24	11990	1
7	DISCH FLANGE	2751	10010	1	41	O-RING	S1865	-----	1
8	FLANGED ELBOW	RF0160	10990	1	42	*WEAR PLATE	38691-860	10010	1
9	HEX HD CAPSCREW	B1414	15991	2	43	STUD	C0808	15991	3
10	HEX HD CAPSCREW	B1415	15991	22	44	LOCKWASHER	J08	15991	3
11	HEX NUT	D14	15991	24	45	HEX NUT	D08	15991	3
12	*FLANGE GSKT	2751-G	18000	2	46	CASING DRAIN PLUG	P20	11990	1
13	*GASKET SET	48211-051	-----	1	47	CHK VALVE SEAT	3286	10010	1
14	STUD	C0809	15991	8	48	*SUCT FLANGE GSKT	2751-G	18000	1
15	HEX NUT	D08	15991	8	49	STUD	C1216	15991	12
16	GREASE CUP	S1509	-----	1	50	HEX NUT	D12	15991	12
17	PIPE COUPLING	AE04	11990	1	51	SUCT FLANGE	2751	10010	1
18	PIPE NIPPLE	THA0412	15070	1	52	CHK VALVE ASSY	3289	-----	1
19	OIL HOLE COVER	26717-068	-----	1	53	-WEIGHT	3287	10010	1
20	INTERMEDIATE	38263-718	10010	1	54	-HEX HD CAPSCREW	B0605	17000	2
21	LOCKWASHER	21171-511	-----	12	55	-LOCKWASHER	J06	17000	2
22	HEX HD CAPSCREW	22645-164	-----	12	56	-WEIGHT	3288	11000	1
23	*BEARING CAP GSKT	5413-G	18000	1	57	* -CHK VALVE GSKT	3290	19080	1
24	HEX HD CAPSCREW	B0604	15991	4	58	ACCESSORY PLUG	P04	11990	1
25	BEARING CAP	4185-A	10010	1	59	SIGHT GAUGE	S1471	-----	1
26	*IMPELLER SHAFT	38525-001	16040	1	60	PIPE NIPPLE	T12	15070	1
27	DRIVE PLATE ASSY	24521-165	-----	1	61	PIPE COUPLING	AE12	11990	1
28	LOCKWASHER	21171-511	-----	8	62	INTERMEDIATE GRD	42381-506	24150	1
29	HEX HD CAPSCREW	22645-158	-----	8	63	INTERMEDIATE GRD	42381-507	24150	1
30	WAVY WASHER	23963-327	-----	1	NOT SHOWN:				
31	*OIL SEAL	25258-622	-----	1		SUCTION STICKER	6588-AG	00000	1
32	*BALL BEARING	S1077	-----	1		STRAINER	3756	-----	1
33	INT DRAIN PLUG	P06	11990	1		NAME PLATE	38818-024	13990	1
34	*BALL BEARING	23421-461	-----	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 view(s) (see Figures 1 and 2) and the accompanying parts list(s).

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.

For engine disassembly and repair, consult the literature supplied with the engine, or contact your local Deutz engine 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. //  
//  
////////////////////////////////////
```

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. //  
//  
////////////////////////////////////
```

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.

Inspect the check valve parts for wear or damage and, if replacement is required, remove the hardware (54 and 55) and separate the check valve (57) and weights (53 and 56).

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 (59, 60 and 61) 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). Use a hoist and sling of suitable capacity to 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.

WARNING

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

Tie and tag any leveling shims used under the pump mounting feet.

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. Unscrew the impeller 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. Tie and tag the shims or measure and record their thickness for ease of reassembly.

Seal Removal

(Figure 2)

For ease of disassembly, the seal and seal plate assembly (37) may be removed as a single unit. Before attempting to remove the seal plate assembly, remove the seal cavity grease cup and piping (16, 17 and 18).

Remove the outer rotating element. Slide the seal plate and remaining seal parts off the shaft as a single unit.

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

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 it is 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) and guards (62 and 63) 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 replacement is required. 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 pre- //  
// cautions 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.

Press the inboard oil seal (35) into the intermediate with the lip positioned as shown in Figure 2.

Slide the assembled shaft and bearings into the intermediate until the inboard bearing seats against the bore shoulder. **Be careful** not to damage the oil seal lip on the shaft threads.

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 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 them with the capscrews (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 (28 and 29).

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.

Slide the seal plate assembly onto the shaft and against the intermediate. Align the lubrication hole in the seal plate with the opening in the intermediate, and 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 prec- //  
// autions printed on solvent containers. //  
// //  
////////////////////////////////////
```

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

Handle the seal parts with extreme care to prevent damage. Be careful not to contaminate precision finished faces; even fingerprints on the faces can shorten seal life. If necessary, clean the faces with a non-oil based solvent and a clean lint free tissue. Wipe **lightly** in a concentric pattern to avoid scratching the faces.

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. Clean and polish the seal spacer sleeve, or replace it if there are nicks or cuts on either end. If any components are worn, replace the complete seal; **never mix old and new seal parts**.

If a replacement seal is being used, remove it from the container and inspect the precision finished faces to ensure that they are free of any foreign matter.

To ease installation of the seal, lubricate the packing rings and seal liner with water or a very **small** amount of oil, and apply a drop of light lubricating oil on the finished faces. Assemble the seal as follows, (see Figure 3).

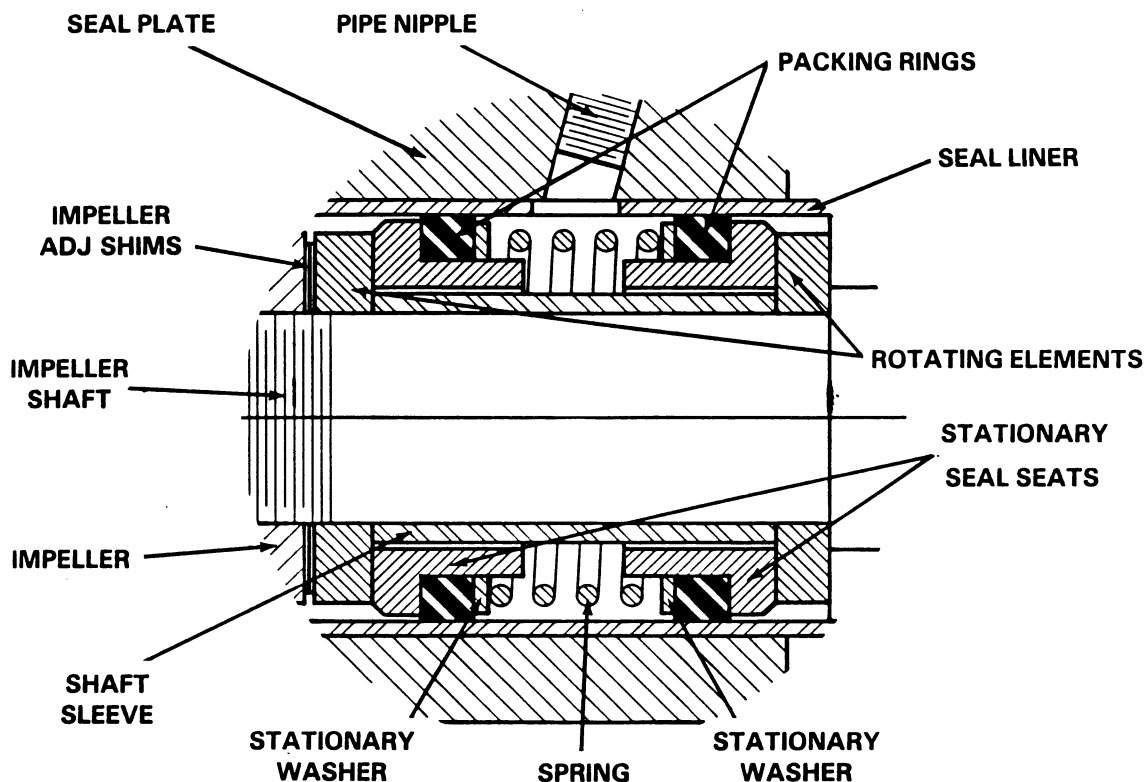


Figure 3. GS1500 Seal Assembly

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 this unit into the lubricated seal liner. A push tube cut from a length of plastic pipe would aid this installation. The I.D. of the tube should be approximately the same as the I.D. of the seal spring.

Install the spacer 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.

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

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

Impeller Installation

(Figure 2)

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

Slide the same thickness 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.

Pump Reassembly

(Figure 2)

If the wear plate was removed for replacement, install the O-ring (41) and secure the replacement wear plate to the pump casing with the hardware (44 and 45).

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 obtained by removing gaskets from the casing gasket set until the impeller binds against the wear plate when the shaft is turned. After the impeller binds, add .015 inch of gaskets.

NOTE

An alternate method of adjusting this clearance is to reach through the discharge port and measure the clearance with a feeler gauge. Add or subtract pump casing gaskets until the proper impeller clearance is attained.

Reinstall any leveling shims used under the pump casing mounting feet and secure the casing to the base with the hardware (59, 60 and 61, Figure 1).

Suction Check Valve Installation

(Figure 2)

Inspect the check valve components and replace as required. Subassemble the check valve weights (53 and 56) and gasket (57) using the hardware (54 and 55).

Secure the check valve, valve seat (47), suction flange (51) and gasket (48) 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 tight, properly supported and 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

(Figure 2)

Fill the grease cup (16) through the grease fitting with No. 2 lithium base grease until grease escapes from the relief hole. Turn the grease cup arm counterclockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see Figure 4).

MAINTENANCE AND REPAIR

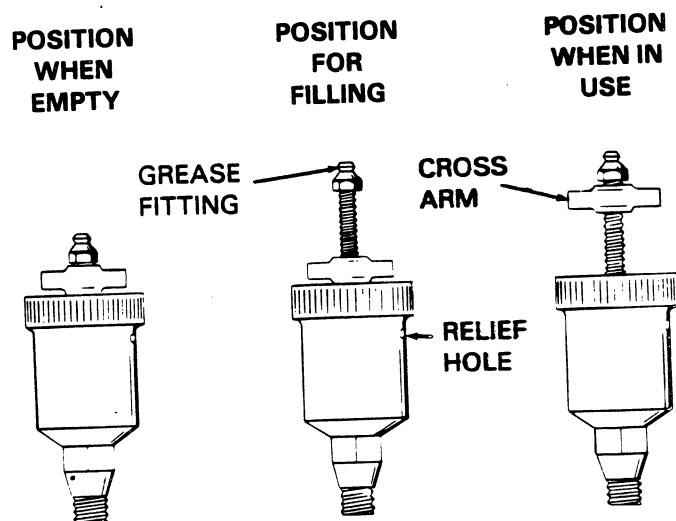


Figure 4. Automatic Lubricating Grease Cup

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**