

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST



<p>MODEL</p>
<p>2D-9</p>

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 is a D Series positive displacement pump, utilizing a single-action diaphragm to produce a

straight-through flow of liquid. The pump is close-coupled to a 3.5 HP Briggs and Stratton gasoline engine. It is ideally suited to industrial and contractor's applications since it will handle liquids ranging from clear water to construction-site muck. The basic material of construction for wetted parts is aluminum, with neoprene flap valves and diaphragm.

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

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:



Immediate hazards which WILL result in severe personal injury or death. These instructions describe the procedure required and the injury which will result from failure to follow the procedure.



Hazards or unsafe practices which COULD result in severe personal injury or death. These instructions describe the procedure required and the injury which could result from failure to follow the procedure.



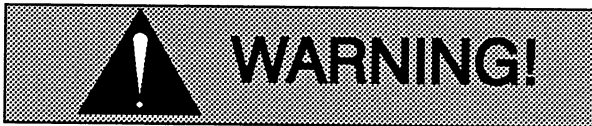
Hazards or unsafe practices which COULD result in minor personal injury or product or property damage. These instructions describe the requirements and the possible damage which could result from failure to follow the procedure.

NOTE

Instructions to aid in installation, operation, and maintenance, or which clarify a procedure.

SAFETY - SECTION A

This information applies to D Series engine driven diaphragm pumps. Refer to the manual accompanying the engine before attempting to begin operation.



Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Disconnect the spark plug wire to ensure that the pump will remain inoperative.
3. Close the discharge valve (if used).
4. Drain the pump.



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.



After the pump has been installed, block the wheels and secure the pump to prevent creeping. Make certain that the pump and all piping or hose connections are tight, properly supported and secure before operation.



Do not operate the pump without the eccentric and coupling guards in place over the rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.



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 pump is 2600 RPM.



The gearbox provided on this pump is designed for operation at 2600 RPM maximum synchronous input speed. If operated at a higher rpm, pump components may be destroyed.



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



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



Never install a positive shut-off valve in the discharge line; discharge restrictions will cause excessive friction loss resulting in overloading and destruction of pump and drive components. It is strongly recommended that unless absolutely necessary, no positive shut-off valve be installed in the suction line; excessive restriction will cause incomplete filling of the diaphragm chamber and result in shortened diaphragm life.

INSTALLATION – SECTION B

Review all **SAFETY** information in Section A.

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

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

Pump Dimensions

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

OUTLINE DRAWING

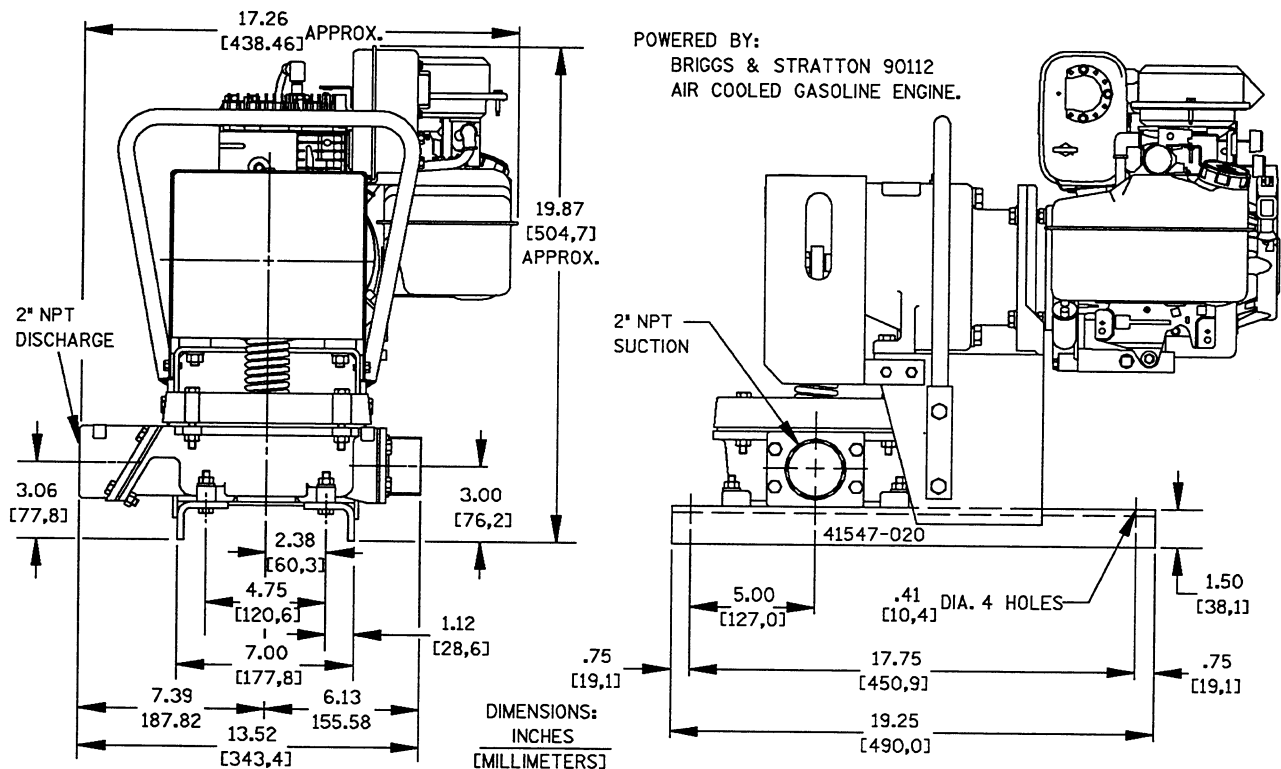


Figure 1. Pump Model 2D-9

PREINSTALLATION INSPECTION

The pump assembly was inspected and tested before shipment from the factory. Before installation, inspect the pump for damage which may have occurred during shipment. Check as follows:

- Inspect the pump for cracks, dents, damaged threads, and other obvious damage.
- Check for and tighten loose attaching hardware. Since gaskets tend to shrink after drying, check for loose hardware at mating surfaces.
- Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated.
- Check levels and lubricate as necessary. Refer to **LUBRICATION** in the **MAINTENANCE AND REPAIR** section of this manual and perform duties as instructed.
- 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

This pump is designed to be easily positioned for operation using the drawbar and wheels. The total pump weight is approximately **108 pounds (49 kg)**, not including accessories or customer installed options. Customer installed equipment such as suction and discharge piping **must** be removed before attempting to lift.



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.

After the pump has been positioned, block the wheels and secure the pump to prevent creeping.

SUCTION AND DISCHARGE PIPING

Pump performance is adversely effected by increased suction lift, discharge elevation, and friction losses. See Page E-1 to be sure your overall application allows the pump to operate within the safe operation range.

Materials

Either pipe or hose maybe 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.

Never pull a line into place by tightening connections at the pump. Lines near the pump must be independently supported to avoid strain on the pump which could cause excessive vibration and increased diaphragm and gear train wear. If hose-type lines are used, they should have adequate support to secure them when filled with liquid and under pressure.

Fixed, Rigid Piping

This pump is equipped with an integral suction accumulator chamber which promotes an efficient flow of liquid and acts as an air cushion against shock. Since the air in this chamber will leak away during pump operation, the air must be replenished periodically. To introduce air into the chamber, stop the pump and remove the suction accumulator plug and integral gasket; this will break prime and allow the liquid in the chamber to drain away through the suction line.

If the pump is mounted in a system with fixed, rigid piping, it is recommended that a flexible connection be installed at or near the suction and discharge ports to absorb shock which would otherwise be transmitted through the drive train and greatly accelerate pump wear.

In a fixed piping installation, properly sized surge suppressors **must** be installed in both suction and discharge lines. If commercial surge suppressors are not readily available, air chambers may be fabricated from pipe as shown in Figure 2.

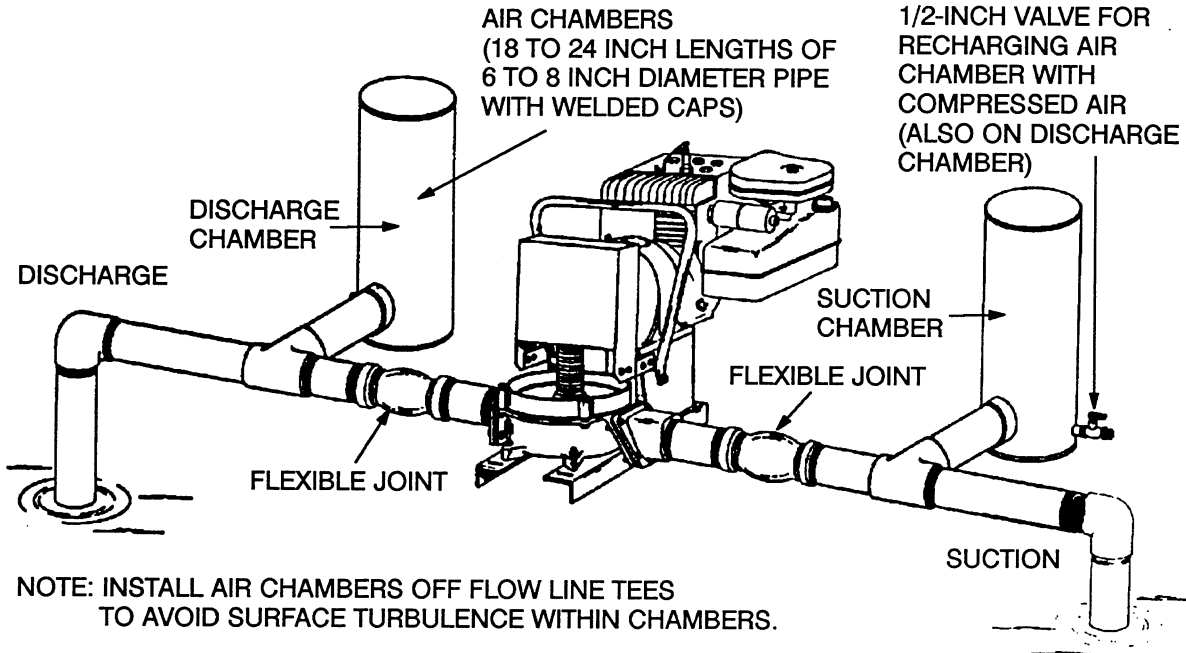


Figure 2. Fixed Piping Installation

Note that the air chambers have not been installed directly in the flow line, but have been installed off tees to avoid turbulence within the chambers. The air chambers are fitted with valves to permit introduction of small amounts of compressed air to further dampen shock; this compressed air will leak away during operation, and should be replaced from time to time. If the suction chamber floods, open the suction chamber valve to break prime and allow the liquid in chamber to drain through the suction line.

Gauges

If discharge pressure and vacuum suction gauges are desired, drill and tap the suction and discharge lines not less than 18 inches (457 mm) 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.

NOTE

Maximum pump performance is realized at suction lifts of 5 feet (1,5 m) or less. Use the shortest possible length of suction hose or piping; lengths of 25 feet (7,6 m) or longer will reduce the capacity of the pump.

It is strongly recommended that no positive shut-off valve be installed in the suction line; excessive restrictions will cause incomplete filling of the diaphragm chamber and result in short diaphragm life.

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. The suction line should not be restricted more than 1 inch below the nominal suction size.

The use of pipe couplings in the suction line is not recommended.

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 2-1/4 inch (57 mm) 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.

DISCHARGE LINES



The discharge line must be the same size as, or larger than, the suction line. Never install or operate the pump with a discharge line smaller than the suction; a restricted discharge line will cause excessive friction loss resulting in overloading and destruction of pump and drive components.

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 pump is provided with integral suction and discharge check valves.



Never install a positive shut-off valve in the discharge line; discharge restrictions will cause excessive friction loss resulting in overloading and destruction of pump and drive components. It is strongly recommended that unless absolutely necessary, no positive shut-off valve be installed in the suction line; excessive restriction will cause incomplete filling of the diaphragm chamber and result in shortened diaphragm life.

OPERATION – SECTION C

Review all **SAFETY** information in Section A.

Follow the instructions on all tags, labels and decals attached to the pump.



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.

Pump application will affect its performance, especially discharge velocities. Consult the Gorman-Rupp factory for actual performance levels for the pump.

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 components are properly lubricated (see **LUBRICATION** in **MAINTENANCE AND REPAIR**).



Make certain that any positive shut-off valve installed in the suction line is open before operating the pump; excessive restriction will cause incomplete filling of the diaphragm chamber and result in shortened diaphragm life. No positive shut-off valve should be installed in the discharge line.

STARTING

Consult the operations manual furnished with the engine. Open any valves installed in the suction line and start the pump.

OPERATION



The pump is designed to operate at approximately 60 cycles per minute through a gearbox with a 43.36:1 ratio at a maximum input speed of 2600 RPM. Make certain that input speed does not exceed this RPM. Operation at higher RPM can cause pump components to be damaged or destroyed.

Priming

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 the engine and check the suction line for leaks.

OPERATION CHECKS

Speed Reducer Check

Check that the speed reducer is properly lubricated (see **LUBRICATION** in **MAINTENANCE AND REPAIR**).

Leakage Check

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

Strainer Check

If a suction strainer has been installed, check and clean it as necessary. It should be cleaned if pump flow begins to drop. If a vacuum suction gauge has been installed, monitor and record the readings regularly to detect strainer blockage.

STOPPING

After stopping the pump, disconnect the engine spark plug wire to ensure that the pump will remain inoperative.

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, flush it with clean water.

Cold Weather Preservation



The primary construction materials of this pump are aluminum, with neoprene flap valves and diaphragm. Do not attempt to clean or flush this pump with any liquid which would attack pump fittings or components. Avoid cleaning with cleaning solvent.

In below freezing conditions, drain the water from the pump and the lines when the pump is not in oper-

ation. Also, clean out any solids by flushing with a hose.

GEARBOX TEMPERATURE CHECK

The gearbox runs higher than ambient temperatures because of heat generated by friction. Temperatures of approximately 200°F (93°C) are considered normal, and can operate intermittently at 250°F (121°C).

Checking gearbox temperatures by hand is inaccurate. Place a contact-type thermometer against the housing and record this temperature for future reference.

A sudden increase in gearbox temperature is a warning that the bearings are at the point of failing. Make certain that the bearing lubricant is of the proper viscosity and at the correct level (see **LUBRICATION** in Section E). 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.

TROUBLESHOOTING – SECTION D

Review all SAFETY information in Section A.



Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Disconnect the engine spark plug wire ensure that the pump will remain inoperative.
3. Close the discharge valve (if used).
4. Drain the pump.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Air leak in suction line. Lining of suction hose collapsed. Integral suction or discharge check valve clogged, binding, or not seating properly. Cracked or broken diaphragm. Diaphragm not securely in place. Strainer clogged.	Correct leak. Replace suction hose. Clean valves, check that flange nuts are tight. Replace diaphragm. Secure diaphragm. Check strainer and clean if necessary
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line. Suction intake not properly submerged. Lining of suction hose collapsed. Cracked or broken diaphragm. Diaphragm not securely in place. Strainer clogged. Integral suction or discharge check valve clogged, binding, or not seating properly.	Correct leak. Check installation. Replace suction hose. Replace diaphragm. Secure diaphragm. Check strainer and clean if necessary Clean valves, check that flange nuts are tight.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP REQUIRES TOO MUCH POWER	Liquid solution too thick. Pump speed too high. Integral discharge check valve clogged or binding. Bearings in engine or gearbox worn or binding.	Dilute if possible. Check engine output. Clean valve. Check bearings.
PUMP CLOGS FREQUENTLY	Integral suction or discharge check valve clogged, binding, or not seating properly. Liquid solution too thick.	Clean valves, check that flange nuts are tight. Dilute if possible.
EXCESSIVE NOISE	Pump, gearbox, or engine not securely mounted. Gearbox or engine not properly lubricated.	Check and tighten mounting bolts. See LUBRICATION in MAINTENANCE AND REPAIR .
BEARINGS RUN TOO HOT	Bearing temperature is high, but within limits. Low or incorrect lubricant. Drive misaligned.	Check bearing temperature regularly to monitor any increase. Check for proper type and level of lubricant. Align drive properly.

PUMP MAINTENANCE AND REPAIR - SECTION E

MAINTENANCE AND REPAIR OF THE WEARING PARTS OF THE PUMP WILL MAINTAIN PEAK OPERATING PERFORMANCE.

IN GALLONS PER MINUTE AT 60 STROKES PER MINUTE					
STATIC LIFT IN FEET	STATIC DISCHARGE HEAD IN FEET				
	0	5	10	15	20
5	27	26	24	22	20
10	25	24	21	20	19
15	22	21	20	19	18
20	21	20	19	18	17

IN LITERS PER MINUTE AT 60 STROKES PER MINUTE					
STATIC LIFT IN FEET	STATIC DISCHARGE HEAD IN METERS				
	0	1,5	3,0	4,6	6,1
1,5	102,2	98,4	90,8	83,3	75,7
3,0	94,6	90,8	79,5	75,7	71,9
4,6	83,3	79,5	75,7	71,9	68,1
6,1	79,5	75,7	71,9	68,1	64,3

* STANDARD PERFORMANCE TEST DATA FOR PUMP MODEL 2D-9

* Based on 70° F (21° C) clear water at sea level with minimum suction lift, using 2 inch (5,08 cm) suction hose and 2 inch (5,08 cm) non-collapsible discharge hose.

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.

NOTE

The Gorman-Rupp speed reducer P/N 24572-006 used in this pump is a proprietary item manufactured by Dayton Electric Manufacturing Co. as a Special Model No. 8Z785. If replacement is necessary, the complete speed reducer must be ordered exclusively from The Gorman-Rupp Company; Gorman-Rupp **does not** stock or furnish any component parts.

Except for the output shaft, all component parts are identical to those used in the Dayton Electric non-

proprietary Model 2Z933-A Speed Reducer, and may be obtained from W.W. Grainger Inc., 1275 Barclay Blvd., Buffalo Grove, Illinois, 60089 (1-800-323-0620).

Figure 3 in this Section shows an exploded-view assembly drawing, followed by a parts list for Dayton Model 2Z933-A Speed Reducer. The output shaft is **not available** as a repair part from either W.W. Grainger or the Gorman-Rupp Company. If the output shaft requires replacement, a complete reducer must be ordered from the Gorman-Rupp Company.

The mounting feet of the non-proprietary gear housing used in Model 2Z933-A must be modified for proper mounting on the base for this pump. Figure 4 in this section shows the necessary modifications.

SECTION DRAWING

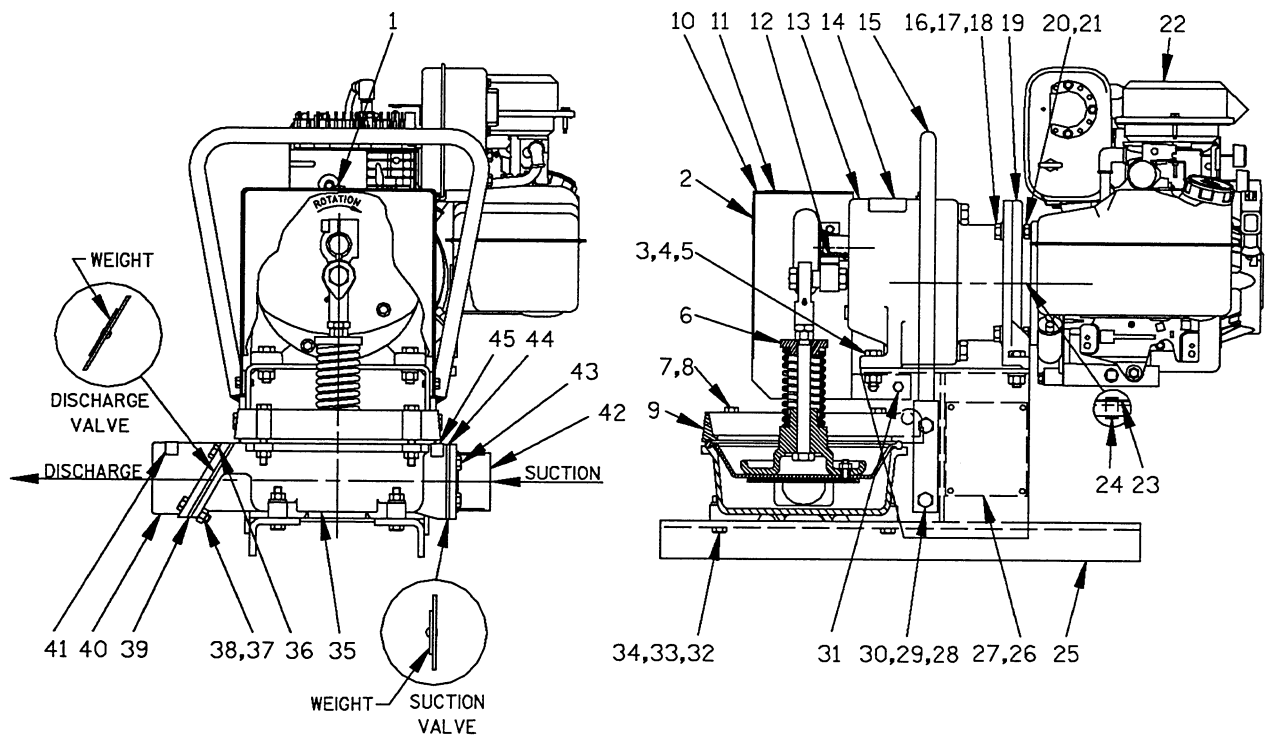


Figure 1. Pump Model 2D-9

PARTS LIST
Pump Model 2D-9
 (From S/N 1077545 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	VENTED PLUG	4823	15079	1	26	NAME PLATE	38818-004	13990	1
2	LUBE DECAL	38816-085	-----	1	27	DRIVE SCREW	BM#04-03	17000	4
3	HEX HD CAPSCREW	B0605	15991	4	28	HEX HD CAPSCREW	B0604	15991	4
4	LOCKWASHER	J06	15991	4	29	LOCKWASHER	J06	15991	4
5	HEX NUT	D06	15991	4	30	HEX NUT	D06	15991	4
6	PLUNGER ROD ASSY	46181-004	-----	1	31	HEX HD TAPSCREW	21281-472	-----	4
7	HEX HD CAPSCREW	B0509	15991	4	32	HEX HD CAPSCREW	B0506	15991	4
8	HEX NUT	D05	15991	4	33	LOCKWASHER	J05	15991	4
9	RETAINER RING	26812-702	-----	1	34	HEX NUT	D05	15991	4
10	ECCENTRIC GRD ASSY	42381-024	24150	1	35	DIAPHRAGM POT	38234-006	10010	1
11	ROTATION DECAL	2613BM	-----	1	36	HEX HD CAPSCREW	B0503	15991	2
12 *	OUTPUT SHAFT KEY	N0403	15990	1	37	HEX HD CAPSCREW	B0504 1/2	15991	2
13	SPEED REDUCER ASSY	44161-029	-----	1	38	HEX NUT	D05	15991	2
◆	-SPEED REDUCER	24572-006	-----	1	39 *	DISCHARGE VALVE ASSY	26812-708	-----	1
14	WARNING DECAL	2613FE	-----	1	40	DISCHARGE FLANGE	26812-707	-----	1
15	CARRY HANDLE	44724-007	24150	1	41	DISCHARGE STICKER	6588BJ	-----	1
16	HEX HD CAPSCREW	B0605	15991	4	42	SUCTION FLANGE	26812-704	-----	1
17	LOCKWASHER	J06	15991	4	43	HEX HD CAPSCREW	B0503	15991	4
18	HEX NUT	D06	15991	4	44 *	SUCTION VALVE ASSY	26812-705	-----	1
19	INTERMEDIATE	38262-102	13040	1	45	SUCTION STICKER	6588AG	-----	1
20	HEX HD CAPSCREW	B0503S	15991	4					
21	LOCKWASHER	J05	15991	4					
22	B & S 3.5 H.P. ENGINE	29112-504	-----	1					
23 *	INPUT SHAFT KEY	N0307	15990	1	NOT SHOWN:				
24	SPACER	31143-062	15070	1		SHIPPING PLUG	11495	15079	1
25	BASE ASSY	41547-020	24150	1		STRAINER	9026D	24001	1
						WARNING DECAL	2613FE	-----	1

* INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO. AND UP

◆ SEE NOTE ON PAGE 1 AND FIGURES 3 AND 4 FOR DETAILS.

SECTION DRAWING

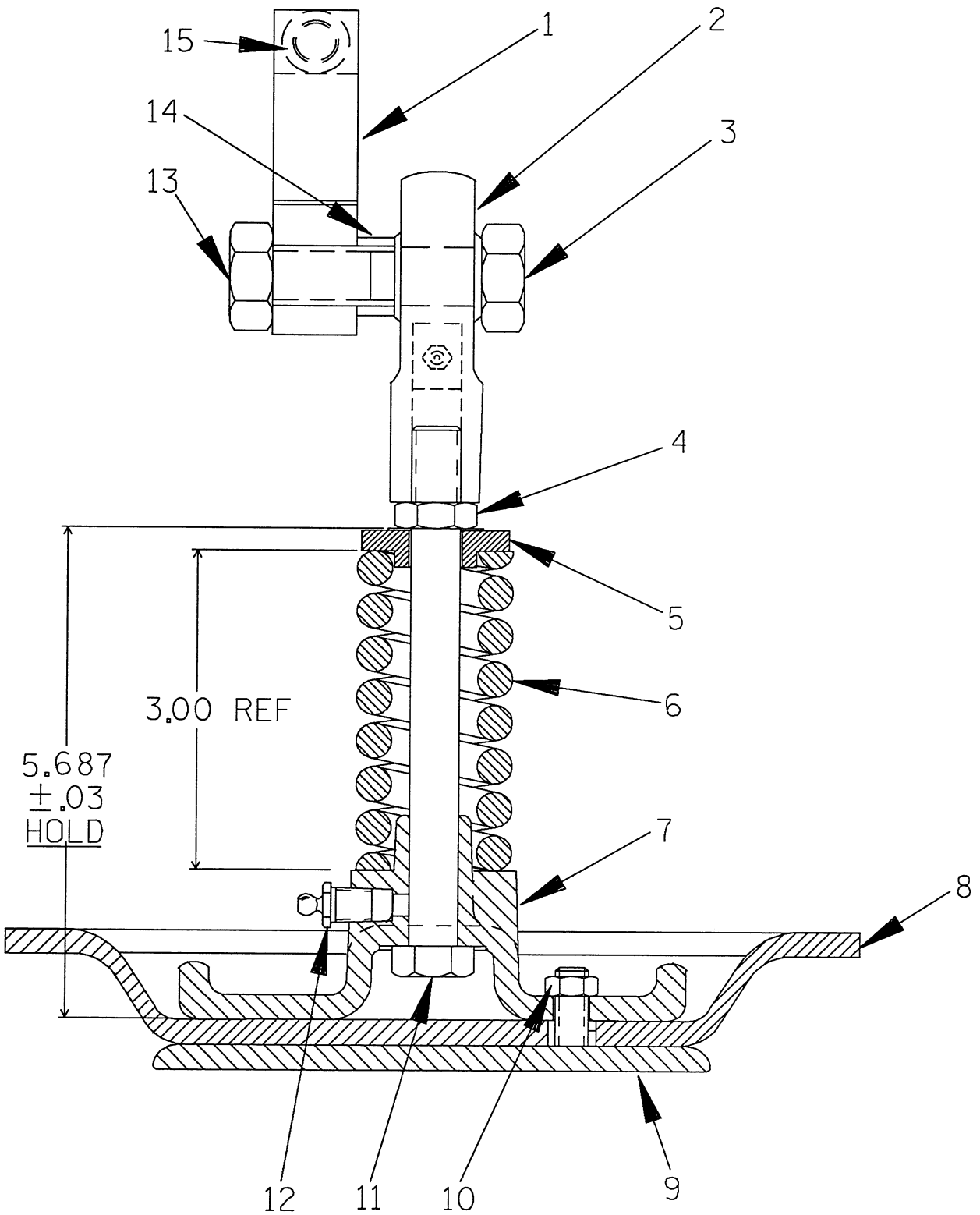


Figure 2. 46181-004 Plunger Rod Assembly

PARTS LIST
46181-004 Plunger Rod Assembly

ITEM NO.	PART NAME	PART NUMBER	MAT'L CODE	QTY
1	ECCENTRIC	38555-505	11060	1
2	ROD END	23924-005	-----	1
3	HEX HD CAPSCREW	B0808	15991	1
4	JAM NUT	AT08S	15991	1
5	SPRING CENTERING WASHER	31513-001	15030	1
6	* SPRING	38571-603	17110	1
7	UPPER DIAPHRAGM PLATE	38583-003	10010	1
8	* DIAPHRAGM	26812-711	-----	1
9	LOWER DIAPHRAGM PLATE	42111-314	24150	1
10	HEX NUT	D04	15991	3
11	PLUNGER ROD ASSY	46181-003	24150	1
12	LUBE FITTING	S186	-----	1
13	JAM NUT	AT08	15991	1
14	SPACER	31143-003	15070	1
15	SOCKET HD CAPSCREW	BD0504	15990	1

* INDICATES PARTS RECOMMENDED FOR STOCK

SECTION DRAWING

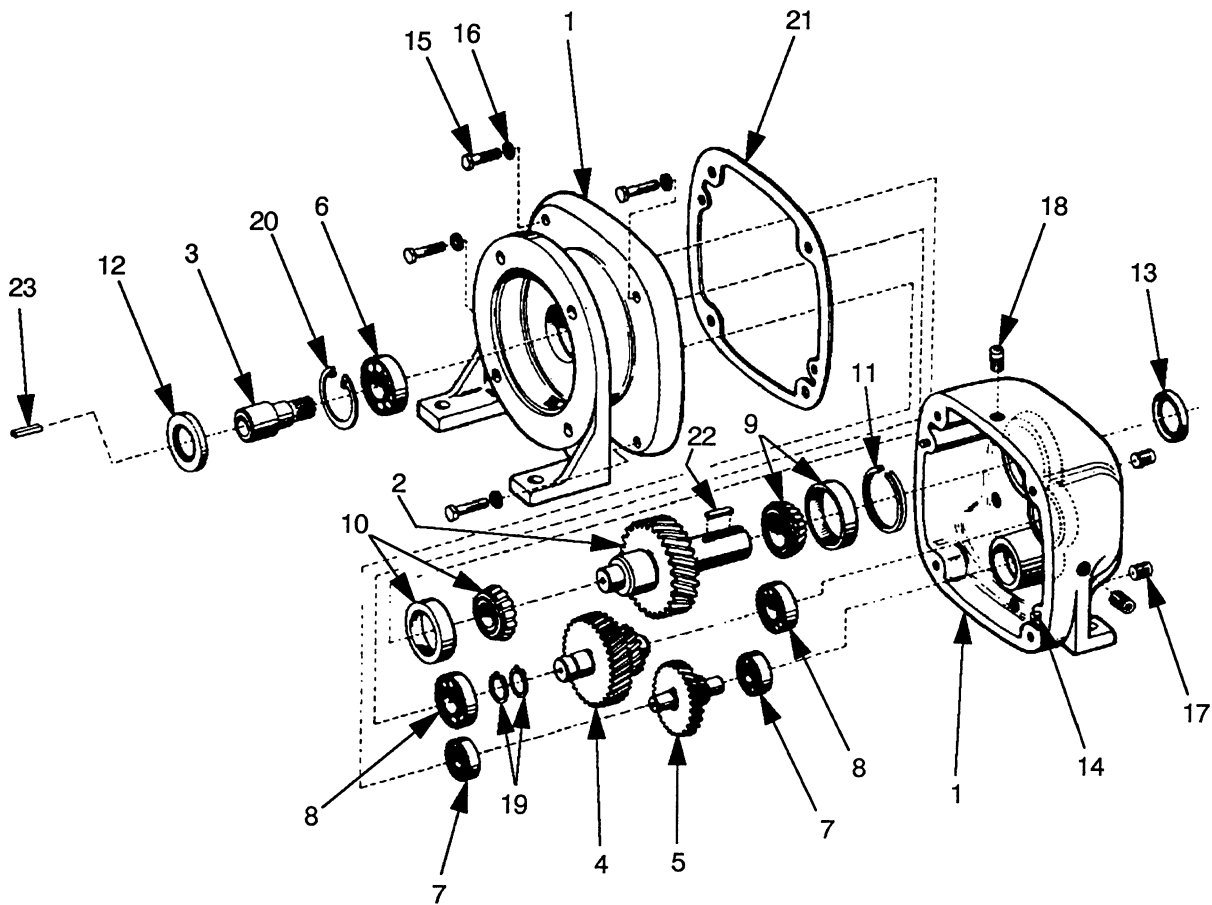


Figure 3. 2Z933-A Dayton Speed Reducer

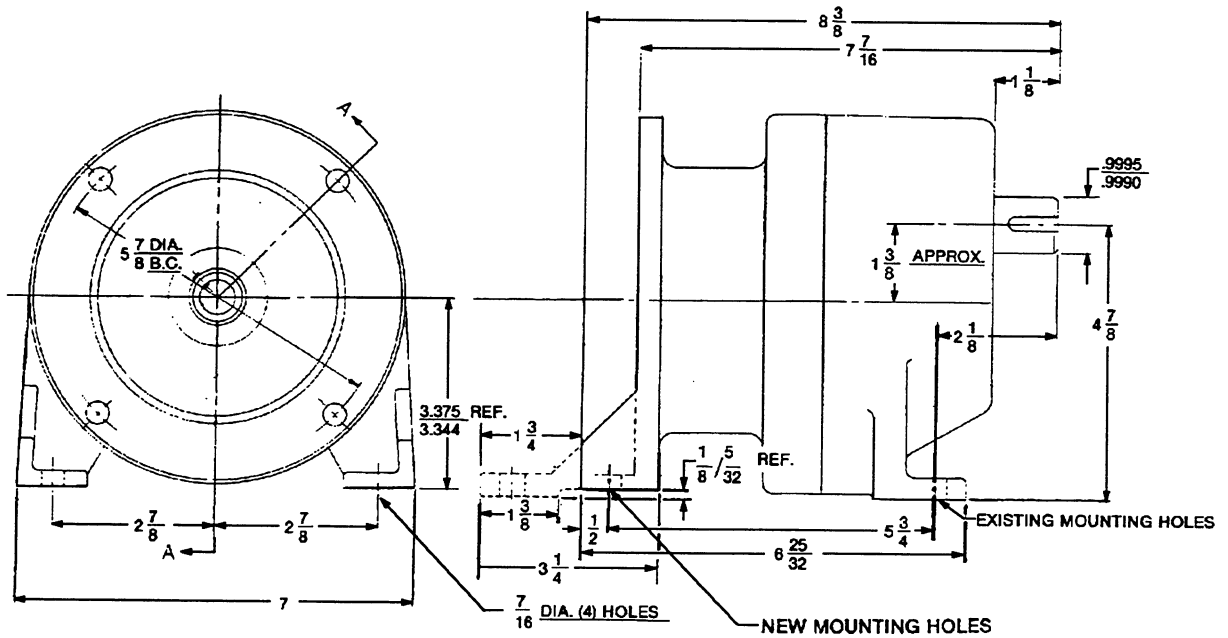
PARTS LIST
2Z933-A Dayton Speed Reducer

ITEM NO.	PART NAME	PART NUMBER	QTY
1	GEAR HOUSING & HOUSING COVER SET	93A119346-000	1
2	* OUTPUT SHAFT ASSEMBLY	G-R PROPRIETARY ITEM	1
3	INPUT PINION	93A118178-001	1
4	PUTPUT PINION ASSEMBLY	93A119542-000	1
5	INTERMEDIATE PINION ASSEMBLY	93A119549-000	1
6	INPUT PINION BEARING	93A113859-006	1
7	INTERMEDIATE PINION BEARING	93A113859-005	2
8	OUTPUT PINION BEARING	93A113859-004	2
9	OUTPUT SHAFT BEARING - COVER END	04A12292-0300	1
10	OUTPUT SHAFT BEARING - HOUSING END	04A12292-0100	1
11	LOAD RING	24A12293-0200	1
12	INPUT SHAFT OIL SEAL	40A02187-3900	1
13	OUTPUT SHAFT OIL SEAL	40A02187-3800	1
14	DOWEL PIN	24A12295-0200	2
15	5/16-18 X 1/2 HEX HD CAPSCREW	STANDARD HARDWARE	1
16	5/16 LOCKWASHER	STANDARD HARDWARE	1
17	PIPE PLUG	93A113412-003	3
18	VENT PLUG	93A113535-001	1
19	SNAP RING	24A09285-1800	2
20	SNAP RING	24A09284-0300	1
21	GASKET	93A119348-004	1
22	OUTPUT KEY	23A02741-3700	1
23	INPUT KEY	23A02741-3600	1

* **NOTE**
The output shaft is **not available** as a repair part from either W.W. Grainger or the Gorman-Rupp Company. If the output shaft requires replacement, a complete reducer (P/N 24572-006) must be ordered from the Gorman-Rupp Company.

All other component parts may be obtained from W.W. Grainger Inc., 5959 Howard St., Chicago, Illinois 60648, or from a W.W. Grainger full stock distributor.

SECTION DRAWING



NOTE: MODIFY GEAR REDUCER (P/N-24572-006) BY REMOVING THE TWO FRONT MOUNTING FEET AND DRILLING NEW MOUNTING HOLES AS SHOWN.

Figure 4. Gear Housing Feet Modification, Model 2Z933-A Dayton Speed Reducer

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

Review all SAFETY information in Section A.

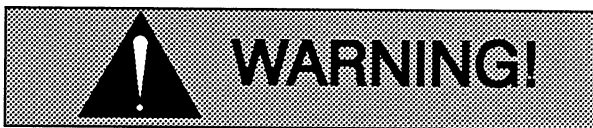
Follow the instructions on all tags, label and decals attached to the pump.

This pump requires little service due to its rugged, minimum-maintenance design. However, if it becomes necessary to inspect or replace the wearing parts, follow these instructions which are keyed to the sectional views (see Figures 1, and 2) and the accompanying parts lists.

Before attempting to service the pump, disconnect the spark plug wire to ensure that it will remain inoperative. 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 Briggs and Stratton engine representative.

Most service functions may be performed without separating the pump and gearbox from the engine. If major repair is required, the pump, gearbox and engine must be disconnected.



Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Disconnect the engine spark plug wire to ensure that the pump will remain inoperative.
3. Close the discharge valve (if used).
4. Drain the pump.

Suction And Discharge Check Valve Removal

(Figure 2)

To service the suction and discharge check valves, remove the suction and discharge piping.

To service the suction check valve assembly (44), disengage the capscrews (43) and separate the suction flange (42) and check valve from the dia-

phragm pot (35). Separate the check valve assembly from the suction flange.

To service the discharge check valve assembly (39), disengage the hardware (37 and 38) and separate the discharge flange (40) and check valve from the diaphragm pot. Separate the check valve assembly from the discharge flange.

Further disassembly of the check valves is not required; individual parts are not available.

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

Pump End Removal

(Figure 1)

Remove the hex head tapscrews (31) and separate the eccentric guard assembly (10) from the pump and base (25).

See Figure 2 and loosen the socket head capscrew (15) securing the eccentric (1) to the speed reducer output shaft.

To remove the pump end, disengage the hardware (32, 33 and 34) securing the pump end to the base and slide the plunger rod eccentric off the speed reducer output shaft. Retain the eccentric key (12).

If it is necessary to remove the speed reducer (13), disengage the hardware (3, 4 and 5) and separate the assembled engine (22), intermediate (19) and speed reducer (13) from the base.

To separate the engine and speed reducer, disengage the hardware (16, 17 and 18) and slide the assemblies apart, retaining the key (23) and spacer (24).

To separate the intermediate and engine, remove the hardware (20 and 21).

NOTE

The Gorman-Rupp speed reducer PIN 24572-006 used in this pump is a proprietary item manufactured by Dayton Electric Manufacturing Co. as a Special Model No. 8Z785. If replacement is necessary, the complete speed reducer must be ordered exclusively from The Gorman-Rupp Company; Gorman-Rupp does not stock or furnish any component parts.

Except for the output shaft, all component parts are identical to those used in the Dayton Electric non-

proprietary Model 2Z933-A Speed Reducer, and may be obtained from W.W. Grainger Inc., 1275 Barclay Blvd., Buffalo Grove, Illinois, 60089 (1-800-323-0620).

Figure 3 in this Section shows an exploded-view assembly drawing, followed by a parts list for Dayton Model 2Z933-A Speed Reducer. The output shaft is **not available** as a repair part from either W.W. Grainger or the Gorman-Rupp Company. If the output shaft requires replacement, a complete retucer must be ordered from the Gorman-Rupp Company.

The mounting feet of the non-proprietary gear housing used in Model 2Z933-A must be modified for proper mounting on the base for this pump. Figure 4 in this section shows the necessary modifications.

Pump End Disassembly

(Figure 1)

To remove the diaphragm pot (35), disengage the hardware (7 and 8) securing it to the retainer ring (9). Separate the diaphragm pot, plunger rod assembly (6) and retainer ring.

Plunger Rod Disassembly

(Figure 2)

To remove the diaphragm (8), remove the nuts (10) securing the lower diaphragm plate (9) to the upper diaphragm plate (7) and separate the components.

To remove the eccentric, remove the jam nut (15) and slide the eccentric and spacer (14) off the capscrew (3). Slide the capscrew out of the rod end (2).

Unscrew the rod end from the plunger rod (11).

To remove the spring (6), unscrew the jam nut (4) from the plunger rod. **Use caution** when removing the jam nut; tension on the compression spring will be released as the jam nut is unscrewed. Remove the spring washer (5) and spring, and slide the plunger rod out of the upper diaphragm plate.

Plunger Rod Reassembly

(Figure 2)

Clean the plunger rod components and the bore of the eccentric (1) with a soft cloth soaked in cleaning solvent.



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

Inspect the plunger rod (11), and replace it if bent or warped. Install the plunger rod in the upper diaphragm plate (7). Install the compression spring (6), spring centering washer (5) and jam nut (4) on the plunger rod, and tighten the jam nut to the **reference** dimension shown in Figure 2.

Inspect the diaphragm (8) and replace it if damaged or worn excessively. Install the diaphragm on the lower diaphragm plate (9) and secure the upper and lower plates with the hex nuts (10).

With the diaphragm installed, adjust the jam nut to attain the final dimension shown in Figure 2 for maximum pump performance.

Install the rod end (2) and tighten it flush with the jam nut. Slide the capscrew (3) through the rod end. Install the spacer (14) and eccentric (1) on the capscrew, and install the jam nut (13) finger tight; do not fully tighten the jam nut until the eccentric is installed on the speed reducer output shaft.

Pump End Reassembly

(Figure 1)

Install the plunger rod assembly in the diaphragm pot (35) and secure the retainer ring (9) to the diaphragm pot with the hardware (7 and 8).

Pump End Installation

(Figure 1)

If the engine (22) and speed reducer (13) were removed, secure the intermediate (19) to the engine with the hardware (20 and 21).

Install the engine shaft key (23) and spacer (24) and slide the speed reducer into place until the engine shaft engages the speed reducer input shaft and key. Secure the speed reducer to the intermediate with the hardware (16, 17 and 18).

Secure the speed reducer and engine to the base with the hardware (3, 4 and 5).

Install the eccentric key (12) in the speed reducer output shaft. Position the diaphragm pot on the base (25) and slide the plunger rod eccentric over the speed reducer output shaft and key. Secure the diaphragm pot to the base with the hardware (32, 33 and 34).

See Figure 2 and tighten the jam nut (13) securing the eccentric (1) to the rod end (2).

Tighten the socket head capscrew (15, Figure 2) securing the eccentric to the speed reducer output shaft.

Install the eccentric guard assembly (10) and secure it to the base with the hex head tapscrews (31).

Suction And Discharge Check Valve Installation

(Figure 2)

Inspect the suction and discharge check valves (39 and 44) and replace them if damaged or worn excessively.

Install the capscrews (43) in the suction flange and position the suction check valve on the flange with the weight toward the inside of the pump as shown in Figure 1. Secure the flange and check valve to the diaphragm pot with the capscrews.

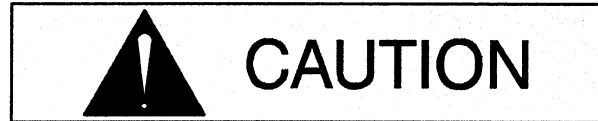
Install the capscrews (37) in the discharge flange and position the discharge check valve on the flange with the weight toward the outside of the pump as shown in Figure 1. Secure the flange and check valve to the diaphragm pot with the capscrews and hex nuts (38).

Refer to **OPERATION**, Section C before starting the pump.

LUBRICATION

Plunger Rod Assembly

(Figure 2)



The eccentric should be lubricated thoroughly after each 8 hours of operation. Failure to do so may cause the eccentric to fail.

Before attempting to lubricate the plunger rod assembly, rotate the eccentric cam until the upper grease fitting can be accessed through the holes in the eccentric guard (10, Figure 1).

Apply No. 2 lithium base grease to the upper lubrication fitting until grease escapes from the eccentric cap. Lubricate the lower fitting until grease escapes from the top of the upper diaphragm plate inside the spring.

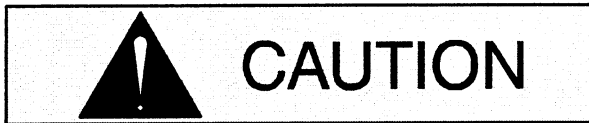
Speed Reducer

(Figure 4)

The speed reducer was fully lubricated when shipped from the factory. Change the oil in a new gearbox at operating temperature after 100 hours of operation or four weeks whichever comes first. To drain the oil, remove the oil drain plug at the bottom of the gear housing cover and the vented plug at the top of the gear housing cover. Flush the case thoroughly with a light oil. Clean and reinstall the oil drain plug.

To fill the speed reducer, remove the oil level plug in the side of the gear housing cover, and add new oil of the proper grade (see the following reference) through the vented plug hole until it flows out the oil level hole. Clean and reinstall the vented plug and the oil level plug.

Under normal conditions, drain the gearbox every 500 hours of operation or every six months. Change the oil more frequently if the pump is operated under severe conditions, continuously or installed in an environment with rapid temperature change.



Monitor the condition of the bearing lubricant regularly for evidence of rust or moisture condensation. This is especially important in areas where variable hot and cold temperatures are common.

The following lubricants are recommended:

Lubricant	Manufacturer
No. 4 Gear Oil	AGMA Lubricant
Meropa Lube No. 6	Texaco

Mobilgear No. 634	Mobil Oil
Sunep No 1150	Sun Oil
Valvata Oil No. J78	Shell Oil

If none of the recommended lubricants are available, use SAE No. 90 multi-purpose gear oil at ambient temperatures of +40 °F (4°C) to +120 °F (49°C), and SAE No. 80 multi-purpose gear oil at temperatures below +40 °F (4°C).

Engine

(Figure 1)

Refer to the engine manufacturer's recommendations or contact your local Briggs and Stratton representative.

**For U.S. and International Warranty Information,
Please Visit www.grpumps.com/warranty
or call:
U.S.: 419-755-1280
International: +1-419-755-1352**

**For Canadian Warranty Information,
Please Visit www.grcanada.com/warranty
or call:
519-631-2870**