



TECHNICAL SERVICE MANUAL

HEAVY-DUTY STAINLESS STEEL PUMPS

SERIES 4197

SIZES GG, HJ, HL, AS, AK, AL

SECTION	TSM 164
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ISSUE	F

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This manual deals only with Series 4197 Heavy-Duty Pumps. Refer to Figures 1 through 15 for general configuration and nomenclature used in this manual. Pump specifications and recommendations are listed in Catalog Section 164, Series 4197 Heavy Duty Stainless Steel Pumps.



FIGURE 2
AS, AK and AL4197 SERIES
Foot Type Unmounted Pump with Flanged Ports

INTRODUCTION

The illustrations used in this manual are for identification purposes only and cannot be used for ordering parts. Obtain a parts list from the factory or a Viking® representative. Always give complete name of part, part number and material with model number and series number of pump when ordering repair parts. The unmounted pump or pump unit model number and serial number are on the nameplate.

In the Viking model number system, basic size letters are combined with series number (4197) and are used to indicate either an unmounted pump or mounted pump unit.

MODEL NUMBER CHART

UNMOUNTED PUMP	UNITS
Foot Mounted	
GG4197	Units are designated by the unmounted pump model numbers followed by a letter(s) indicating drive style.
HJ4197	
HL4197	
AS4197	
AK4197	
AL4197	
	D = Direct Drive



FIGURE 1
GG, HJ and HL4197 SERIES
Foot Type Unmounted Pump with Flanged Ports

SPECIAL INFORMATION

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) Be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

Failure to follow above listed precautionary measures may result in serious injury or death.

SAFETY INFORMATION AND INSTRUCTIONS

IMPROPER INSTALLATION, OPERATION OR MAINTENANCE OF PUMP MAY CAUSE SERIOUS INJURY OR DEATH AND/OR RESULT IN DAMAGE TO PUMP AND/OR OTHER EQUIPMENT. VIKING'S WARRANTY DOES NOT COVER FAILURE DUE TO IMPROPER INSTALLATION, OPERATION OR MAINTENANCE.

THIS INFORMATION MUST BE FULLY READ BEFORE BEGINNING INSTALLATION, OPERATION OR MAINTENANCE OF PUMP AND MUST BE KEPT WITH PUMP. PUMP MUST BE INSTALLED, OPERATED AND MAINTAINED ONLY BY SUITABLY TRAINED AND QUALIFIED PERSONS.

THE FOLLOWING SAFETY INSTRUCTIONS MUST BE FOLLOWED AND ADHERED TO AT ALL TIMES.

Symbol Legend :



Danger - Failure to follow the indicated instruction may result in serious injury or death.

WARNING

Warning - In addition to possible serious injury or death, failure to follow the indicated instruction may cause damage to pump and/or other equipment.



BEFORE opening any liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure that :

- Any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
- The pump drive system means (motor, turbine, engine, etc.) has been "locked out" or otherwise been made non-operational so that it cannot be started while work is being done on the pump.
- You know what material the pump has been handling, have obtained a material safety data sheet (MSDS) for the material, and understand and follow all precautions appropriate for the safe handling of the material.

WARNING

INSTALL pressure gauges/sensors next to the pump suction and discharge connections to monitor pressures.



WARNING

USE extreme caution when lifting the pump. Suitable lifting devices should be used when appropriate. Lifting eyes installed on the pump must be used **only** to lift the pump, **not** the pump with drive and/or base plate. If the pump is mounted on a base plate, the base plate must be used for all lifting purposes. If slings are used for lifting, they must be safely and securely attached. For weight of the pump alone (which does not include the drive and/or base plate) refer to the Viking Pump product catalog.



BEFORE operating the pump, be sure all drive guards are in place.



DO NOT attempt to dismantle a pressure relief valve that has not had the spring pressure relieved or is mounted on a pump that is operating.



DO NOT operate pump if the suction or discharge piping is not connected.



AVOID contact with hot areas of the pump and/or drive. Certain operating conditions, temperature control devices (jackets, heat-tracing, etc.), improper installation, improper operation, and improper maintenance can all cause high temperatures on the pump and/or drive.



DO NOT place fingers into the pumping chamber or its connection ports or into any part of the drive train if there is **any possibility** of the pump shafts being rotated.



WARNING

THE PUMP must be provided with pressure protection. This may be provided through a relief valve mounted directly on the pump, an in-line pressure relief valve, a torque limiting device, or a rupture disk. If pump rotation may be reversed during operation, pressure protection must be provided on **both** sides of pump. Relief valve adjusting screw caps must always point towards suction side of the pump. If pump rotation is reversed, position of the relief valve must be changed. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure. For additional information, refer to Viking Pump's Technical Service Manual TSM 000 and Engineering Service Bulletin ESB-31.

WARNING

DO NOT exceed the pumps rated pressure, speed, and temperature, or change the system/duty parameters from those the pump was originally supplied, without confirming its suitability for the new service.



WARNING

BEFORE operating the pump, be sure that:

- It is clean and free from debris
- all valves in the suction and discharge pipelines are fully opened.
- All piping connected to the pump is fully supported and correctly aligned with the pump.
- Pump rotation is correct for the desired direction of flow.



WARNING

THE PUMP must be installed in a matter that allows safe access for routine maintenance and for inspection during operation to check for leakage and monitor pump operation.

ROTATION: Viking pumps operate equally well in a clockwise or counterclockwise rotation. Shaft rotation determines which port is suction and which is discharge. Suction port is where pumping elements (gear teeth) come out of mesh.

PRESSURE RELIEF VALVES:

1. Viking pumps are positive displacement pumps and must be provided with some sort of pressure protection. This may be a relief valve mounted directly on the pump, an inline pressure relief valve, a torque limiting device or a rupture disk.
2. There are relief valve options available on these pumps. Relief valve options include an internal relief valve and a return to tank relief valve.
3. If pump rotation is reversed during operation, pressure protection must be provided on *both* sides of the pump.
4. The relief valve adjusting screw cap must always point towards the suction side of the pump. If pump rotation is reversed, remove the pressure relief valve and turn end for end. Refer to **Figure 3** below.
5. Pressure relief valves should not be used to control flow or regulate discharge pressure.

For additional information on pressure relief valves, refer to **Technical Service Manual TSM 000 and Engineering Service Bulletin ESB-31**.

SPECIAL MECHANICAL SEALS:

Extra care should be taken in repair of these pumps. Be sure to read and follow all special instructions supplied with your pump.

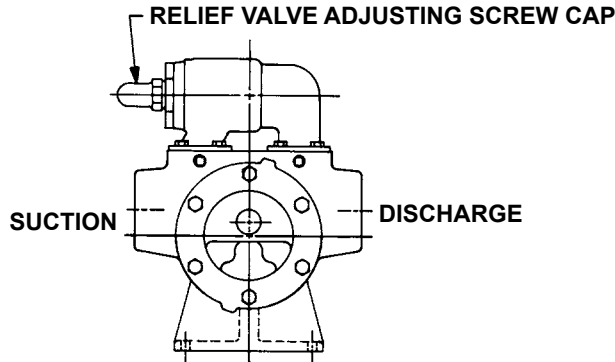


FIGURE 3

MAINTENANCE

Series 4197 pumps are designed for long, trouble-free service life under a wide variety of application conditions with a minimum of maintenance. The points listed below will help provide long service life.

CLEANING PUMP: Keep the pump as clean as possible. This will facilitate inspection, adjustment and repair work and help prevent overlooking a dirt covered grease fitting.

STORAGE: If the pump is to be stored, or not used for six months or more, the pump must be drained and a light coat of non-detergent SAE 30 weight oil must be applied to all internal pump parts. Lubricate the fittings and apply grease to the pump shaft extension. Viking suggests rotating pump shaft by hand one complete revolution every 30 days to circulate the oil.

SUGGESTED REPAIR TOOLS: The following tools must be available to properly repair Series 4197 pumps. These tools are in addition to standard mechanics' tools such as open end wrenches, pliers, screw drivers, etc. Most of the items can be obtained from an industrial supply house.

1. Soft Headed hammer
2. Allen wrenches (set screws & special mechanical seals)
3. Snap Ring Pliers
INTERNAL – Viking P/N 2-810-047-999 GG-HJ-HL 4197
EXTERNAL – Viking P/N 2-810-029-375 GG-HJ-HL 4197
4. Mechanical Seal Installation Sleeve
2-751-001-730 for 0.75 inch seal; GG 4197
2-810-004-730 for 1.25 inch seal; AS-AL 4197
5. Bearing Locknut Spanner Wrench – 2-810-043-375
6. Spanner Wrench, adjustable pin type for use on bearing housing end cap – 2-810-008-375
7. Brass bar
8. Arbor press

DISASSEMBLY

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) Be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

Failure to follow above listed precautionary measures may result in serious injury or death.

1. Refer to **Figures 7 & 8**, page 6, for model to be disassembled and name of parts.
2. Mark the head and casing before disassembly to ensure proper reassembly.

- NOTE:** The four valve capscrews, valve and gasket must be removed from the GG4197 model before the six head capscrews are removed.

Remove the head capscrews.

- Tilt the top of the head back when removing to prevent the idler from falling off the idler pin. Avoid damaging the head gasket.

Remove the head from the pump.

- Remove the idler and bushing assembly. If the idler bushing needs replacing, see “**Installation of Carbon Graphite Bushings,**” page 8.

- Insert a brass bar or piece of hardwood in the port opening and between the rotor teeth to keep the shaft from turning. Turn the locknut counterclockwise and remove the locknut from the shaft. See **Figure 9 or 10,** page 7.

- Loosen the two setscrews in the face of the bearing housing and turn the thrust bearing assembly counterclockwise and remove from casing. See **Figure 9 or 10,** page 7.

- GG, HJ, HL:** Remove the snap ring from the shaft. See **Figure 9,** page 7.

AS, AK, AL: Remove the bearing spacer from the shaft. See **Figure 10,** page 7.

- Remove the brass bar or piece of hardwood from the port opening.

- The rotor and shaft assembly can now be removed by tapping on the end of the shaft with a lead hammer or, if using a regular hammer, use a piece of hardwood between the shaft and hammer. The spring and rotary member of the seal will come out with the rotor and shaft.

- GG, HJ, HL:** Remove the inner snap ring and single row ball bearing from the casing. See **Figure 9,** page 7.

AS, AK, AL: Remove the bearing retainer washer. See **Figure 10,** page 7.

- With a drift or screwdriver inserted in the shaft end of the casing, tap the stationary seat from the casing. See **Figure 11,** page 7 and **Figure 13,** page 8.

- Disassemble the thrust bearing assembly.

GG, HJ, HL: Remove the outer snap ring from the bearing housing and remove the ball bearing. See **Figure 9,** page 7.

AS, AK, AL: Loosen the two setscrews in the flange outside diameter. Rotate the end cap and lip seal counterclockwise and remove. Remove the ball bearing. See **Figure 10,** page 7.

The casing should be examined for wear, particularly in the area between the ports. All parts should be checked for wear before the pump is put together.

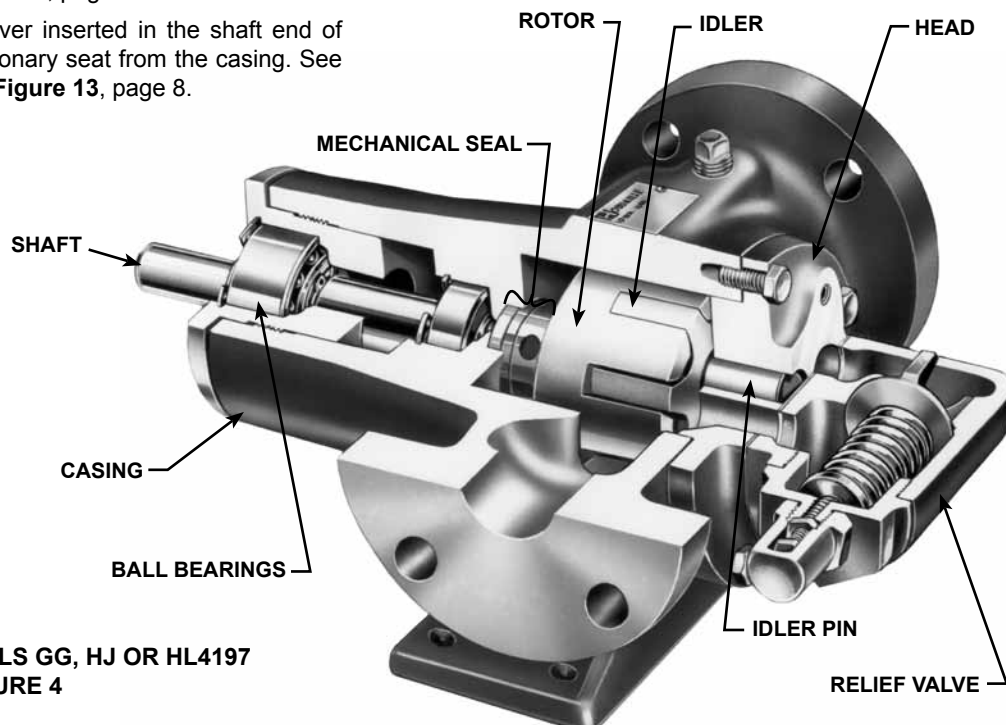
When making major repairs, such as replacing a rotor and shaft assembly; it is advisable to also install a new mechanical seal, head and idler pin assembly, and idler and bushing assembly. See “**Installation of Carbon Graphite Bushings,**” page 8.

Clean all parts thoroughly and examine for wear or damage. Check the lipseals, ball bearings, bushing and idler pin and replace if necessary. Check all other parts for nicks, burrs, excessive wear and replace if necessary.

In 2005, the use of single seal bearings were phased out. Pumps now use “Sealed for Life” bearings that have seals on both sides.

For older models, wash the bearings in clean solvent. Blow out the bearings with compressed air. Do not allow the bearings to spin; turn them slowly by hand. Spinning the bearings will damage the race and balls. Make sure the bearings are clean, then lubricate with non-detergent SAE 30 weight oil and check for roughness. Roughness can be determined by turning the outer race by hand. Replace the bearings if they have roughness.

Be sure the shaft is free from nicks, burrs and foreign particles that might damage the mechanical seal. Scratches on the shaft in the seal area will provide leakage paths under the mechanical seal.



**CUTAWAY OF MODELS GG, HJ OR HL4197
FIGURE 4**

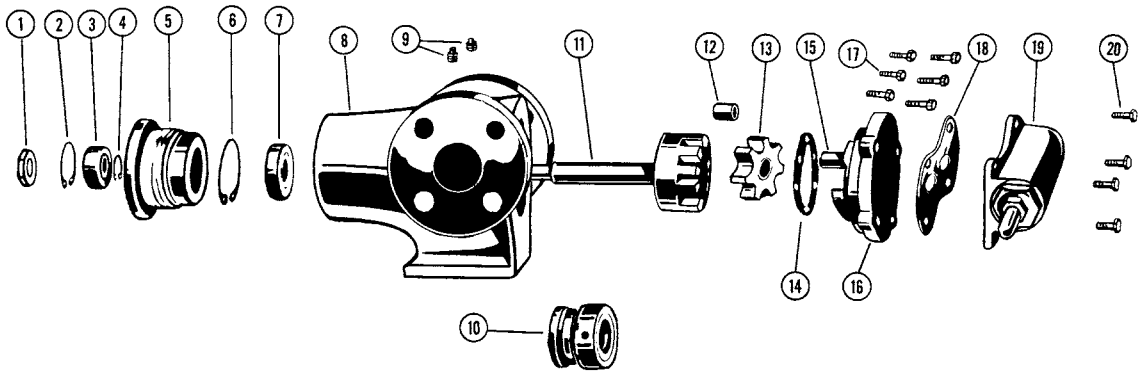


FIGURE 5
EXPLODED VIEW FOR MODELS GG, HJ AND HL 4197

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	8	Casing	15	Idler Pin
2	Snap Ring (Outer)	9	Pipe Plug	16	Head and Idler Pin Assembly
3	Ball Bearing (Outer)	10	Mechanical Seal	17	Capscrews for Head
4	Snap Ring for Shaft	11	Rotor and Shaft Assembly	18	Gasket for Relief Valve
5	Bearing Housing	12	Idler Bushing	19	Relief Valve
6	Snap Ring (Inner)	13	Idler and Bushing Assembly	20	Capscrews for Valve
7	Ball Bearing (Inner)	14	Head Gasket		

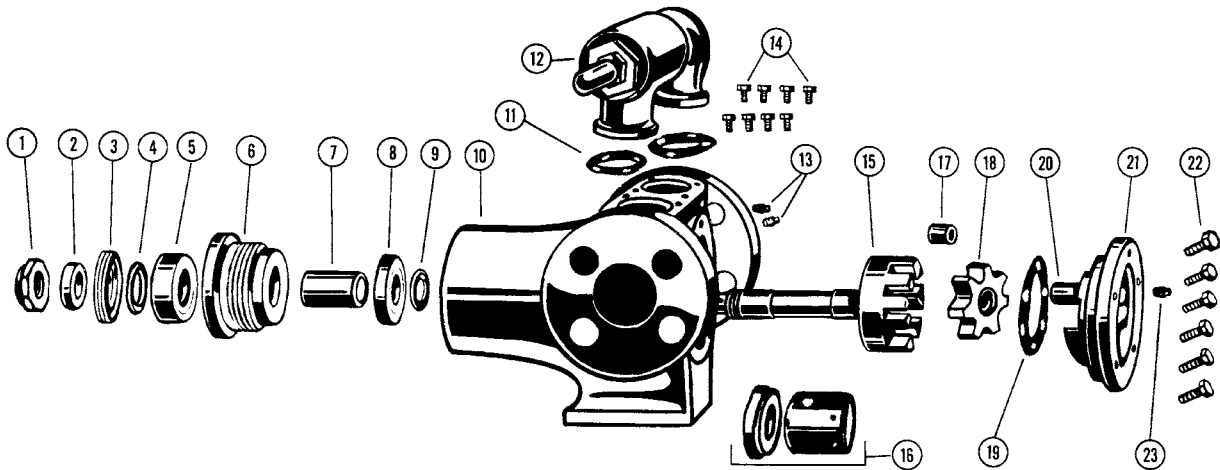


FIGURE 6
EXPLODED VIEW FOR MODELS AS, AK AND AL 4197

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	9	Bearing Retainer Washer	17	Idler Bushing
2	Bearing Spacer Collar	10	Casing	18	Idler and Bushing Assembly
3	End Cap for Bearing Housing	11	Gasket for Relief Valve	19	Head Gasket
4	Lip Seal for Bearing Housing	12	Relief Valve	20	Idler Pin
5	Ball Bearing (Outer)	13	Pipe Plugs	21	Head and Idler Pin Assembly
6	Bearing Housing	14	Capscrews for Valve	22	Capscrews for Head
7	Bearing Spacer	15	Rotor and Shaft Assembly	23	Pipe Plug
8	Ball Bearing (Inner)	16	Mechanical Seal		

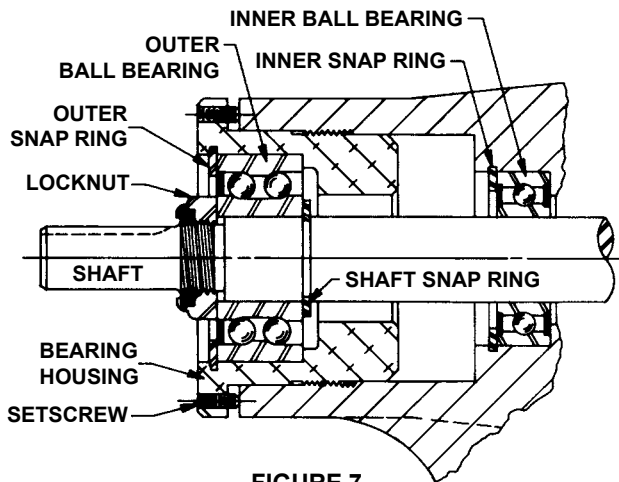


FIGURE 7
THRUST BEARING ASSEMBLY GG, HJ AND HL SIZES

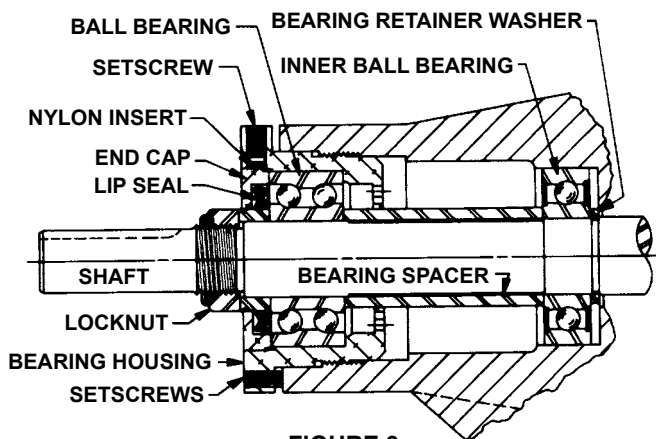


FIGURE 8
THRUST BEARING ASSEMBLY AS, AK AND AL SIZES

ASSEMBLY

PTFE Fitted Mechanical Seal

1. Installing New Seal: See **Figures 9 thru 13**.

GENERAL INFORMATION:

Mechanical seals for HJ, HL, AS, AK and AL4197 size pumps are of the drive set screw type. Mechanical seals for GG4197 size pump are friction driven and are pressed onto the rotor hub.

Installation sleeves are furnished with replacement seals for GG, AS, AK, size pumps. (this is not necessary with HJ and HL pumps). **NOTE: Cleanliness during installation is essential to seal performance. Never allow the seal faces to contact a dirty surface.**

ORDER OF ASSEMBLY:

1. Stationary seat and seat ring in casing
2. Installation sleeve on the shaft (where appropriate)
3. Seal rotating portion on the shaft
4. Rotor and shaft into casing
5. Head with gasket and idler onto the casing

PREPARATION:

Remove burrs from threads and gently radius leading edges on rotor shaft. Use 300 grit paper to radius the edges and to polish the shaft at the seal area. Clean the rotor hub, shaft

and seal seat bore in casing, making sure they are free from dirt and grit.

Place installation sleeve on shaft, wide end against shaft shoulder. See **figure 10**, page 7.

STATIONARY SEAT ASSEMBLY:

Refer to **Figures 9 and 11**, page 7.

All models-Coat the outside diameter of the seat ring assembly and the inside diameter of the seal housing bore with SAE 30 oil. Align the slot in the back of the seal seat with anti-rotation pin in the bottom of the casing seat bore and start the seal seat into this bore. Protect the lapped surface of the seal seat with a disc of clean cardboard and press the seal seat into this bore until it is firmly at the bottom of the bore. A hammer handle or wood dowel will serve to press against the cardboard disc and seat.

ASSEMBLY OF SEAL ROTATING PORTION:

Models HJ, HL, AS, AK and AL4197 (refer to **figure 12**, page 7) - Coat the inside diameter of the rotating portion assembly, shaft and tapered sleeve with SAE 30 weight oil. Be sure the shaft is free of any scratches, nicks and burrs. Check the internal parts (PTFE rings and carbon washer) of the rotating portion so that the parts concentrically align so they will not be pinched and twisted at installation. With the shaft pointed upward, push the rotating portion down along the large shaft onto the large diameter. Remove the holding clips, which hold the spring-loaded disc away from PTFE and carbon parts. See **figure 10**, page 7. Push the seal against the rotor hub and tighten the set screws to lock the seal to the shaft. Remove the tapered sleeve.

MODEL GG4197 - rotating portion of the mechanical seal for GG4197 size pump does not have set screws to drive it and must depend upon interference fit with the rotor hub. See **figure 12**, page 7. The rotating portion must be disassembled before the retainer (cartridge containing spring, disc, PTFE wedges and carbon face) can be pressed upon rotor hub. See **figure 11**, page 7.

To disassemble the rotating portion of the seal, compress the carbon face and rapidly depress the retaining ring through the notch at the end of the retainer cartridge, as shown in **figure 15**, page 9.

CAUTION !

Do not allow the compressed spring to be released suddenly, which might send metal parts flying. Protect your eyes! Protect the carbon face and the PTFE parts from damage or contamination. Disassemble the spring and disc by removing the holding clips around the outside.

Press the retainer cartridge onto the rotor hub. See **figure 12**, page 7.

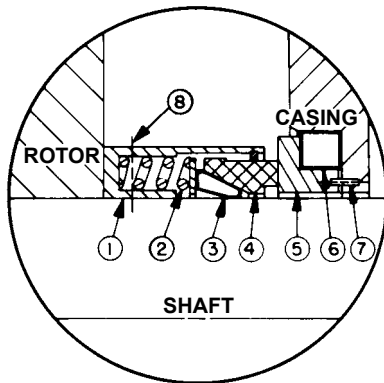
At the factory, an installation tube is used to press the retainer cartridge onto the rotor hub. In lieu of a special tool, a 6 1/2" length of one-inch schedule 40 pipe or some blocks of wood and a light hammer can be used.

Lubricate the rotor hub with PTFE paste, grease or SAE 30 oil and start retainer onto the leading edge of the rotor hub as evenly as possible.

Insert one inch pipe onto the retainer cartridge and press it against the rotor hub, or, with a block of wood in each hand push on the outside edge on the side to force the retainer down the hub. It may be necessary to use a length of hard wood and a light hammer to completely set the retainer cartridge to completely set the retainer cartridge against the back of the rotor.

Check dimensionally from the end of the retainer to a machined portion on the back of the rotor at least two places 180° apart. Runout should not exceed 0.003" (the plane formed by the end of the retainer should be perpendicular to the shaft as closely as possible).

Clean off the assembly just installed. Insert the spring and disc. Lubricate the two piece PTFE wedge inside and outside with SAE 30 oil. Place the tapered sleeve furnished with the replacement seals on the shaft against the largest shaft diameter and coat it with SAE 30 oil. Push the PTFE wedge assembly over the tapered sleeve and using the carbon washer, push the wedge onto the retainer against the disc. Align the retainer with carbon washer indents, compress and secure with retainer ring. When the carbon face is compressed against spring, some "drag" should be felt, but the spring must be able to push the wedge and carbon face out against the retainer ring.



MECHANICAL SEAL FOR MODELS HJ, HL, AS, AK, AL4197

1. Retainer Cartridge
2. Springs
3. Wedge
4. Rotating Face (Washer)
5. Stationary Seat
6. Seat Ring (Gasket)
7. Anti-Rotation Pin
8. Drive Set Screws

FIGURE 9

2. Remove the installation sleeve.
3. All models - Flush sealing faces of both the rotary member and the seal seat with light oil and install the rotor and shaft. Push the rotor and shaft into the casing slowly until the ends of the rotor teeth are just below the face of the casing.

Place the gasket on the head and install the head and idler assembly on the pump. The pump head and casing were marked before disassembly to ensure proper reassembly. If not, be sure the idler pin, which is offset in the pump head, is positioned toward and equal distance between the port connections to allow for proper flow of liquid through the pump.

COAT SHAFT AND TAPERED SLEEVE WITH LIGHT OIL BEFORE ASSEMBLY

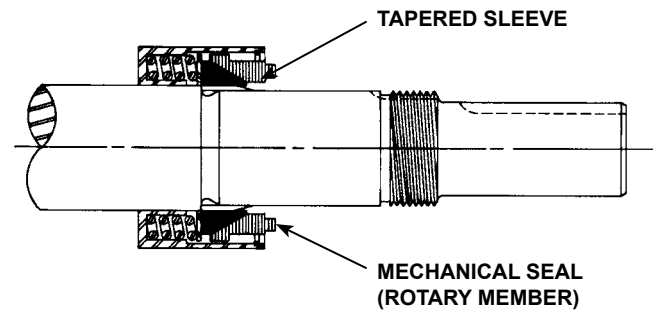
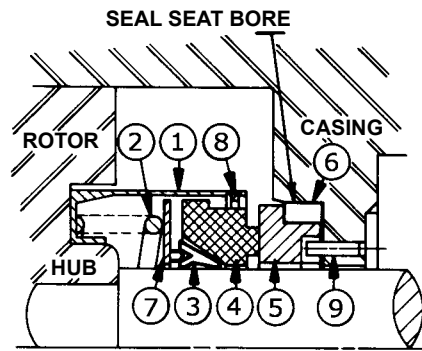


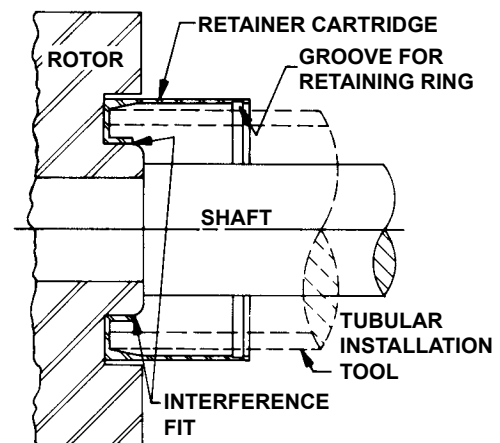
FIGURE 10



MECHANICAL SEAL FOR GG4197

1. Retainer Cartridge
2. Springs
3. Wedge
4. Rotating Face (Washer)
5. Stationary Seat
6. Seat Ring (Gasket)
7. Disc
8. Retaining Ring
9. Anti-Rotation Pin

FIGURE 11



GG4197 SEAL RETAINER CARTRIDGE ON ROTOR HUB
FIGURE 12

4. Tighten the head capscrews evenly.
5. If the pump was equipped with a relief valve and was removed during disassembly, install on the head with new gaskets. Relief valve adjusting screw cap must always point towards the suction port. Refer to **figure 3**, page 3. For relief valve repair or adjustments, see “**Pressure Relief Valve Instructions**,” page 9.

In 2005, the use of single seal bearings were phased out. Pumps now use “Sealed for Life” bearings that have seals on both sides. The new bearings can be installed either side first and do not need to be packed with grease.

6. Install the single row ball bearing in the casing. (For older models using single seal bearings, pack the ball bearing with multi-purpose grease, NLGI #2, and install in the casing with the sealed end towards the head end of the pump.) Install the inner snap ring in GG, HJ and HL size pumps. See **figure 7**, page 6.

NOTE: AS, AK and AL size pumps do not have a snap ring; a bearing retainer washer must be assembled over the end of the shaft before the bearing is assembled. See **figure 8**, page 6.

7. Place the bearing spacer over the shaft and against the single row ball bearing in the casing (AS, AK and AL size pumps). See **figure 8**, page 6.
8. Install the shaft snap ring in the groove in the shaft (GG, HJ and HL size pumps). See **figure 7**, page 6.
9. For models using single seal bearings, pack the lubrication chamber between the inner ball bearing and the double row ball bearing in the thrust bearing assembly approximately half full with multi-purpose grease, NLGI #2. See **figures 7 and 8**, page 6.
10. Pack the double row ball bearing with multi-purpose grease, NLGI #2 and press into the bearing housing with shield side toward the coupling end of the shaft. See **figure 7**, page 6. (AS, AK and AL size pumps do not use a shielded bearing). Install the snap ring to hold the bearing in place on GG, HJ and HL size pumps.

NOTE: On AS, AK and AL size pumps, install the lip seal in the bearing housing end of the cap. The lip should face towards the end of the shaft. Put the bearing spacer sleeve in the lip seal and install in the bearing housing and tighten the setscrews securely. See **figure 8**, page 6.

11. Insert a piece of brass or hard wood through the port opening between the rotor teeth to keep the shaft from turning.
12. Start the thrust bearing assembly into the casing. Turn by hand until tight. This forces the rotor against the head. Replace and tighten the locknut on the shaft.
13. Remove brass piece or hardwood from port opening
14. Adjust the pump end clearance, refer to “**Thrust Bearing Adjustment**” below.

DANGER !

Before starting pump, be sure all drive equipment guards are in place.

Failure to properly mount guards may result in serious injury or death.

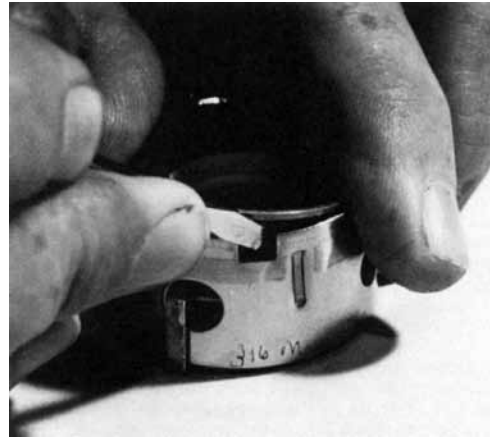


FIGURE 13

THRUST BEARING ADJUSTMENT

See **Figures 7 and 8**, page 6.

Loosen the two screws in the face of the thrust bearing assembly.

If the shaft cannot be rotated freely, turn the thrust bearing assembly counterclockwise until the shaft can be turned easily.

To set end clearance:

1. While turning the rotor shaft, rotate the thrust bearing assembly clockwise until a noticeable drag occurs. This is zero end clearance.
2. Mark the position of the bearing housing with respect to the casing.
3. Rotate the thrust bearing assembly counterclockwise the distance listed below as measured on outside of bearing housing.
4. After the adjustment is made, tighten the two setscrews in the face of the bearing housing assembly to secure the position.

For viscosities above 2500 SSU, add additional end clearance (0.004” for GG, HJ and HL size pumps and 0.005” for AS, AK and AL size pumps).

PUMP SIZE	DISTANCE IN INCHES ON O.D. OF BEARING HOUSING	END CLEARANCE
GG	0.69” (11/16”)	.005
HJ , HL	0.94” (15/16”)	.005
AS , AK , AL	1.25” (1-1/4”)	.008

INSTALLATION OF CARBON GRAPHITE BUSHINGS

When installing the carbon graphite bushings, extreme care must be taken to prevent breaking. Carbon graphite is a brittle material and is easily cracked. If cracked, the bushing will quickly disintegrate. Using a lubricant and adding a chamfer on the bushing and the mating part will help in installation. The additional precautions listed below must be followed for proper installation:

1. A press must be used for installation.
2. Be certain the bushing is started straight.
3. Do not stop pressing the operation until the bushing is in the proper position, as starting and stopping may result in a cracked bushing.
4. Check the bushing for cracks after installation.

PRESSURE RELIEF VALVE INSTRUCTIONS

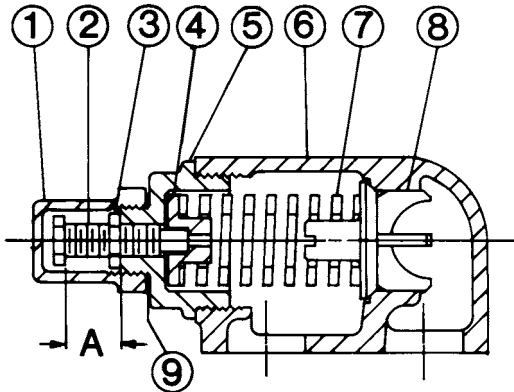


FIGURE 14
VALVE - GG, HJ and HL SIZES

VALVE - LIST OF PARTS	
1. Valve Cap	6. Valve Body
2. Adjusting Screw	7. Spring
3. Lock Nut	8. Poppet
4. Spring Guide	9. Cap Gasket
5. Bonnet	

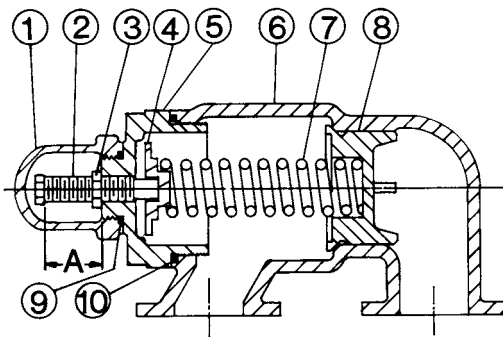


FIGURE 15
VALVE - AS, AK and AL SIZES

VALVE - LIST OF PARTS	
1. Valve Cap	6. Valve Body
2. Adjusting Screw	7. Spring
3. Lock Nut	8. Poppet
4. Spring Guide	9. Cap Gasket
5. Bonnet	10. Bonnet Gasket

DISASSEMBLY

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) Be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

Failure to follow above listed precautionary measures may result in serious injury or death.

Mark the valve and head before disassembly to ensure proper reassembly.

1. Remove the valve cap.
2. Measure and record the length of extension of the adjusting screw. Refer to "A" on Figures 14 and 15.
3. Loosen the locknut and back out the adjusting screw until spring pressure is released.
4. Remove the bonnet, spring guide, spring and poppet from the valve body. Clean and inspect all parts for wear or damage and replace as necessary.

ASSEMBLY

Reverse the procedures outlined under "Disassembly" above. If the valve is removed for repair, be sure to replace in the same position. The relief valve adjusting screw cap must *always* point towards suction side of the pump. If the pump rotation is reversed, remove the relief valve and turn end for end. Refer to Figure 3, page 3.



TECHNICAL SERVICE MANUAL

HEAVY-DUTY STAINLESS STEEL PUMPS

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DANGER !

Before starting pump, be sure all drive equipment guards are in place.

Failure to properly mount guards may result in serious injury or death.

PRESSURE ADJUSTMENT

If a new spring is installed or if the pressure setting of the pressure relief valve is to be changed from that which the factory has set, the following instructions must be carefully followed.

1. Install a pressure gauge in the discharge line for actual adjustment operation.
2. Carefully remove the valve cap which covers the adjusting screw.
Loosen the locknut which locks the adjusting screw so the pressure setting will not change during operation of the pump.
3. Turn the adjusting screw in to increase the pressure and out to decrease the pressure.
4. With discharge line closed at a point beyond pressure gauge, the gauge will show the maximum pressure the valve will allow while the pump is in operation.

IMPORTANT

When ordering parts for the pressure relief valve, always give the model number and serial number of the pump as it appears on the nameplate and the name of the part wanted. When ordering springs, be sure to give the pressure setting desired.



WARRANTY

Viking warrants all products manufactured by it to be free from defects in workmanship or material for a period of one (1) year from date of startup, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. The warranty period for Universal Seal series pumps ONLY (Universal Seal models listed below) is three (3) years from date of startup, provided that in no event shall this warranty extend more than forty-two (42) months from the date of shipment from Viking.

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