

# INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST



| MODEL             |
|-------------------|
| <b>VG4D3-BF6L</b> |

**THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO**

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

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INTRODUCTION

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

This pump is a VG Series, centrifugal model with an enclosed impeller. This pump is designed for high pressure distribution of clean liquids containing specified entrained solids. The basic material of construction for wetted parts is gray iron, with a gray iron impeller and brass wearing parts. Be sure the liquid being pumped is compatible with these materials. The pump is close-coupled to a six cylinder, air-cooled Deutz diesel engine, model BF6L913.

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

|                            |    |                               |
|----------------------------|----|-------------------------------|
| The Gorman-Rupp Company    | or | Gorman-Rupp of Canada Limited |
| P.O. Box 1217              |    | 70 Burwell Road               |
| Mansfield, Ohio 44901-1217 |    | 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 VG 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 disconnect the positive battery cable 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 clean liquids containing specified entrained solids. Do not attempt to pump volatile, corrosive, or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

WARNING

After the pump has been 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

```

////////////////////////////////////
//
// 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

```

////////////////////////////////////
//
// 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

```

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

```



WARNINGS

---

---

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 //  
// for this unit is 2300 RPM. //  
//  
////////////////////////////////////
```

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.

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 and engine.

OUTLINE DRAWING

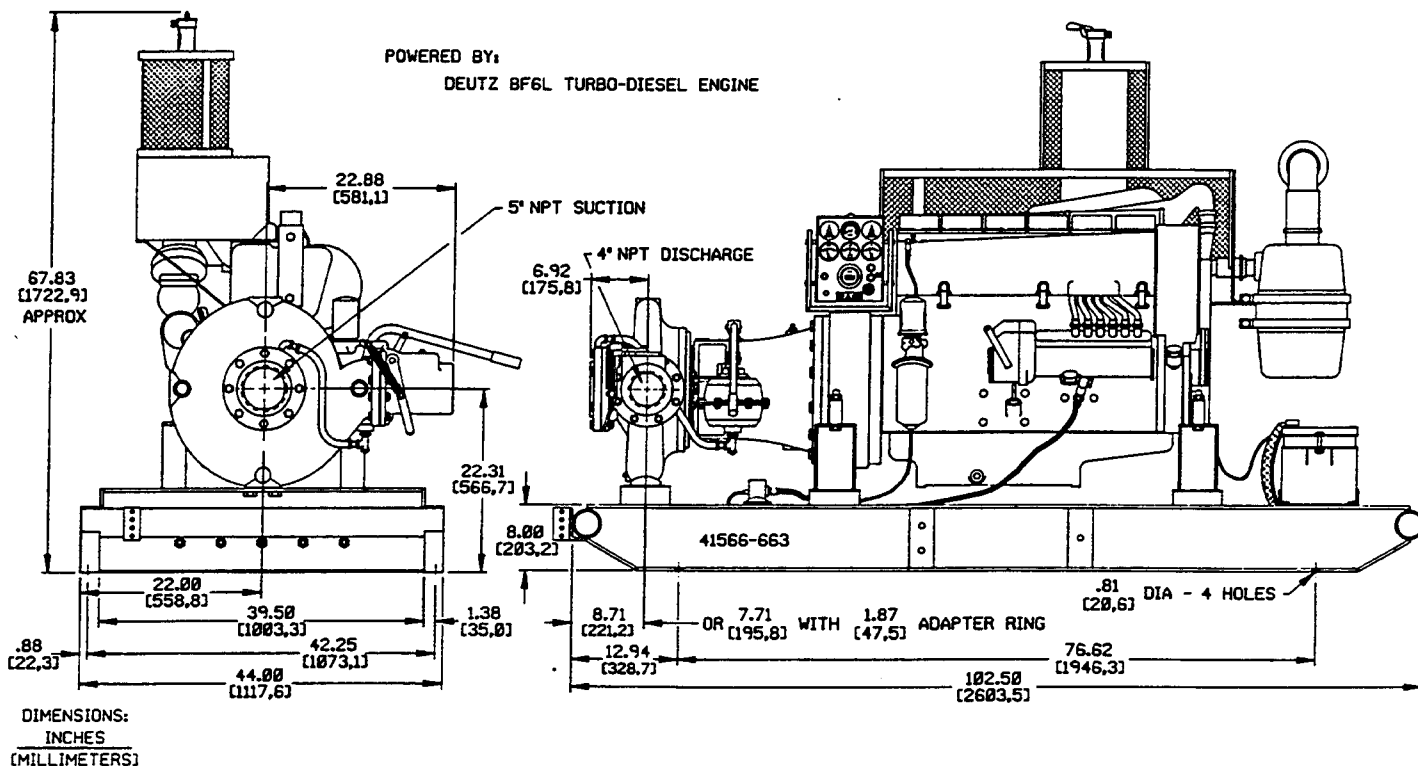


Figure 1. Pump Model VG4D3-BF6L

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## 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 and engine 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 **2,830 pounds**, not including the weight of accessories and wheel kit. Customer installed equipment such as suction and discharge hoses **must** be removed before attempting to lift.

### CAUTION

The pump assembly can be seriously damaged if the cables or chains used to lift and move the unit are improperly wrapped around the pump.

### Mounting

Locate the pump in an accessible place as close as practical to the liquid being pumped. Level mounting is essential for proper operation. The pump may have to

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be supported or shimmed to provide for level operation or to eliminate vibration.

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°.

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.

## 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.

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## SUCTION LINES

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

### Fittings

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

### Strainers

If a strainer is furnished with the pump, be certain to use it; any spherical solids which pass through a strainer furnished with the pump will also pass through the pump itself.

If a strainer is not furnished with the pump, but is installed by the pump user, make certain that the total area of the openings in the strainer is at least three or four times the cross section of the suction line, and that the openings will not permit passage of solids larger than the solids handling capability of the pump.

This pump is designed to handle up to 3/8 inch diameter spherical solids.

### Sealing

Since even a slight leak will affect priming, head, and capacity, especially when operating with a high suction lift, all connections in the suction line should be sealed with pipe dope to ensure an airtight seal. Follow the sealant manufacturer's recommendations when selecting and applying the pipe dope. The pipe dope should be compatible with the liquid being pumped.

### Suction Lines In Sumps

If a single suction line is installed in a sump, it should be positioned away from the wall of the sump at a distance equal to one and one-half times the diameter of the suction line.

If there is a liquid flow from an open pipe into the sump, the flow should be kept away from the suction inlet because the inflow will carry air down into the sump, and air entering the suction line will reduce pump efficiency.

If it is necessary to position inflow close to the suction inlet, install a baffle between the inflow and the suction inlet at a distance one and one-half times the diameter of the suction pipe. The baffle will allow entrained air to escape from the liquid before it is drawn into the suction inlet.

If two suction lines are installed in a single sump, the flow paths may interact, reducing the efficiency of one or both pumps. To avoid this, position the suction inlets so that they are separated by a distance equal to at least three times the diameter of the suction pipe.

### Suction Line Positioning

The depth of submergence of the suction line is critical to efficient pump operation. Figure 2 shows recommended minimum submergence vs. velocity.

#### NOTE

The pipe submergence required may be reduced by installing a standard pipe increaser fitting at the end of the suction line. The larger opening size will reduce the inlet velocity. Calculate the required submergence using the following formula based on the increased opening size (area or diameter).

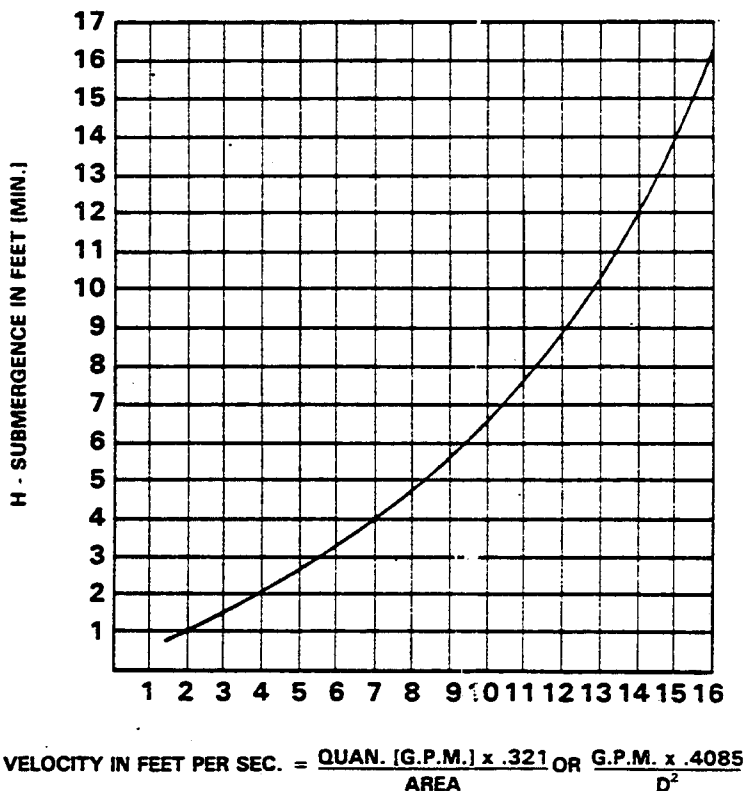


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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## 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

The spring loaded check valve provided with this pump will **not** function as a discharge check valve in system piping. It is intended to prevent recirculation of air during the priming cycle.

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:

### ALIGNMENT

The alignment of the pump and the engine is critical for trouble free mechanical operation. See Section E, **Securing Intermediate To Engine** for detailed information.



OPERATION - SECTION C

WARNING

```

////////////////////////////////////
//
// This pump is designed to handle clean liquids containing //
// specified entrained solids. Do not attempt to pump vol- //
// atile, corrosive, 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 //
// for this unit is 2300 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).

Since this pump is not self-priming, it is equipped with a hand-operated vacuum priming pump, and a spring-loaded check valve.

Hand-Operated Priming Pump

The hand-operated priming pump (see Figure 1) is designed to draw air out of the suction line and the pump casing.

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

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

To prime the pump, open the cock in the bottom of the priming pump. Operate the handle of the pump until all of the air is expelled from the line and a small amount of liquid flows from the drain cock.

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**NOTE**

For installation and operating instructions on the discharge check valve, see the separate check valve manual accompanying this literature.

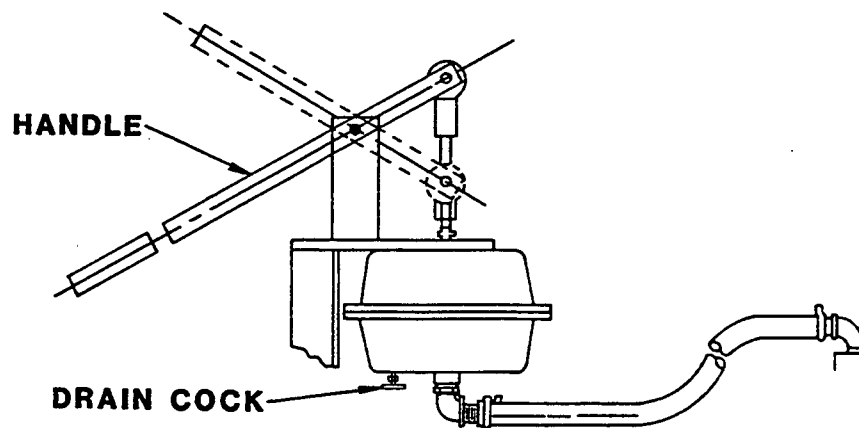


Figure 1. Hand Primer Assembly

Once the pump is fully primed, close the cock, open the discharge line throttling valve and start the pump.

**STARTING**

Consult the operations manual furnished with the engine.

**NOTE**

This pump is equipped with a safety shut down device to terminate engine operation if pump discharge pressure falls below 30 psi. During engine start up, the button on the discharge pressure gauge must be depressed to over-ride this safety feature.

**OPERATION****CAUTION**

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

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## OPERATION

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### Leakage

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

### Liquid Temperature And Overheating

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

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

#### WARNING

```

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

```

### Strainer Check

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

**Never** introduce air or steam pressure into the pump casing or piping to remove a blockage. This could result in personal injury or damage to the equipment. If backflushing is absolutely necessary, **liquid pressure** must be limited to 50% of the maximum permissible operating pressure shown on the pump performance curve.

### Pump Vacuum Check

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

With the pump inoperative, install a vacuum gauge in the system, using pipe dope on the threads. Block the suction line and start the pump. At operating speed the pump should pull a vacuum of 20 inches or more of mercury. If it does not, check for air leaks in the seal, gasket, or discharge valve.

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**OPERATION**

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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.

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---

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 disconnect the //
// positive battery cable to ensure that the pump //
// will remain inoperative. //
// 3. Allow the pump to cool if overheated. //
// 4. Vent the pump slowly and cautiously. //
// 5. Close the suction and discharge valves. //
// 6. Check the temperature before opening any covers, //
// plates, or plugs. //
// 7. Drain the pump. //
////////////////////////////////////
    
```

| TROUBLE   | POSSIBLE CAUSE   | PROBABLE REMEDY  |
|---|--|--|
| PUMP FAILS TO PRIME                                   | Auxiliary priming device faulty or improperly installed.<br><br>Air leak in suction line.<br><br>Lining of suction hose collapsed.<br><br>Leaking or worn seal or pump gasket.<br><br>Suction lift or discharge head to high.<br><br>Strainer clogged. | Repair priming device or check installation.<br><br>Correct leak.<br><br>Replace suction hose.<br><br>Check pump vacuum. Replace leaking or worn seal or gasket.<br><br>Check piping installation and reduce suction lift and/or discharge head.<br><br>Check strainer and clean if necessary. |
| PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE | Air leak in suction line.<br><br>Pump speed too high.<br><br>Lining of suction hose collapsed.<br><br>Impeller or other wearing parts worn or damaged.   | Correct leak.<br><br>Check engine output.<br><br>Replace suction hose.<br><br>Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.  |

| TROUBLE  | POSSIBLE CAUSE   | PROBABLE REMEDY  |
|--|--|--|
| PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE(cont.) | <p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Suction lift too high.</p> <p>Strainer clogged.</p> <p>Discharge throttling valve partially closed; check valve installed improperly.</p> <p>Discharge pressure at or below safety shutdown limit.</p> <p>Discharge check valve locked closed.</p> | <p>Free impeller of debris.</p> <p>Check engine output; consult engine operation manual.</p> <p>Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.</p> <p>Check strainer and clean if necessary.</p> <p>Open discharge valve fully; check piping installation.</p> <p>Check starting instructions; increase pressure.</p> <p>Check position of handle; open valve.</p> |
| PUMP REQUIRES TOO MUCH POWER                                 | <p>Discharge head too low.</p> <p>Liquid solution too thick.</p> <p>Pump speed too high.</p>   | <p>Adjust discharge valve.</p> <p>Dilute if possible.</p> <p>Check engine output.</p>  |
| PUMP CLOGS FREQUENTLY  | <p>Discharge flow too slow.</p> <p>Suction check valve or foot valve clogged or binding.</p>   | <p>Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.</p> <p>Clean valve.</p>   |
| EXCESSIVE NOISE  | <p>Cavitation in pump.</p> <p>Pumping entrained air.</p> <p>Pump or drive not securely mounted.</p> <p>Impeller clogged or damaged.</p>  | <p>Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.</p> <p>Locate and eliminate source of air bubble.</p> <p>Secure mounting hardware.</p> <p>Clean out debris; replace damaged parts.</p>   |

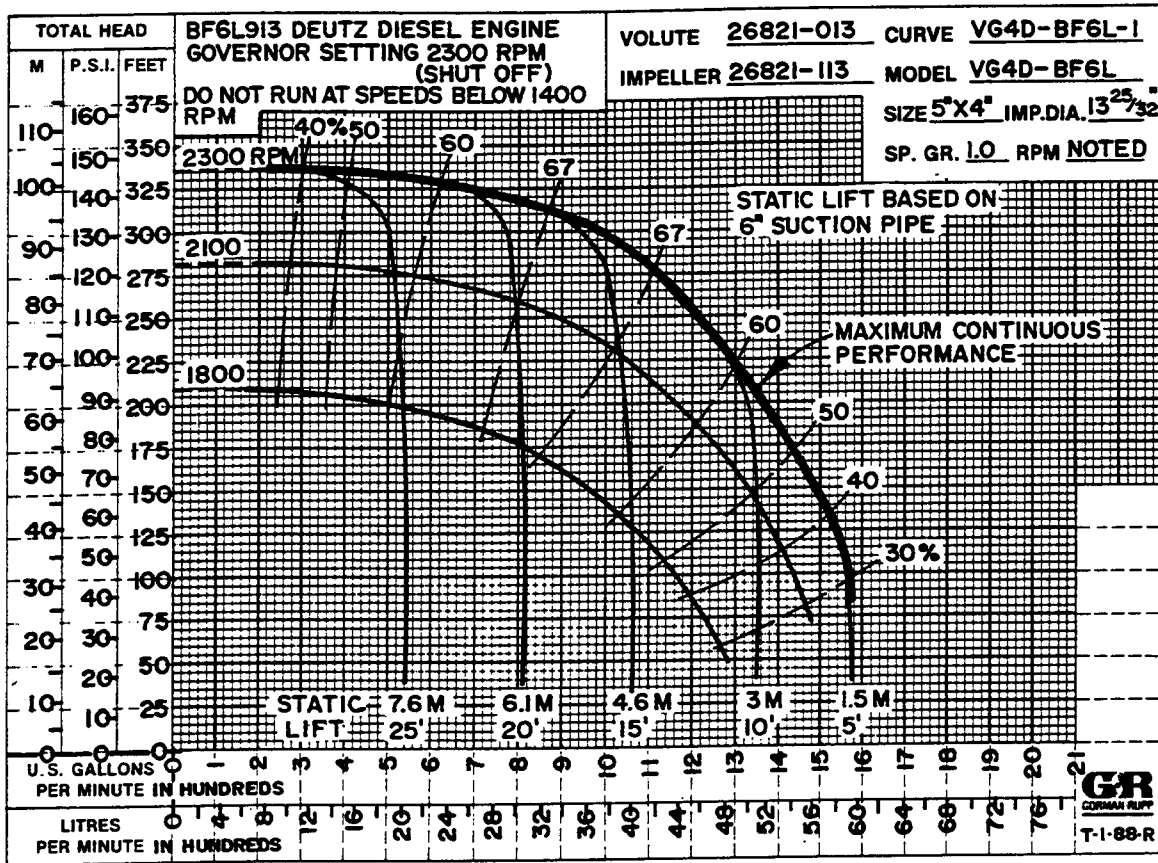


| TROUBLE              | POSSIBLE CAUSE  | PROBABLE REMEDY  |
|----------------------|---|--|
| BEARINGS RUN TOO HOT | <p>Bearing temperature is high, but within limits.</p> <p>Low or incorrect lubricant.</p> <p>Suction and discharge lines not properly supported.</p> <p>Drive misaligned.</p> | <p>Check bearing temperature regularly to monitor any increase.</p> <p>Check for proper type and level of lubricant.</p> <p>Check piping installation for proper support.</p> <p>Align drive properly.</p> |



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 VG4D3-BF6L

\*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.

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
// for this unit is 2300 RPM.
//
////////////////////////////////////
    
```

SECTIONAL DRAWING

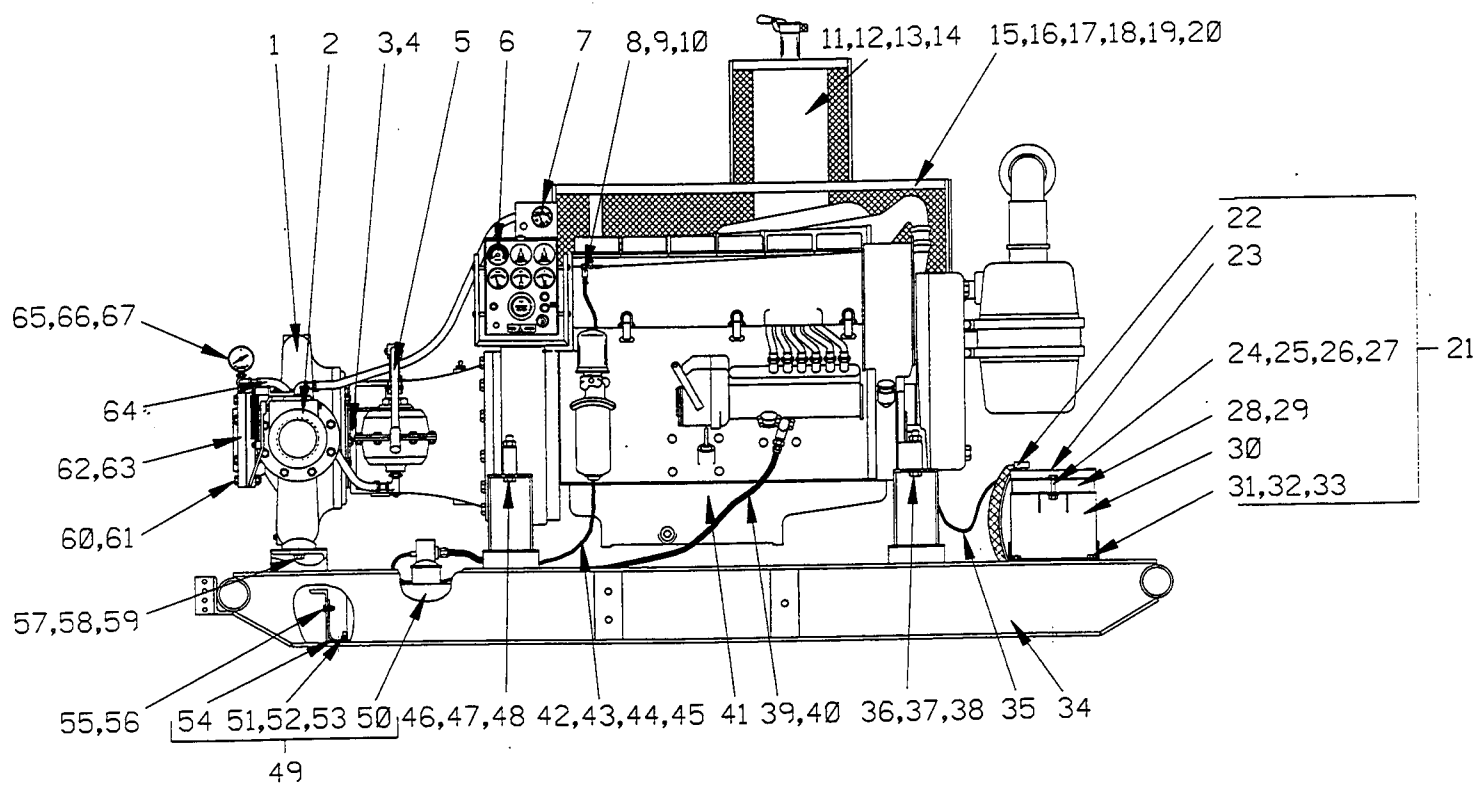


Figure 1. Pump Model VG4D3-BF6L

**PARTS LIST**  
**Pump Model VG4D3--BF6L**

(From S/N 882386 up)

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

| ITEM NO. | PART NAME          | PART NUMBER   | MAT'L CODE | QTY | ITEM NO. | PART NAME         | PART NUMBER | MAT'L CODE | QTY |
|----------|--------------------|---------------|------------|-----|----------|-------------------|-------------|------------|-----|
| 1        | PUMP END ASSY      | VG4D3--(BF6L) |            | 1   | 37       | LOCKWASHER        | J08         | 15991      | 2   |
| 2        | **CHECK VLV ASSY   | GRP14-04A     | ---        | 1   | 38       | HEX NUT           | D08         | 15991      | 2   |
| 3        | STUD               | C1013         | 15991      | 2   | 39       | FUEL LINE ASSY    | 46341-803   | ---        | 1   |
| 4        | FLAT WASHER        | K10           | 15991      | 2   | 40       | CONNECTOR         | S1447       | ---        | 1   |
| 5        | **HAND PRIMER ASSY | GRP43-01      | ---        | 1   | 41       | DEUTZ BF6L ENGINE | 29217-101   | ---        | 1   |
| 6        | TACHOMETER KIT     | 48312-606     | ---        | 1   | 42       | FUEL RETURN ASSY  | 14294       | 24030      | 1   |
|          | -ELECTRIC TACH     | 26861-021     | ---        | 1   | 43       | REDUCING ELBOW    | Q0402       | 11999      | 1   |
| 7        | PRESS GAUGE KIT    | 48312-008     | ---        | 1   | 44       | MALE CONNECTOR    | 26523-382   | ---        | 1   |
|          | -SAFETY SWITCH     | S812          | ---        | 1   | 45       | HOSE CLAMP        | 26518-641   | ---        | 1   |
| 8        | FUEL LINE ASSY     | 11308F        | ---        | 1   | 46       | HEX HD CAPSCREW   | B0815       | 15991      | 2   |
| 9        | HOSE CLAMP         | 26518-641     | ---        | 1   |          | FLATWASHER        | K08         | 15991      | 2   |
| 10       | HOSE BARB FIT      | 26523-443     | ---        | 1   | 47       | LOCKWASHER        | J08         | 15991      | 2   |
| 11       | MUFFLER ASSY       | 46211-023     | 24150      | 1   | 48       | HEX NUT           | D08         | 15991      | 2   |
| 12       | MUFFLER CLAMP      | 29334-265     | ---        | 1   | 49       | FUEL TANK         | 46711-041   | ---        | 1   |
| 13       | WEATHER CAP        | S2021         | ---        | 1   |          | & GUARD ASSY      |             |            |     |
| 14       | 90_ ELBOW          | 29334-335     | ---        | 1   | 50       | -FUEL TANK        | 46711-042   | 24150      | 1   |
| 15       | HEX HD CAPSCREW    | 22645-839     | ---        | 2   | 51       | -FLAT WASHER      | K06         | 15991      | 6   |
| 16       | LOCKWASHER         | 21171-510     | ---        | 2   | 52       | -CARRIAGE BOLT    | AB0604      | 15991      | 6   |
| 17       | HEX HD CAPSCREW    | B0605         | 15991      | 1   | 53       | -HEX NUT          | 21765-314   | ---        | 6   |
| 18       | LOCKWASHER         | J06           | 15991      | 1   | 54       | -GUARD ASSY       | 34851-178   | 15080      | 1   |
| 19       | HEX NUT            | D06           | 15991      | 1   | 55       | HEX HD CAPSCREW   | B0604       | 15991      | 10  |
| 20       | HEAT SHIELD ASSY   | 42381-050     | 24150      | 1   | 56       | HEX NUT           | 21765-314   | ---        | 10  |
| 21       | BATTERY BOX ASSY   | GRP40-08B     | ---        | 1   | 57       | HEX HD CAPSCREW   | B0804       | 15991      | 2   |
| 22       | *-GRND CABLE ASSY  | 5795AC        | 24040      | 1   | 58       | LOCKWASHER        | J08         | 15991      | 2   |
| 23       | -LID ASSY          | 42113-012     | 24150      | 1   | 59       | FLAT WASHER       | K08         | 15991      | 2   |
| 24       | -HEX HD CAPSCREW   | B0605         | 15991      | 2   | 60       | HEX HD CAPSCREW   | B1211       | 15991      | 8   |
| 25       | -FLAT WASHER       | K06           | 15991      | 2   | 61       | HEX NUT           | D12         | 15991      | 8   |
| 26       | -LOCKWASHER        | J06           | 15991      | 2   | 62       | * FLANGE GASKET   | 1678G       | 18000      | 1   |
| 27       | -HEX NUT           | D06           | 15991      | 2   | 63       | SUCTION FLANGE    | 1757C       | 10010      | 1   |
| 28       | -BATTERY TAG       | 38818-506     | ---        | 1   | 64       | HAND PRIMER HOSE  | 31412-102   | 19180      | 1   |
| 29       | *-BATTERY          | 29331-506     | ---        | 1   | 65       | STREET ELBOW      | RS04        | 11999      | 1   |
| 30       | -BATTERY BOX       | 42431-030     | 24150      | 1   | 66       | SERVICE TEE       | US04        | 11999      | 1   |
| 31       | -HEX HD CAPSCREW   | B0605         | 15991      | 4   | 67       | VACUUM GAUGE      | S47         | ---        | 1   |
| 32       | -LOCKWASHER        | J06           | 15991      | 4   |          |                   |             |            |     |
| 33       | -HEX NUT           | D06           | 15991      | 4   |          | NOT SHOWN:        |             |            |     |
| 34       | BASE               | 41566-663     | 24150      | 1   |          | STRAINER          | S2278       | ---        | 1   |
| 35       | * POS CABLE ASSY   | 47311-116     | ---        | 1   |          | REDUCING BUSHING  | AP9680      | 11990      | 1   |
| 36       | HEX HD CAPSCREW    | B0815         | 15991      | 2   |          | CAUTION DECAL     | 2613FJ      | ---        | 1   |
|          | FLATWASHER         | K08           | 15991      | 2   |          | WARNING DECAL     | 2613FE      | ---        | 1   |

\*\* SEE THE ACCOMPANYING LITERATURE FOR OPERATION, PARTS & SERVICE

\* INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO. .... AND UP

SECTIONAL DRAWING

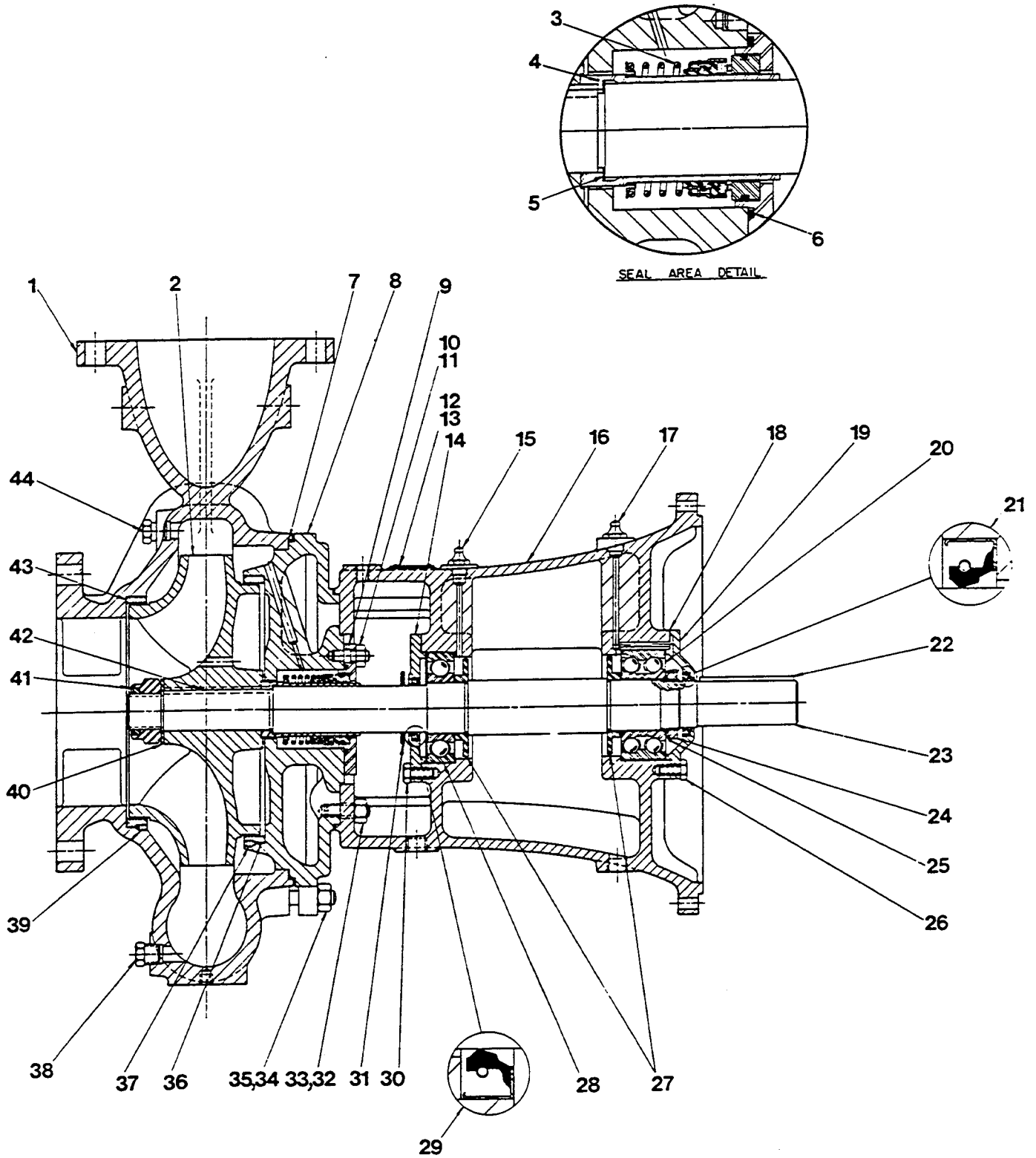


Figure 2. Pump End Assy VG4D3-(BF6L)

**PARTS LIST**  
**Pump End Assy VG4D3-(BF6L)**

| ITEM NO. | PART NAME          | PART NUMBER | MATL CODE | QTY | ITEM NO. | PART NAME                | PART NUMBER  | MATL CODE | QTY |
|----------|--------------------|-------------|-----------|-----|----------|--------------------------|--------------|-----------|-----|
| 1        | PUMP CASING        | 26821-013   | -----     | 1   | 27       | BEARING SPACER           | 26821-324    | -----     | 2   |
| 2        | *IMPELLER          | 26821-113   | -----     | 1   | 28       | *INBOARD BALL BRG        | 23275-012    | -----     | 1   |
| 3        | *SEAL ASSY         | 25271-095   | -----     | 1   | 29       | *INBOARD OIL SEAL        | 26821-634    | -----     | 1   |
| 4        | *SHAFT SLEEVE      | 26821-227   | -----     | 1   | 30       | HEX HD CAPSCREW          | B00603 1/2   | 15991     | 4   |
| 5        | *SHAFT SLEEVE GSKT | 26821-443   | -----     | 1   | 31       | SLINGER RING             | 26821-497    | -----     | 1   |
| 6        | *SEAL CAP O-RING   | 26821-286   | -----     | 1   | 32       | HEX NUT                  | 26821-536    | -----     | 4   |
| 7        | *SEAL PLATE GSKT   | 26821-425   | -----     | 1   | 33       | STUD                     | 26821-566    | -----     | 4   |
| 8        | SEAL PLATE         | 26821-161   | -----     | 1   | 34       | HEX NUT                  | D00010       | -----     | 16  |
| 9        | SEAL CAP           | 26821-247   | -----     | 1   | 35       | STUD                     | 26821-572    | -----     | 16  |
| 10       | STUD               | 26821-560   | -----     | 2   | 36       | *SEAL PLATE<br>WEAR RING | 26821-305    | -----     | 1   |
| 11       | HEX NUT            | D00008      | 15991     | 2   | 37       | SOC HD CAPSCREW          | 26821-582    | -----     | 2   |
| 12       | NAME PLATE         | 38814-044   | 13990     | 1   | 38       | CASING DRAIN PLUG        | 26821-503    | -----     | 1   |
| 13       | DRIVE SCREW        | BM#04-03    | 15990     | 2   | 39       | SOC HD CAPSCREW          | 26821-582    | -----     | 2   |
| 14       | BEARING CAP        | 26821-079   | -----     | 1   | 40       | IMPELLER WASHER          | NOT REQUIRED |           | 1   |
| 15       | GREASE FITTING     | 26821-601   | -----     | 1   | 41       | *IMPELLER NUT            | 26821-135    | -----     | 1   |
| 16       | BEARING HOUSING    | 26821-057   | -----     | 1   | 42       | *IMPELLER KEY            | 26821-264    | -----     | 1   |
| 17       | GREASE FITTING     | 26821-601   | -----     | 1   | 43       | *CASING WEAR RING        | 26821-302    | -----     | 1   |
| 18       | *BEARING CAP GSKT  | 26821-408   | -----     | 1   | 44       | CASING FILL PLUG         | 26821-503    | -----     | 1   |
| 19       | BEARING CAP        | 26821-080   | -----     | 1   |          | NOT SHOWN:               |              |           |     |
| 20       | *OUTBOARD BALL BRG | 26821-333   | -----     | 1   |          | SUCT STICKER             | 6588-AG      | 00000     | 1   |
| 21       | *OUTBOARD OIL SEAL | 26821-638   | -----     | 1   |          | DISCH STICKER            | 6588-BJ      | 00000     | 1   |
| 22       | *SHAFT KEY         | N00814      | 15990     | 1   |          | OPTIONAL:                |              |           |     |
| 23       | *IMPELLER SHAFT    | 26821-177   | -----     | 1   |          | VITON/SST SEAL           | 25271-096    | -----     | 1   |
| 24       | LOCKING NUT        | 26821-362   | -----     | 1   |          | BRONZE IMPELLER          | 26821-093    | -----     | 1   |
| 25       | LOCKWASHER         | 26821-372   | -----     | 1   |          |                          |              |           |     |
| 26       | HEX HD CAPSCREW    | B00603 1/2  | 15991     | 4   |          |                          |              |           |     |

\*INDICATES PARTS RECOMMENDED FOR STOCK

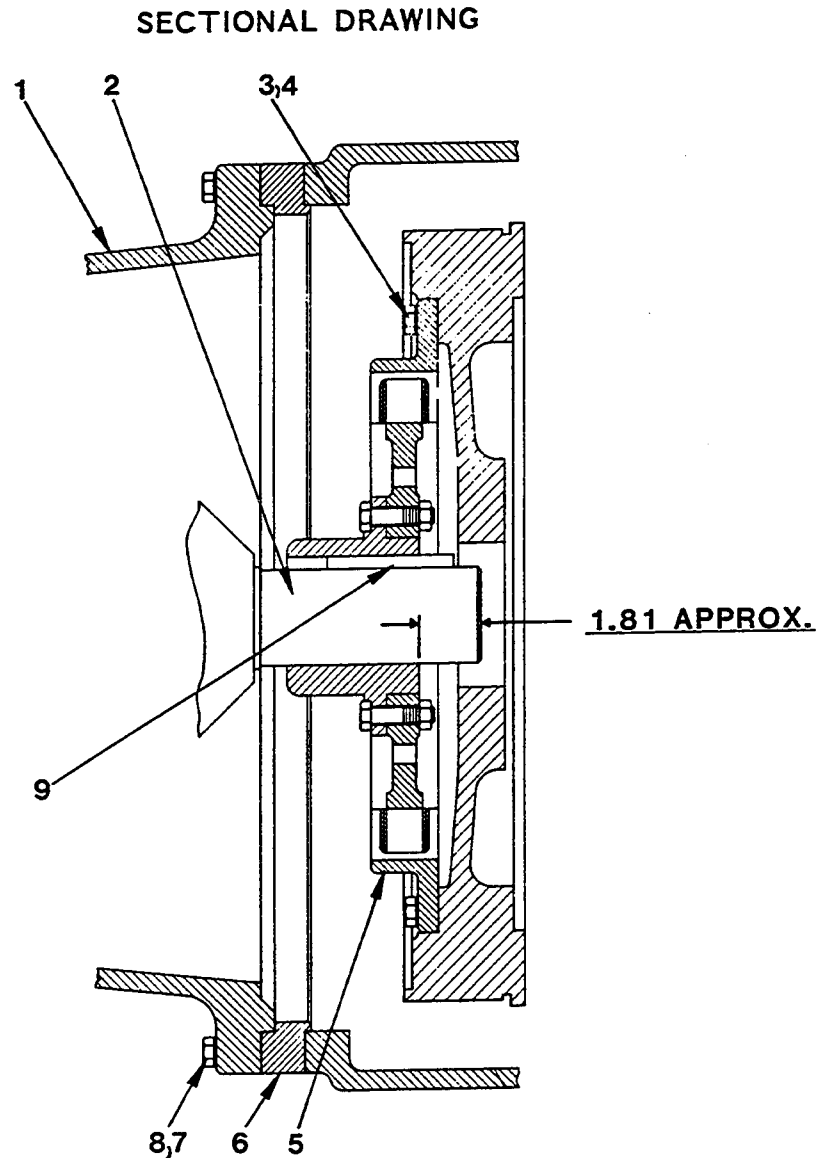


Figure 3. Standard Drive Assembly For Pump Model VG4D3-BF6L

| ITEM NO. | PART NAME            | PART NUMBER | MATL CODE | QTY |
|----------|----------------------|-------------|-----------|-----|
| 1        | BEARING HOUSING      | 26821-057   | -----     | REF |
| 2        | * IMPELLER SHAFT     | 26861-177   | -----     | REF |
| 3        | HEX HD CAPSCREW      | 22645-162   | -----     | 8   |
| 4        | LOCKWASHER           | 21171-511   | -----     | 8   |
| 5        | DRIVE PLATE ASSY     | 24392-009   | -----     | 1   |
| 6        | BELL HOUSING ADAPTOR | 29312-013   | -----     | 1   |
| 7        | HEX HD CAPSCREW      | 22645-170   | -----     | 12  |
| 8        | LOCKWASHER           | 21171-511   | -----     | 12  |
| 9        | * SHAFT KEY          | N0814       | 15990     | REF |

\*INDICATES PARTS RECOMMENDED FOR STOCK



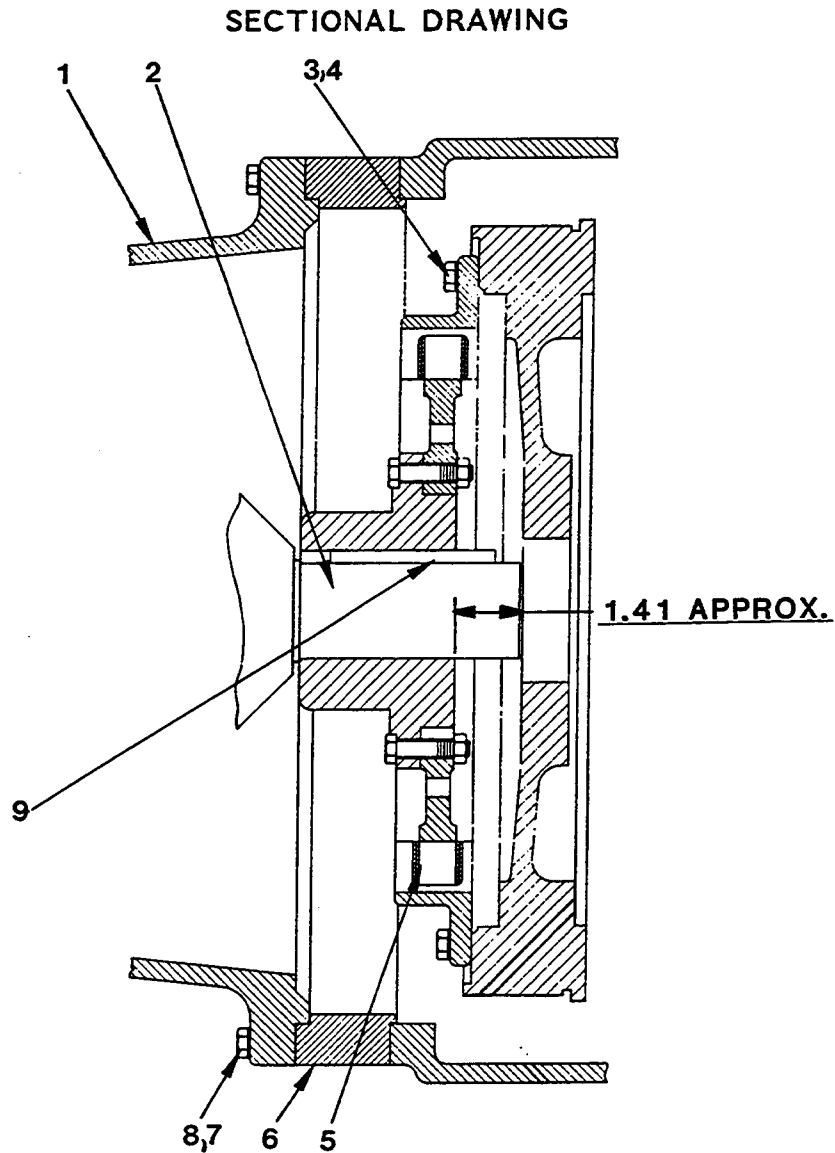


Figure 4. Optional Drive Assembly For Pump Model VG4D3-BF6L

| ITEM NO. | PART NAME            | PART NUMBER | MATL CODE | QTY |
|----------|----------------------|-------------|-----------|-----|
| 1        | BEARING HOUSING      | 26821-057   | -----     | REF |
| 2        | * IMPELLER SHAFT     | 26861-177   | -----     | REF |
| 3        | HEX HD CAPSCREW      | 22645-160   | -----     | 8   |
| 4        | LOCKWASHER           | 21171-511   | -----     | 8   |
| 5        | DRIVE PLATE ASSY     | 24392-011   | -----     | 1   |
| 6        | BELL HOUSING ADAPTOR | 29312-003   | -----     | 1   |
| 7        | HEX HD CAPSCREW      | 22645-562   | -----     | 12  |
| 8        | LOCKWASHER           | 21171-511   | -----     | 12  |
| 9        | * SHAFT KEY          | N0814       | 15990     | REF |

\*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).

See the accompanying literature for Installation, Operation and Maintenance of the GRP14-04-A Discharge Check Valve and the GRP43-09 Hand Primer Assembly.

Before attempting to service the pump, switch off the engine ignition and remove the key 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 disconnect the     //
//       positive battery cable 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.                                     //
////////////////////////////////////
    
```

**Check Valve Removal**

**(Figure 1)**

Drain the discharge piping and remove it from the pump.

Remove the hardware securing the discharge check valve assembly (2) to the pump casing and remove the check valve and check valve gasket.

Refer to the accompanying literature for maintenance instructions for the check valve.

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If no further disassembly is required, see **Check Valve Installation**.

### Impeller Removal

#### (Figure 2)

For access to the impeller (2) or seal assembly (3), the pump casing (1) must be separated from the seal plate (8).

Drain the suction piping and remove it from the pump. Remove the casing drain plug (38) and drain the pump. Clean and reinstall the drain plug.

#### (Figure 1)

Remove the hardware (56, 57 and 58) securing the pump casing to the base. Disconnect the hand primer hose (63) from the suction flange, (62). Remove the nuts (34, Figure 2) securing the hand primer assembly (5) to the pump. Refer to the accompanying literature for maintenance and repair of the priming pump.

#### (Figure 2)

Remove the remaining nuts (34) and separate the pump casing from the seal plate. Tie and tag any leveling shims used under the casing. Remove the seal plate gasket (7) and clean the mating surfaces.

Inspect the casing wear ring (43) for excessive wear or scoring. If replacement is required, remove the setscrews (39) and pry or cut the ring from the casing bore.

Remove the impeller nut and washer (40 and 41) and use a soft-faced mallet to tap the impeller from the shaft. Retain the impeller key (42). Inspect the impeller and replace it if cracked or badly worn.

### Seal Removal

#### (Figure 2)

To remove the seal assembly (3), disengage the nuts (32) and slide the seal plate (8), seal and shaft sleeve (4) off the shaft as a single unit. Remove the shaft sleeve gasket (5).

Disengage the nuts (11) and remove the seal cap (9) and O-ring (6). Remove the stationary element and O-ring from the seal cap.

Pull the sleeve and rotating portion of the seal from the seal plate. Slide the rotating element, retainer and bellows, spring, and spring holder off the sleeve.

Inspect the seal plate wear ring (36) for excessive wear or scoring. If replacement is required, remove the setscrews (37) and pry or cut the ring from the seal plate.

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

---

---

## Separating Intermediate From Engine

### (Figures 3 or 4)

To service the impeller shaft, bearings, or drive plate, the pump must be separated from the engine. To accomplish this, support the intermediate using a suitable hoist and sling, and disengage the hardware (7 and 8) securing the intermediate and adaptor (6) to the engine bellhousing. Separate the intermediate and drive assembly (5) from the engine by pulling straight away.

The drive assembly consists of two parts; a drive spider attached to the impeller shaft, and a drive ring attached to the engine flywheel. Loosen the locking setscrew, and use a suitable puller to remove the drive spider and key (9) from the shaft. Remove the hardware (3 and 4) securing the drive ring to the flywheel.

Inspect the drive assembly parts for excessive wear. Individual parts for the drive assembly are not available.

## Shaft And Bearing Removal And Disassembly

### (Figure 2)

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

#### CAUTION

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

Remove the slinger ring (31). Disengage the capscrews (30) and remove the inboard bearing cap (14) and oil seal (29).

#### NOTE

There are no provisions for draining the grease from the bearing housing. Place a drip pan under the bearing housing before removing the shaft and bearings.

Disengage the capscrews (26) and remove the outboard bearing cap (19), oil seal (21) and gasket (18). Inspect the oil seals and, if replacement is required, use a screwdriver or other suitable tool to pry them from the bearing caps.

Straighten the tabs on the lockwasher (25), and remove the lock nut (24) and lockwasher. Place a block of wood against the drive end of the shaft and tap the shaft, inboard bearing (28) and spacer (27) out of the bearing housing. The outboard bearing (20) and spacer will remain in the bearing housing. Use a suitable puller to remove the bearing from the bearing housing.

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Use a bearing puller to remove the inboard bearing from the shaft. Remove the bearing spacers (27) from the shaft and bearing housing.

### Shaft and Bearing Reassembly And Installation

#### (Figure 2)

Clean the bearing housing, 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 prec- //
// autions 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 bearing housing. Replace the shaft or bearing housing if the proper bearing fit is not achieved.

Pre-pack the bearings by hand (or use a bearing packer if available) with No. 0 lithium base grease until the bearing balls are thoroughly lubricated.

Position the inboard bearing spacer (27) on the shaft as shown in Figure 2. Lubricate the shaft with light oil and press the inboard bearing (28) onto the shaft until it seats squarely against the bearing spacer. Lubricate the bearing housing bore with light oil and press the outboard ball bearing (20) into the housing bore until fully seated.

---

---

**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 spacer (27) on the shaft as shown in Figure 2 and slide the shaft into the bearing housing until the inboard bearing is fully seated in the bearing bore.

**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 lock washer (25) and lock nut (24) and secure with the tabs on the lockwasher.

Press the oil seals (21 and 29) into the bearing caps (14 and 19) with the lips positioned as shown in Figure 1. Align the grease passage in the outboard bearing cap with the grease passage in the bearing housing and secure the cap and gasket (18) to the bearing housing with the capscrews (26). Be careful not to damage the lip of the oil seal (21) on the shaft keyway.

Secure the inboard bearing cap to the bearing housing with the capscrews (30). Be careful not to damage the oil seal (29) on the shaft threads.

Install the slinger ring (31). Lubricate the bearings as indicated in **LUBRICATION**.

**Securing Intermediate To Engine****(Figures 3 or 4)**

Install the key (9), and press the drive spider onto the shaft to the dimension shown in Figure 3 or 4. **Be sure** to use the correct dimension for the drive assembly used on your pump.

Secure the drive ring to the engine flywheel with the hardware (3 and 4).

Position the adaptor (6) against the intermediate, slide the hardware (7 and 8) through the mounting holes in the intermediate and adaptor to hold it in place. Using a suitable hoist and sling, carefully slide intermediate, shaft and bearings into position until the teeth on the drive spider fully engage those in the drive ring. Secure the intermediate and adaptor to the engine bellhousing with the hardware (7 and 8).

---



---

## Seal Reassembly And Installation

### (Figures 2 and 5)

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

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

To ease installation of the seal, lubricate the O-rings and bellows with water or a very **small** amount of oil, and apply a drop of light lubricating oil on the finished faces. Assemble the seal as follows, (see Figure 5).

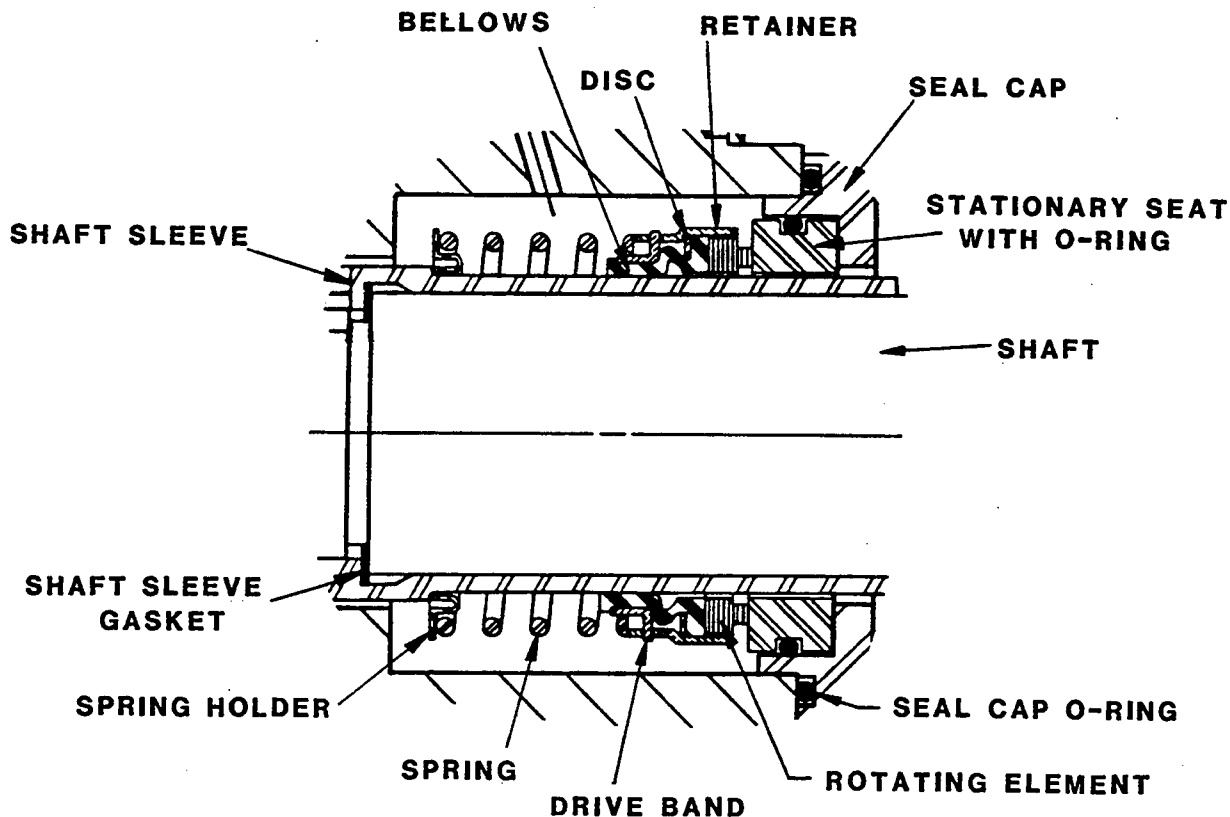


Figure 5. 25271-095 Seal Assembly

**CAUTION**

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

If the seal plate wear ring (36) was removed, press a new one into the seal plate until it seats squarely against the bore shoulder.

**CAUTION**

The wear ring **MUST** seat squarely in the seal plate bore or binding and/or excessive wear will result.

Drill and tap two new holes in the seal plate and wear ring and secure the wear ring with the setscrews (37).

Lay the seal plate on a flat surface with the impeller side down. Position the shaft sleeve (4) in the seal plate bore with the shoulder end down. Drop the spring holder and spring over the sleeve. Align the drive grooves of rotating



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---

element with the drive lugs of the bellows retainer, and slide this portion of the seal down the sleeve until the retainer seats in the spring.

Use thumb pressure to press the stationary seat into the seal cap (9) until fully seated. Secure the seal cap and O-ring (6) to the seal plate with the nuts (11).

Install a new sleeve gasket (5) completely against the shaft shoulder. Carefully slide the subassembled seal plate, seal, sleeve, and seal cap over the shaft and secure it to the bearing housing with the nuts (32).

## Impeller Installation

### (Figure 2)

Inspect the impeller and replace it if cracked or badly worn. Install the impeller key (42) and slide the impeller against the sleeve until both are fully seated. Install the impeller washer and nut (40 and 41).

If the casing wear ring (43) was removed, press a new one into the casing until it seats squarely against the bore shoulder.

### CAUTION

The wear ring **MUST** seat squarely in the casing bore or binding and/or excessive wear will result.

Drill and tap two new holes in the casing and wear ring and secure the wear ring with the setscrews (39).

Install the seal plate gasket (7). Slide the pump casing (1) over the impeller, position the hand primer mounting bracket against the seal plate, and secure with the nuts (34).

Replace any leveling shims used under the casing, and secure the pump casing to the base with the hardware (56, 57 and 58, Figure 1).

## Final Pump Reassembly

Reconnect the priming pump hose (63, Figure 1) at the pump suction flange (62). Reinstall the discharge check valve assembly (2, 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.

---

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

## LUBRICATION

### Seal Assembly

The seal assembly is lubricated by the medium being pumped and no additional lubrication is required.

### Bearings

The bearing housing was fully lubricated when shipped from the factory. Under normal conditions, add one shot of No. 0 lithium base grease from a grease gun through the grease fittings (15 and 17) after each 250 hours of operation or once each month, whichever comes first. **Do not** over-lubricate. Over-lubrication can cause the bearings to over-heat, resulting in premature bearing failure.

### CAUTION

If grease is forced out around the shaft as new grease is added, the bearing cavities are full. **DO NOT** add more grease. It is strongly recommended that the bearing housing be disassembled and cleaned immediately.

There are no provisions in the bearing cavities to drain or flush the lubricant. The pump and bearing housing must be separated from the base and engine, and the bearing caps removed to completely maintain these cavities.

Under normal conditions, change the grease after each 5000 hours of operation, or at 12 month intervals, whichever comes first. Change the grease more frequently if the pump is operated continuously or installed in an environment where variable hot and cold temperatures are common.

When lubricating a dry (overhauled) bearing housing, fill the cavities through the grease fittings with approximately 1 ounce of grease.

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

### Engine

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



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