INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST

GORMAN-RUPP PUMPS

SUBMERSIBLE PUMP

MODEL
S2K3–E1 115/1

THE GORMAN-RUPP COMPANY ● MANSFIELD, OHIO

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TABLE OF CONTENTS

INTRODUCTION . . . . . PAGE I – 1

SAFETY - SECTION A . . . . . PAGE A – 1

INSTALLATION – SECTION B . . . . . PAGE B – 1

PREINSTALLATION INSPECTION . . . . . PAGE B – 1
Lubrication . . . . . PAGE B – 1
PUMP INSTALLATION . . . . . PAGE B – 1
Pump Dimensions . . . . . PAGE B – 1
Motor Specifications . . . . . PAGE B – 2
Lifting . . . . . PAGE B – 2
Positioning the Pump . . . . . PAGE B – 3
Correct Pump Installations . . . . . PAGE B – 3
PIPING . . . . . PAGE B – 4

OPERATION – SECTION C . . . . . PAGE C – 1

PUMP OPERATION . . . . . PAGE C – 1
Manual Operation . . . . . PAGE C – 1
Automatic Operation . . . . . PAGE C – 1
Operational Checks . . . . . PAGE C – 2
STOPPING . . . . . PAGE C – 2
Storage and Cold Weather Preservation . . . . . PAGE C – 2

TROUBLESHOOTING – SECTION D . . . . . PAGE D – 1

PUMP MAINTENANCE AND REPAIR - SECTION E . . . . . PAGE E – 1

PERFORMANCE CURVE . . . . . PAGE E – 1
PARTS LISTS:
S2K3–E1 115/1 Pump Model . . . . . PAGE E – 3
PUMP END DISASSEMBLY . . . . . PAGE E – 4
Strainer Removal . . . . . PAGE E – 4
Impeller Removal . . . . . PAGE E – 4
Seal Removal . . . . . PAGE E – 5
POWER CABLE AND CAPACITOR REPLACEMENT . . . . . PAGE E – 5
Power Cable Removal . . . . . PAGE E – 5
Power Cable Installation . . . . . PAGE E – 6
PUMP END REASSEMBLY . . . . . PAGE E – 6
Cleaning And Inspection Of Pump Parts . . . . . PAGE E – 6
Seal Installation . . . . . PAGE E – 7
Impeller Installation . . . . . PAGE E – 8
Strainer Installation . . . . . PAGE E – 8
LUBRICATION SPECIFICATIONS . . . . . PAGE E – 9

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 S-Series submersible model, designed to handle dirty water that does not contain large entrained solids. Do not attempt to pump volatile, flammable or corrosive liquids that may damage the pump. The basic materials of construction are cast iron and stainless steel, with a cast iron impeller.

The pump may be operated fully or partially submerged, but should not be opreated dry for extended periods. The pump is not explosion-proof, and should not be operated in a hazardous atmosphere.

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:

DANGER!

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.

WARNING!

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.

CAUTION

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 S-Series submersible motor driven pumps.

Do not operate this pump where explosive vapors or flammable material exist. Death or serious injury will result.

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Unplug the pump power cable to ensure that the pump will remain inoperative.**
3. **Allow the pump to cool if overheated.**

This pump is designed to handle dirty water that does not contain large entrained solids. It is not designed to pump volatile, flammable or corrosive materials. Do not attempt to pump any liquids which may damage the pump or endanger personnel as a result of pump failure.

Never attempt to alter the length or repair any power cable with a splice. The pump motor and cable must be completely waterproof. Damage to the pump or personal injury may result from alterations.

After the pump has been installed, make certain that the pump and all piping or hose connections are secure before operation.

Do not attempt to lift the pump by the power cable or piping. Attach proper lifting equipment to the lifting handle fitted to the pump.

Obtain the services of a qualified electrician to troubleshoot, test and/or service the electrical components of this pump.

Pumps and related equipment must be installed and operated according to all national, local and industry standards.

INSTALLATION – SECTION B

Review all SAFETY information in Section A.

DANGER!

Do not operate this pump where explosive vapors or flammable material exist. Death or serious injury will result.

This section only summarizes recommended installation practices for the pump. If there are questions concerning your specific application, contact your local distributor or the Gorman-Rupp Company.

CAUTION

Pumps and related equipment must be installed and operated according to all national, local and industry standards.

PREINSTALLATION INSPECTION

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 attaching hardware.

c. The pump is furnished with a 30-foot (9 meter) long power cable. Inspect the cable for cuts or damage.

d. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties as indicated.

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.

Lubrication

The shaft seal and bearings in this pump are fully lubricated from the factory. No additional lubrication is required.

PUMP INSTALLATION

Pump Dimensions

The pump is provided with a suction strainer to prevent large solids from clogging the impeller. See Figure 1 for the approximate physical dimensions of the pump.

OUTLINE DRAWING

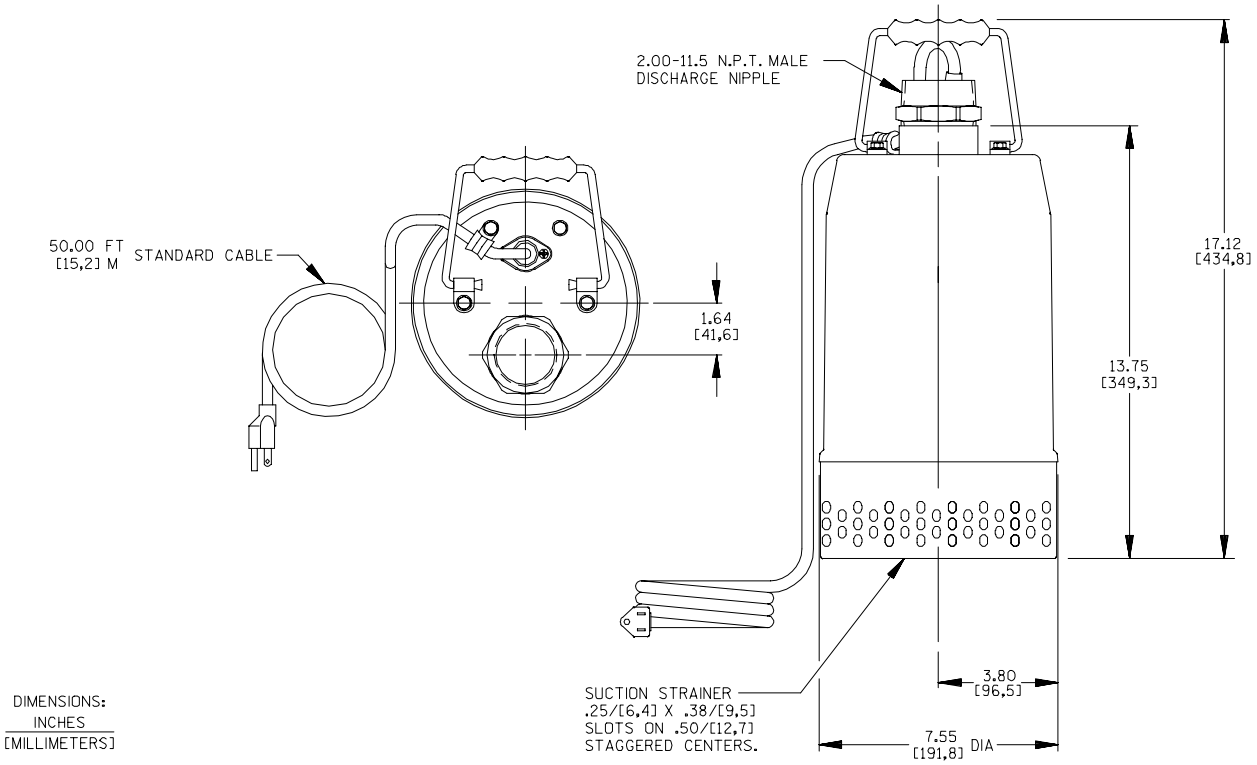


Figure 1. Pump Model S2K3--E1 115/1

Motor Specifications

H.P.	Hz.	RPM	Amps
1.0	60	3400	13

Lifting

This pump is designed to be light weight and portable, with a convenient carry handle that makes it ideal for general contracting applications. The pump weights approximately 54 lbs. (24,5 kg.), not including the weight of discharge piping.

Attach a rope or chain to the lifting handle on the top of the pump. **Do not** lift the unit by the power cable or the discharge piping. Customer installed equipment such as rigid discharge piping **must** be removed before attempting to lift.

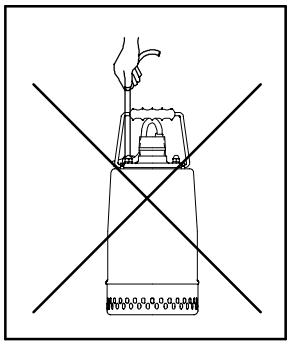


Figure 2. Do Not Lift Pump by Power Cable

WARNING!

Do not attempt to lift the pump by the power cable or piping. Attach proper lifting equipment to the handle on the pump.

Positioning the Pump

This pump is designed to operate fully or partially submerged; however it **should not** be operated dry for exended periods of time.

CAUTION

Extended dry operation will destroy the seal assembly.

Never place the pump on loose or soft ground; the pump could sink, preventing water from reaching the impeller (see Figure 3).

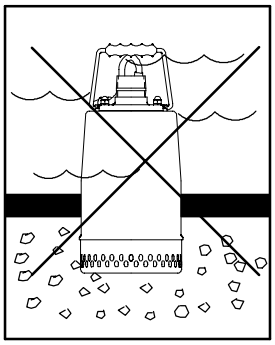
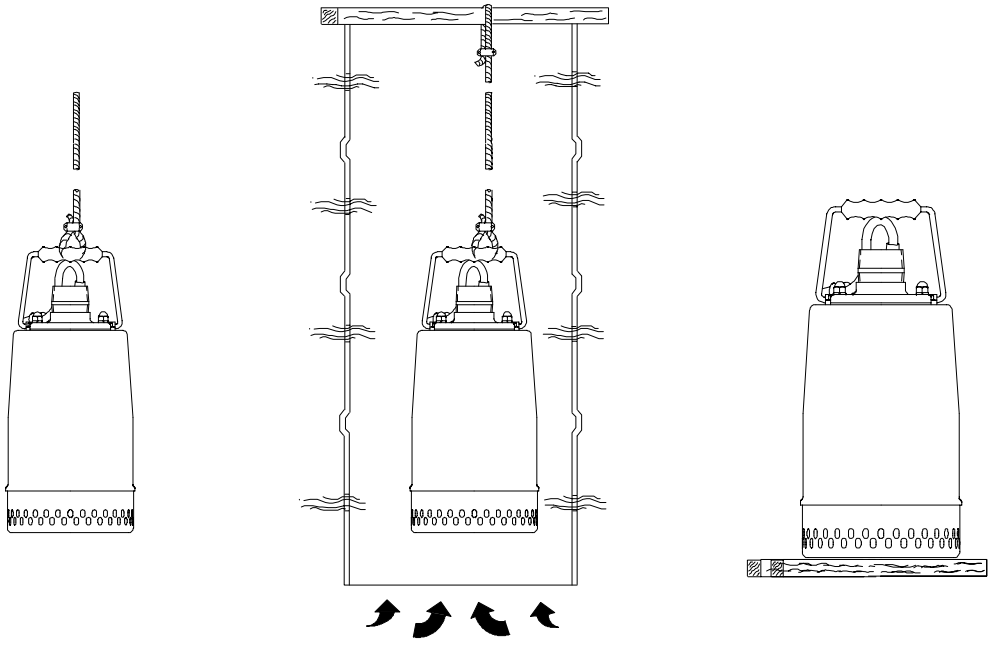


Figure 3. Do Not Place Pump on Loose Ground

Secure and support the pump by the handle on the pump. If the bottom is heavily sludge-covered, rest the pump on support blocks or suspend it near the surface of the liquid. If the application involves a lot of debris, protect the pump from excessive wear and clogging by suspending it in a perforated barrel or culvert pipe. See Figure 4 for correct pump installations.

The pump is provided with a suction strainer to prevent large solids from clogging the impeller. Any spherical solids which pass through the strainer will pass through the pump.



SUSPEND BY HANDLE **IN PERFORATED CULVERT PIPE** **ON SUPPORTS**

Figure 4. Correct Pump Installations

PIPING

The pump volute is equipped with a standard 2 – inch NPT tapped discharge connection. Either hose or rigid pipe may be used for the discharge connection.

For maximum pumping capacity, use non-collapsible hose or rigid piping, and keep the discharge as short and straight as possible. If rigid piping is used, minimize the use of elbows and fittings which increase friction losses and reduce pump performance.

A check valve or throttling valve may be installed in the discharge line to control siphoning or back flow when the pump is shut off.

OPERATION – SECTION C

Review all SAFETY information in Section A.

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

PUMP OPERATION

DANGER!

Do not operate this pump where explosive vapors or flammable material exist. Death or serious injury will result.

WARNING!

This pump is designed to handle dirty water that does not contain large entrained solids. It is not designed to pump volatile, flammable or corrosive materials. Do not attempt to pump any liquids which may damage the pump or endanger personnel as a result of pump failure.

Install the pump and piping as described in **INSTALLATION**, Section B.

Manual Operation

The pump is provided with a 30-foot (3 m) power cable. **Never** splice the power cable due to safety and warranty considerations.

WARNING!

Never attempt to alter the length or repair any power cable with a splice. The pump motor and cable must be completely waterproof. Damage to the pump or personal injury may result from alterations.

Always keep the plug end dry.

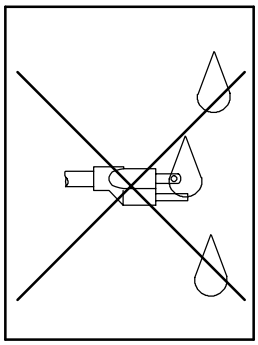


Figure 1. Always Keep Plug End Dry

For manual operation, simply plug the power cable into any 115 volt **grounded** receptacle. It is strongly recommended that a Ground Fault Interrupter (GFI) type receptacle (or equivalent) be used (see Figure 2).

WARNING!

Always use a three-prong grounded receptacle. It is strongly recommended that a Ground Fault Interrupter (GFI) type receptacle (or equivalent) be used.

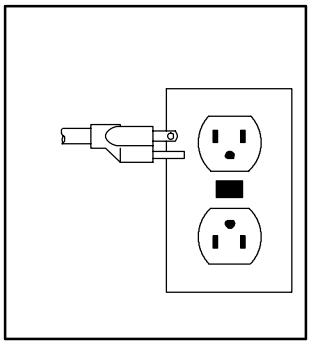


Figure 2. Always Use a Grounded Receptacle

Automatic Operation

A float switch assembly is available as an option from the factory to provide for automatic operation. Observe the following instructions for automatic operation.

1. Attach the plastic tie on the float switch power cable to the standpipe in the sump at the approximate desired liquid level. **Do not** allow

the liquid level to drop below the bottom of the pump motor cover to ensure cooling of the pump motor.

2. The tie is positioned on the cable approximately 6 inches (152 mm) below the float. This setting allows approximately 9 inches (229 mm) of liquid rise between pump start/stop. The start/stop interval may be increased by loosening the nut on the plastic tie swivel and extending the float end of the power cable. The liquid level in the sump will increase approximately 8 inches (203 mm) between start/stop intervals for every 6 inches (152 mm) of cable increase.

3. Plug the pump power cable into the female end of the float cable plug.

4. Plug the float cable into a **grounded** receptacle. It is **strongly** recommended that a Ground Fault Interrupter (GFI) type receptacle (or equivalent) be used (see Figure 2).

Operational Checks

Check the pump for proper operation when it is first started and periodically thereafter to identify minor problems.

Check the pump for unusual noises or excessive vibration while it is operating. If noise or vibration is excessive, stop the pump and refer to the troubleshooting chart for possible causes.

Check the pump strainer screen for clogging caused by stones, sticks, or other debris. Clean the strainer screen when required. In some cases, stopping the pump momentarily may back flush the strainer screen, purging most of the debris from it. If this fails to clean the screen, unplug the pump , remove it from the sump, and remove the debris manually (see **MAINTENANCE AND REPAIR** in Section E).

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

STOPPING

To stop the pump when in manual mode, simply unplug it from the receptacle. After stopping the pump, be sure to perform all required maintenance and preservation procedures.

CAUTION

This pump is equipped with automatic thermal overload protection which will stop the pump if overheating occurs. Unplug the pump and allow it to cool before attempting to service the pump.

When operated in the automatic mode, the pump will stop and start as the liquid level rises and falls. For service or extended stopping, unplug both the pump and float switch from the receptacle.

Storage and Cold Weather Preservation

After stopping the pump, use the rope or chain attached to the lifting handle on the pump to remove the pump from the sump. **Do not** lift the unit by the power cable or the discharge piping. Customer installed equipment such as rigid discharge piping **must** be removed before attempting to lift.

WARNING!

<u>Do</u> <u>not</u> attempt to lift the pump by the power cable or piping. Attach proper lifting equipment to the handle on the pump.

Clean the strainer screen before storage. If the application involves a lot of mud or sludge, remove the strainer and clean the impeller before storage.

NOTE

The most common cause of failure to run is hardened mud or sludge in the impeller.

In freezing temperatures, the pump will not freeze as long as it is submerged in liquid. If the pump casing is not submerged, or if the liquid begins to freeze, remove the pump from the sump and allow

it to dry thoroughly. Run the pump for two or three minutes to dry the inner walls.

If the pump freezes, move it into a warm area until completely thawed, or submerge it into the liquid. If the liquid is near freezing, the pump must be submerged for an extended period of time. Start the pump and check for shaft rotation. If still frozen, allow additional thawing time before attempting to restart.

CAUTION

Do not attempt to thaw the pump by using a torch or other source of flame. This could damage gaskets, electrical components, or motor windings.

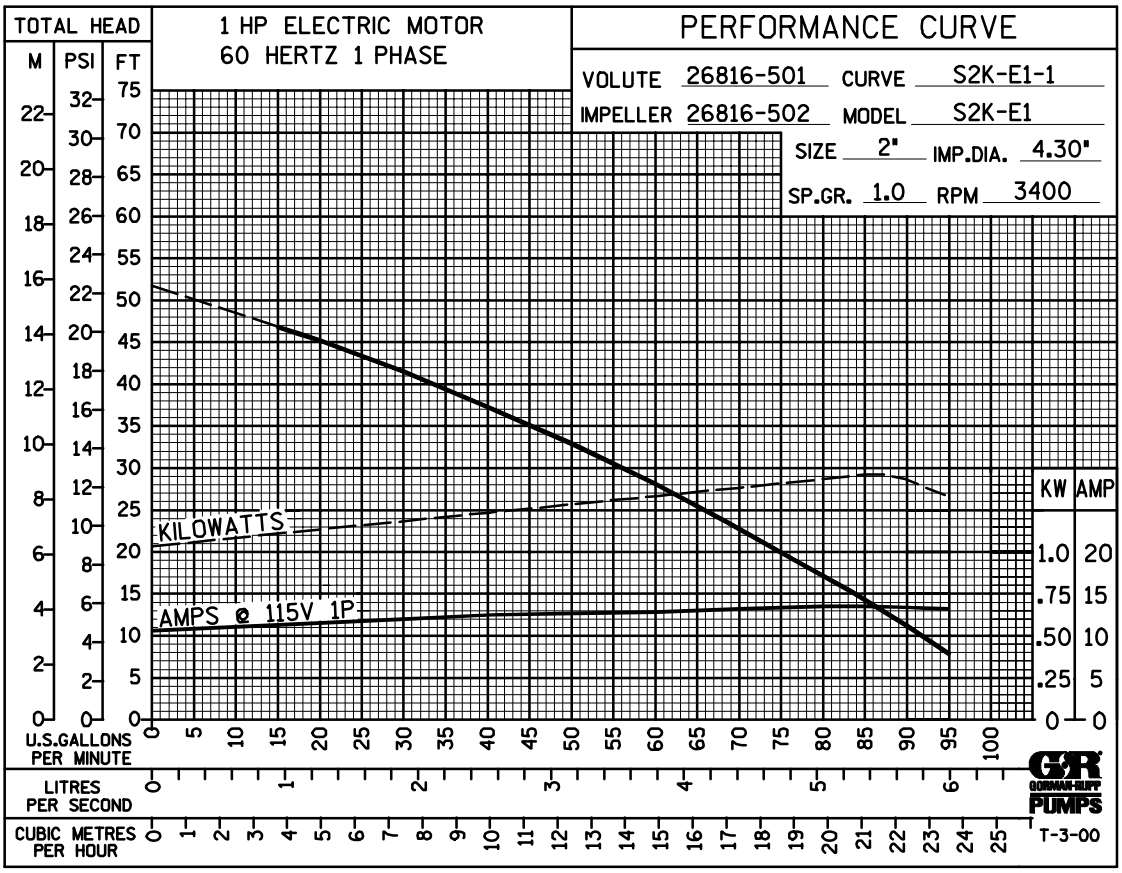
TROUBLESHOOTING – SECTION D

Review all SAFETY information in Section A.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP WILL NOT RUN (MANUAL MODE)	Hardened mud or sludge in impeller.	Remove strainer, check and clean.
	Damaged power cable.	Inspect and replace as required.
	Strainer clogged.	Check and clean as required.
	Impeller binding.	Check freedom of rotation. Add shims or gaskets as required.
PUMP WILL NOT RUN (AUTOMATIC MODE)	Liquid level device(s) fouled with mud or foreign material.	Clean liquid level device(s).
	Float type sensing device(s) tangled or obstructed.	Check installation for free movement of float.
	Defective liquid level device(s).	Replace device.
MOTOR RUNS, BUT PUMP FAILS TO DELIVER RATED DIS-CHARGE	Discharge line clogged or restricted; hose kinked.	Check discharge lines; straighten hose.
	Liquid being pumped too thick.	Dilute liquid by heating if possible.
	Worn impeller vanes.	Check impeller.
	Pumping entrained air.	Check liquid level in sump; check position of pump.
	Damaged or unbalanced impeller.	Replace impeller.
PUMP RUNS WITH EXCESSIVE NOISE OR VIBRATION	Pumping entrained air.	Check liquid level in sump; check position of pump.
	Damaged impeller.	Inspect and replace impeller.

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 S2K3--E1 115/1**

✳ Based on 70° F (21° C) clear water at sea level. Since pump installations are seldom identical, your performance may be difference due to such factors as viscosity, specific gravity, elevation and temperature.

SECTION DRAWING

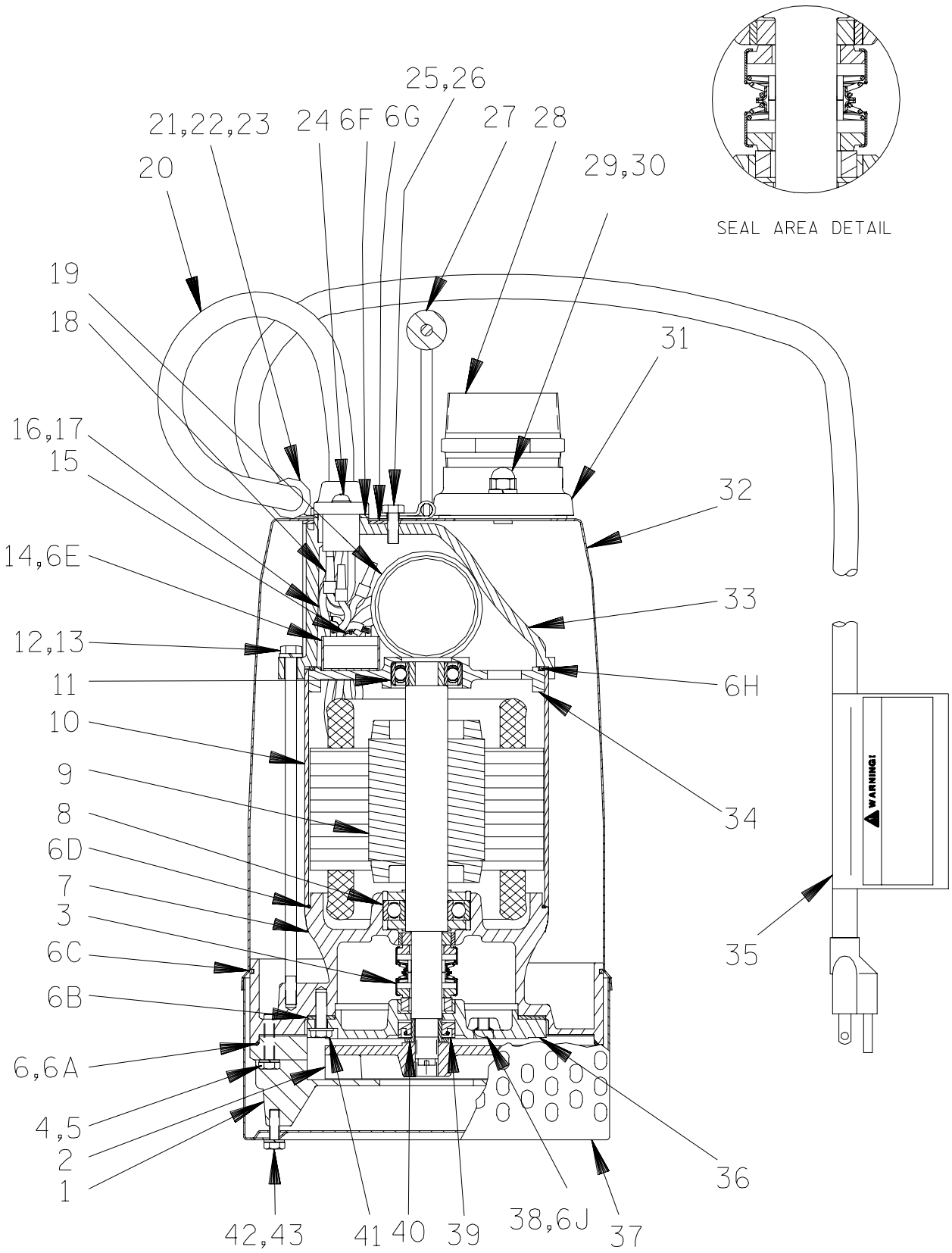


Figure 1. Pump Model S2K3–E1 115/1

PARTS LIST
Pump Model S2K3–E1 115/1
(From S/N 1194721 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
1	IMP HSG/SUCTION CVR	26816–501	– – –	1
2 ✳	IMPELLER	26816–502	– – –	1
3 ✳	SEAL ASSEMBLY	26816–503	– – –	1
4	HEX HD MACH SCREW	26816–529	– – –	3
5	LOCKWASHER	26816–530	– – –	3
6 ✳	O-RING KIT W/GASKET	26816–516	– – –	1
6A	–SUCTION COVER O-RING			1
6B	–OIL CHAMBER COVER O-RING			1
6C	–OIL CHAMBER O-RING			1
6D	–LOWER STATOR CASING O-RING			1
6E	–MOTOR COVER GROMMET			1
6F	–OUTER POWER CABLE GLAND GASKET			1
6G	–INNER POWER CABLE GLAND GASKET			1
6H	–UPPER STATOR CASING O-RING			1
6J	–SEAL DRAIN SCREW O-RING			1
7	OIL CHAMBER	26816–519	– – –	1
8	LOWER BALL BEARING	26816–508	– – –	1
9	ROTOR W/SHAFT	26816–505	– – –	1
10	STATOR W/CASING	26816–504	– – –	1
11	UPPER BALL BEARING	26816–210	– – –	1
12	HOLDING ROD	26816–531	– – –	3
13	LOCKWASHER	26816–538	– – –	3
14	OVERLOAD	26816–512	– – –	1
15	PAN HD MACH SCREW	26816–432	– – –	2
16	PAN HD MACH SCREW	26816–023	– – –	1
17	GRD WIRE W/RING TERM	26816–340	– – –	1
18	WIRE NUT	27284–011	– – –	3
19	CAPACITOR	26816–513	– – –	1
20	POWER CABLE W/GLAND	26816–215	– – –	1
21	POWER CABLE LINE CLIP	26816–020	– – –	1
22	HEX HD CAPSCREW	26816–345	– – –	2
23	WASHER	26816–034	– – –	2
24	PAN HD MACH SCREW	26816–026	– – –	2
25	HEX HD CAPSCREW	26816–345	– – –	2
26	WASHER	26816–034	– – –	2
27	HANDLE	26816–521	– – –	1
28	DISCH NIPPLE MNPT	26816–022	– – –	1
29	CAP HEX NUT	26816–524	– – –	2
30	LOCKWASHER	26816–525	– – –	2
31	DISCH FLANGE ASSY	26816–509	– – –	1
32	PUMP CASING (OUTER)	26816–511	– – –	1
33	PUMP TOP COVER	26816–514	– – –	1
34	MOTOR COVER UPPER	26816–518	– – –	1
35	WARNING TAG	38817–082	– – –	1
36	OIL CHAMBER COVER	26816–506	– – –	1
37	STRAINER	26816–517	– – –	1
38	PAN HD MACH SCREW	26816–507	– – –	1
35	LIP SEAL BUNA-N	26816–007	– – –	1
24	HEX HD MACH SCREW	26816–345	– – –	2
28	GRD WIRE W/RING TERM.	26816–340	– – – –	1
29	MOTOR COVER (UPPER)	26816–618	– – –	1
34	PAN HD MACH SCREW	26816–027	– – –	3
36	SHAFT SLEEVE	26816–339	– – –	1
38	SEAL CVTY DRAIN SCREW	26816–028	– – –	3
39	LIP SEAL BUNA–N	26816–507	– – –	1
40	SHAFT SLEEVE	26816–539	– – –	1
41	HEX HD CAPSCREW	26816–028	– – –	3
42	HEX HD MACH SCREW	26816–532	– – –	3
43	LOCKWASHER	26816–533	– – –	3
NOT SHOWN				
	NAME PLATE	38818–126	– – –	1
	GORMAN-RUPP DECAL	GR–03	– – –	1
OPTIONAL				
	FLOAT SWITCH	27471–191	– – –	1

✳ INDICATES PARTS RECOMMENDED FOR STOCK

PUMP MAINTENANCE AND REPAIR

Review all SAFETY information in Section A.

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

The following maintenance and repair instructions are provided separately for each individual pump model, and are keyed to the Pump Model view (Figure 1), and the accompanying parts list.

Before attempting to service the pump, unplug the pump power cable to ensure that the pump will remain inoperative.

WARNING!

Before attempting to open or service the pump:

1. **Familiarize yourself with this manual.**
2. **Unplug the pump power cable to ensure that the pump will remain inoperative.**
3. **Allow the pump to completely cool if overheated.**

Use a rope or chain attached to the handle on the pump to remove the pump from the sump and move it to a suitable location for service. It is not necessary to disconnect a flexible discharge hose before removing the pump. If rigid discharge piping is used, disconnect the piping before attempting to move the pump.

WARNING!

Do not attempt to lift the pump by the power cable or piping. Attach proper lifting equipment to the handle on the pump.

Select a suitable location, preferably indoors, to perform the degree of maintenance required. If the motor housing is to be opened, the work must be done in a clean, well-equipped shop. All maintenance functions must be done by qualified personnel.

WARNING!

Obtain the services of a qualified electrician to service the electrical components of this pump.

Check the chart in **TROUBLESHOOTING**, Section D, to determine the nature of the pump problem. If the problem is mechanical in nature, such as worn pump parts, seal replacement, etc., refer to the appropriate **PUMP END DISASSEMBLY** procedures for your specific pump.

Complete disassembly procedures for the pump motor **are not** included in this manual. Instructions are provided only for replacement of pump end components, the pump power cable and capacitor. If the pump fails to run and motor problems are suspected, contact your Gorman-Rupp distributor or the factory for motor service.

Carefully inspect any O-rings or gaskets before removal and cleaning to determine if a proper seal and compression existed prior to disassembly. If sealing was faulty or questionable, the cause must be determined and corrected before reassembly. All gaskets and most O-rings **must** be replaced if disturbed. Repair gaskets and O-rings are available as a kit shown on the parts lists.

PUMP END DISASSEMBLY

Strainer Removal

To remove the strainer screen (37), lay the pump on its side, disengage the hardware (42 and 43) and remove the strainer. If the impeller is clogged, the debris can usually be removed without further disassembly.

Impeller Removal

Remove the machine screws (4) and separate the suction cover (1) and suction cover O-ring (6A).

Immobilize the shaft by inserting a large flat-blade screwdriver into the slot in the end of the shaft. Strike the impeller in a counterclockwise direction with a soft-faced mallet or wood block and hammer. When the impeller breaks loose, remove the screwdriver and unscrew the impeller from the shaft.

Seal Removal

NOTE

The seal for this pump consists of two identical seal assemblies installed back-to-back in tandem. The two seals are provided for repair under one part number for the mechanical seal kit.

Before attempting to remove the seal, remove the oil cavity drain screw and O-ring (38 and 6J) and drain the oil from the seal cavity.

Disengage the machine screws (41) and use a pair of flat head screwdrivers to pry the oil chamber cover (36) and oil seal (39) off the shaft as a unit. Use caution when removing the oil chamber cover; the lower seal stationary element and seat will also come off the shaft. Remove the oil chamber gasket (6B).

Invert the oil chamber cover and remove the lower seal stationary element and seat from the cover. With the oil chamber cover inverted, press the oil seal (39) out of the oil chamber cover from the back side.

Lubricate the seal area of the rotor shaft, and slide the rotating portion of both the lower and upper seal assemblies off the shaft.

To remove the stationary portion of the upper seal assembly, slide two stiff wires with hooked ends along the shaft and hook the stationary seat and element from the back side. Pull the stationary portion of the seal from the bore of the oil chamber (7).

Stuff a clean tissue into the stationary seal seat bore or wrap a small rag around the shaft to prevent contamination of the motor cavity.

If no further disassembly is required, proceed with the appropriate **PUMP END REASSEMBLY** procedures for your specific pump.

Complete disassembly procedures for the pump motor **are not** included in this manual. Instructions are provided only for replacement of the pump end components, the power cable and capacitor. If the pump fails to run and motor problems are suspected, contact your Gorman-Rupp distributor or the factory for motor service.

POWER CABLE AND CAPACITOR REPLACEMENT

Power Cable Removal

With the strainer (37) and suction cover (1) removed, disengage the hardware (29 and 30) and remove the discharge nipple (28) and loose parts of the flange assembly (31).

Disengage the hardware (25 and 26) and remove the handle (27).

Disengage the hardware (22 and 23) and separate the power cable clip (21) from the outer pump casing (32).

Remove the hardware (24) securing the cable gland to the pump casing. Pull the outer pump casing up off the motor, feeding the cable gland down through the hole in the casing as the casing is removed.

Remove the holding rods and lockwashers (12 and 13) securing the motor top cover (33) to the stator casing (10). Raise the motor top cover to expose the power cable leads and capacitor (19). Remove the connectors (18) from the power cable leads and remove the power cable and inner power cable gland gasket (6G).

It is not necessary to remove the ground wire (17) unless replacement is required. To remove the ground wire, disengage the machine screw (16). To remove the overload (14) and the motor cover grommet (6E), disengage the machine screws (15). Use caution not to allow the motor leads for the capacitor to slip down into the motor.

If the capacitor (19) requires replacement, remove the shrink tubing (not shown) and separate the capacitor leads from the stator leads.

Complete disassembly procedures for the pump motor **are not** included in this manual. Instructions are provided only for replacement of the pump end components, the power cable and capacitor. If the pump fails to run and motor problems are suspected, contact your Gorman-Rupp distributor or the factory for motor service.

Power Cable Installation

NOTE

Reuse of old O-rings or gaskets may result in premature leakage or reduced pump performance. It is strongly recommended that new O-rings and gaskets be used during reassembly (see the parts lists for the O-ring/gasket kit part number).

If the capacitor (19) was removed, feed the motor leads for the capacitor and overload through the new grommet (6E) and install the grommet in the hole in the upper motor cover (34).

Connect the wires for the overload (14) to those in the motor, and secure the overload with the machine screws (15). Slide a piece of heat shrink tube (not shown) over the capacitor leads. Connect the leads on the capacitor to the capacitor leads from the motor. Slide the heat shrink tubing down over the connections and use a heat gun to shrink the tubing and seal the connections.

If the ground wire (17) was removed, secure a new wire to the motor top cover (34) with the machine screw (16).

Slide the gland end of the power cable down through the outer pump casing (32). Install a new outer power cable gland gasket (6F) against the power cable gland. Push the power cable leads through a new inner power cable gland gasket (6G) and down through the hole in the pump top cover (33).

Connect the ground wire and stator leads to the power cable leads with the wire connectors (18).

The green ground lead on the power cable must be connected to the green lead grounded to the motor top cover. Failure to ground the power cable or miss wiring of the ground lead could damage the pump and/or cause serious injury or death to personnel.

Carefully fold the capacitor and power cable leads under the pump top cover and secure the cover to the stator casing (10) with the holding rods and lockwashers (12 and 13). **Make sure** the cable leads are not pinched under the pump top cover.

Position the inner power cable gland gasket (6G) over the flange on the motor top cover. Slide the outer pump casing (32) down over the motor and over the motor top cover flange. Secure the pump casing to the motor top cover with one of the capscrews and lockwashers (25 and 26).

Carefully compress the power cable leads into the motor top cover and secure the power cable gland to the cover with the machine screws (24). Install the cable clip (21) on the cable and secure it to the pump with the remaining capscrew and lockwasher (22 and 23).

Secure the flange assembly (31) and nipple (28) to the pump with the cap nuts and lockwashers (29 and 30).

Secure the handle (27) to the pump with the previously removed hardware (25 and 26).

PUMP END REASSEMBLY

Cleaning And Inspection Of Pump Parts

Carefully inspect any O-rings or gaskets before removal and cleaning to determine if a proper seal and compression existed prior to disassembly. If sealing was faulty or questionable, the cause must be determined and corrected before reassembly. Replace any parts as required. It is **strongly** recommended that all seals and gaskets be replaced any time the pump is disassembled.

Thoroughly clean all reuseable parts with a soft cloth soaked in cleaning solvent. Remove all O-rings and gaskets, and clean the sealing surfaces of dirt or gasket material. Be careful not to scratch gasket surfaces.

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 rotor shaft for damaged threads, scoring, or nicks. Remove nicks and burrs with a fine file or emery cloth to restore original contours.

The shaft seal assembly should not be reused because wear patterns on the finished faces cannot be realigned during reassembly. This could result in premature failure. If any components are worn, replace the complete seal; **never mix old and new seal parts.**

Handle a new seal with extreme care to prevent damage. Be careful not to contaminate the 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.

Install the shaft seal as illustrated in Figure 2.

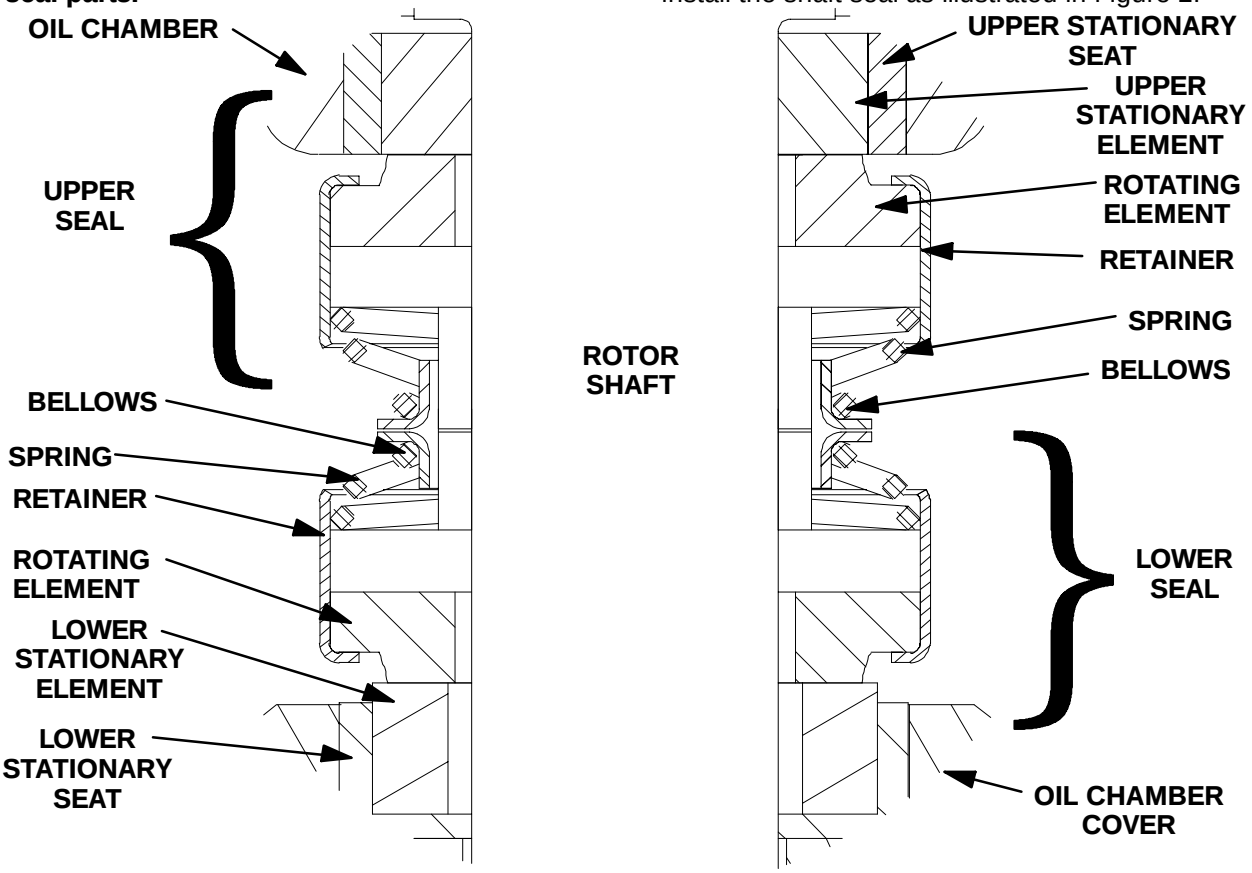


Figure 2. Seal Assemblies

Seal Installation

(Figures 1 and 2)

NOTE

The seal for this pump consists of two identical seal assemblies installed back-to-back in tandem. The two seals are provided for repair under one part number for the mechanical seal kit.

Do not unwrap the new seal(s) until time of installation. Cleanliness of seal components is critical, especially the seal faces.

Clean the rotor shaft and seal cavity area. Be sure the area is dry and free of lint and dirt. Check the seal bore for burrs or nicks that might prevent a good seal. Apply a **light** coating of oil to the bore.

Carefully remove the material stuffed into the seat bore (or unwrap the shaft). **Be sure** no debris stopped by the material falls into the motor cavity.

NOTE

When pressing seal components onto the shaft, use hand pressure only.

Ensure that the upper stationary element is subassembled into the stationary cup seat. Position this subassembly in the oil chamber bore with the sealing face up, and cover the seal face with a clean, lint-free cloth. Use your thumbs to press the assembly into the bore. Apply equal pressure on op-

posite sides until the seat contacts the bore shoulder. Remove the tissue and inspect the seal face to ensure that it is clean and dry. If cleaning is necessary, use a clean lint-free cloth to wipe **lightly** in a concentric pattern.

Be certain the seal face of the upper rotating element is free of grit or surface damage and that it is clean and dry. If cleaning is necessary, use a clean lint-free cloth to wipe in a concentric pattern. Apply a **light** coating of oil to the seal seating surface on the shaft and the I.D. of the bellows. Apply a drop of oil to the seal face.

Slide the rotating portion of the upper seal assembly onto the lubricated shaft as shown in Figure 2. Apply firm, steady pressure on the seal retainer until the seal slides onto the shaft and the upper seal faces contact.

Repeat the above procedure for the rotating portion of the lower seal assembly, making sure to position the lower seal back-to-back against the upper seal.

Position the oil chamber cover (36) with the motor side up. Ensure that the lower seal stationary element is subassembled in the stationary cup seat. Position this subassembly in the cover bore with the sealing face up, and cover the seal face with a clean, lint-free cloth. Use your thumbs to press the assembly into the bore. Apply equal pressure on opposite sides until the seat contacts the bore shoulder. Remove the tissue and inspect the seal face to ensure that it is clean and dry. If cleaning is necessary, use a clean lint-free cloth to wipe **lightly** in a concentric pattern.

Apply a drop of oil to the lower seal stationary face. Install the oil chamber cover gasket (6B). Carefully position the oil chamber cover over the shaft so the lower seal faces contact. Install the machine screws (41) and tighten them in an alternating pattern until the seal springs are compressed and the cover seats tightly against the gasket.

Fill the seal chamber with approximately 6.5 oz (0,19 liter) of oil to cover the seals, but **do not** completely fill the chamber. There must be enough air in the chamber to allow for expansion as the oil heats. Refer to the **Lubrication Specifications** at the end of this section for the correct lubricant. Reinstall the oil cavity drain screw and O-ring (38 and 6J).

Lubricate the lip of the oil seal (39) and place the seal in the oil chamber cover (36) with the lip positioned as shown in the seal detail, Figure 1. Press the seal into the oil chamber cover until fully seated.

Impeller Installation

Before installing the impeller, remove the oil cavity drain screw and O-ring (38 and 6J) and check the seal cavity oil level. Fill the seal chamber with approximately 6.5 oz (0,19 liter) of oil to cover the seals, but **do not** completely fill the chamber. There must be enough air in the chamber to allow for expansion as the oil heats. Refer to the **Lubrication Specifications** at the end of this section for the correct lubricant. Reinstall the oil cavity drain screw and O-ring.

Inspect the impeller (2) for cracks, broken vanes, or wear from erosion, and replace it if damaged. Clean the threads on the rotor shaft.

Lubricate the O.D. of the shaft sleeve (40). Slide the sleeve over the shaft and through the lip seal (39) until fully seated against the shaft shoulder. Be careful not to roll or damage the lip seal.

Screw the impeller onto the shaft until it is fully seated. Insert a large flat-blade screwdriver into the slot in the end of the shaft. Tighten the impeller on the shaft by tapping it with a hammer and wood block or a soft-faced mallet.

Install the suction cover O-ring (6A) and impeller housing/suction cover (1). Secure with the hardware (4 and 5).

Strainer Installation

Position the strainer screen (37) against the impeller housing/suction cover, and secure it with the hardware (42 and 43).

LUBRICATION SPECIFICATIONS

When shipped from the factory, the pump seal cavity was fully lubricated with **Shell Turbo-T68** oil. Use **only** Shell Turbo-T68 or **Gulf Harmony HVI AW 26** oil for repair. Quantities for each pump are as follows:

Seal Cavity . . . . . Cover seal but do not completely fill chamber

Motor . . . . . Does not require lubrication

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or call:
519—631—2870

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