# INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL

ACE



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

This pump is a 50 Series, enclosed impeller, centrifugal model. It is specifically designed for the pumping of clean liquids at high heads and high discharge pressures.

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

The Gorman-Rupp Company P.O. Box 1217 Mansfield, Ohio 44902 Gorman-Rupp of Canada Limited 70 Burwell Road St. Thomas, Ontario N5P 3R7

For information or technical assistance on the power source, contact the power source 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, or 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 describe the procedure required and the damage which could result from failure to follow the procedure.

## WARNING

Instructions which must be followed to avoid causing injury or death to personnel. These describe the procedure required and the injury which could result from failure to follow the procedure.



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## WARNINGS

THESE WARNINGS APPLY TO ALL ENGINE DRIVEN PUMPS. REFER TO THE MANUAL ACCOMPANYING THE ENGINE BEFORE ATTEMPTING TO START THE ENGINE.







Overheated pumps can cause severe burns and injury. If overheating of the pump casing occurs:

- 1. Stop the pump immediately.
- 2. Allow the pump to cool.
- 3. Refer to instructions in this manual before restarting the pump.







## INSTALLATION

Seldom are two pump installations identical. The information presented in this section is a summary of the recommended installation practices related to inspection, pump positioning, hardware, suction and discharge piping, and sumps. For further assistance, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

## PREINSTALLATION INSPECTION

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

a. Inspect the pump assembly for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose bolts, nuts, cap screws, and other attaching hardware. Since gaskets tend to shrink after drying, check for and tighten loose nuts and cap screws securing mating surfaces.

c. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated. Note the direction of rotation indicated on the pump.

d. Check all lubricant levels and lubricate as necessary. Refer to the MAINTENANCE AND REPAIR section of this manual.

## POSITIONING THE PUMP

#### Mounting

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



Lifting



Make sure that hoists and other lifting equipment are of sufficient capacity to safely handle the pump assembly. If chains and cables are used, make certain that they are positioned so that they will not damage the pump, and so that the load will be balanced.

## CAUTION

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

## SUCTION AND DISCHARGE PIPING

### Materials

Either pipe or hose may be used for suction and discharge lines, but hose used in suction lines must be the rigid-wall, reinforced type to prevent collapse under suction. Using pipe 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**

Never pull a pipe line into place by tightening the flange bolts. The connecting flange must be aligned exactly with the pump port. Lines near the pump must be independently supported to avoid strain on the pump which could cause serious vibration, decreased bearing life, and increased shaft and seal wear. Hose-type lines should have supports strong enough to secure the line when it is 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 close to the pump before installing the lines.



## 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 down or to either side to avoid air pockets.

### Strainers

Install a strainer at the end of the suction line to avoid possible clogging or damage to the pump. The total area of the openings in the strainer should be at least three or four times the cross section of the suction line, but no opening should be larger than the solids handling capability of the pump. Clean the strainer regularly during operation.

#### Sealing

All connections in the suction line should be sealed with pipe dope to ensure an airtight seal. Even a slight leak will affect priming, head, and capacity, especially when operating with a high suction lift. After installation, inspect the suction line carefully for potential leaks.

## **DISCHARGE LINES**

## **Throttling Valves**

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

#### **Check Valves**

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

With high discharge heads, install a throttling value and a check value in the discharge line to protect the pump from excessive shock pressure and reverse rotation when it is stopped.





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.

## SUCTION LINE POSITIONING

The depth of submergence of the suction line is critical to efficient pump operation. Figure 1 shows recommended minimum submergence vs. velocity.



Figure 1. Recommended Minimum Suction Line Submergence Vs. Velocity



## **OPERATION**



## 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 an exhaust primer.

## **Exhaust Primer**

In the exhaust primer, engine exhaust gases are directed through a venturi to create a vacuum and draw air out of the suction line and the volute.

The exhaust primer is capable of priming a pump with a 20-foot suction lift in about two minutes; less time will be required for priming at a lesser lift. If the pump does not prime in a reasonable length of time, check the suction line for leaks.



Figure 1. Exhaust Primer Assembly



Close the discharge line throttling valve.

Close the spring-loaded check value in the discharge line before engaging the exhaust primer.

To prime the pump, close the exhaust primer handle (see figure 1), and open the cock in the priming line. Consult the operating manual furnished with the engine, and start the engine. Allow the pump to prime until liquid flows continuously from the exhaust primer nozzle. When the pump is fully primed, open the exhaust primer handle, and close the cock in the priming line.

Open the spring-loaded check valve in the discharge line. Partially open the discharge throttling valve so that the discharge line fills slowly to prevent damage to piping, gaskets, and other devices in the line which could be affected by shock resulting from rapid filling of the line. When the discharge line is completely filled, adjust the discharge throttling valve to the desired 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.

## Overheating

Overheating can occur if the valves in the suction or discharge lines are 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 volute casing with cool liquid.



## **Strainer Check**

Check the suction strainer regularly during pump operation, or if the pump flow rate begins to drop, and clean it as necessary. Be especially alert for unusual noises when pumping liquids containing solids.



## Pump Vacuum Check

Install a vacuum gauge in the system, using pipe dope on the threads.

The pump should pull a vacuum of 20 inches or more of mercury at operating speed with the suction line blocked. If it does not, check for air leaks in the seals or gaskets.

With the pump primed and at operating speed, and the suction line open, read the vacuum gauge. Shut off the pump, keep the vacuum line open, and read the gauge again to see if the vacuum remains at the maximum developed by the pump. If the vacuum falls off rapidly, an air leak exists. If the liquid level at the source of supply remains at a constant level, check to make certain that the air leak is not from the vacuum gauge connection.

## STOPPING

After stopping the pump, disconnect the power source to ensure that the pump will remain inoperative.

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, 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, operate the pump during the draining process. Clean out any remaining solids by flushing with a hose.



# TROUBLESHOOTING



Trouble	Possible Cause	Probable Remedy	
PUMP FAILS TO	Air leak in suction line.	Correct leak.	
PRIME	Lining of suction hose collapsed.	Replace suction hose.	
	Suction check valve clogged or binding.	Clean valve.	
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.	
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See INSTALLATION.	
	Suction strainer clogged.	Clean suction strainer.	
PUMP STOPS OR	Air leak in suction line.	Correct leak.	
FAILS TO DE- LIVER RATED FLOW OR PRESSURE	Suction intake not sub- merged at proper level or sump too small.	Check installation and correct as needed. Check submergence chart (Section B, page 4).	
	Lining of suction hose collapsed.	Replace suction hose.	
	Impeller or other wearing parts worn or damaged.	Check impeller clearance. Replace worn parts as needed.	
	Impeller clogged.	Free impeller of debris.	
	Pump speed too slow.	Check driver output.	
	Discharge head too high.	Install bypass line.	
	Suction lift too high.	Reduce suction lift.	



Trouble	Possible Cause	Probable Remedy		
PUMP STOPS OR FAILS TO DE- LIVER RATED	Leaking or worn seal or pump gaskets.	Check pump vacuum. Replace leaking or worn seal or pump gaskets.		
FLOW OR PRESSURE (cont)	Suction strainer clogged.	Clean suction strainer.		
PUMP REQUIRES	Pump speed too high.	Reduce speed of power source.		
POWER	Discharge head too low.	Adjust discharge valve.		
	Liquid solution too thick.	Dilute if possible.		
PUMP CLOGS FREQUENTLY	Discharge flow too slow.	Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.		
	Suction check valve clogged or binding.	Free valve, and clean or replace it.		
EXCESSIVE NOISE	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line.		
	Pumping entrained air.	Locate and eliminate source of air bubble.		
	Pump or drive not securely mounted.	Secure mounting hardware.		
	Impeller clogged or damaged.	Clean out debris; replace damaged parts.		





The only moving parts of this pump are the impeller, seal rotating elements, and the shaft. The wear ring, impeller, and seal, which receive the most wear, are easily accessible and can be replaced by removing the cover without disturbing the volute casing and piping. Maintenance and replacement of these three parts will maintain the peak operating efficiency of the pump.



50 SERIES OM-01329-0E

# SECTIONAL DRAWING



Figure 1. Pump Model 54A2-VG4D



## PARTS LIST PUMP MODEL 54A2-VG4D

(From S/N 459260 up)

TEM NO.	PART NAME	PART NUMBER	MATL CODE	ΩΤΥ	ITEM NO.	PART NAME	PART NUMBER	MATL	01
1	VOLUTE CASING	5435	10010	1		RUBBER HOSE	31411-041		1
2	*IMPELLER	5436	10010	1		STREET ELBOW	S-0514	· · · _	1
3	* SEAL ASSEMBLY	GS-1250	_	1		MOUNTING HARDWARE			
4	* SEAL GREASE CUP	S-1509	-	1		MACHINE BOLT	B-1007	15991	2
5	*IMPELLER WEAR RING	4869	14000	1		MACHINE BOLT	B-1011	15991	4
6	STUD	C-1011	15991	2		HEX NUT	D-10	15991	6
7	STUD	C-1012	15991	2		LOCKWASHER	J-10	15991	e
8	HEX NUT	D-10	15991	4		FLANGE	1756	10010	1
9	LOCKWASHER	J-10	15991	4		FLANGE GASKET	1676-G	18000	1
10	* SEAL LINER	2205-A	14080	1		LEVER	1458-A	15990	
11	*IMPELLER SHIM SET	37-J	17090	1	、 、	VALVE BODY	1466	· 10010	
12	HEX HEAD CAPSCREW	B-0503	15991	· 2		NAME PLATE	2613-D	13990	
13	LOCKWASHER	J-0503	15991	2		HEX HEAD CAPSCREW	B-0604	15991	
13	COVER PLATE	1215-B	10010	1		HEX HEAD CAPSCREW	B-0805	15991	
	COVER FLATE	1215-B	18000			HEX HEAD CAPSCREW	B-0803		
15				1				15991	
16		AE-06	11990	1		HEX HEAD CAPSCREW	B-1010	15991	. 1
17	PIPE NIPPLE	T-0606	15070	1		HEX NUT	D-08	15991	1
18	VOLUTE DRAIN PLUG	P-06	11990	1		HEX NUT	D-10	15991	1
19	HEX NUT	D-08	15991	12		LOCKWASHER	J-08	15991	
20	STUD	C-0807	15991	12		FLAT WASHER	K-04	15991	
TON	SHOWN:					FLAT WASHER	K-08	15991	
	STRAINER	S-1528	-	1		PIPE PLUG	P-08	11990	
	WISCONSIN VG4D ENGINE	202-F4	-	1		PIPE NIPPLE	T-08	15070	
	EXHAUST PRIMING VALVE	1467	10010	1		PIPE NIPPLE	T-0608	15070	
	EJECTOR BODY	1778	14000	1		REDUCING PIPE BUSHING	AP-1202	11990	
	EJECTOR BODY	1779	14000	1		REDUCING PIPE BUSHING	AP-1608	11990	
	SADDLE STRAP	4062-X	24000	2		WELD STUD	CN-0805	15990	
	BASE	5673	24000	1		STREET ELBOW	RS-06	11990	
	SUPPORT BRACKET	5743-A	15990	1		CHECK VALVE ASSEMBLY	GRP14-04-A		
	AIR ELIMINATOR CLIP	6006	15990	1		ADJUSTING SHIM SET	513-A	17090	:
	SUPPORT ASSEMBLY	6559-K	24000	1		SPRING BRACKET	3844	14000	
	PRIMING NIPPLE	7003	24040	1		PACKING NUT	3847	14100	
	FELT STRIP	9490-C	18030	2		SHAFT	3848	17010	
	COTTER PIN	M-0406	15990	2		EXTENSION SPRING	3849	16030	
	GAS COCK	S-02	13550	1		SPACER	3855	15070	
	SPRING WASHER	S-165	_	2		WEIGHT ARM ASSEMBLY	4266	24000	
				1		VALVE BODY			
	CONNECTOR	S-551	-	1			4268	10010	
		S-563				HANDLE	5364	11000	
	FLEX HOSE ASSEMBLY	S-1003	-	1		BUSHING	11573	15030	
	COPPER TUBING	W-884	14990	1		VALVE WEIGHT	11588	10010	
	SHUTOFF COCK	26661-351	-	1		VALVE GASKET	11591-G	18000	
	INSTRUMENT PANEL ASSEMBLY	48312-801	-	1		CHECK VALVE	12390	24010	
	WIRE ASSEMBLY	5795-G	-	1		HEX HEAD CAPSCREW	B-0604	15991	
	WIRE ASSEMBLY	5795-H	-	1		HEX HEAD CAPSCREW	B-0606	15991	
	WIRE ASSEMBLY	5795-J	-	1		HEX HEAD CAPSCREW	B-1009	15991	1
	WIRE ASSEMBLY	5795-Z	-	1		STUD	C-1010	15991	
	INSTRUMENT PANEL	6363-B	15990	1		HEX NUT	D-10	15991	1
	FEMALE CONNECTOR	S-577		1		LOCKWASHER	J-06	15991	
	TUBE FITTING	S-634	-	1		FLAT WASHER	K-06	15991	
	FITTING	S-698	-	1		KEY	N-0207	15990	
	PUSH STOP SWITCH	S-783	-	1		PIPE PLUG	P-04	11990	
	CLAMP	S-804		2		PACKING RING	S-0378	_	
	GROMMET	S-807		3		WOODRUFF KEY	AV-0404	15990	
	SAFETY SWITCH	S-948		1		NYLOCK CAPSCREW	BT-0806	15991	
	COMBINATION SAFETY SWITCH	S-971		1		ALLEN HEAD SETSCREW	GA-0401	15990	
	FLEX HOSE ASSEMBLY	S-1003	_	1		ALLEN HEAD SETSCREW	GA-0401 ½	15990	
	OIL PRESSURE GAUGE	S-1588	_	1		FLAT WASHER	KE-08	15990	
	HOSE END SWITCH	S-1588 S-1670		1	OPTIO		NE-UO	10331	•
			15001		0-10		CDD00 0		
	PAN HEAD TAPSCREW	BP#14-02	15991	4		WHEEL KIT	GRP30-8		

\*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO. ..... AND UP



## PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

This pump requires little service due to its rugged, minimum-maintenance design. If it becomes necessary to inspect and/or replace the wearing parts, however, follow these instructions, which are keyed to the sectional view (see figure 1) and the accompanying parts list.

### Pump Disassembly

Disconnect the power source, making certain that it will remain inoperative while the pump is being serviced, and close all connecting valves. Remove the volute drain plug (18) to drain the pump.

Remove the hex nuts (19) securing the cover plate (14) to the volute casing (1) for access to the wear ring (5), impeller (2), and seal assembly (3).

To remove the impeller, block the shaft or power source to prevent rotation, and using an impeller wrench, turn the impeller in the direction of pump rotation. Unscrew the impeller and replace it if scored or badly worn.

Remove the impeller adjusting shims (11). For ease of reassembly, tag and tie the shims, or measure and record their thickness.

Inspect the wear ring, and replace it if scored or worn.

#### Seal Disassembly

Before removing the seal assembly, turn the cross arm on the seal grease cup (4) clockwise until it rests against the cover (see figure 3). This will prevent the grease in the cup from escaping after the seal is removed.

Carefully remove the seal spring, the shaft sleeve, and the stationary and rotating seal elements, using a stiff wire with a hooked end if necessary. Remove the seal liner (10), which is a press fit.

Clean the seal cavity and shaft with a soft cloth soaked in cleaning solvent.

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

The seal is not normally reused because of the high polish on its lapped faces, but if it is necessary to reuse the old seal, wash all metallic parts in cleaning solvent and dry thoroughly.

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



Replace the seal liner if worn or grooved. If the seal liner is replaced, a hole must be drilled in it after installation to permit the flow of lubricant from the grease cup to the seal assembly. Deburr the hole after drilling, and clean the seal liner.

## CAUTION

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

Reinstall the shaft sleeve, and install the replacement seal as a complete unit.

Lubricate the packing rings with soft grease or oil when installing the seal, and place a drop of light lubricating oil on the lapped faces. Assemble the seal as shown in figure 2.

Before starting the pump, fill the grease cup through the grease fitting with a good grade of No. 2 pressure gun grease until grease escapes from the relief hole. Turn the grease cup arm counterclockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see figure 3).



Figure 2. GS-1250 Seal Assembly





Figure 3. Automatic Lubricating Grease Cup

## **Pump Reassembly**

Reinstall the impeller adjusting shims and the impeller. It is necessary for the impeller to be centered in the volute scroll for maximum pump efficiency. Measure this clearance and add or subtract impeller shims until it is reached.

Reassemble the cover plate to the volute casing, replacing the cover gasket (15).

Before starting the pump, turn the impeller shaft to be sure the impeller does not bind or scrape.

Clean and reinstall the volute drain plug.

## LUBRICATION

## Seal Assembly

Before starting the pump, fill the grease cup through the grease fitting with a good grade of No. 2 pressure gun grease until grease escapes from the relief hole. Turn the grease cup arm counterclockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see figure 3).

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

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

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