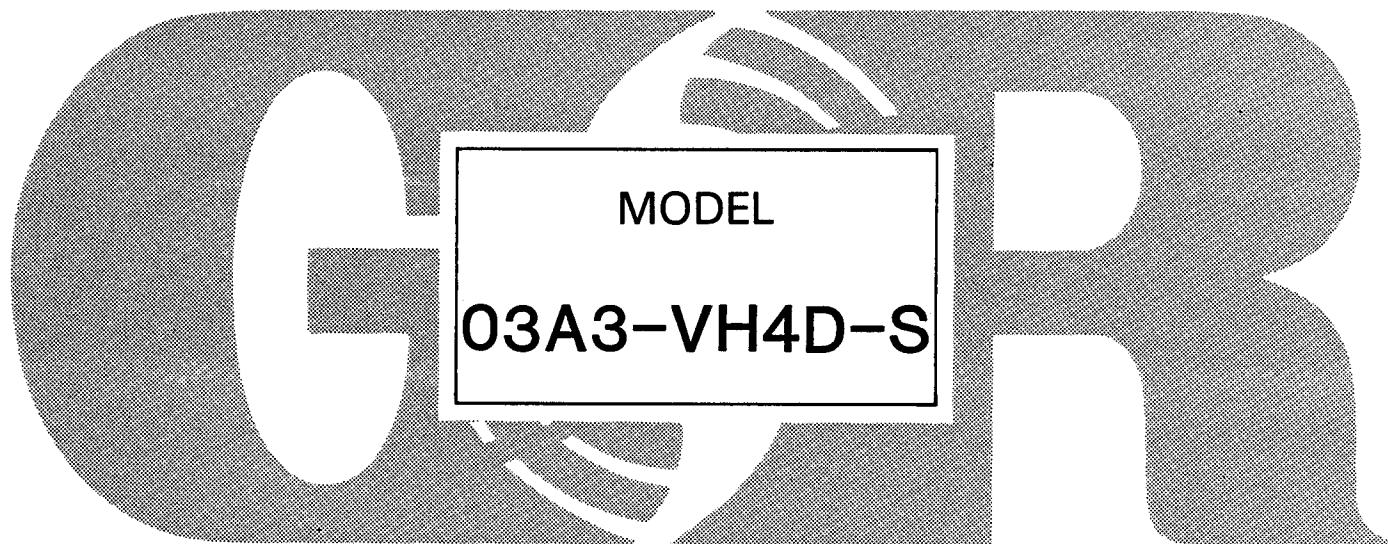


July 24, 1985



INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

Printed in U.S.A.

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The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

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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 O Series, semi-enclosed impeller, centrifugal model with straight-in suction, without a suction check valve. This pump is designed for pumping non-volatile, non-flammable liquids containing specified entrained solids. The basic material of construction for wetted parts is gray iron, with a ductile iron impeller and brass wear ring.

The engine furnished incorporates a spark-arresting muffler, and the base is equipped with a ground cable to eliminate static build-up of the liquid being pumped. The pump is designed for use in a non-flammable atmosphere where spark-arresting features are required, such as very dry grassy or forested areas.

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 0 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 or take other //  
// action to ensure that the pump will remain inop- //  
// erative. //  
// 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 non-volatile, //  
// non-flammable 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 connections are tight, properly sup- //  
// ported 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 attempt to disengage any parts of an overheated //  
// pump unit. Vapor pressure within the pump casing can //  
// eject these parts with great force when they are disen- //  
// gaged. Allow the pump to cool before servicing it. //  
// //  
//////////////////////////////////////
```

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

```
//////////////////////////////////////  
//  
// 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 2600 RPM. //  
// //  
//////////////////////////////////////
```

INSTALLATION

INSTALLATION - SECTION B

Since pump installations are seldom identical, this section offers only general recommendations and practices required to inspect, position, and arrange the pump and piping.

Most of the information pertains to a standard **static lift application** where the pump is positioned above the free level of liquid to be pumped.

If installed in a **flooded suction application** where the liquid is supplied to the pump under pressure, some of the information such as mounting, line configuration, and priming must be tailored to the specific application. Since the pressure supplied to the pump is critical to performance and safety, **be sure** to limit the incoming pressure to 50% of the maximum permissible operating pressure as shown on the pump performance curve.

For further assistance, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

Pump Dimensions

See Figure 1 for the approximate physical dimensions of this pump.

OUTLINE DRAWING

DIMENSIONS:

INCHES

MILLIMETERS

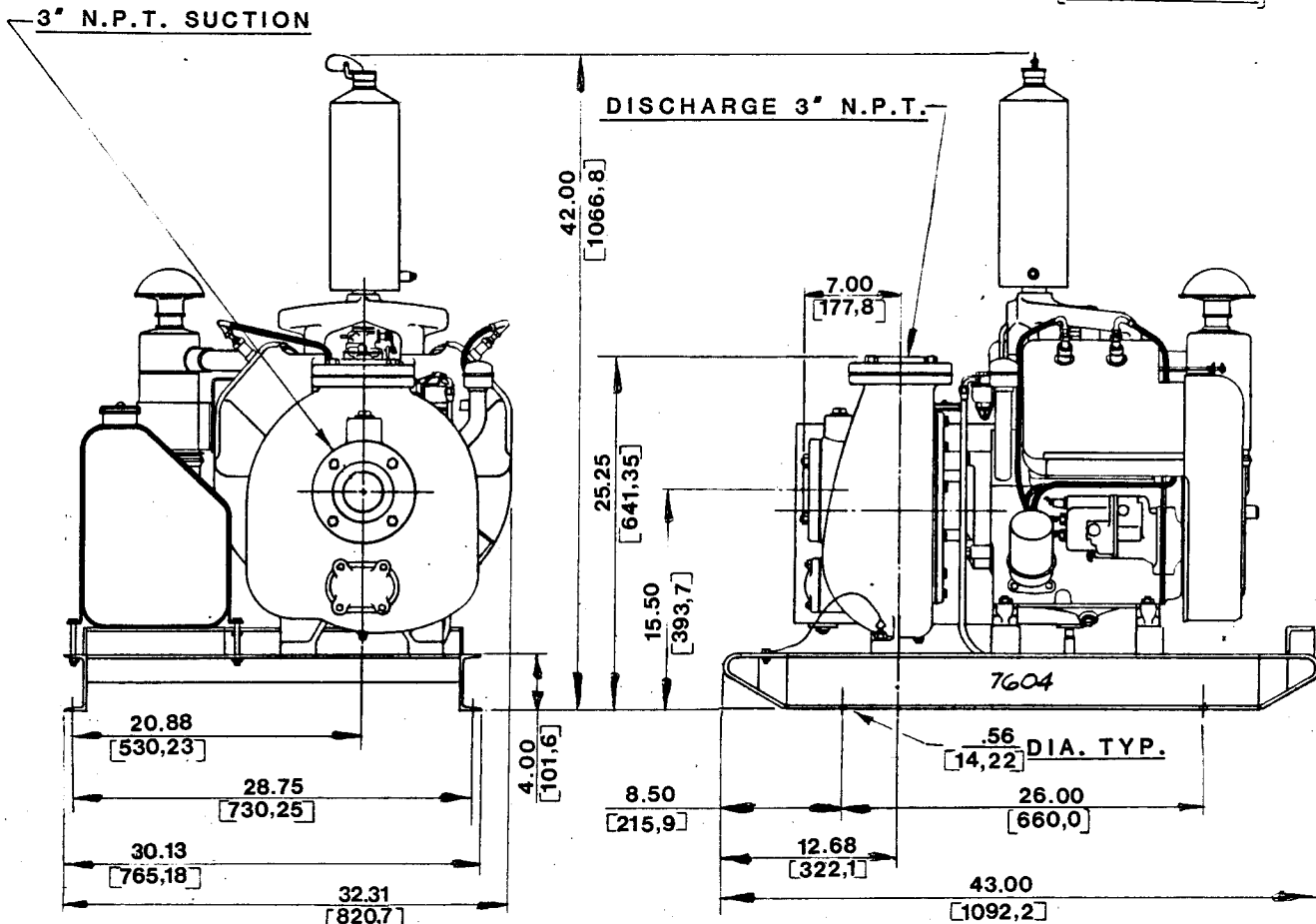


Figure 1. Pump Model 03A3-VH4D-S

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.

INSTALLATION

- d. Check all lubricant levels and lubricate as necessary. Refer to LUBRICATION in the MAINTENANCE AND REPAIR section of this manual and perform duties as instructed.
- e. If the pump and 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 **3,600 pounds**. This pump weighs approximately **720 pounds**, not including the weight of accessories and the optional wheel kit. Customer installed equipment such as suction and discharge piping **must** be removed before attempting to lift.

CAUTION

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

Mounting

Locate the pump in an accessible place as close as practical to the liquid being pumped. Level mounting is essential for proper operation. The pump may have to be supported or shimmed to provide for level operation or to eliminate vibration.

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

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.

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.

INSTALLATION

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).

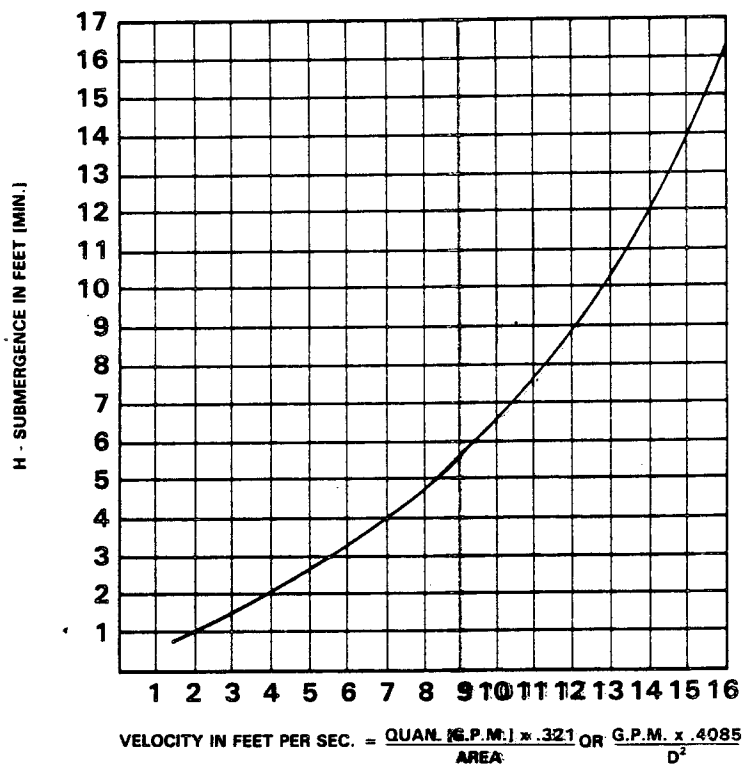


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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.

OPERATION

OPERATION - SECTION C**WARNING**

```
////////////////////////////////////  
//  
// This pump is designed to handle non-volatile, //  
// non-flammable 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

```
////////////////////////////////////  
//  
// 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 2600 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 should never be operated unless there is liquid in the casing.

CAUTION

Never operate this 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.

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

GROUNDING

To eliminate electrostatic build-up by the liquid being pumped, the base must be grounded by attaching the ground wire assembly to a ground rod. Install the ground rod in accordance with the National Electrical Codes and all local codes. Be sure the clamp or fastener has made a tight electrical connection with the rod.

CAUTION

Inspect and test the ground wire assembly for conductivity. Replace broken or frayed wire before resuming operation.

STARTING

Consult the operations manual furnished with the engine.

WARNING

```
////////////////////////////////////  
//  
// Consult the operations manual furnished with the engine //  
// before attempting to crank start the engine. When //  
// starting, make sure footing is firm and dry and other //  
// personnel are clear of the crank rotation plane. To //  
// avoid kickback injury, keep legs and upper body out of //  
// crank rotation plane and grasp the crank handle with THE //  
// THUMB UNDER THE HANDLE (See Figure 1). //  
// //  
////////////////////////////////////
```

Since the engine can be started using a hand crank, be sure to follow all safety precautions to prevent possible injury due to engine kickback.

OPERATION

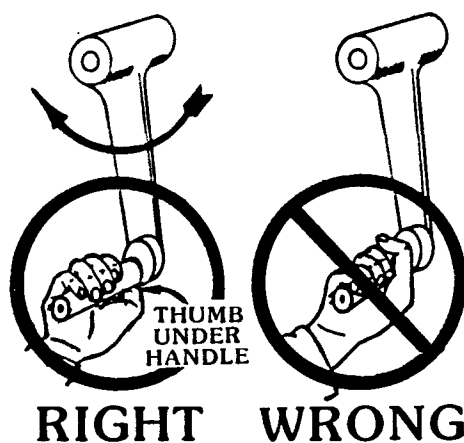


Figure 1. Crank Starting

OPERATION

CAUTION

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

Lines With a Bypass

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

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

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

Lines Without a Bypass

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

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

Leakage

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

Liquid Temperature And Overheating

The **maximum** liquid temperature for this pump is 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.

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.

Pump Vacuum Check

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

Open the suction line, and read the vacuum gauge with the pump primed and at operating speed. Shut off the pump. The vacuum gauge reading will immediately drop proportionate to static suction lift, and should then stabilize. If the vacuum reading falls off rapidly after stabilization, an air leak exists. Before checking for the source of the leak, check the point of installation of the vacuum gauge.

STOPPING

Never halt the flow of liquid suddenly. If the liquid being pumped is stopped abruptly, damaging shock waves can be transmitted to the pump and piping system. Close all connecting valves slowly. 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 or take other action to ensure that the pump will remain inoperative.

Cold Weather Preservation

In below freezing conditions, drain the pump to prevent damage from freezing. Also, clean out any solids by flushing with a hose. Operate the pump for approximately one minute; this will remove any remaining liquid that could freeze the pump rotating parts.

If the pump will be idle for more than a few hours, or if it has been pumping liquids containing a large amount of solids, drain the pump, and flush it thoroughly with clean water. To prevent large solids from clogging the drain port and preventing the pump from completely draining, insert a rod or stiff wire in the drain port, and agitate the liquid during the draining process. Clean out any remaining solids by flushing with a hose.

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 or take other
//    action to ensure that the pump will remain inop-
//    erative.
// 3. Allow the pump to cool if overheated.
// 4. Vent the pump slowly and cautiously.
// 5. Close the suction and discharge valves.
// 6. Check the temperature before opening any covers,
//    plates, or plugs.
// 7. Drain the pump.
//
////////////////////////////////////

```

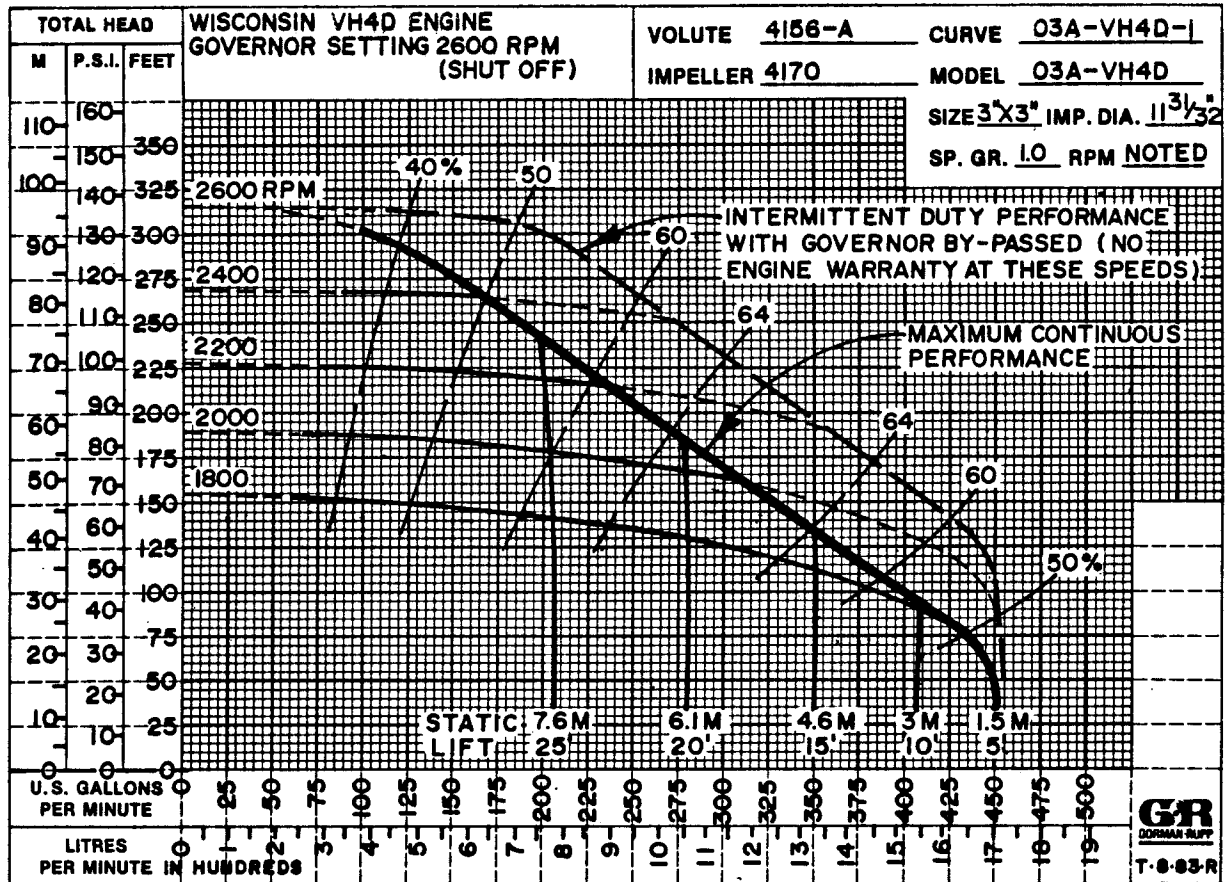
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Suction check valve or foot valve clogged or binding.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

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE(cont.)	<p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Suction lift or discharge head too high.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Strainer clogged.</p>	<p>Free impeller of debris.</p> <p>Check engine output; consult engine operation manual.</p> <p>Check piping installation and install bypass line if needed. See INSTALLATION.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check strainer and clean if necessary.</p>
PUMP REQUIRES TOO MUCH POWER	<p>Pump speed too high.</p> <p>Discharge head too low.</p> <p>Liquid solution too thick.</p>	<p>Check engine output.</p> <p>Adjust discharge valve.</p> <p>Dilute if possible.</p>
PUMP CLOGS FREQUENTLY	<p>Discharge flow too slow.</p> <p>Suction check valve or foot valve clogged or binding.</p> <p>Discharge line clogged or restricted; hose kinked.</p>	<p>Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.</p> <p>Clean valve.</p> <p>Check discharge lines; straighten hose.</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>

MAINTENANCE AND REPAIR

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 03A3-VH4D-S

*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

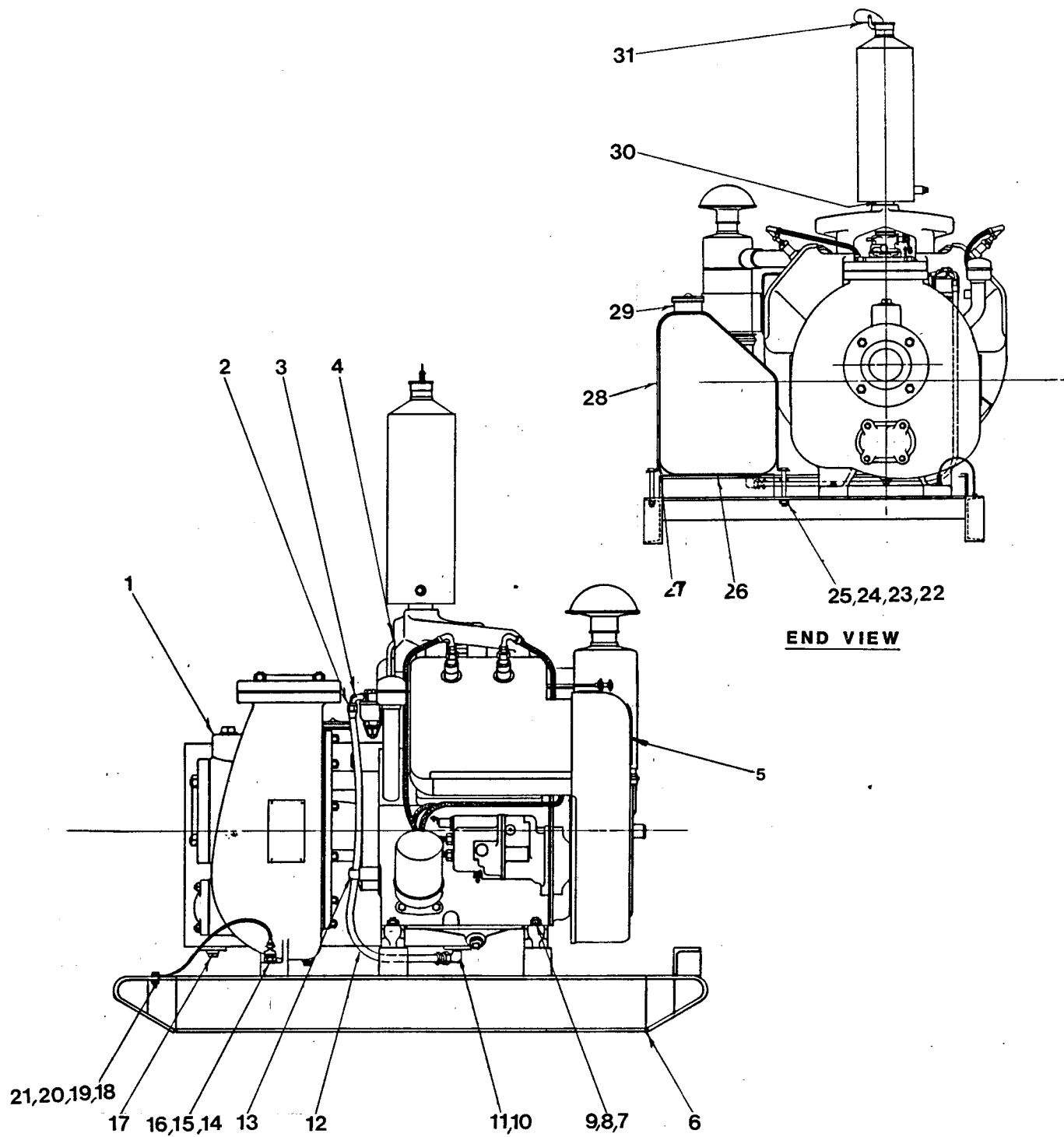


Figure 1. Pump Model 03A3-VH4D-S

MAINTENANCE AND REPAIR

PARTS LIST
Pump Model 03A3-VH4D-S
 (From S/N 810826 up)

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

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP END ASSY	(SEE FIGURE 2)		1
2	SWIVEL HOSE END	S01670	-----	1
3	ELBOW	S01061	-----	1
4	WISCONSIN VH4D ENGINE	29137-432	-----	1
5	WARNING DECAL	38817-058	-----	1
6	COMBINATION BASE	7604	24000	1
7	HEX HD CAPSCREW	B00809	15991	4
8	T TYPE LOCKWASHER	BL00008	15991	8
9	HEX NUT	D00008	15991	4
10	SWIVEL HOSE END	S01670	-----	1
11	TUBE FITTING	S00634	-----	1
12	HOSE	31411-025	19360	1
13	CLIP	6006	15990	1
14	HEX HD CAPSCREW	B01007	15991	2
15	T TYPE LOCKWASHER	BL00010	15991	4
16	HEX NUT	D00010	15991	2
17	PIPE PLUG	P00004	11990	1
18	T TYPE LOCKWASHER	BL00004	15991	2
19	HEX NUT	D00004	15991	1
20	GROUND WIRE ASSY	13830	-----	1
21	HEX HD CAPSCREW	B00403	15991	1
22	HEX HD CAPSCREW	B00606	15991	1
23	HEX HD CAPSCREW	B00615	15991	3
24	LOCKWASHER	J00006	15991	4
25	HEX NUT	D00006	15991	2
26	FELT STRIP	9490	18030	2
27	FELT STRIP	9490-D	18030	2
28	GAS TANK STRAP	6353	15990	2
29	GAS TANK	S00992	-----	1
30	PIPE PLUG	AE00020	11990	1
31	WEATHER CAP	S01331	-----	1

*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO. AND UP

SECTIONAL DRAWING

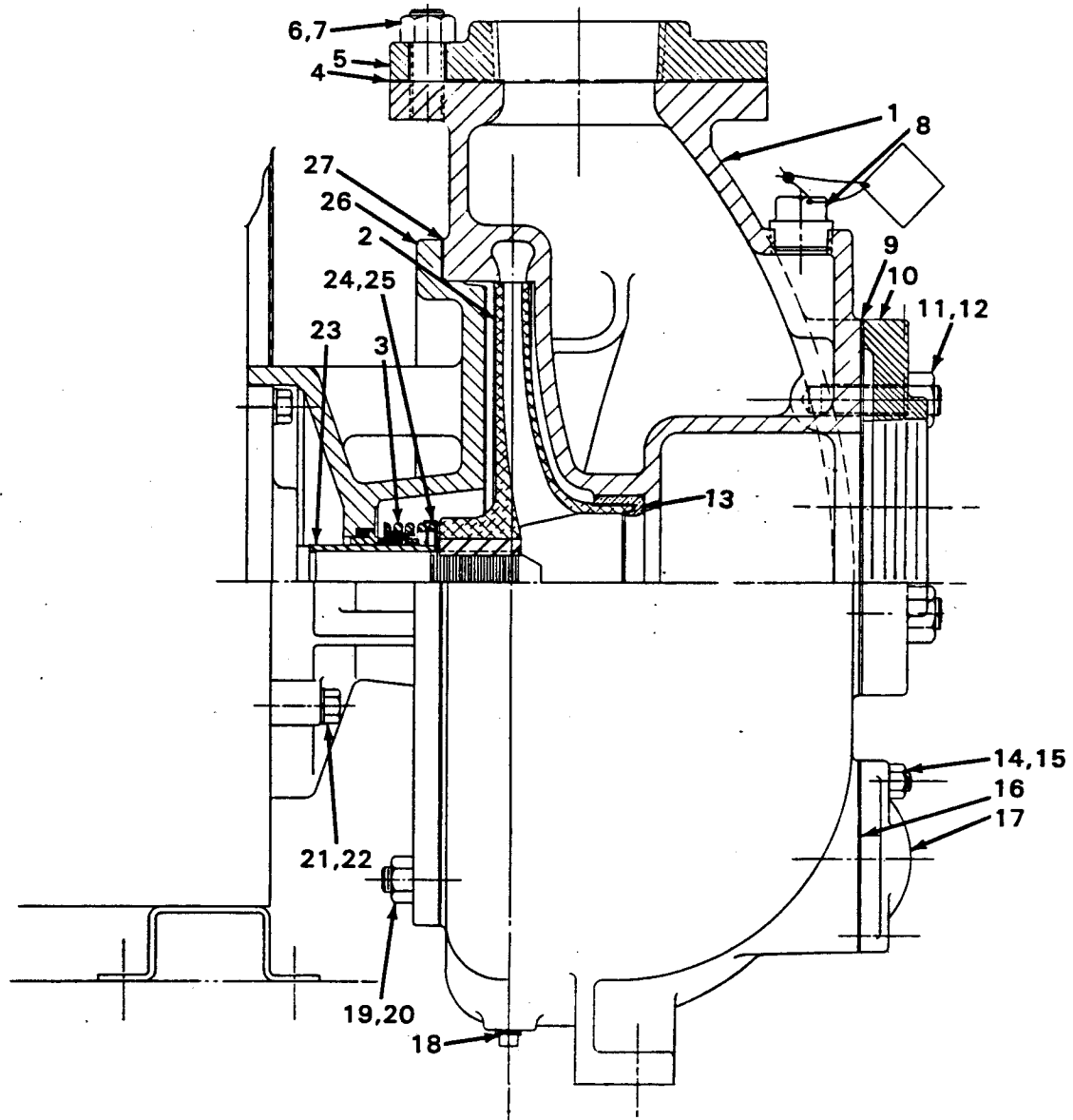


Figure 2. Pump End Assy 03A3-VH4D-S

MAINTENANCE AND REPAIR

PARTS LIST
Pump End Assy 04A3-VG4D-S

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP CASING	4156-A	10010	1
2	* IMPELLER	4170	13010	1
3	* SEAL ASSEMBLY	25271-207	-----	1
4	* DISCHARGE FLANGE GASKET	1674-GB	20000	1
5	DISCHARGE FLANGE	1753-A	11000	1
6	STUD	C01009	15991	4
7	HEX NUT	D00010	15991	4
8	FILL PLUG ASSEMBLY	48271-062	-----	1
9	* SUCTION FLANGE GASKET	1674-GB	20000	1
10	SUCTION FLANGE	1753-A	11000	1
11	STUD	C01009	15991	4
12	HEX NUT	D00010	15991	4
13	* WEAR RING	4158-A	14000	1
14	STUD	C00606	15991	4
15	HEX NUT	D00006	15991	4
16	* CLEAN OUT COVER GASKET	4635-GA	20000	1
17	CLEAN OUT COVER	4635	10010	1
18	CASING DRAIN PLUG	P00004	11990	1
19	STUD	C00807	15991	12
20	HEX NUT	D00008	15991	12
21	HEX HD CAPSCREW	B00709	15991	4
22	LOCKWASHER	J00007	15991	4
23	* SHAFT SLEEVE	3428-A	17030	1
24	* SPRING CENTERING WASHER	3930	17090	1
25	* IMPELLER ADJUSTING SHIM SET	37-J	17090	1
26	INTERMEDIATE	4161-A	10010	1
27	* PUMP CASING GASKET	4156-GA	20000	1
NOT SHOWN:				
	NAME PLATE	2613-C	13990	1
OPTIONAL:				
	WHEEL KIT	GRP30-08	-----	1

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

Before attempting to service the pump, switch off the engine ignition or take other action to ensure that the engine will remain inoperative while the pump is being serviced, and close all valves in the suction and discharge lines.

WARNING

```
////////////////////////////////////  
//  
// Before attempting to open or service the pump: //  
//  
// 1. Familiarize yourself with this manual. //  
// 2. Switch off the engine ignition or take other //  
// action to ensure that the pump will remain inop- //  
// erative. //  
// 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. //  
//  
////////////////////////////////////
```

Pump Disassembly

(Figure 2)

Before attempting to service the pump, remove the casing drain plug (18) and drain the pump. Clean and reinstall the drain plug.

To service the wear ring, impeller, seal assembly, or intermediate, the pump casing must be separated from the base and intermediate.

Remove the suction and discharge lines. See Figure 1 and remove the hardware (14, 15 and 16) securing the casing to the base. Remove the nuts (20), and use a suitable hoist and sling to separate the pump casing and gasket (27) from the intermediate (26).

Tie and tag any leveling shims used under the casing feet to ease reassembly.

WARNING

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

MAINTENANCE AND REPAIR

Inspect the wear ring (13), and replace if badly scored or worn. The wear ring is a press fit in the pump casing.

Impeller Removal

(Figure 2)

Immobilize the engine crankshaft and insert a 7/16 inch diameter steel rod between the vanes of the impeller. To loosen the impeller, turn the rod in a counter-clockwise direction (when facing the impeller). **Be careful** not to damage the impeller vanes.

After the impeller breaks loose, remove the bar and unscrew the impeller. Use caution when removing the impeller; tension on the seal spring will be released as the impeller is removed. Remove the impeller adjusting shims (25). Tie and tag the shims or measure and record their thickness for ease of reassembly.

Seal Removal

(Figure 2)

Remove the spring centering washer (24), spring, shaft sleeve (23), retainer and bellows, and rotating element.

Disengage the hardware (21 and 22) and slide the intermediate and stationary element off the shaft as a unit. Press the stationary element with O-ring out of the intermediate.

Seal Installation

(Figures 2 and 3)

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 3).

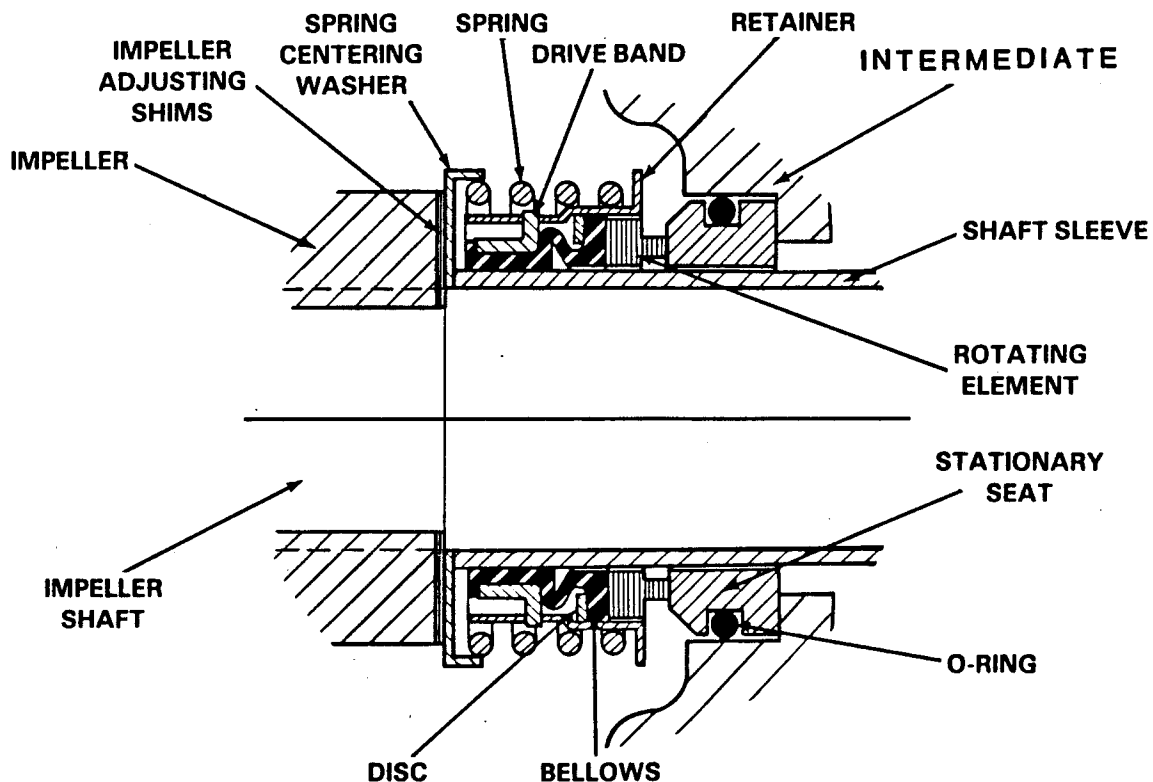


Figure 3. 25271-207 Seal Assembly

CAUTION

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

Lay the intermediate on a flat surface with the impeller side facing up. Subassemble the O-ring onto the stationary element and press this subassembly into the intermediate until it seats squarely against the shoulder bore. Position

the shaft sleeve (23) through the I.D. of the stationary element with the chamfered end down.

Subassemble the rotating element into the retainer and bellows and slide this subassembly over the shaft sleeve until the polished faces contact.

Carefully slide the assembled intermediate, sleeve, and seal over the shaft. Secure the intermediate to the engine with the hardware (21 and 22). Install the seal spring and spring centering washer (24).

Impeller Installation

(Figure 2)

Inspect the impeller and replace it if cracked or badly worn. Install the same thickness of impeller adjusting shims (25) as previously removed and screw the impeller onto the shaft until tight.

For maximum pump efficiency, the impeller should be centered within the volute scroll.

To verify the impeller positioning, measure the pump casing and impeller as shown in Figure 4. Use these measurements to calculate the required impeller location (dimension E). Add or remove impeller adjusting shims until dimension E is obtained.

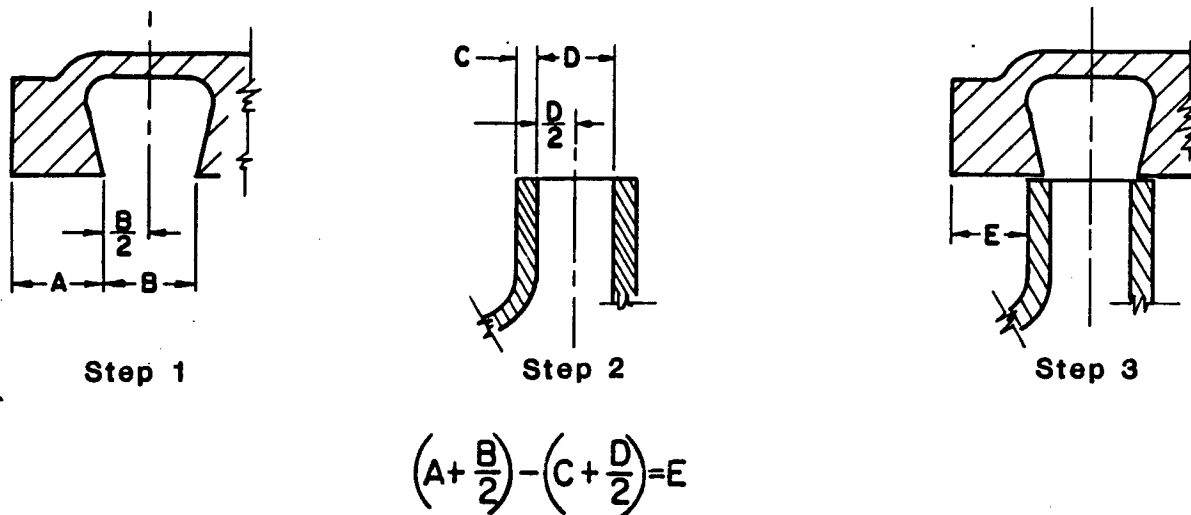


Figure 4. Centering Impeller Within Volute Scroll

NOTE

After the impeller has been properly positioned, check for free rotation. Correct any scraping binding before further reassembly.

Pump Reassembly

(Figure 2)

If removed for replacement, press the wear ring (13) into the casing until it seats squarely against the shoulder bore.

CAUTION

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

Install the casing gasket (27) and secure the casing to the intermediate with the hardware (20). Reinstall any leveling shims used under the casing mounting feet and secure the casing to the base with the hardware (14, 15 and 16, Figure 1).

Final Pump Reassembly

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 pedestal 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

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

Engine

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

ENGINE MODIFICATIONS

The Wisconsin VH4D engine used on this pump is not a standard commercial model. It has been specially modified for use in a non-flammable atmosphere where spark-arresting features are required. Further modifications may not be made without jeopardizing the integrity of the safety features. Consult the engine manufacturer or their local representative for acceptable replacement parts.

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or call:
519–631–2870**