

Harriman Utility Board Pump and Motor Data

Woody Street
PUMP No. 1

PUMP		PART NO.	DATE	PRICE
S.O. #	61 - 25295			
Product #	61 - 25295			
Type	VOSOL - 4			
Model				
TDH	47 ft.			
Manufacture	Chicago Pump			
GPM	320			
Top Bearing				
Bottom Bearing				
Top Seal				
Middle Seal				
Lower Seal				
Impeller				
Shaft Length				
Packing Size				
Right Hand				
Left Hand				
Bowl Diameter				
Lip Plate				
Wear Plate				
Priming Cover				
Suction Flange 4"				
Impeller Bolt				
Impeller Washer				
Cover Gasket				
MOTOR				
Make	Marathon Electric			
Model	5F 284TTDR7106 AA W			
Serial	474024			
S.O. #				
H.P	10			
RPM	880			
AMP	29 / 14.5			
Full load Amps	40			
Voltage	230 / 460			
C Class OF INS	B			
Phase	3			
<i>Cycle</i>	<i>60</i>			



SOUTHERN
SALES COMPANY, INC.

weedy?

P.O. Box 40384
2929 Kraft Drive
Nashville, TN 37204

(615) 254-0066 w
(615) 254-0791 fax

Start-up Report

SSC Job #			Date:	
Project Name			Eqpt. Mfr.	
Project Address1			Description	
Project Address2			Station #	
Project City, ST			Model # (s)	
Site Phone#			Serial #(s)	
Site Fax#			Design GPM	
Contact Person			Design TDH	
Contractor:			Pump Type	

Pump Data:

	Pump 1	Pump 2	Pump 3	
Static Suction Head (ft)				
Static Discharge Head (ft)				
Operating RPM				
Pump Sheave Size				
Motor Shaft Size				
Motor Sheave Size				
Belt Size				
Quantity of Belts				
Operating Discharge Head (ft)				
Operating Suction Head (ft)				
Less Adjustment Gauge Height (ft)				
Total Dynamic Head (ft)				
Shut-off Discharge Head (ft)				

Electrical Data:

	Pump 1	Pump 2	Pump 3	Pump #1	Pump #2
Weg. Motors:	28SET05 (MODEL) 03018 ET 3E 286T (BT46822)				(BT46822)
HP	30				
Voltage/Ø/Cycle	480/3/60				
RPM	1765				
Frame Size	286T				
Type	ET				
S.F.	1.25 1.25	1.25			
Full Load Amps	35.1				
Other	CODE: H ENCL: TEFC-WP				
Controls:	U.S. FILTER	SERIAL #	504370	LCZ000	
Starter Size	SIZE 1 (SS)	SOFT START			
Breaker Size	100 AMP	100 AMP.			
Overload/Heater Size	#20150 (ELECTR)	ELECTR SET @ 3A			
Other	SOFT STARTS = SA52L50N3S				
Voltage:	OFF	ON	OFF	ON	OFF
L1 to L2	484	484	484	484	
L2 to L3	486	486	486	485	
L1 to L3	487	485	486	485	
L1 to ground	280	280	280	280	
L2 to ground	282	281	282	281	
L3 to ground	281	280	281	281	
Amperage:					
L1	31	31	31	30	
L2	31	32	31	31	
L3	32	33	32	32	

Automatic Level Control & Alarm Settings

	Low Alarm	Lead Pump	Lag 1 Pump	Lag 2 Pump	Hi Alarm
On	1.5	4.5			5.6
Off		2.0			

General Notes:

- HAD PROBLEMS W/ COLLIER HAMMER GROUND FAULT RELAY.
Pump #2 GROUND FAULT RELAY IS BAD WILL HAVE
TO ORDER NEW RELAY + INSTALL.

Owner: _____

Date: _____

Engineer: Alex M...

Date: 10/30/06

Contractor: Rick Medley

Date: 10-30-06

Service Technician: Russel Wisort

Date: 10-30-06



***“Water and Wastewater Pumps, Valves and
Treatment Equipment Since 1923”***

Harriman Utility Board

Pump and Motor Data

WOODY

PUMP No. 2

PUMP		PART NO.	DATE	PRICE
S.O. #	61-04985-6-C			
Product #				
Type	VOSOL-4			
Model				
TDH	47			
Manufacture	CHICAGO PUMP			
GPM	320			
Top Bearing				
Bottom Bearing				
Top Seal				
Middle Seal				
Lower Seal				
Impeller				
Shaft Length				
Packing Size				
Right Hand				
Left Hand				
Bowl Diameter				
Lip Plate				
Wear Plate				
Priming Cover				
Suction Flange 4"				
Impeller Bolt				
Impeller Washer				
Cover Gasket				
MOTOR				
Make	Marat			
Model	5E 28			
Serial	47402			
S.O. #				
H.P	10			
RPM	880			
AMP	29 / 14.5			
Full load Amps				
Voltage	230 / 460			
Max AMB	40			
C Class OF INS	R			

Motor # 2

July '01

Rewound For 460 Volts

		Part No.	Date	Price
Cycle	60			
DES	B			
Duty	CONT			
Thermal Protection	NONE			
Frame Size	284TCV			
Type	TDR - BCV			
S.F.	1.15			
Code	G			
Shaft End Bearing	77610			
Operating End Bearing	77508			
CONTROLS				
Manufacture				
Breaker				
S.O.#				
Starter				
Rated				
Thermal No.				
Working Condition				
GPM				
TDH				
Operating RPM				
Static Discharge Head				
Static Suction Head				
Discharge Head	Pump # 1	Pump # 2		
Suction Head	Pump # 1	Pump # 2		
Shut Off Head	Pump # 1	Pump # 2		
Motor AMP Load				
L1				
L2				
L3				
Voltage				
L1-L2				
L2-L3				
L1-L3				
L1-GND				
L2-GND				
L3-GND				

Harriman Utility Board

Pump and Motor Data

WOODY

PUMP No. 3

PUMP		PART NO.	DATE	PRICE
S.O. #	61-04985-6-B			
Product #				
Type	VOSOL-4			
Model				
TDH	47			
Manufacture	CHICAGO PUMP			
GPM	320			
Top Bearing				
Bottom Bearing				
Top Seal				
Middle Seal				
Lower Seal				
Impeller				
Shaft Length				
Packing Size				
Right Hand				
Left Hand				
Bowl Diameter				
Lip Plate				
Wear Plate				
Priming Cover				
Suction Flange 4"				
Impeller Bolt				
Impeller Washer				
Cover Gasket				
MOTOR				
Make	Marathon Electric			
Model	5F 284YYDR7106 AA W			
Serial	474023			
S.O. #				
H.P	10			
RPM	880			
AMP	29 / 14.5			
Full load Amps				
Voltage	230 / 460			
Max AMB	40			
C Class OF INS	R			

		Part No.	Date	Price
Cycle	60			
DES	B			
Duty	CONT			
Thermal Protection	NONE			
Frame Size	284TCV			
Type	TDR - BCV			
S.F.	1.15			
Code	G			
Shaft End Bearing	77610			
Operating End Bearing	77508			
CONTROLS				
Manufacture				
Breaker				
S.O.#				
Starter				
Rated				
Thermal No.				
Working Condition				
GPM				
TDH				
Operating RPM				
Static Discharge Head				
Static Suction Head				
Discharge Head	Pump # 1	Pump # 2		
Suction Head	Pump # 1	Pump # 2		
Shut Off Head	Pump # 1	Pump # 2		
Motor AMP Load				
L1				
L2				
L3				
Voltage				
L1-L2				
L2-L3				
L1-L3				
L1-GND				
L2-GND				
L3-GND				



WOODY PUMP STATION

DRY PIT TYPE
FM ROUTE ATTACHED

INNERT ELV OF INFLUENT PIPE = 813.5'

ELV OF SUCTION PIPE = 810.96'

L OF FM = 5300 LF

FM = 10" DIAM.

DISCHARGE PT OF FM AT 903 FT GRD ELV. AT 5,300 LF. ← CONTROLLING POINT

HIGH PT AT 867 FT GRD ELV AT 3,050 LF

C FACTOR = 120

FLOWS: BASED ON AUG. 2001 ENGINEERING REPORT
BY BOB THREADGILL, P.E.

AVE DAILY = 502 GPM

PEAK DAILY = 805 GPM

WET WEATHER = 1262 GPM

SOLUTION:

INPUT DATA INTO A HYDRAULIC MODEL FOR PRESSURIZED SYSTEMS. THE SUCTION ELEVATION IS REFLECTED BY A RESERVOIR & THE DISCHARGE ELEVATION IS REFLECTED BY A RESERVOIR. INPUTTING THIS DATA WILL INDICATE WHERE THE PUMPS WILL OPERATE UNDER THIS CONDITION. A SYSTEM CURVE IS CALCULATED BELOW TO CHECK THE MODEL. THIS SYSTEM CURVE DOES NOT TAKE INTO ACCOUNT HEADLOSSES THROUGH THE STATION.

$$\text{STATIC MAX} = 903' - 810.96' = 92.04'$$

$$\text{H}_{\text{L}} \Rightarrow 502 \text{ GPM} = 10.65'$$

$$805 \text{ GPM} = 25.51'$$

$$1262 \text{ GPM} = 58.61'$$

$$\text{SYSTEM CURVE PTS} \Rightarrow \begin{array}{l} 502 \text{ GPM} = 103' \\ 805 \text{ GPM} = 118' \\ 1262 \text{ GPM} = 151' \end{array}$$

MIN. FLOW FOR 10" FM = 500 GPM

WOODY P.S. WILL REQUIRE A VFP PUMPING OPERATION TO GET THE DESIRED FLOW RANGE. MAX. FLOW WILL BE OBTAINED USING A 2 PUMP OPERATION & MIN FLOW USING A 1 PUMP OPERATION

SEE ATTACHED CURVES & MODEL RESULTS

PROJECT SOUTH HIRSHMAN PUMP STATIONS
REHABILITATION
SUBJECT WOODY PUMP STATION

SHEET 2 OF 2

DATE 11-15-02

JOB NO. 7601-30

BY NDW

CHECKING AVAILABLE WET WELL VOLUME

$$VOLUME_{MIN} = \frac{Q_{OUT} \cdot T_c}{4}$$

$$T_c = 10 \text{ STAIRS PER HOUR OR } 6 \text{ MIN}$$

$$Q_{OUT \text{ PEAK}} = 805 \text{ GPM}$$

$$VOL_{MIN} = 805(6)/4 = 1208 \text{ GALLONS}$$

VOLUME AVAILABLE =>

$$VOLUME \text{ B/W INVERT ELEV \& \# OF SUCTON} \approx (813.5 - 810.96) [(4,083)(20) + (7)(3)] \approx 261 \text{ cf}$$

IF APPROX. 17% OF GROUT IN BASIN IS W/IN THIS AREA
GROUT VOLUME = $6(13.5) + 143 = 224 \text{ cf}$ 17% = 38.08 cf
(THIS ASSUMPTION SHOULD BE CONSERVATIVE)

$$AVAILABLE \text{ VOLUME} = 261 - 38 = 223 \text{ cf} = 1668 \text{ GALLONS}$$

WHICH IS GREATER THAN 1208 GALLONS: OK.



P.O. Box 40384
 2929 Kraft Drive
 Nashville, TN 37204

(615) 254-0066 work
 (615) 254-0791 fax

To: Nina Williams, GRW Elrod Dunson **From:** Bill Allen ext. 3103

Fax: 366-0406 **Pages:** 3

Phone: 366-1600 **Date:** 11/26/2002

Re: Harriman, TN Woody Pump Station **CC:**

Urgent **For Review** **Please Comment** **Please Reply** **Please Recycle**

Dear Nina:

Per my recent meeting with you, I am pleased to enclose our pump selection for the referenced project. For this application, we propose three (3) Gorman Rupp Model JD6K60-E70 dry pit submersible pumps. These pumps would be rated to deliver a flow range between 500-1300 GPM @ 105-169' TDH. Two pumps would deliver a combines flow of 1300 GPM (650 GPM each) @ 169'+ TDH. The proposed pump would be driven by a 70 HP, 1750 RPM, 460/3/60 submersible motor and suitable for operation in a dry pit.

Please review this selection and call me to discuss.

Sincerely yours,

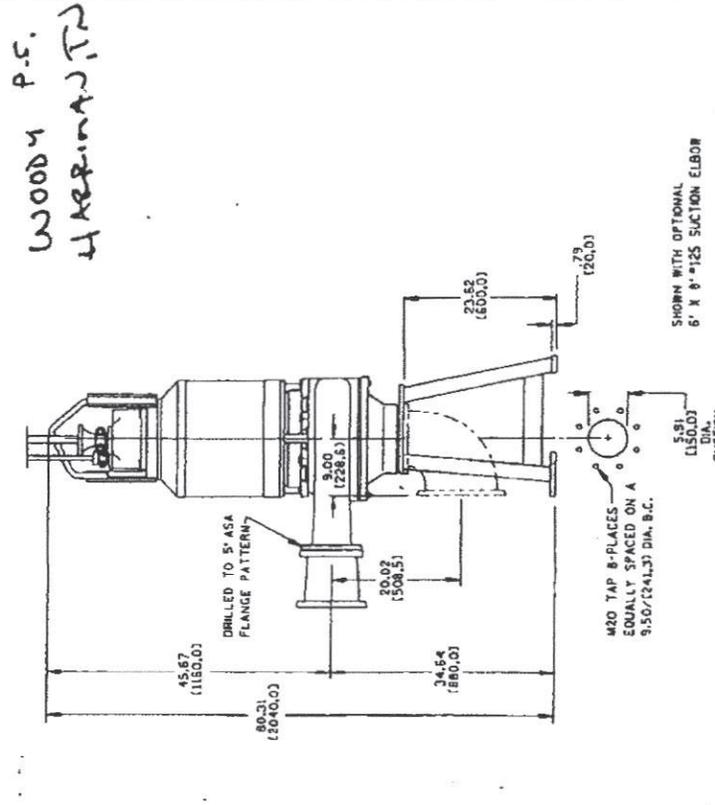
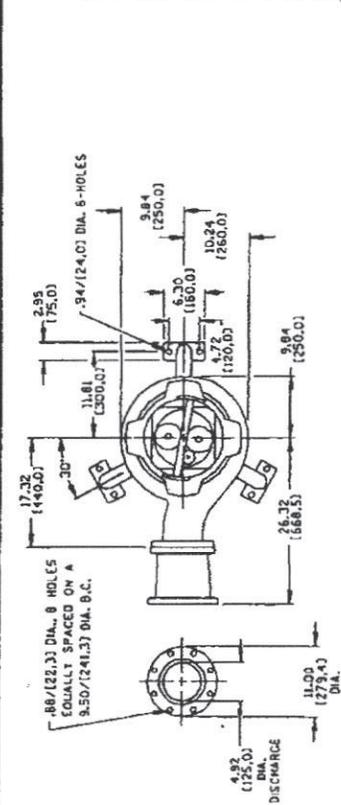
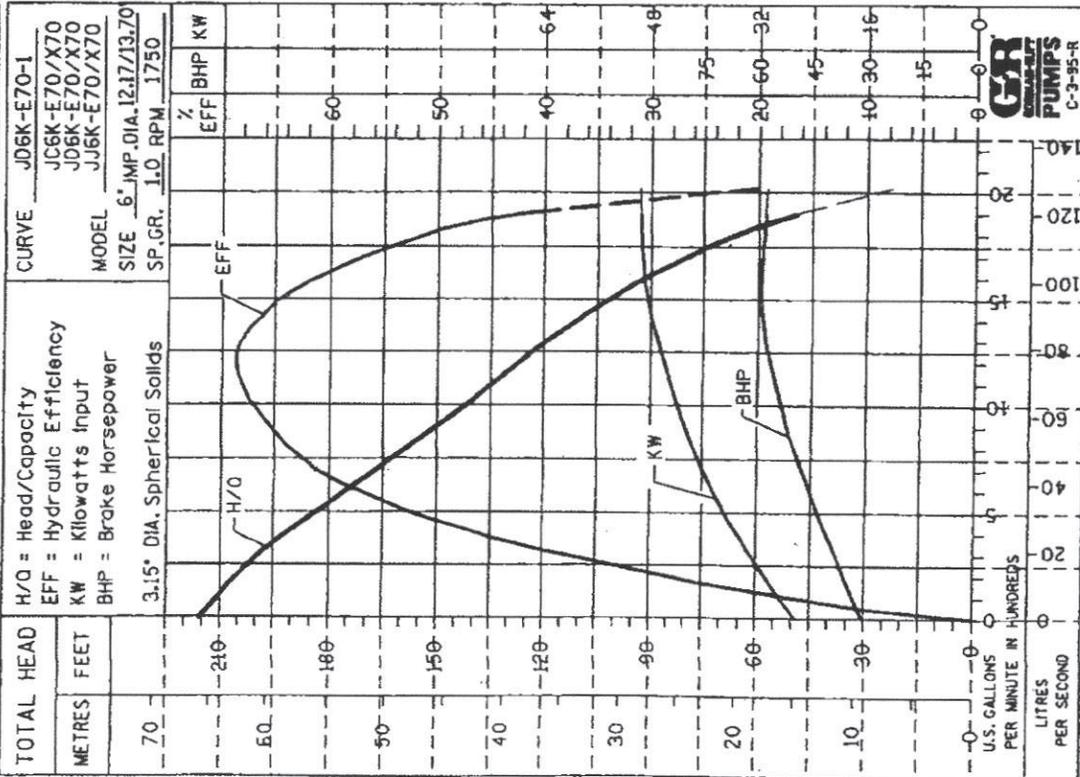

 Bill Allen

Specification Data

SECTION 125, PAGE 480

OVERALL DIMENSIONS
and
APPROXIMATE WEIGHTS

NET WT: (pump only) 1305 LBS. [592 KG.]
(pump w/std. cable) 1324 LBS. [601 KG.]
SHIPPING WT: 1554 LBS. [705 KG.]
CRATE SIZE: 74.9 CU. FT. [2,1 CU. M.]

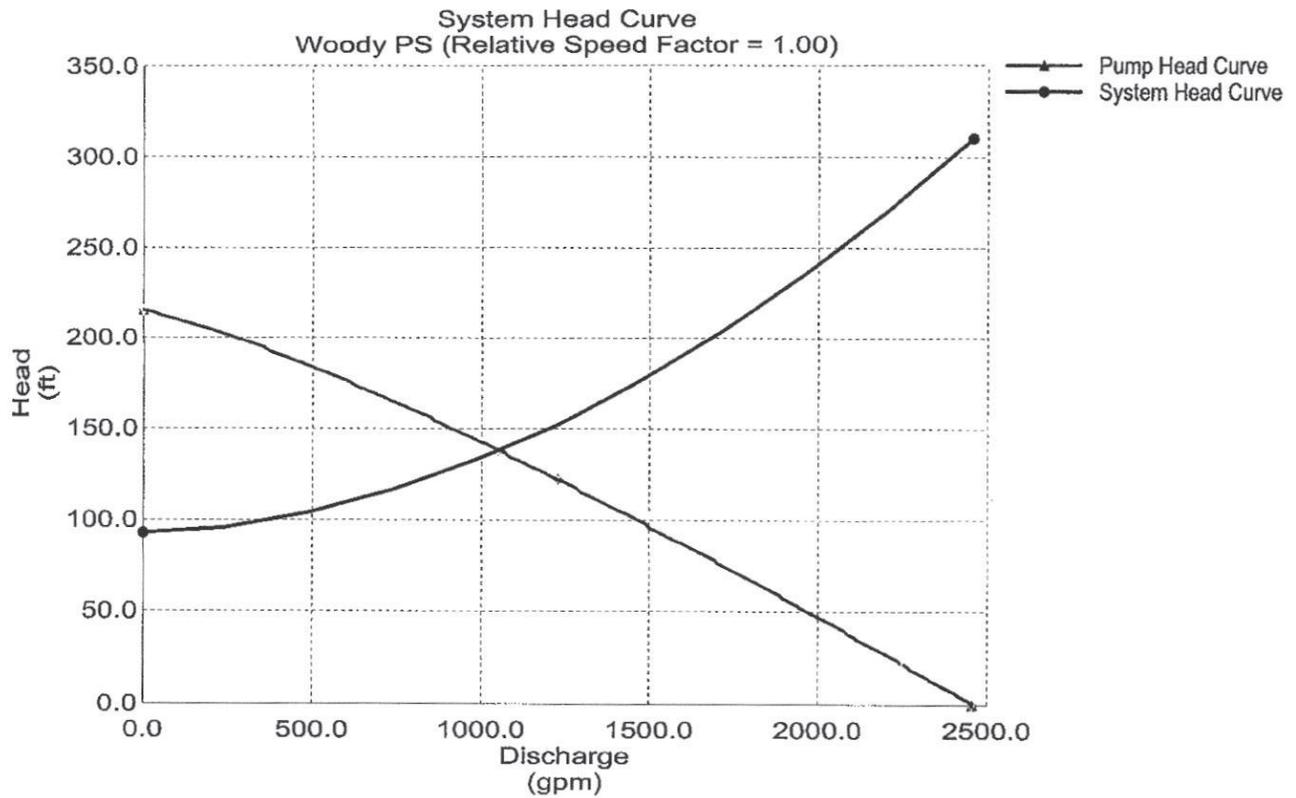


WOODY P.S.
HARRIS, TN



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

Graph



Woody St Pump Sta

C D



Wet/Dry Pit Pump

Electric Motor Driven Model JD6K60-E70

Size 6" x 6"

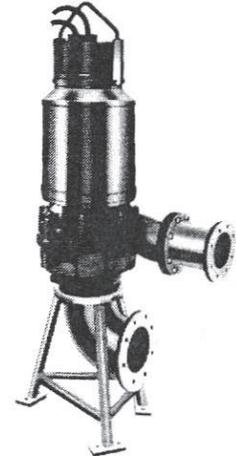


APPROVED
X-PROOF MOTORS FOR CLASS 1,
DIV. 1, GROUPS C&D LOCATIONS
(See Note for Ordering FM)

PUMP SPECIFICATIONS

Size: 6" x 6" (152 mm x 152 mm) Flanged.
 Casing: Gray Iron No. 30.
 Impeller: Single Vane, Gray Iron No. 3.
 Handles 3.15" (80 mm) Diameter Spherical Solids.
 Suction Head: Gray Iron No. 30.
 Seal Housing: Gray Iron No. 30.
 Lower Bearing Bracket: Gray Iron No. 30.
 Motor Housing: Gray Iron No. 30.
 Motor Cooling Jacket: Stainless Steel No. 304.
 Motor Shaft: Stainless Steel No. 329.
 Upper Bearing: Single Ball Type, Grease Lubricated.
 Lower Bearing: Double Ball Type, Grease Lubricated.
 O-Rings: Nitrile Rubber.
 Hardware-External Wetted: Stainless Steel No. 304.
 External Surface Protection: Black Epoxy Paint.
Standard Equipment: Pump Mounting Stand, Hoisting Bail.
Optional Equipment: Suction Elbow with Cleanout Opening,
 Pump Control Panel.

Note: When Ordering FM Approved Model, Specify "X" Instead of "E" Following Hyphen in Model Number



MOTOR/CABLE SPECIFICATIONS

Motor: 70.0 H.P., 60 Hertz, 1750 R.P.M., Three Phase, *460 or 575 Volts, 91.0/72.8 Full Load Amps, NEMA Code H, 1.15 Service Factor, Air Filled Enclosure, Squirrel Cage, Induction Start, G-R Frame No. 7, Class F Insulation Rated 311 °F (155 °C), 104 °F (40 °C) Ambient Plus 239 °F (115 °C) Temperature Rise.
Std. Features: Moisture Sensor Switch, Thermal Protection Switches, Star-Delta or Across-the-Line Motor Wiring Connection.

† **Power/Control Cables:** Neoprene Jacketed, (2) 6 AWG., 4-Conductor Power Cables, Plus (1) 14 AWG, 3-Conductor Control Cable for Moisture and Thermal Protection.

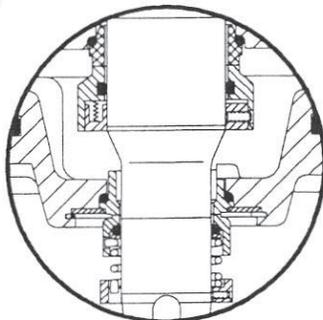
** 26 Feet (8 Meters) Provided Standard.

Maximum Temperature of Liquid Pumped: 104 °F (40 °C).

* Specify Voltage Required at Time of Order.

** For Different Lengths, Specify at Time of Order.

† See Accessories Section for CSA-Approved Cable Specifications. Specify CSA When Ordering.

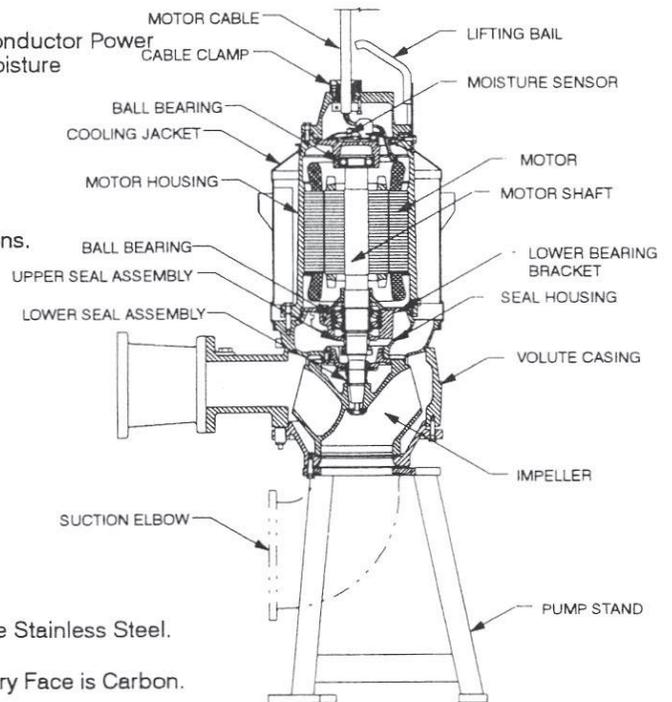


SEAL SPECIFICATIONS

Tandem Mechanical Seals. Oil-Lubricated. Cage and Springs are Stainless Steel. Fluorocarbon Elastomers (DuPont Viton® or Equivalent).
Upper Seal: Rotating Face is Hardened Stainless Steel, Stationary Face is Carbon.
Lower Seal: Rotating and Stationary Faces are Silicon Carbide.



Use only X-proof model for application in Class I, Division I, Groups C and D X-proof environments, or where trace amounts of volatile, flammable liquids may be present.



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

Specifications Subject to Change Without Notice

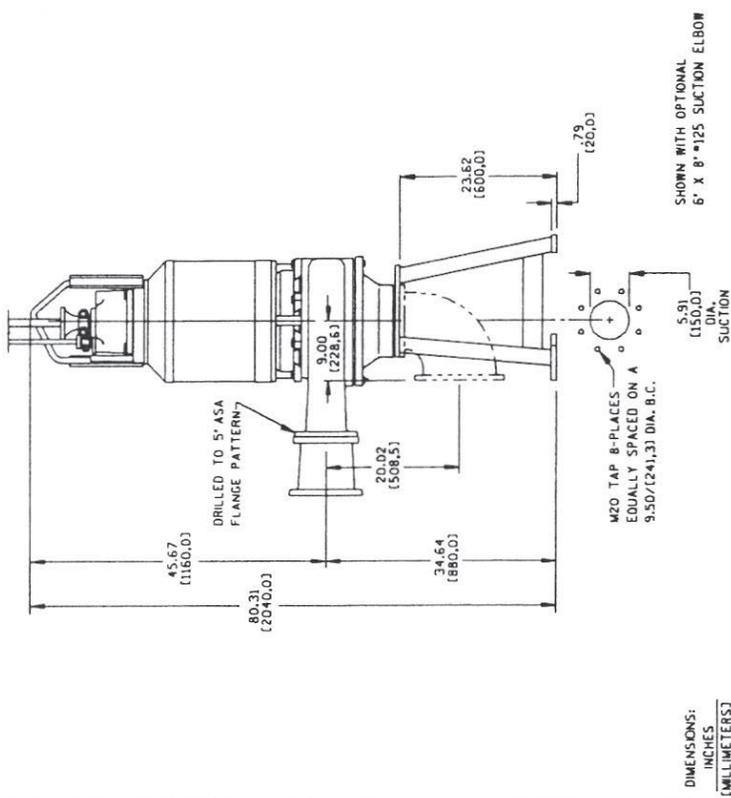
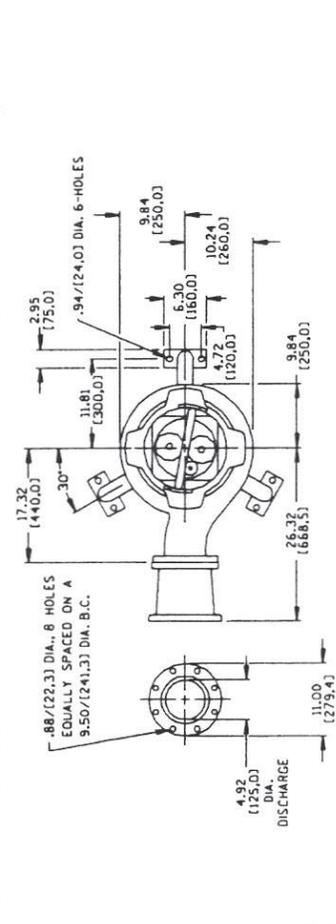
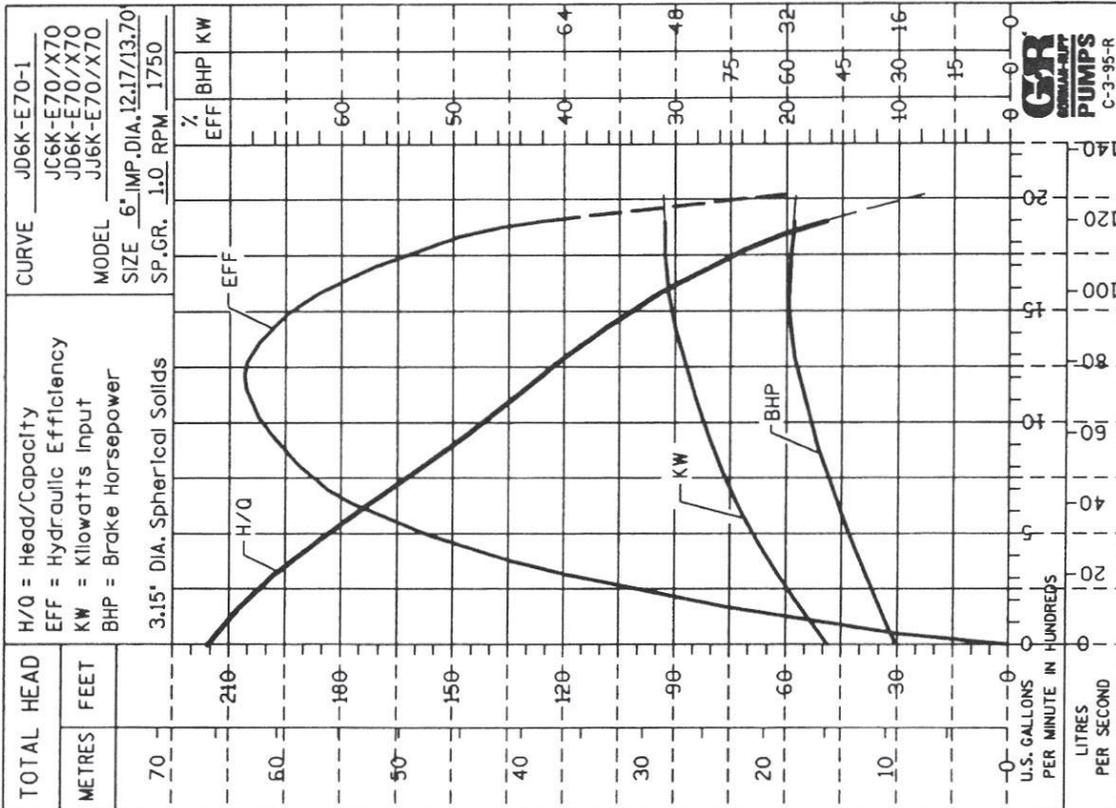
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Specification Data

SECTION 125, PAGE 480

OVERALL DIMENSIONS
and
APPROXIMATE WEIGHTS

NET WT: (pump only) 1305 LBS. [592 KG.]
(pump w/std. cable) 1324 LBS. [801 KG.]
SHIPPING WT: 1554 LBS. [705 KG.]
CRATE SIZE: 74.9 CU. FT. [2,1 CU. M.]



DIMENSIONS:
INCHES
(MILLIMETERS)



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WITH PARTS LIST



SUBMERSIBLE PUMPS

MODELS	
JD6H60-E56 460/3	JD6J60-E56 460/3
JD6K60-E70 460/3	
SINGLE VOLTAGE	

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

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

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INTRODUCTION

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

The manual applies **only** to the submersible pump models listed on the cover and in **MAINTENANCE AND REPAIR - SECTION E**. Refer to the nameplate on your pump to determine the **specific** model, voltage, and horsepower.

The pump is driven by a waterproof, single-voltage electric motor, and must be operated through an appropriate control box matching the voltage and other characteristics of the motor. The control box must also provide for proper operation of the motor protection devices such as the integral moisture and thermal switches. Control boxes and other control devices other than those integral to the pump motor are **not** covered in this manual. Refer to other literature accompanying the pump.

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

This pump is equipped with a cooling jacket which does not require an outside source of cooling water; liquid being pumped is forced through a narrow aperture behind the impeller, and circulated through the cooling jacket. The pump is designed to operate in a fixed piping system in a dry pit, and will handle raw, unscreened sewage and effluents with solids up to 3.15 inches (80 mm) in diameter. A mounting stand is provided with the pump, but instructions for installing the stand are not furnished in this manual. Because of its waterproof integrity, the pump will continue to operate if the dry pit becomes flooded.

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

The following are used to alert 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

The following information is specific to the Gorman-Rupp J Series Submersible pumps listed on the cover and in **MAINTENANCE AND REPAIR - SECTION E**. They apply throughout this manual to the instructions contained in the pages which follow.

In addition to this manual, see the separate literature covering the control box and other control accessories which will be used with this pump. This literature contains essential information on installing and operating the pump, and on making electrical connections.



WARNING!

Before attempting to install, operate, or service this pump, familiarize yourself with this manual, and with all other literature shipped with the pump. Unfamiliarity with all aspects of pump operation covered in this manual could lead to destruction of equipment, injury, or death.



WARNING!

This pump is designed to handle raw sewage and industrial wastes at temperatures of 104 °F (40 °C); do not apply at higher temperatures. Do not attempt to pump volatile, flammable, or corrosive liquids which may damage the pump or endanger personnel as a result of pump failure.



WARNING!

The electrical power used to operate this pump is high enough to cause injury or death. Obtain the services of a qualified electrician to make all electrical connections.



WARNING!

Do not connect the pump motor directly to the incoming power lines. The pump motor is designed to operate through a Gorman-Rupp approved control box which provides overload protection and power control; otherwise, the pump warranty will be voided. Make certain that the pump and control box are properly grounded and that the incoming power matches the requirements of the pump and controls. Install and operate the control box in accordance with the National Electric Code and all local codes. Failure to follow the instructions in this warning could result in injury or death to personnel.



WARNING!

Do not attempt to lift this pump by the motor power cable or the piping. Attach proper lifting equipment to the lifting handle, and make certain that the hook of the lifting device is securely positioned in the apex of the handle. If chains or cables are wrapped around the pump to lift it, make certain that they are positioned so as not to damage the pump, and so that the load will be balanced.



WARNING!

After the pump has been installed, make certain that the pump and all piping or hose connections are secure before operation. Loose connections can result in damage to equipment and serious injury to personnel.

**WARNING!**

The following precautions should be taken before attempting to open or service the pump; otherwise, injury or death could result.

1. Lock out the power to the control panel to ensure that the pump will remain inoperative.
2. Allow the pump to cool if overheated.
3. Close the discharge valve (if used).

**WARNING!**

If this pump is used to handle sewage, take necessary precautions during maintenance and repair to prevent personal contamination which could result in illness.

INSTALLATION - SECTION B

Review all SAFETY information in Section A.

This section is intended only to summarize recommended installation practices for this pump. If there are any questions concerning your specific installation, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

Automatic liquid level controls are available from Gorman-Rupp as options. For information on installing and operating these controls, see the technical data accompanying them.

PREINSTALLATION INSPECTION

The pump assembly was inspected and tested before shipment from the factory. Before installation, check 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 loose attaching hardware. Since gaskets tend to shrink after drying, check for loose hardware at mating surfaces.
- c. The standard pump is provided with 26 ft. (8 m) of power cable. Inspect the cable for cuts or damage.
- d. Check that amperes, phase, voltage, and Hertz indicated on the motor name plate match the ratings on the control box.
- e. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated.
- f. Check for any oil leaks. If there is any indication of an oil leak, see **LUBRICATION in MAINTENANCE AND REPAIR - SECTION E**.

LUBRICATION

These pumps are equipped with two mechanical seals. The lower seal prevents liquid being pumped from entering the seal housing cavity from the pump end. The upper seal prevents oil from escaping from the seal housing into the motor housing, and acts as back-up protection in the event of lower seal failure.

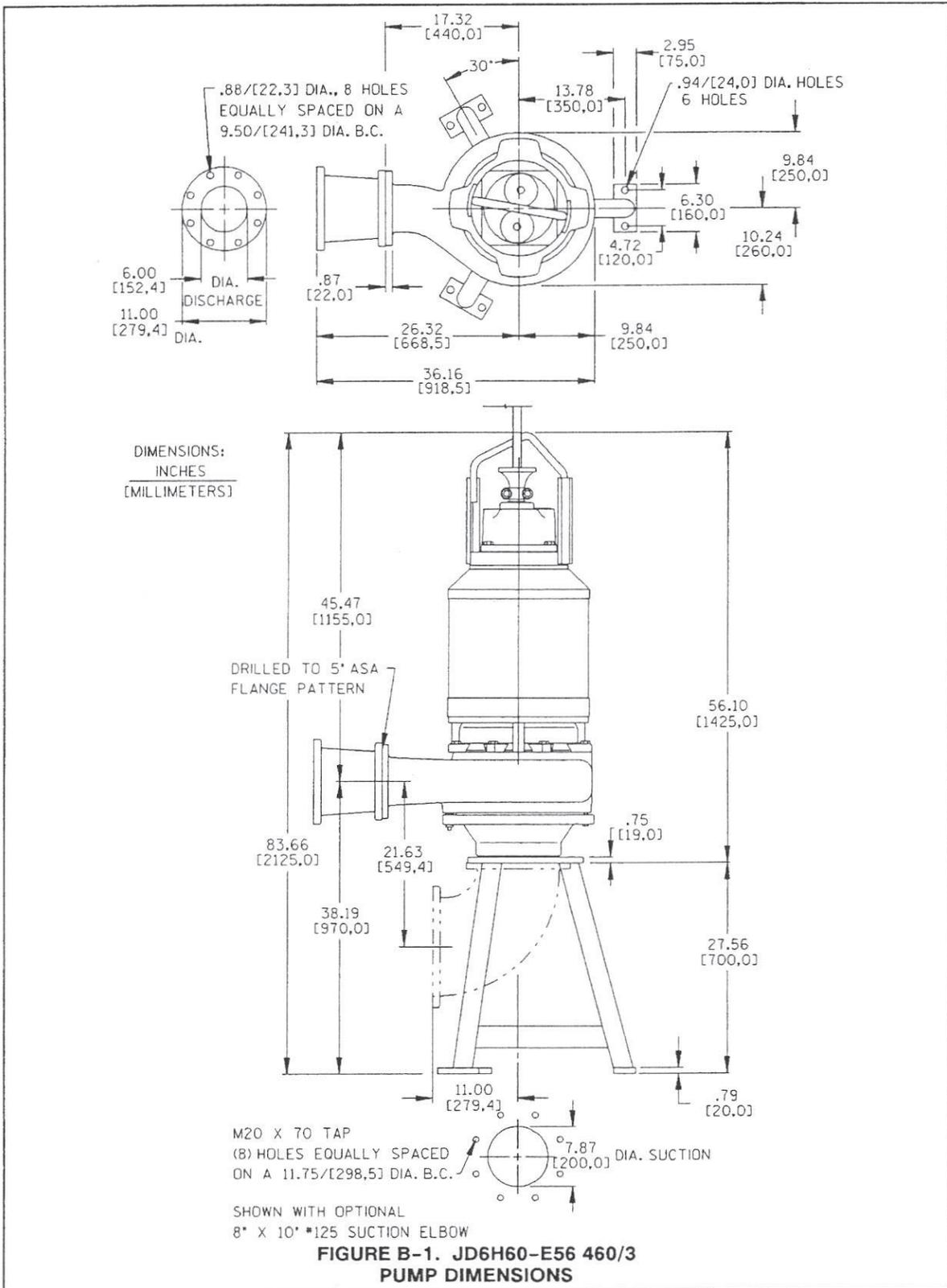
Both shaft seals are lubricated by oil in the seal housing (see **LUBRICATION in MAINTENANCE AND REPAIR - SECTION E**).

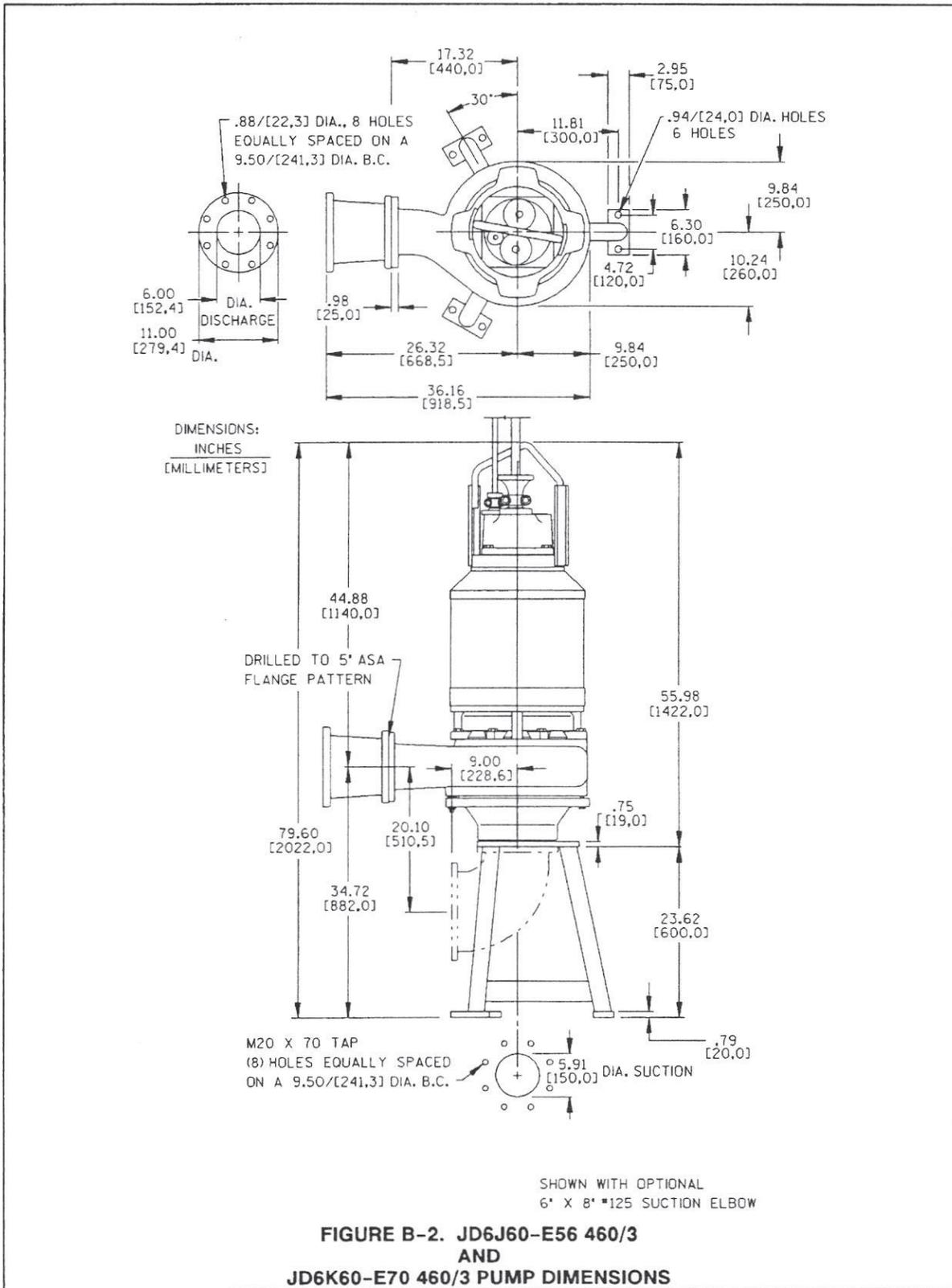
The shaft bearings are grease lubricated.

There is no other lubrication in the pump.

Pump Dimensions

See Figures B-1 and B-2 for the approximate physical dimensions of this pump.





Pump Motor Specifications

The motor furnished with this pump is a single voltage, 60 Hz., Squirrel Cage, Induction Start, G-R Frame Size No. 7; Class F Insulation Rated 155°C

(311°F), 40°C (104°F) ambient, plus 115°C (239°F) temperature rise.

See Table B-1 for motor specifications.

TABLE B-1. PUMP MOTOR SPECIFICATIONS							
MODEL NUMBER	VOLTAGE /PHASE	SIZE	H.P.	MOTOR RPM	MAX LOAD	NO LOAD	LOCKED ROTOR
JD6H60-E56	460/3	6"	56	1750	65.0A	25.5A	403.2A
JD6J60-E56	460/3	6"	56	1750	65.0A	25.5A	403.2A
JD6K60-E70	460/3	6"	70	1750	76.2A	29.1A	469.8A

PUMP INSTALLATION

Lifting

Use lifting equipment with a capacity of at least **7,275 lbs. (3300 kg.)**. The maximum weight for these pumps is approximately **1,455 lbs. (660 kg.)**, including the weight of standard cable, but **not** including the weight of customer-installed accessories such as piping. Discharge hose or piping must be removed before attempting to lift the pump.

Positioning the Pump

NOTE

*Before installing and operating the pump, check the direction of impeller rotation to ensure that the pump is properly wired at the control box. See **IMPELLER ROTATION, SECTION C.***

This pump is designed to be mounted on a stand with an optional 6 x 8-inch suction elbow. See FIGURES B-1 or B-2 for typical stand/elbow installations.

Refer to FIGURE E-1 in **MAINTENANCE AND REPAIR - SECTION E** during pump installation.

1. Install and secure the stand (26) in the floor of the dry pit.

2. Install the upper seal (79) on the pump stand, and use a lifting device to position the pump on the stand.
3. Install the lower seal (79) on the optional suction elbow, and secure the elbow, pump and stand with the screws (21).
4. Align the system suction and discharge piping, and secure them to the pump.

NOTE

The recommended maximum submergence depth is 65 feet.

Piping

NOTE

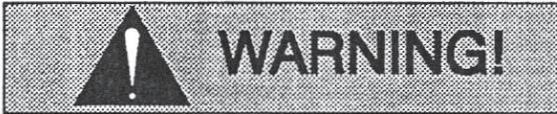
*Refer to **PERFORMANCE CURVES in OPERATION - SECTION C** when determining the most efficient piping installation.*

This pump is equipped with a 6-inch discharge reducing flange. Either hose or rigid pipe may be used to make discharge connections.

If rigid discharge piping is installed, the line must be independently supported to avoid vibration and strain on the pump. For maximum pumping capacity, keep the line as short and straight as possible. Elbows and fittings used in a discharge line increase friction losses; minimize their use.

It is recommended that a check valve or throttling valve be installed in the discharge line to control siphoning or back flow when the pump is shut off.

ELECTRICAL CONNECTIONS



Install and operate this pump in accordance with the National Electrical Code and all local codes. Have a qualified electrician perform all checks and connections in this section.

Never attempt to alter the length of the pump motor cable or to repair it with a splice. The power cable and pump motor must be kept completely waterproof. Serious damage to the pump and injury or death to personnel can result from any alteration to the cable.

Field Wiring Connections (Incoming Power)

Field wiring is **not** provided with this pump, and must be supplied by the user. The field wiring must be of the proper size and type to ensure an adequate voltage supply to the pump. Voltage available at the motor must be within the range indicated in Table B-2.

NOMINAL VOLTAGE	PHASE	MINIMUM VOLTAGE	MAXIMUM VOLTAGE
460	3	420	500

Use conduit cable clamps to secure the incoming field wiring to the control box. Make certain all connections are tight. If necessary, support the cable weight to prevent excessive strain on cable clamps and cable.

Motor Cable Grounding Test



Do not connect the pump control cable to the control box or incoming voltage before verifying the pump ground; otherwise, personnel will be exposed to serious injury or death.

Connect one lead of lamp, bell or similar testing device to motor cable green/yellow ground lead. Connect second test lead to an **uninsulated** point on the pump body. The test circuit should close.

If the test circuit does not close there is a defect in the cable or motor which must be corrected.

Conductor Identification

The conductors in the pump cable are labeled when shipped from the factory. If the conductors are shortened in the field, resulting in loss of identification markers, they can still be identified by their location relative to the ground wire.

Refer to FIGURES B-4 and B-5 at the end of this section; as seen from the free end of the cable, the conductor immediately adjacent to and clockwise from ground (green/yellow) is assigned number T1 (T4), the next clockwise conductor T2 (T5), etc.

If the conductors are re-labeled, they should be identified with wire markers from the factory.

Control Box Connections



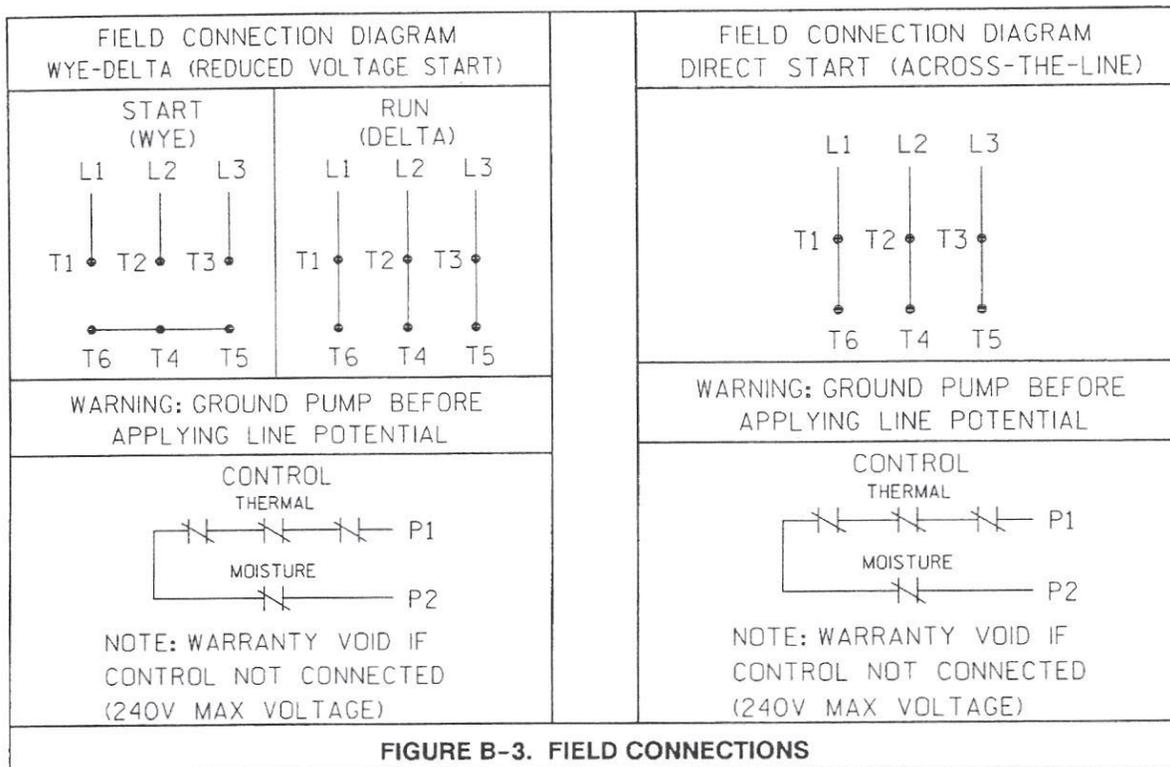
The pump warranty is void if the motor is not operated through a control box. Since proper operation of this pump depends on the quality and performance of the electrical controls, the pump warranty is valid only when the controls installed have been approved by Gorman-Rupp.

This pump is shipped completely wired for the voltage shown on the nameplate, and is ready for operation through an approved control box.

Ground the control box in accordance with the instructions accompanying it.

When WYE/DELTA starting is desired, see FIGURE

B-3, and wire the motor to a control which will provide the connections shown for the START period, and then reconnect as shown in the RUN diagram.



When across-the-line starting is desired, see FIGURE B-3, and wire the motor to a control which will provide the connections shown.

Control leads P1 and P2 provide the motor with moisture and thermal protection. Note that thermal protection is supplementary **only**; separate Class 10 overload relays are required for motor running protection.



The thermal protection contacts will automatically reclose when the motor cools to the established safe operating temperature. Whenever automatic restarting is not

desirable, connect only to controls which are wired for manual restart.

EIC to NEMA Cross-Reference

Refer to the following chart for IEC to NEMA marking cross-reference.

IEC TO NEMA MARKING CROSS-REFERENCE	
U1 = T1	U2 = T4
V1 = T2	V2 = T5
W1 = T3	W2 = T6
1 = P1	
2 = P2	

Wiring Diagrams

Complete schematic diagrams for the motor wiring are shown in FIGURES B-4 and B-5.

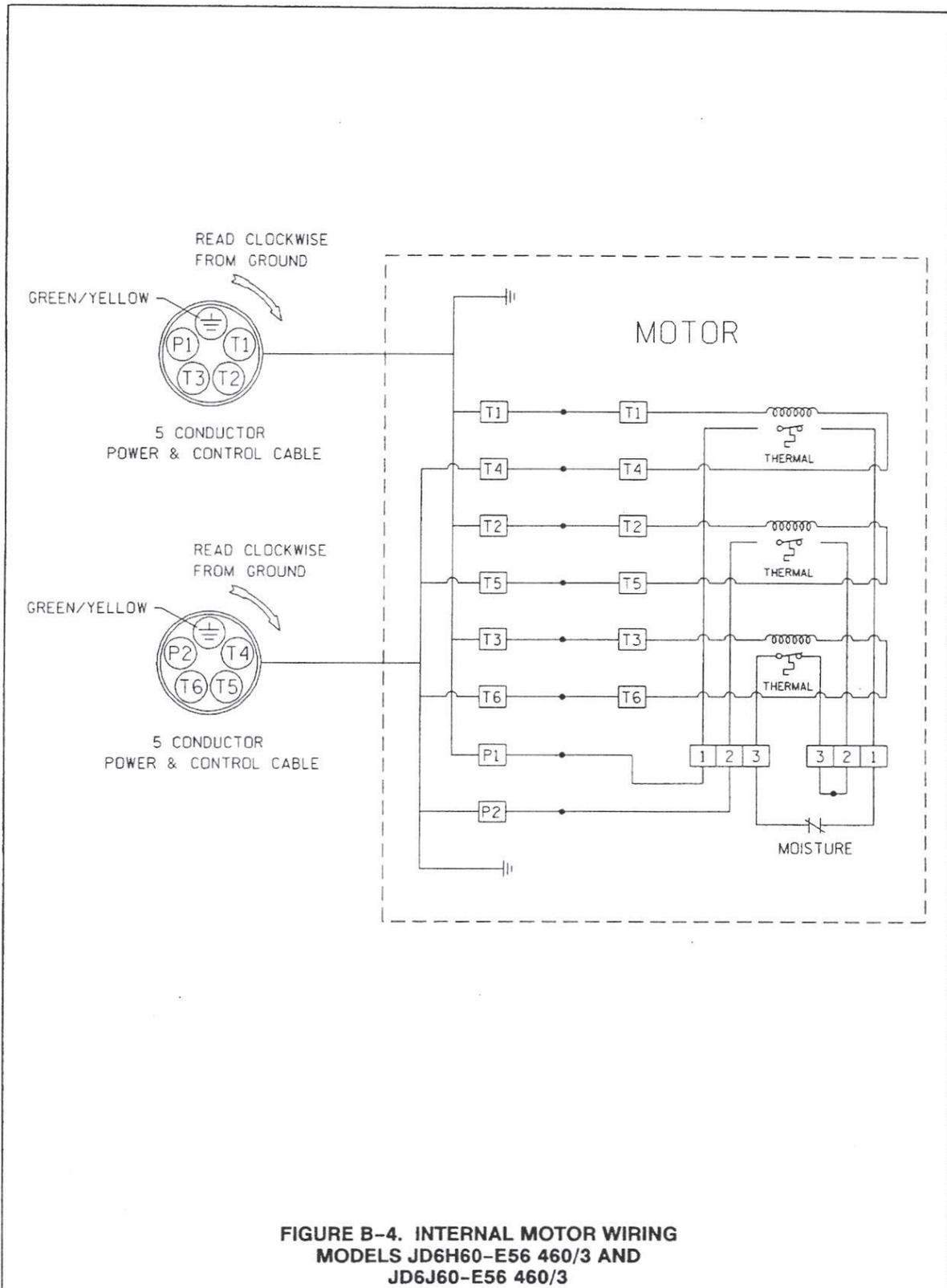
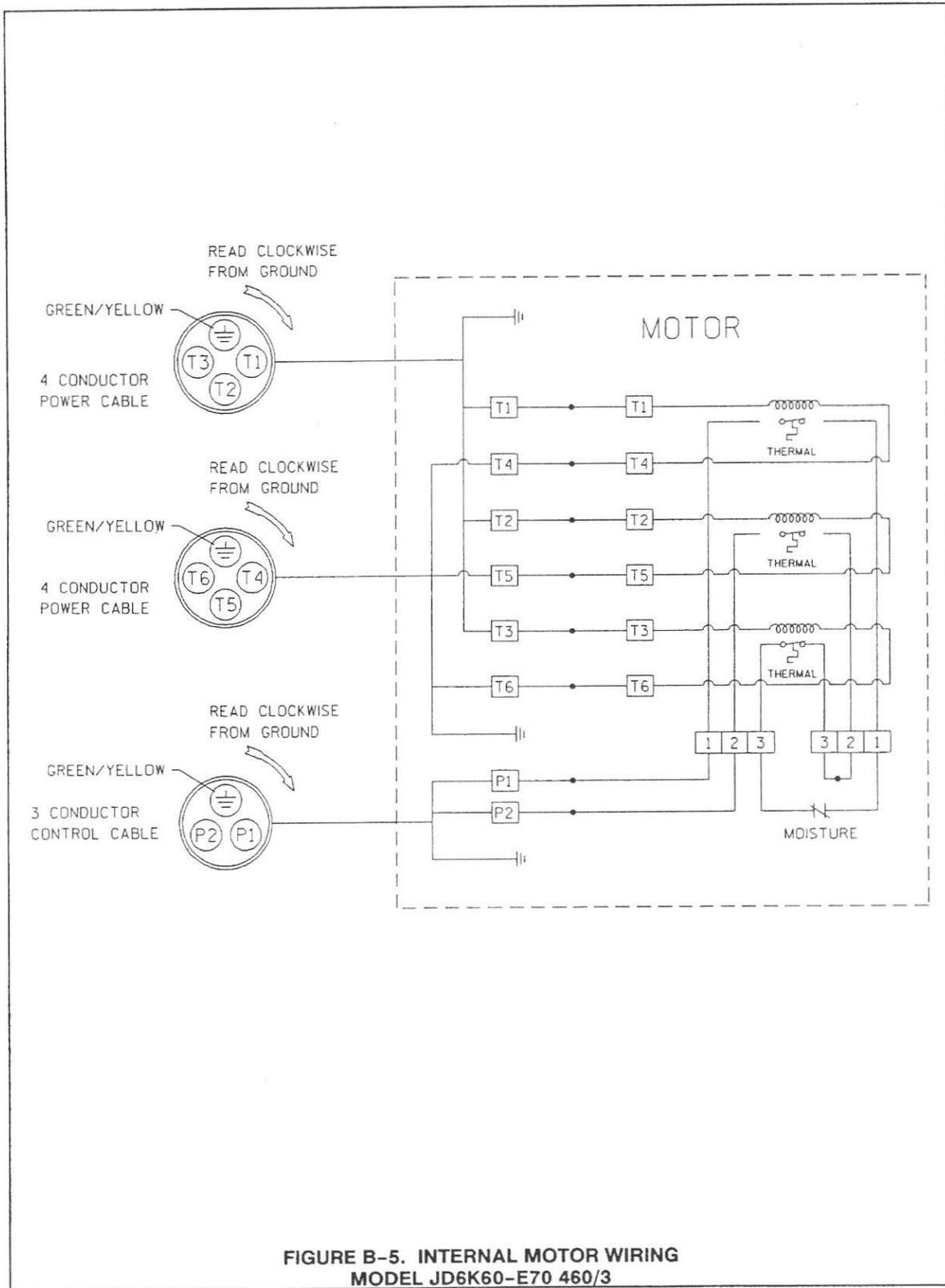


FIGURE B-4. INTERNAL MOTOR WIRING
MODELS JD6H60-E56 460/3 AND
JD6J60-E56 460/3



Liquid Level Devices

Optional controls available from Gorman-Rupp may provide a means to automatically regulate the liquid level. These control boxes may be connected to the following sensing devices which perform **either** filling or dewatering functions (see FIGURE B-6).



The internal wiring of the sensing devices are different for filling and dewatering functions. Be sure to follow the instructions included with the option before making connections.

- **Diaphragm Type:** two fixed-position sensors (upper and lower) each contain a diaphragm

which flexes with changes in liquid level, thus activating an enclosed miniature switch.

- **Bulb (Float) Type:** a bulb raises or lowers (floats) with the liquid level, thus activating an enclosed miniature switch.

Other types of liquid level devices may also be used. Consult the factory for the liquid level device best suited for your application.



Liquid level devices **must** be positioned far enough to allow 6 minutes between starts. If the pump motor cycles more than 10 starts per hour, it will over-heat, resulting in damage to the motor windings or control box components.

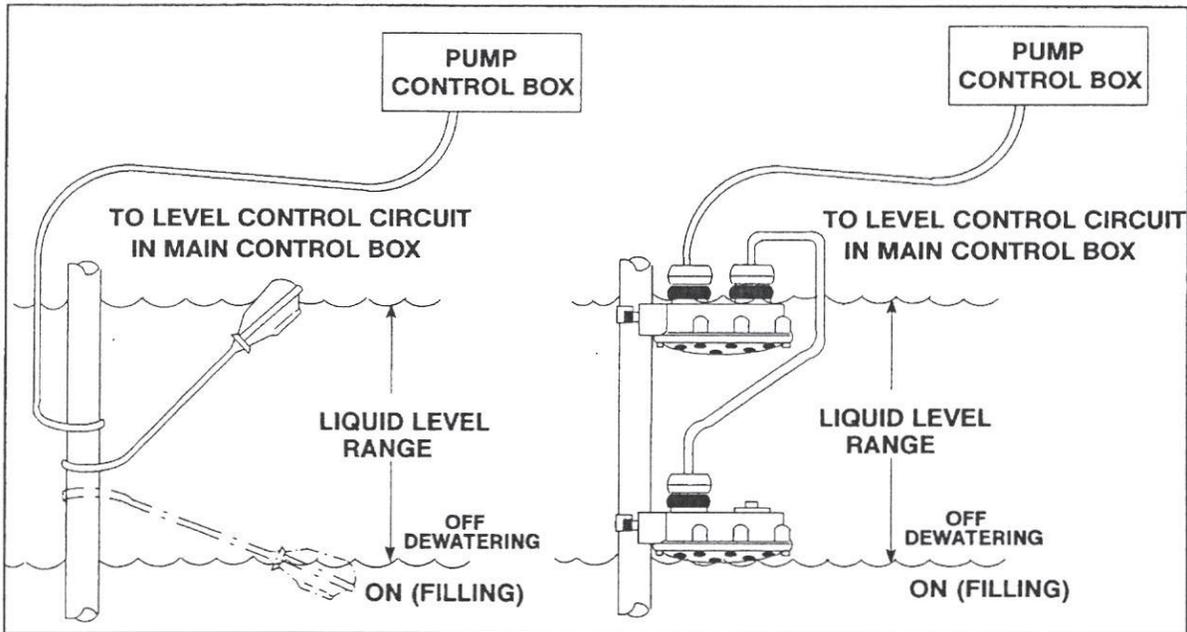


FIGURE B-6. LIQUID LEVEL DEVICES

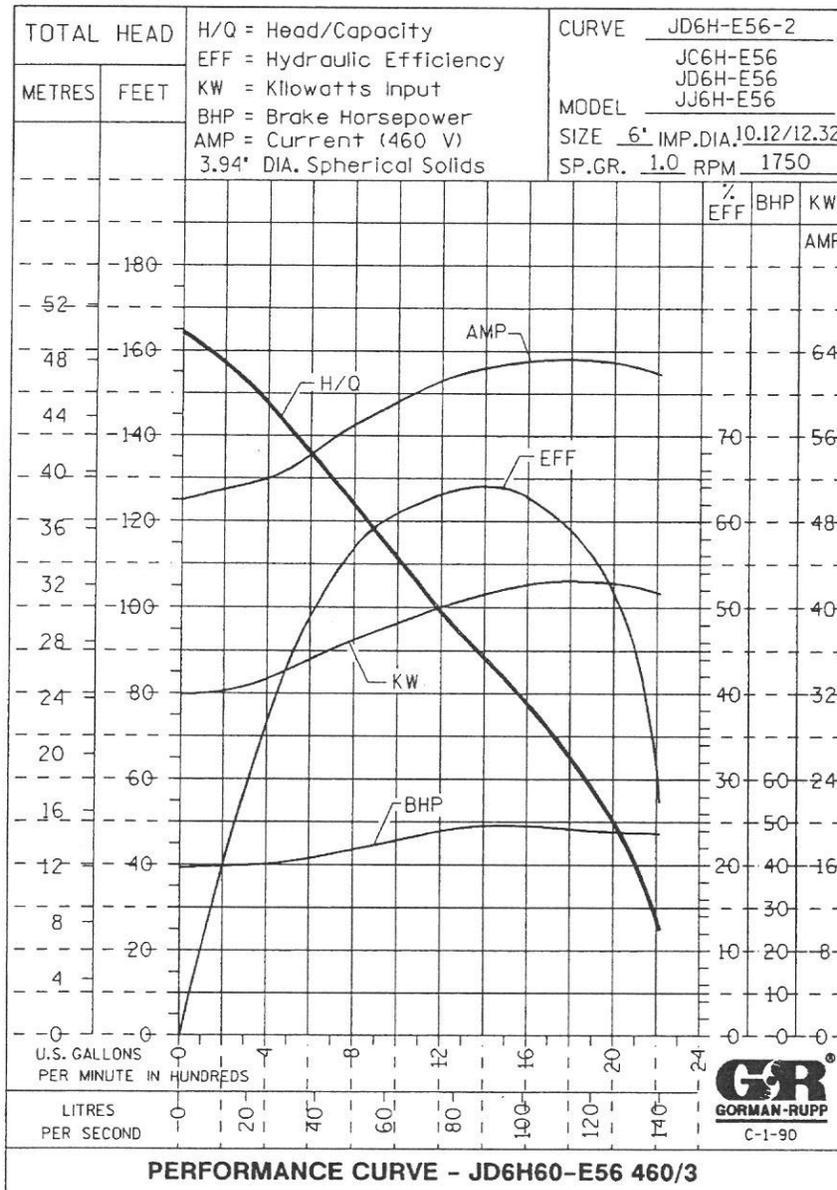
OPERATION - SECTION C

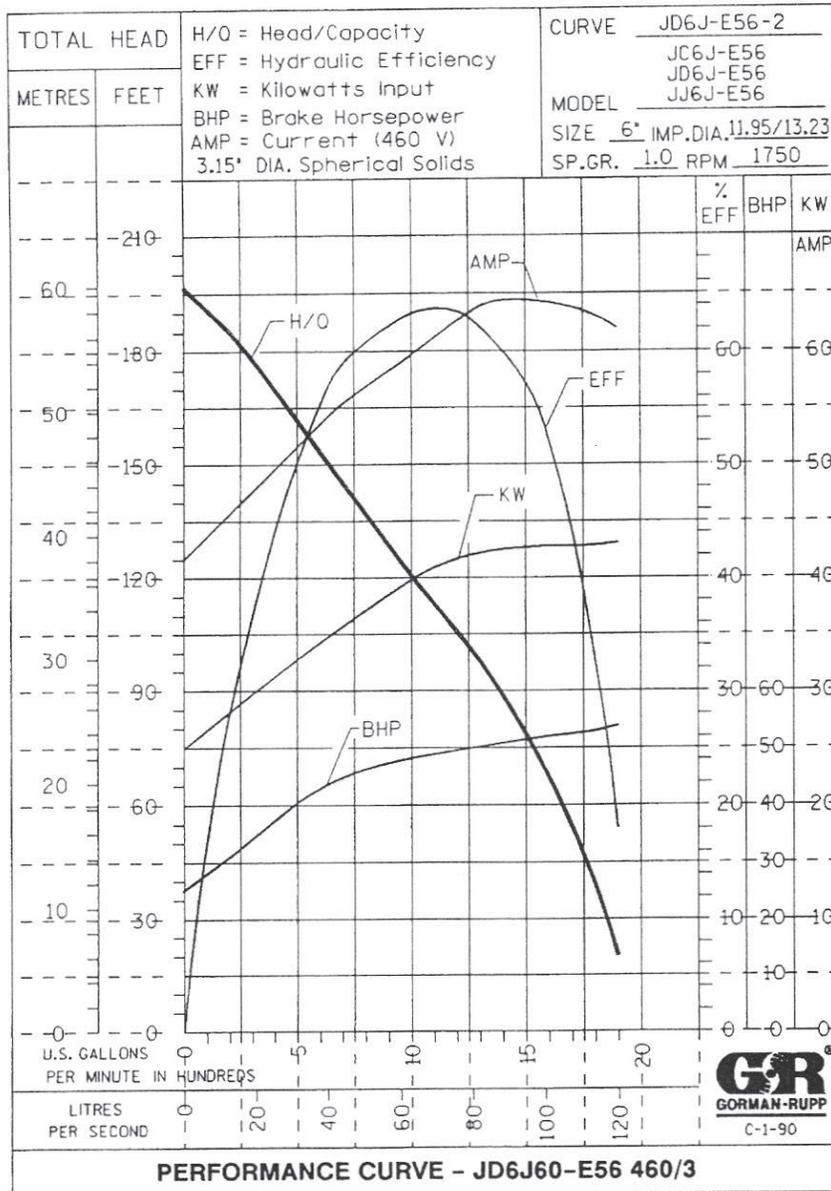
PERFORMANCE CURVES

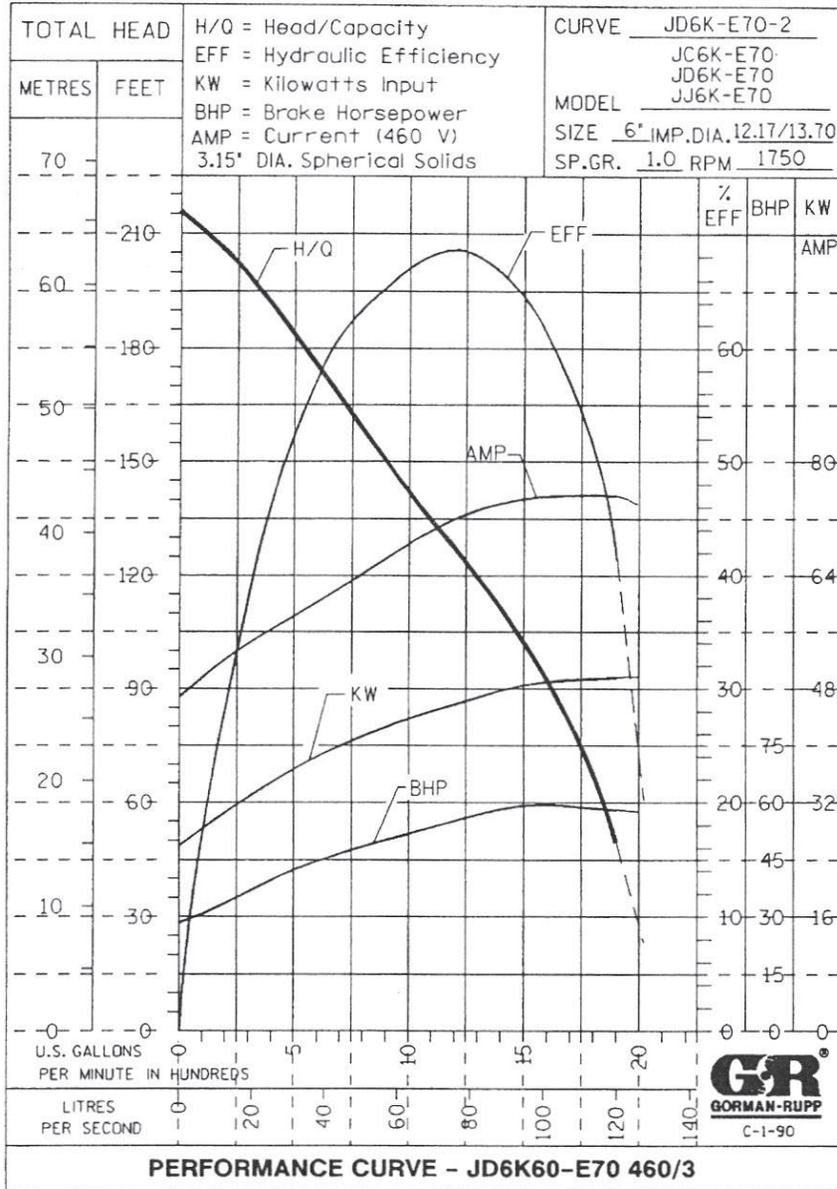
In the following curves, performance is based on 70° F (21° C) clear water at sea level. The performance of your pump may be different due to such factors as viscosity, specific gravity, elevation, temperature, and impeller trim.

NOTE

This curve applies to standard production models. 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.



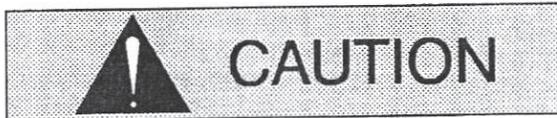




Review all SAFETY information in Section A.

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

PUMP OPERATION



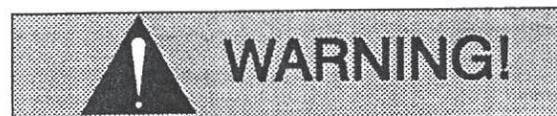
The pump warranty is void if the motor is not operated through a control box approved by Gorman-Rupp.

See the operating instructions furnished with the control box, and with other optional accessories and controls, before attempting to start the pump.

Liquid Temperature and Overheating



Standard versions of this pump will handle liquids with temperatures up to 104°F (40°C) maximum. Do not install in service with higher liquid temperatures; otherwise, pump components and operation may be affected.



Overheated pumps can cause severe burns and injury. If the pump becomes overheated:

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

Overheating can occur if the pump is misapplied, if the control box fails to provide overload or thermal protection, or if the pump is operated against a

closed discharge valve for an extended period of time.

Impeller Rotation

Refer to Figure C-1, and check impeller rotation as follows before installing the pump in a wet well.

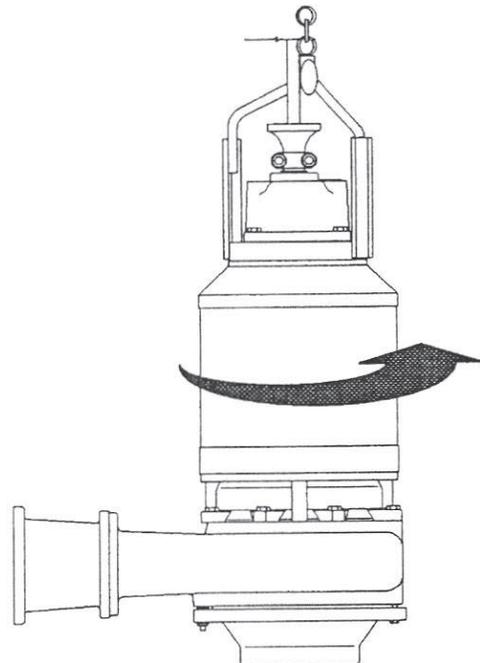


FIGURE C-1. PUMP ROTATION



While checking impeller rotation, secure the pump to prevent the motor power cable from coiling.

Suspend the pump by the lifting handle. Apply power **briefly** and note the direction of pump twist. As viewed from the top, the pump should twist in a counterclockwise direction; this will indicate that impeller rotation is correct.

If the pump twists in a clockwise direction, impeller rotation is incorrect. Have qualified personnel interchange the control box connections of any two pump motor power leads. Recheck pump twist; it should now be in a counterclockwise direction.

STARTING, STOPPING, AND OPERATIONAL CHECKS

Starting



Do not attempt to operate the pump until impeller rotation has been checked; otherwise, the pump will be damaged.

Follow the control box manufacturer's instructions, start the pump, and run any recommended checks.

Stopping

Follow the control box manufacturer's instructions for stopping the pump.



The integral thermal overload device will shut off the motor if the temperature rises above design limits. When the pump cools and the temperature falls below these limits, the motor will restart automatically. To avoid the hazards of an unexpected motor start-up, do not attempt to handle or service the pump unless all power to the motor has been shut off at the control box; otherwise, serious personal injury could result.

During motor shutoff by the thermal overload device, control box circuits remain live. Do not attempt to service any control box components unless incoming power has been shut off.

After stopping the pump, be sure to perform all required maintenance and preservation procedures.

Operational Checks

To detect minor problems, check the pump for proper operation when it is first started and at periodic intervals.



To avoid serious damage to the pump, check for unusual noises or excessive vibration while the pump is running. If noise or vibration is excessive, stop operation and refer to the troubleshooting chart in Section D.

The suction inlet or impeller may become clogged with debris. In some cases, stopping the pump momentarily may backflush this blockage. If backflushing does not clear the debris, remove the pump from the wet well, **disconnect power**, and clear manually.



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

Check the pump for overheating. Overheating can occur if the pump is misapplied, if the control box fails to provide overload or thermal protection, or if the pump is operated against a closed discharge valve for an extended period of time.

Cold Weather Preservation

The pump will not freeze as long as the casing is submerged in liquid. If the casing is not submerged, or if the liquid begins to freeze, remove the pump from the wet well and dry it thoroughly. Run the pump for two or three minutes to dry the inner walls.

If the pump does freeze while it is out of the liquid, submerge it until thawed; if the liquid is near freezing, the pump must be submerged for an extended period of time. Check thawing by starting the pump and checking that the shaft rotates freely. If the pump remains frozen allow additional thawing time before attempting to restart.

If submerging does not thaw the pump, move it into a warm area until completely thawed.



Do not attempt to thaw the pump by using a torch or other source of flame. This could damage O-rings or heat the oil in the seal housing above critical temperatures, causing the pump to rupture or explode.

TROUBLESHOOTING – SECTION D

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

NOTE

*Many of the probable remedies listed in the **TROUBLESHOOTING CHART** require use of electrical test instruments; for specific procedures, see **ELECTRICAL TESTING** at the end of the chart.*

TROUBLESHOOTING CHART

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO START.	NO POWER TO MOTOR.	CHECK FOR BLOWN FUSE OR OPEN CIRCUIT BREAKER
	IMPELLER JAMMED.	CHECK IMPELLER; DISASSEMBLE AND REPAIR AS NECESSARY.
	MOTOR, VOLTAGE OR CONTROL BOX INCOMPATIBLE; DEFECTIVE CONNECTIONS	CHECK RATINGS ON PUMP NAMEPLATE AND CONTROL BOX; CHECK INCOMING VOLTAGE; CHECK CONNECTIONS.
	MOTOR CABLE DAMAGED	CHECK PER ELECTRICAL TESTING .
	CONTROL BOX CURRENT INTERRUPTING OR MOISTURE-SENSING DEVICES TRIPPED.	CHECK CONTROL BOX; CHECK FOR LEAKING SHAFT SEALS, CUT O-RINGS, OR MOISTURE WICKING THROUGH CABLE.
	OPEN CIRCUIT IN MOTOR WINDINGS OR CABLE.	CHECK CONTINUITY PER ELECTRICAL TESTING .
	MOTOR OVERHEATED, THERMAL SWITCHES TRIPPED.	ALLOW MOTOR TO COOL.
MOTOR RUNS BUT DOES NOT DELIVER RATED DISCHARGE.	PUMP RUNNING BACKWARD.	CHECK IMPELLER ROTATION (SEE SECTION C).
	VOLTAGE TOO LOW OR TOO HIGH; EXCESSIVE VOLTAGE DROP BETWEEN PUMP AND CONTROL BOX.	CHECK INCOMING VOLTAGE; CHECK WIRING SIZE, TYPE AND LENGTH. (SEE INSTALLATION – SECTION B).
	DISCHARGE HEAD TOO HIGH.	REDUCE DISCHARGE HEAD, OR INSTALL STAGING ADAPTER AND ADDITIONAL PUMP.
	DISCHARGE THROTTLING VALVE PARTIALLY CLOSED; CHECK VALVE IMPROPERLY INSTALLED.	OPEN DISCHARGE VALVE FULLY; CHECK PIPING INSTALLATION.
	IMPELLER OR DISCHARGE LINE CLOGGED.	CLEAR
	LIQUID BEING PUMPED TOO THICK.	DILUTE LIQUID IF POSSIBLE.
	(CONT.)	IMPELLER WORN OR DAMAGED.

TROUBLESHOOTING CHART (cont'd)

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
(CONT.) MOTOR RUNS, BUT DOES NOT DELIVER RATED DISCHARGE.	INSUFFICIENT LIQUID IN WET WELL.	STOP PUMP UNTIL LIQUID LEVEL RISES.
	IMPELLER ROTATING IN WRONG DI- RECTION.	CHECK IMPELLER ROTATION (SEE SEC- TION C).
PUMP STARTS THEN SHUTS OFF.	CLOGGED SUCTION PORT OR IM- PELLER CAUSING MOTOR OVER- LOAD.	CLEAR BLOCKAGE; RESET OVERLOAD DEVICE IN CONTROL BOX.
	MOTOR OVERHEATED; THERMAL SWITCH TRIPPED.	ALLOW PUMP TO COOL.
	MOISTURE SENSING DEVICE TRIP- PED.	DISASSEMBLE PUMP AND LOCATE LEAK.
	MOTOR BEARINGS DEFECTIVE.	DISASSEMBLE PUMP AND CHECK
	MOTOR CABLE DAMAGED.	CHECK PER ELECTRICAL TESTING.
	INSUFFICIENT LIQUID IN WET WELL.	STOP PUMP UNTIL LIQUID LEVEL RISES.
EXCESSIVE NOISE OR VIBRA- TION.	PUMP OPERATING OUTSIDE DE- SIGNATED OPERATING RANGE.	CHECK DISCHARGE HEAD AND FLOW: ADJUST AS REQUIRED TO MEET PER- FORMANCE SPECIFICATIONS.
	IMPELLER CLOGGED.	CLEAR BLOCKAGE
	IMPELLER LOOSE OR DAMAGED.	CHECK IMPELLER; REPLACE IF NECESSARY.
	MOTOR SHAFT OR BEARINGS DEFECTIVE.	REPLACE
	PUMPING ENTRAINED AIR.	CHECK WET WELL LIQUID LEVEL.

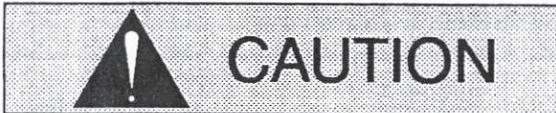
ELECTRICAL TESTING

Make the electrical checks which follow to deter-
mine if pump malfunctions are being caused by
problems in the motor or in the motor cable.

Test Equipment

An ammeter and megohmmeter of adequate range
and quality are required to conduct the electrical
tests which follow.

Equipment	Use
Ammeter	To check AC Voltage and current (amperage)
Ohmmeter	To measure resistance (ohms) to ground



Refer to the wiring diagram(s) accompanying the motor and control box before reconnecting any electrical leads which have been disconnected. Connections to the wrong terminals may damage the motor and/or control devices.

Voltage Imbalance

Use a voltmeter to read each phase of the incoming 3 phase power. Each phase must balance with the other two as closely as can be measured with a commercial instrument. If the phases are out of balance, contact your power company. If the phases are balanced, check out the motor as described in the following steps:

- a. Use a voltmeter, Amprobe, or equivalent instrument to read the voltage of incoming power lines 1 and 2, 2 and 3, and 1 and 3 at the control box. Voltage must match as closely as can be measured. If possible, measure the voltage at the control box with:
 1. The pump shut off.
 2. The pump running in air.
 3. The pump submerged and running under full load.

The voltage measured under each condition must be the same.

- b. If voltage is balanced when the pump is off but is imbalanced when the pump is running, thoroughly check the power source, all interconnecting cables, and the pump motor to isolate the defect.
- c. Use an Amprobe or equivalent instrument to measure the current draw (amperage) of each phase while the pump is running under full load, and with no load. In each condition, the amperage readings for all three phases must match as closely as can be measured. Normal amperage values are listed in Table 1, Section B;

these values apply only when the voltage at the site is the normal voltage listed.

Motor and Power Cable Continuity

Set the megohmmeter at R x 1 scale and zero-balance it. Test as follows:

- a. Shut off incoming power to the control box, and disconnect the motor power cable leads. Connect the megohmmeter test leads to any two power cable leads, and note the megohmmeter reading. A high resistance reading indicates an open or broken circuit in the power cable or motor windings, or a bad connection between the motor and cable.
- b. Repeat Step a. with each set of leads. The three readings shall be as close as can be measured.
- c. If readings indicate that continuity problems exist in the motor or motor cable, the motor must be returned to the factory or to a U/L-approved facility.

Insulation Resistance

Set the megohmmeter at R x 100, and zero-balance it. Test as follows:

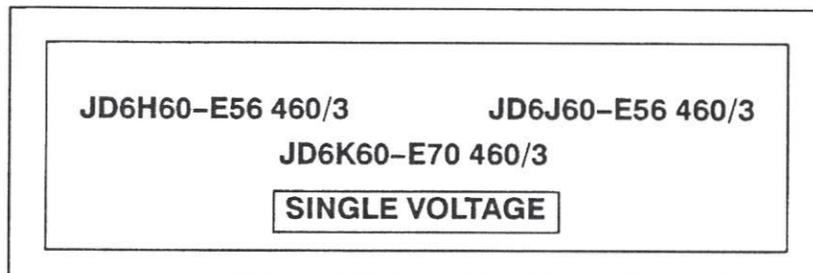
- a. Shut off incoming power to the control box, and disconnect the motor power cable leads. Connect one megohmmeter test lead to the motor cable green/yellow ground lead. Touch the other test lead to each of the motor cable leads in turn. Note the readings.
- b. Readings will indicate resistance values in both the power cable and motor windings. If resistance reads infinity (∞), insulation is good. If resistance reads between infinity (∞), and 1 megohm, insulation is acceptable but should be rechecked regularly. If resistance reads less than 1 megohm, insulation should be checked more closely and frequently.
- c. If readings indicate that a ground exists, test the stator and motor power cable separately. Replace as required.

MAINTENANCE AND REPAIR - SECTION E

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

PUMP MODELS

THE FOLLOWING PUMP MODELS, FROM SERIAL NO. 932111 UP, ARE COVERED IN THIS SECTION.



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.

PERFORMANCE CURVES FOR THESE PUMPS ARE SHOWN AT THE BEGINNING OF OPERATION - SECTION C.

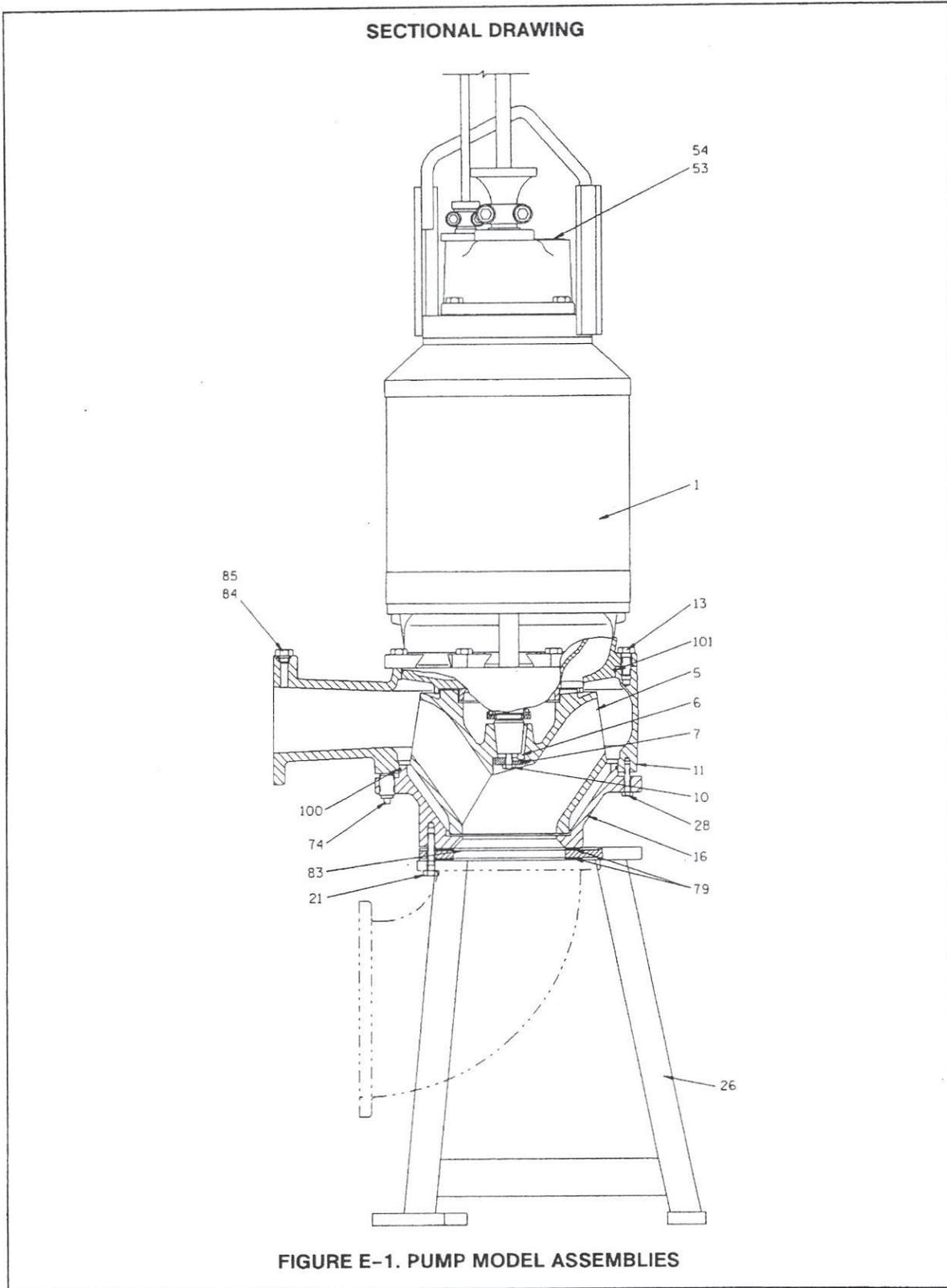
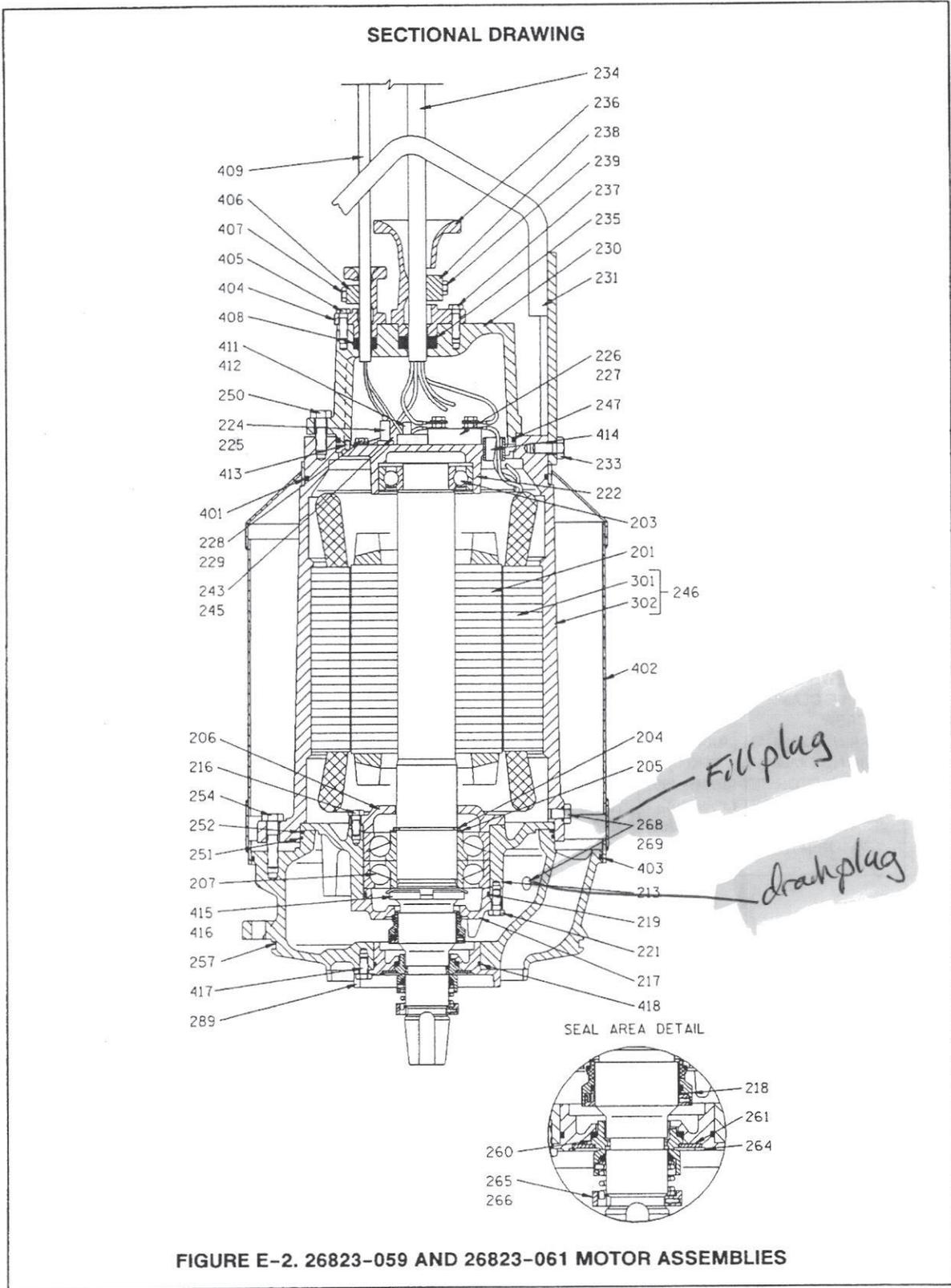


FIGURE E-1. PUMP MODEL ASSEMBLIES

**PUMP MODEL ASSEMBLIES
PARTS LIST**

ITEM NO.	PART NAME	PART NUMBER	QTY
1	MOTOR ASSEMBLY (JD6H60 AND JD6J60)	26823-059	1
	MOTOR ASSEMBLY (JD6K60)	26823-061	1
5	* IMPELLER (JD6H60)	26823-847	1
	* IMPELLER (JD6J60)	26823-865	1
	* IMPELLER (JD6K60)	26823-864	1
6	* SHAFT KEY	26824-178	1
7	CAP	26824-315	1
10	IMPELLER SCREW	26824-409	1
11	VOLUTE CASING	26823-793	1
13	SCREW	26824-421	8
16	SUCTION COVER	26824-526	1
21	SCREW	26824-400	6
26	STAND	26823-955	1
28	SCREW	26824-423	6
53	NAME PLATE	38818-055	1
54	RIVET	26824-451	4
74	ADJUSTING SCREW	26824-382	3
79	FLANGE SEAL	26824-043	2
84	PLUG	26824-261	1
85	* O-RING	26824-122	1
100	* O-RING	26824-148	1
101	* O-RING	26824-148	1
	* INDICATES PARTS RECOMMENDED FOR STOCK		
	OPTIONS:		
	NONE		



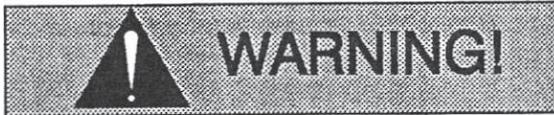
**26823-059 AND 26823-061 MOTOR ASSEMBLIES
PARTS LIST**

ITEM NO.	PART NAME	PART NUMBER	QTY	ITEM NO.	PART NAME	PART NUMBER	QTY
201	ROTOR AND SHAFT	26823-211	1	301	-STATOR (JD6H-J60)	26823-281	1
203	* UPPER BALL BEARING	26823-729	1		-STATOR (JD6K60)	26823-236	1
204	UPPER RETAINING RING	26824-225	1	302	-MOTOR HOUSING	26823-478	1
205	UPPER SUPPORT RING	26824-317	1	247	* MOTOR COVER O-RING	26824-126	1
206	LOWER BEARING COVER	26823-688	1	250	SCREW	26824-384	4
207	* LOWER BALL BEARING	26823-735	2	251	* MOTOR HOUSING O-RING	26824-133	1
213	LOWER BEARING HOUSING	26823-626	1	252	* LOWER BEARING BRKT O-RING	26824-133	1
216	SCREW	26824-416	4	254	SCREW	26824-385	4
217	BEARING BRACKET COVER	26823-689	1	257	SEAL HOUSING	26823-562	1
218	* UPPER SEAL ASSEMBLY	26824-089	1	260	* SEAL ASSEMBLY	26824-097	1
219	O-RING	26824-123	1	261	SEAL CLAMP	26823-584	1
221	SCREW	26824-416	4	264	LOCKING RING	26824-192	1
222	UPPER BEARING BRACKET	26823-654	1	265	RETAINING RING	26824-223	1
224	MOISTURE SWITCH	26823-301	1	266	SCREW	26824-403	2
225	SCREW	26824-413	2	268	DRAIN/FILL PLUG	26824-261	3
226	CONNECTION PLATE	26824-811	1	269	* PLUG O-RING	26824-122	3
227	SCREW	26824-427	2	289	OIL HOUSING COVER	26824-594	1
228	WASHER	26824-316	1	401	* MOTOR HSNG O-RING	26824-139	1
229	SCREW	26824-415	2	402	* COOLING JACKET	26824-574	1
230	MOTOR COVER	26823-522	1	403	* O-RING	26824-151	1
231	LIFTING HANDLE	26823-539	1	404	CABLE INLET (JD6K60)	26823-347	1
233	SCREW	26824-408	4	405	SCREW (JD6K60)	26824-404	3
234	MOTOR CABLE (JD6H-J60)	26823-316	2	406	CABLE CLAMP (JD6K60)	26823-367	1
	MOTOR CABLE (JD6K60)	26823-317	2	407	SCREW (JD6K60)	26824-352	2
235	* RUBBER SEAL	26824-075	2	408	RUBBER SEAL (JD6K60)	26824-078	1
236	CABLE INLET	26823-344	2	409	CONTROL CABLE (JD6K60)	26823-318	1
237	SCREW	26824-354	6	411	TERMINAL BOARD	26823-420	1
238	CABLE CLAMP	26823-366	2	412	SCREW	26824-369	2
239	SCREW	26824-354	4	413	SPRING PIN	26824-561	1
243	WIRING DIAGRAM (JD6H-J60)	26823-387	1	414	INSULATION SLEEVE	26823-436	2
	WIRING DIAGRAM (JD6K60)	26823-388	1	415	LOCKWASHER	26824-742	1
244	CONNECTOR SET (JD6H-J60)	26823-415	1	416	NUT	26824-732	1
	CONNECTOR SET (JD6K60)	26823-411	1	417	SCREW	26824-383	2
246	STATOR/MTR HSG (JD6H-J60)	26823-134	1	418	* O-RING	26824-144	1
	STATOR/MTR HSG (JD6K60)	26823-136	1				

* INDICATES PARTS RECOMMENDED FOR STOCK

PUMP AND MOTOR DISASSEMBLY AND REASSEMBLY

Review all SAFETY information in Section A.



Do not attempt to service the pump end and/or motor assemblies unless all power to the motor has been shut off at the control box; otherwise, injury or death could result.

Use a lifting device with sufficient capacity (see INSTALLATION, Section B). If slings or chains are used to move the pump or components, make sure that the load is balanced; otherwise serious personal injury or death could result.

The following maintenance and repair instructions are keyed to the sectional views, FIGURES 1, and 2, and their accompanying parts lists.

Select a suitable location, preferably indoors, to perform required maintenance. All work must be performed by qualified personnel. Recommended spare parts are shown on the parts lists.

Check TROUBLESHOOTING, Section D to determine causes and remedies of pump problems. Disassemble only as far as required.

If a maintenance problem is electrical, see ELECTRICAL TESTING in TROUBLESHOOTING, Section D.

PUMP AND MOTOR DISASSEMBLY



If necessary to pry components apart to separate them, use levers on both sides of the component, and apply pressure evenly. Be careful not to mar mating surfaces. When removing parts from the rotor/shaft assembly, be careful not to mar the surface or tapered end of the shaft.



When servicing the pump, always protect the free ends of the cables from exposure to moisture. Wet cable ends can allow moisture to penetrate into the cable and/or motor.

PUMP END DISASSEMBLY

Except as noted, all references are to FIGURE E-1.

NOTE

The volute casing and impeller may be removed without draining the oil from the pump.

Removing Pump From Stand

1. Disconnect the discharge piping at the discharge volute casing.
2. Engage the lifting handle (231, FIGURE E-2) with a suitable lifting device, but do not apply tension to the mounted pump.
3. Disengage the hardware (21) securing the pump to the stand and elbow.
4. Lift the pump from the stand; the upper seal (79) will become a free part.
5. Place the pump in an upright position on a level work surface.

Removing Cooling Jacket



Although the suction cover, volute casing and impeller may be removed without removing the cooling jacket or draining oil from the pump, it is recommended that the cooling jacket be removed before further disassembly to prevent trapped dirt from entering the pump and motor.

1. See FIGURE E-2, and remove the screws (233) securing the lifting handle (231) to the motor housing (302), and remove the handle.
2. See FIGURE E-3. Use a spreader bar to protect the motor cover and components, and secure the hooks of the lifting device to the ears on the cooling jacket (402, FIGURE E-2).

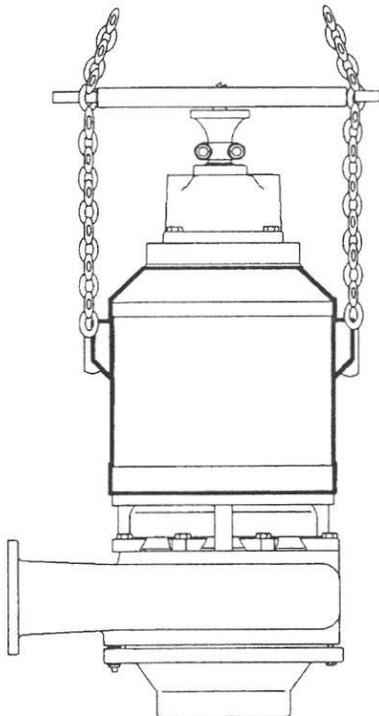


FIGURE E-3. REMOVING COOLING JACKET

3. Tap the cooling jacket with a soft-faced mallet to break the bond with the motor housing, and lift the jacket off the pump.
4. Remove any caked dirt from the motor surface, and carefully wash the external surface of the motor housing and the internal surface of the cooling jacket. Dry all surfaces.
5. Position the lifting handle so that the apex is on the discharge side of the motor housing, and secure the handle to the motor housing with the previously removed hardware.

Suction Cover and Volute Casing Removal

1. With the pump supported in a vertical position by the lifting device, remove the hardware (28) securing the suction cover (16) to the volute casing (11).
2. Lift the pump slightly, and use a soft-faced mallet to tap the suction cover out of the volute casing. Remove the suction cover O-ring (100).
3. Lay the pump in a horizontal position on a workbench or other suitable surface.

NOTE

If the impeller (5) is to be removed, do not remove the volute casing until the impeller screw (10) has been loosened. Insert a wood block or metal bar through the discharge opening to block impeller rotation while loosening the impeller screw. After loosening the impeller screw, remove the wood block or bar, and proceed with volute casing removal.

2. Remove the screws (13) securing the volute casing to the motor assembly (1), and separate the assemblies.

Impeller Removal

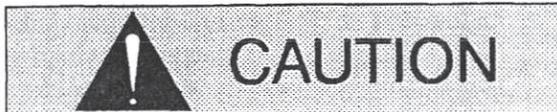
1. Block impeller rotation as described above, and remove the screw (10) securing the impeller (5) to the motor shaft. Remove the impeller washer (7).
2. Use a suitable puller to remove the impeller. Retain the impeller key (6).

NOTE

An alternate method of removing the impeller is to position two wedges opposite each other behind the impeller, and tap the wedges carefully in turn until the impeller comes free of the shaft.

Lower Seal Removal

All references are to FIGURES E-2 and E-4.



To maintain peak operating efficiency, it is **strongly** recommended that the seal be replaced if the pump is disassembled. In the event that the seal will be reused, handle seal parts with extreme caution to prevent damage. Use care not to contaminate the precision-finished faces; even fingerprints on the faces can shorten seal life.

1. Remove the drain/fill plugs and O-rings (268 and 269), and drain the seal and bearing cavities. Clean and reinstall the plugs and O-rings.

NOTE

Use caution in Step 2; tension on the seal spring will be released.

2. Loosen the retaining screws (266) securing the retaining ring (265) on the shaft, and remove the retaining ring.
3. Turn the seal spring until it is free of the groove in the seal rotating element, and remove the spring.
4. Remove the seal rotating element and O-ring.
5. Remove the screws (417), and pry the oil housing cover (289) and remaining seal components off the shaft as an assembly. Remove the O-ring (418) from the groove in the oil housing cover.
6. Remove the locking ring (264) and seal clamp (261), and press the seal stationary seat and O-ring out of the oil housing cover from the back side.

NOTE

If the upper seal assembly has leaked, the motor must be disassembled and the upper seal and lower bearing (207) must be replaced. Do not reassemble pump end components at this time if the upper bearing must be replaced. Refer to **MOTOR DISASSEMBLY** for upper seal replacement.

7. Refer to **INSPECTION AND CLEANING** before reassembling the pump end components.

PUMP END REASSEMBLY

Except as noted, all references are to FIGURE E-1.

Lower Seal Installation

All references are to FIGURES E-2 and E-4.

1. Unwrap the seal components. Check that the seal faces are clean and undamaged. If necessary to clean, use a clean tissue and wipe in a concentric pattern.
2. Lightly lubricate the seal stationary seat O-ring, place a clean tissue over the sealing face of the stationary seat, and press the stationary seat and O-ring into the oil housing cover (289). **Make sure** the slot in the stationary ring meshes with the lug that prevents rotation.
3. Install the seal clamp (261) in the step in the oil housing cover, and secure with the locking ring (264).
4. Install a new O-ring (418) in the groove in the oil housing cover. Lightly lubricate the O-ring, and carefully slide the oil housing cover and stationary seal parts over the shaft. Press the oil housing cover into the lower bearing housing (213) until fully seated, and secure with the screws (221).
5. Lubricate and install the rotating element O-ring in the rotating element. Install the seal spring retainer and spring in the rotating element, making sure to engage the spring in the hole in the rotating element. Slide the assembled rotating element, O-ring, spring retainer and spring onto the shaft until the seal faces contact.

6. Install the retaining ring (265) over the seal spring, and secure with the retaining screws (266) so that the screws sit in the groove in shaft.

NOTE

See **Seal Testing** before installing the pump end components.

Impeller Installation

1. Check the impeller (5) for broken vanes, cracks, or excessive wear. Replace as necessary.
2. Oil the end of the motor shaft and the keyway. Install the impeller key (6) in the shaft keyway. Position the impeller (5) on the shaft, and engage the key in the impeller keyway. Use a soft-faced mallet to tap the impeller onto the shaft until fully seated.

NOTE

The volute casing (11) must be installed and secured to the seal housing in order to tighten the impeller screw (10). With the volute casing installed, insert a wood block or metal bar through the discharge opening to block impeller rotation. After installing and tightening the impeller screw as described below, remove the wood block or bar, and proceed with pump reassembly.



The threads of the impeller screw (10) and its mating surfaces **must** be lubricated to reduce friction and prevent corrosion.

3. Lubricate the threads of the screw (10) and its mating surfaces with SAE 10W 30 oil; install the impeller washer (7) and screw, and torque the screw to 65 ft. lbs. (780 in. lbs. or 9 m. kg.)

Suction Cover and Volute Casing Installation

NOTE

The impeller clearance should always be adjusted when the volute casing or impeller have been removed from the pump.

1. Position the volute casing (11) against the motor flange, and secure it with the screws (13).
2. Replace the O-ring (100), and secure the suction cover (16) to the volute casing with the hardware (28); do not fully tighten the hardware until the impeller clearance has been established.
3. Back off the adjusting screws (74), and tighten the screws (28) evenly until the inner surface of the suction cover just touches the impeller. Loosen the screws (28), then turn the adjusting screws evenly until there is a clearance of 0.20 to 0.35 inches (0,5 to 0,9 mm) between the impeller and suction cover.
4. With the impeller clearance set, fully tighten the screws (28) securing the suction cover to the volute casing.
5. See **LUBRICATION** before returning the pump to service.

Installing Cooling Jacket

1. Remove any caked dirt, and carefully wash the internal surface of the cooling jacket (402). Dry all surfaces.
2. Disengage the hardware (233), and remove the lifting handle (231) from the motor housing (302).
3. See FIGURE E-3. Use a spreader bar to protect the motor cover and components, and secure the hooks of the lifting device to the ears on the cooling jacket.
4. Lift the cooling jacket above the motor assembly, and note the position of the fins on the interior of the jacket. The longest fin must go into the slot next to the screw plug (268) in the motor housing (302). Align the cooling jacket, and lower it over the motor housing.



In the following step, use caution not to damage the upper rim of the cooling jacket.

5. To press the cooling jacket down over the motor housing, position the lifting handle (231) along the upper rim of the jacket, and use a mallet to tap the apex of the handle until the cooling jacket is fully seated. Make certain that the seal housing O-ring (403) is not pinched.
6. Position the lifting handle so that the apex is on the discharge side of the motor housing, and secure the handle to the motor housing with the previously removed hardware (233).

Installing Pump on Stand

NOTE

See **LUBRICATION** at the end of this section before installing the pump on the stand.

1. If the lower seal (79) requires replacement, disengage the hardware securing the optional elbow to the suction piping, and replace the lower seal before installing the pump on the stand.
2. With the lower seal replaced, position the upper seal (79) on the stand. Use a suitable lifting device to position the pump on the stand. Secure the pump assembly to the stand (26) with the hardware (21).
3. Replace the discharge increaser gasket (902), and secure the discharge increaser (901) to the discharge piping with the previously removed hardware.

NOTE

If the suction cover is excessively worn, setting the impeller clearance may take the volute casing out of alignment with the system discharge piping. If the discharge is misaligned, install additional upper seal(s) (79) as necessary to shim the pump.

MOTOR DISASSEMBLY

All references are to FIGURE E-2.

Upper Seal Removal

NOTE

Use caution in Step 1; tension on the retainer springs will be released.

1. With the pump end components and lower seal assembly removed, remove the screws (254) securing the seal housing (257) to the stator housing (302). Carefully pry the seal housing out of the stator housing. Remove and discard the O-rings (251 and 252).
2. Loosen the retaining screws, and remove the upper seal retainer and retainer springs. Remove the seal rotating element and O-ring.
3. Remove the screws (221), and carefully pry the lower bearing housing cover (217) from the lower bearing housing (213). The remaining seal components will come off with the cover.
4. Invert the lower bearing housing cover, and press the seal stationary seat and O-ring out from the back side.
5. Remove and discard the O-ring (219) from the lower bearing housing cover.

If no further disassembly is required, refer to **INSPECTION AND CLEANING**, followed by **Upper Seal Installation** and **PUMP END REASSEMBLY**.

Bearing Removal

NOTE

Because bearings can be damaged while being removed, it is recommended that they be inspected in place.

If the bearings will not be replaced, it is also recommended that they be cleaned in place (see **INSPECTION AND CLEANING**).

1. With the seal housing (257) removed, pull the rotor and shaft assembly (201), and assembled

bearings (203 and 207) from the stator and housing assembly (246).

2. Remove the nut and lockwasher (415 and 416). Slide the lower bearing housing (213) and lower bearings (207) down the shaft until the bearing cover (206) seats against the retaining ring (204). Loosen the screws (216), and slide the lower bearing housing and bearings off the shaft.
3. Inspect the bearings (207) for roughness or binding, and replace as necessary. If replacement is required, use an arbor (or hydraulic) press and a suitable sized sleeve to press them from the bearing cover.
4. Remove the support ring (205) and retaining ring (204), and slide the bearing cover (206) and screws (216) off the shaft.
5. Inspect the upper bearing (203) for roughness or binding, and replace as necessary. To remove the upper bearing, lightly oil the upper end of the rotor/shaft (201) and pull or press the bearing off the shaft.

Motor Cover Removal and Disassembly

NOTE

If desired, the motor cover (230) may be removed and disassembled without disassembling the pump end components.

1. Remove the screws (233) securing the lifting handle (231) to the motor housing (302). Remove the lifting handle.
2. Remove the screws (250) securing the motor cover (230) to the motor housing. Pry the motor cover from the motor housing. Carefully raise the motor cover enough to expose the wiring connections.

NOTE

Unless desired to replace the motor cover (230) and/or motor cable (234), do not disconnect the wiring between the motor cover and the stator (301). The thermal protection and moisture detection

leads are insulated against wicking; if disconnected, this insulation must be re-established.

3. To remove the motor cover (230), disconnect the motor cable leads at the terminal boards (226 and 411). Remove the screw (229) securing the ground connector (228). The insulation sleeve (414) and upper bearing housing (222) are free parts.
4. Remove the motor cover (230) and dowel pin (413).
5. To remove the moisture switch (224), remove the screw (225).

NOTE

Unless absolutely necessary, do not remove the motor cables (234) or control cable (409, if so equipped) from the motor cover (230), or move or remove the components in the cable inlets (236 or 404). When these components are installed, they deform the cable(s), and they will have to be trimmed if they are moved.

6. To remove the motor cables (234), cable inlets (236), cable clamps (238) and rubber seals (235) as individual units, remove the screws (237), and pull the assemblies out of the motor cover (230).
7. To remove the control cable (409), cable inlet (404), cable clamp (406) and rubber seal (408) on those units so equipped, remove the screws (405), and pull the assembly out of the motor cover (230).
8. If desired to separate the any of the components removed in Steps 6 and 7, lubricate the cables to ease removal.

NOTE

In the stator/motor housing (246), the stator (301) is a hot shrink fit in the motor housing (302). No instructions are given in this manual for separating the stator/motor housing, or thermal protectors (307). It is strongly recommended that the stator/motor housing be returned to the factory or an authorized Gorman-Rupp repair facility if any of these components require service.

INSPECTION AND CLEANING

Carefully inspect all O-ring seating areas to determine if they formed a proper seal. If sealing was faulty, determine the cause before reassembling the pump. After inspection, remove and discard all O-rings.



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

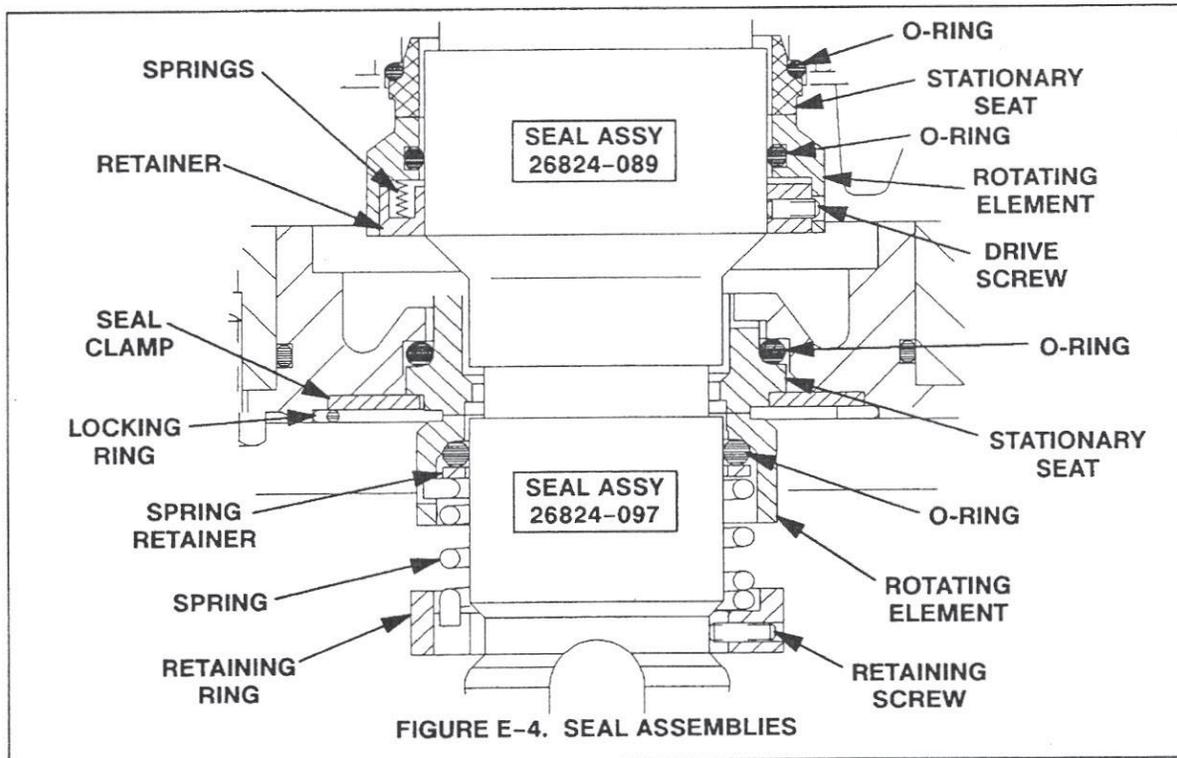
Bearings

1. It is recommended that bearings be cleaned in place on the shaft.

2. Clean bearings thoroughly in **fresh** cleaning solvent; dry with filtered compressed air.
3. Coat external surfaces with light oil to ease reassembly; these bearings are permanently sealed and require no additional lubrication.
4. Cover the bearings with clean cloth to keep external surfaces free of all dirt and foreign material; **failure to do so could damage the bearings or their mating surfaces.**

Other Reusable Parts (Except Seal Assemblies)

1. Thoroughly clean all reusable parts.
2. Inspect all mating surfaces and the rotor/shaft assembly for nicks or burrs, and restore to original contours with a honing stone or fine file.
3. If the surface cannot be restored, replace the part.



Cleaning Seal Assemblies



Seal faces are precision finished and subject to wear patterns which cannot be re-aligned during assembly. The seal assembly should be replaced completely at each overhaul to ensure trouble-free operation. If necessary to use an old seal in an emergency, **never** mix old and new seal parts; seal performance will be severely affected.

1. Inspect the seal assemblies for wear, scoring, grooves, and other damage that might cause leakage.
2. Wash all seal parts in fresh cleaning solvent and allow to dry thoroughly. Reinspect the parts after cleaning.
3. If needed, clean the seal faces with a clean, lint-free tissue. Wipe lightly in a concentric pattern to avoid scratching the faces.

MOTOR REASSEMBLY

Except as noted, all references are to FIGURE E-2.

Motor Cover Reassembly and Installation

1. Clean the exterior of the motor cables (234) and control cable (409 if so equipped) with warm water and mild detergent, and inspect for obvious damage. (If required, see **ELECTRICAL TESTING** in **TROUBLESHOOTING, SECTION D**.)



Do **not** splice the cables. The waterproof integrity must be maintained. If repairs are required other than at either end, replace the entire cable.

NOTE

If the cable inlets (236 and 404), cable clamps (238

and 406), and rubber seals (235 and 408) have been moved or removed, lubricate the cables (234 and 409) to ease installation.

2. Install the cable inlets (236 and 404) and clamps (238 and 406) on the cables (234 and 409). Discard the old rubber seals (235 and 408) and install new ones. Locate the new seals above the deformation mark left on the cables by the old seals.
3. Cut the motor cables (234) and control cable (409) above the seal deformation marks. Strip the cable's outer insulation so that the individual leads are long enough to make motor connections; the ground leads must be longer than the others.
4. Install new ends and ground connectors on the new leads. Remove the identification sleeves from the old leads, and install on the new wire ends. Install identifying sleeves or markers identical to those on the old leads on the new leads.
5. Lubricate the outside of the cables, and pull the rubber seals (235 and 408) down to within two inches (51 mm) of the end of the cable sheaths. Pull the cable inlets (236 and 404) down the cables until flush with the rubber seals.
6. Insert the cable leads into the motor cover (230), making certain that the rubber seals bottom in the cover, and that the cable inlets (236 and 404) seat flush against the seals. Secure the cable inlets and installed components with the screws (237 and 405).
7. Install the cable clamps (238 and 406), and secure with the screws (239 and 407).
8. Install the insulation sleeves (414) in the upper bearing cover (222). Thread the leads from the stator (301) through the insulation sleeves, and seat the upper bearing cover in the motor housing (302).



Refer to the wiring diagrams in **INSTALLATION, Section B**, when connecting all

motor leads. Misconnected leads could severely damage the motor, and cause injury or death to personnel.

9. Connect the leads from the motor and control cables, and from the stator (301), to the terminal boards (226 and 411).
10. Secure the ground connectors with the screws and washers (228 and 229).

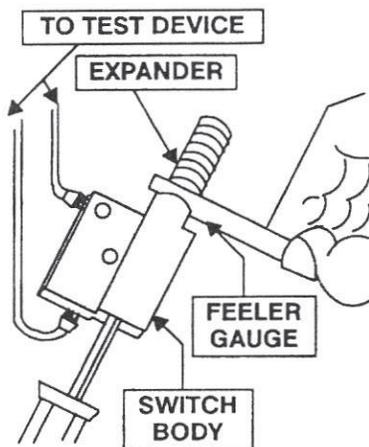


FIGURE E-5. MOISTURE SWITCH ADJUSTMENT

11. The moisture switch (224) should be checked and, if required, adjusted any time the motor is opened for service.



The switch is extremely sensitive to atmospheric moisture and contamination from handling; therefore, **make sure** hands are clean and dry before touching the switch. When installing a replacement switch, remove it from the air-tight plastic shipping bag prior to installation to allow it to acclimate to local humidity levels **before** checking and adjusting the clearance as follows.

See FIGURE E-5, and install the switch in a simple bell circuit or other test circuit. Use a feeler gauge to check clearance between the expander and switch body; clearance should be 0.100 inches (2,5 mm).

12. After checking, secure the moisture switch (224) with the screw (225).
13. Lubricate a new O-ring (247), and install it in the motor cover (230). Position the dowel pin (413) in the hole in the upper bearing housing (222). Press the motor cover into the housing so hole in the bottom of the cover aligns with the dowel pin (413) in the upper bearing housing. Secure the motor cover and lifting handle (231) to the motor housing with the hardware (233 and 250).

Bearing Installation



When installing bearings, **never** press or hit against the outer race, balls, or ball cage. Press **only** on the inner race. A metal or plastic sleeve with the same O.D. as the inner race is useful for installing bearings.

NOTE

*The upper bearing (203) is secured by a tight press fit onto the shaft. The lower bearings (207) are secured by a tight press fit into the lower bearing housing (213). The upper bearing may be heated to ease installation. **Do not** heat the lower bearings.*

Bearings should never be heated by direct flame. An induction heater, hot oil bath or electric oven may be used. If a hot oil bath is used to heat bearings, both the oil and the container must be absolutely clean, and if the oil has been previously used, it must be thoroughly filtered.

1. Fill bearings with Shell Darina Grease R2 or equivalent. Do not fully pack the bearings; allow some room for expansion of grease when bearings are in operation.



Use tongs, insulated gloves, or other protective devices when handling heated bearings.

NOTE

Do not heat the bearing until ready to install. Heat to a uniform temperature no higher than 250°F (120°C), and slide onto the shaft in one continuous motion to prevent cooling and sticking.

2. Lightly oil both ends of the rotor/shaft assembly (201) and the I.D. and O.D. of the bearings.
3. Slide or press the upper bearing (203) onto the shaft until it seats squarely against the shaft shoulder.

NOTE

After the bearing has cooled, check that it has not shrunk away from the shaft shoulder. If the bearing has shifted, use a suitable sleeve and a press to fit it snug against the shoulder.

4. Secure the upper bearing cover (206) to the bearing housing (213) with the screws (216). Position this subassembly on the bed of an arbor (or hydraulic) press.

NOTE

*The lower bearings (207) may be **cooled** to ease installation into the lower bearing housing.*

5. Position the first of the two lower bearings (207) in the bearing housing with the lower side of the inner race down (toward the bearing cover). Press the bearing into the bearing housing until fully seated against the cover.
6. Position the second lower bearing in the bearing housing with the lower side of the inner race up (toward the open end of the housing). Press the second bearing into the housing until fully seated against the first bearing.

7. Disengage the screws (216) and remove the upper bearing cover (206) from the lower bearing housing. Position the bearing cover on the shaft, and install the retaining ring (204) and support ring (205).
8. Slide the assembled lower bearings and bearing housing onto the shaft. Secure the upper bearing cover to the lower bearing housing with the screws (216).
9. Install the tabbed lockwasher (415), and screw the nut onto the shaft until the bearings are securely seated against the support ring (205). Back the nut off to align the nearest slot with a corresponding tab on the washer, and bend the tab over to secure in place.
10. Lubricate a new O-ring (219), and install it in the groove in the lower bearing housing cover (217).
11. Slide the lower bearing housing cover over the shaft, and press it into the bearing housing until seated against the lower bearing. Secure the lower cover to the bearing housing with the screws (221).
12. Guide the assembled shaft and bearings through the stator/motor housing (246) until the upper bearing (203) seats squarely in the motor cover (230) and lower the bearing housing (213) is fully seated in the motor housing (302).

Upper Seal Installation

All references are to FIGURES E-2 and E-4.



If a new seal is being installed, do not unwrap it until ready to install; seal components **must** be kept clean. Handle seal parts with extreme caution to prevent damage. Use care not to contaminate the precision-finished faces; even fingerprints on the faces can shorten seal life.

NOTE

Use hand pressure only to install seal components. A push tube cut from plastic pipe approximately the

same O.D. as the stationary seat is a useful aid when installing these components. It is recommended that the pump be inverted during seal assembly.

1. Lubricate the O-rings (251 and 252) and install them in the grooves in the seal plate (257). Press the seal plate into the motor housing (9302) until fully seated against the bearing housing (213), and secure with the screws (254).
2. Lubricate the motor shaft and the seal cavity of the lower bearing cover (217).
3. Unwrap the seal components. Check that the seal faces are clean and undamaged. If necessary to clean, use a clean tissue and wipe in a concentric pattern.
4. Lightly oil the seal stationary seat O-ring. Place a clean tissue over the seal face, and install the stationary seat and O-ring in the lower bearing cover with the seal face up.
5. Lightly oil the seal rotating element O-ring, and slide the rotating element and O-ring onto the shaft until the sealing faces contact.
6. Place a drop of grease in the spring cups of the seal retainer, and install the springs. Install the retainer and springs in the rotating element, and align the bottom of the retainer with the shaft shoulder. Secure the retainer with the retaining screws.

NOTE

Test the upper seal as described in **SEAL TESTING** before installing and testing the lower seal assembly, and installing the pump end components (see **PUMP END REASSEMBLY**).

7. After testing the upper seal, proceed with **PUMP END REASSEMBLY**.

SEAL TESTING

All references are to FIGURE E-1.

The seal assemblies should be tested under pressure and submerged in water before the pump end components are assembled.



CAUTION

Compressed air used in testing **must be dry**. Moist air in the motor housing will cause the moisture switch to trip.

Test 1: Upper Seal Integrity



WARNING!

This test is conducted with the pump under power. Refer to the wiring diagram and observe all precautions outlined in INSTALLATION, Section B when connecting the motor cable to the control box; otherwise, the pump could be damaged, and personnel exposed to injury or death.

1. There are two screw plugs (268) in the seal housing (257), and one in the motor housing (302). Remove either plug and O-ring (269) in the seal housing.
2. Thread an air hose adapter into the plug hole; install an air hose.
3. Remove the screw plug and O-ring (268 and 269) from the motor housing.
4. Thread an air hose adapter into the plug hole; install an air hose.
5. Connect the motor cable leads to the control box. **Do not** apply power to the motor at this time.
6. Submerge the motor assembly horizontally so that both hose connections are covered.
7. Apply 14–15 psi pressure maximum to the **both** air hoses.



CAUTION

In the following steps **do not apply power for more than 10 seconds**. Otherwise, the unlubricated seal will overheat and may burn.

8. Briefly apply power to the motor, and check for air bubbles.
9. If air bubbles appear, shut off power, then apply again. If air bubbles persist, the seal and/or motor cover are leaking.
10. Disassemble the seal housing (257) and bearing housing (213), and find and correct the cause of the leak.
11. Re-run the test after corrective action has been taken.

Test 2: Lower Seal Integrity

1. Install air hoses as in Test 1.
2. Submerge the pump in water and apply 14-15 psi maximum to the **seal housing** air hose. Check for air bubbles.
3. If air bubbles appear, the seal is leaking. Disassemble the seal housing (257) and find and correct the cause of the leak.
4. Re-run the test after corrective action has been taken.
5. After the seals have been tested, remove the air hoses. Lubricate the seal as indicated in **LUBRICATION**. Install and tighten the plugs and O-rings (268 and 269) in the motor housing (302) and seal housing (257).

LUBRICATION

All references are to FIGURE E-2.

The seal assembled (218 and 260) are lubricated by a reservoir of oil in the seal housing (257). No other general lubrication is required.



The screw plug (268) in the **motor housing** is used for testing **only**; **do not** add oil through this plug.

Before installing or removing the drain/fill plugs (268), always clean the area around the plugs to prevent contamination of the oil.

Discard the plug O-rings (269) if the plugs are removed. Lubricate the new O-rings with oil (**not grease**) before installing them.

Draining Oil

1. Lay the pump flat on a work surface with one of the two drain/fill plugs (268) in the seal housing facing up.
2. Slowly open the upper plug to release any pressure in the seal housing (257).
3. Place a clean container under the lower plug, remove the plug, and roll the pump on its side to drain the seal housing.

Condition Of Oil

1. Check the condition of the oil drained from the pump.
2. If the oil is clear, it can be reused.
3. If the oil is milky or contains a small amount of water, it must be changed.
4. If the oil contains a large amount of water, it must be changed, and the lower seal assembly (260) must be checked before the pump is put back in operation.

Adding Oil

1. Lay the pump flat on a work surface with one of the two drain/fill plugs (268) facing up.
2. Slowly open the upper plug to release any pressure in the seal housing.
3. Remove both fill/drain plugs (268), and through the top plug hole add SAE 10W 30 motor oil until it escapes from the lower plug hole.
4. Lubricate and install new O-rings (269), and install and tighten the plugs (268).

July 18, 1979

WARRANTY

Pumping units manufactured by The Gorman-Rupp Company, Mansfield, Ohio are guaranteed to be free from defects in material and workmanship for one year from date of shipment from factory in Mansfield, Ohio. The obligation under this Warranty, statutory or otherwise, is limited to replacement or repair at Mansfield, Ohio factory or at a point designated by Gorman-Rupp, of such part as shall appear to us upon inspection at such point, to have been defective in material or workmanship.

This Warranty does not obligate The Gorman-Rupp Company to bear the cost of labor or transportation charges in connection with replacement or repair of defective parts; nor shall it apply to a pump upon which repairs or alterations have been made unless authorized by Gorman-Rupp.

No warranty is made in respect to engines, motors, or trade accessories, such being subject to warranties of their respective manufacturers.

In Submersible Pumps, pump and motor are integral and Submersibles are warranted as a unit. Since motor is subject to an important degree upon quality and performance of electrical controls, unit warranty is valid only when controls have been specified and provided by Gorman-Rupp.

No express implied or statutory warranty, other than herein set forth is made or authorized to be made by Gorman-Rupp.

In no event shall The Gorman-Rupp Company be liable for consequential damages or contingent liabilities arising out of the failure of any Gorman-Rupp pump or parts thereof to operate properly.

THE GORMAN-RUPP COMPANY
Mansfield, Ohio

NOTE: In Canada, all above references to "The Gorman-Rupp Company, Mansfield, Ohio" is understood to mean "Gorman-Rupp of Canada Limited, St. Thomas, Ontario."

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

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