



TECHNICAL SERVICE MANUAL

HEAVY-DUTY STAINLESS STEEL PUMPS

SERIES 724 AND 4724

SIZES F - G

SECTION	TSM 211
PAGE	1 OF 8
ISSUE	E

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FIGURE 1 - F, FH, G SIZE

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 serial number of the pump when ordering repair parts.

UNMOUNTED PUMP		UNITS
PACKED	MECH. SEAL	
F724	F4724	Units are designated by the unmounted pump model numbers followed by a letter indicating drive style. D = Direct Drive V = V-Belt Drive
FH724	FH4724	
G724	G4724	

This maintenance bulletin deals exclusively with the bracket mounted, Heavy-Duty, Stainless Steel Pumps. This type of pump may be equipped with either a Multi-Ring stuffing box with packing, called a Series 724 pump; or a Roto-Ring mechanical seal, called a Series 4724 pump. The figure number and letter prefix, which indicates the basic pump size, make up the pump model. Both the packed and mechanical seal pumps are similar in overall appearance to the pump illustrated in **Figure 1**.

The pump or unit model and serial number which can be found on a nameplate attached to the pump or base, are important means of identification when ordering repair parts or a replacement pump.

An outstanding feature of these pumps is the integral thrust bearing which is easily adjusted and holds the rotor in a fixed position. This bearing is a double row angular contact ball bearing securely locked against a shoulder on the shaft by a locknut. Adjustment of the thrust bearing, to properly position the rotor, will be explained at the end of this article.

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.

SPECIAL INFORMATION

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

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, a rupture disk, or other device.
2. There are relief valve options available on those pump models designed to accept a relief valve.
3. If pump rotation is reversed during operation, pressure protection must be provided on **both** sides of pump.
4. Relief valve adjusting screw cap must **always** point towards suction side of pump. If pump rotation is reversed, remove pressure relief valve and turn end for end. **Refer to Figure 1, page 1 and Figures 2 and 3, page 3.**
5. Pressure relief valves should not be used to control pump flow or regulate discharge pressure.

For additional information on pressure relief valves, **Refer to Technical Service Manual TSM000 and Engineering Service Bulletin ESB-31.**

MAINTENANCE

The small Stainless Steel series 724 and 4724 pumps are designed for long, trouble-free service life under a wide variety of application conditions with a minimum of maintenance, however, the following should be considered.

1. **LUBRICATION** - Periodic external lubrication should be applied slowly with a hand gun at all lubrication fittings provided. A good quality of general purpose grease is satisfactory in the majority of cases, however, applications involving very high or low temperatures may require other types of lubricants. Suggested frequency of lubrication is once every 500 hours of operation. Do not over-grease. Consult the factory if you have specific lubrication questions.
2. **PACKING ADJUSTMENT** - New packed pumps, (Series 724) generally require some initial packing adjustment to control leakage as packing "runs-in". Make initial packing adjustments carefully and do not over tighten the packing gland. After initial adjustment, occasional inspection will reveal the need for packing gland adjustment and/or replacement of the packing. See instructions in disassembly and reassembly regarding repacking the pump.
3. **END CLEARANCE ADJUSTMENT** - After long term operation it is sometimes possible to improve the performance of the pump, without major repair, through adjustment of end clearance of the pump. Refer to instructions under **End Clearance**, page 6, for information regarding this procedure.

4. **RELIEF VALVE** - If your pump is equipped with a relief valve, adjustment can be made as follows. Remove the adjusting screw cap, loosen the locknut and turn in the adjusting screw to increase the pressure and turn-out to decrease the pressure. If the pump is not producing the rated capacity, adjustment of the relief valve may be necessary.
5. **CLEANING THE PUMP** - It is good practice to keep the pump as clean as possible. This will facilitate inspection, adjustment and repair work and help prevent omission of lubrication to fittings covered or hidden with dirt.
6. **STORAGE** - If the pump is to be stored or not used for any appreciable length of time it should be drained and a light coat of lubricating and preservative oil should be applied to the internal parts. Lubricate all fittings. Rotate by hand every 30 days.

SUGGESTED REPAIR TOOLS: The following tools must be available to properly repair Series 724 and 4724 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 (some mechanical seals and set collars)
3. Packing hooks, flexible
Small for 0.25 inch and 0.31 inch cross section packing
Large for 0.38 inch and up cross section packing
4. Mechanical seal installation sleeve
5. Bearing locknut spanner wrench (2-810-043-375)
6. Spanner wrench, adjustable pin type for use on double end caps (2-810-008-375)
7. Brass bar
8. Arbor press

SEALED PUMPS

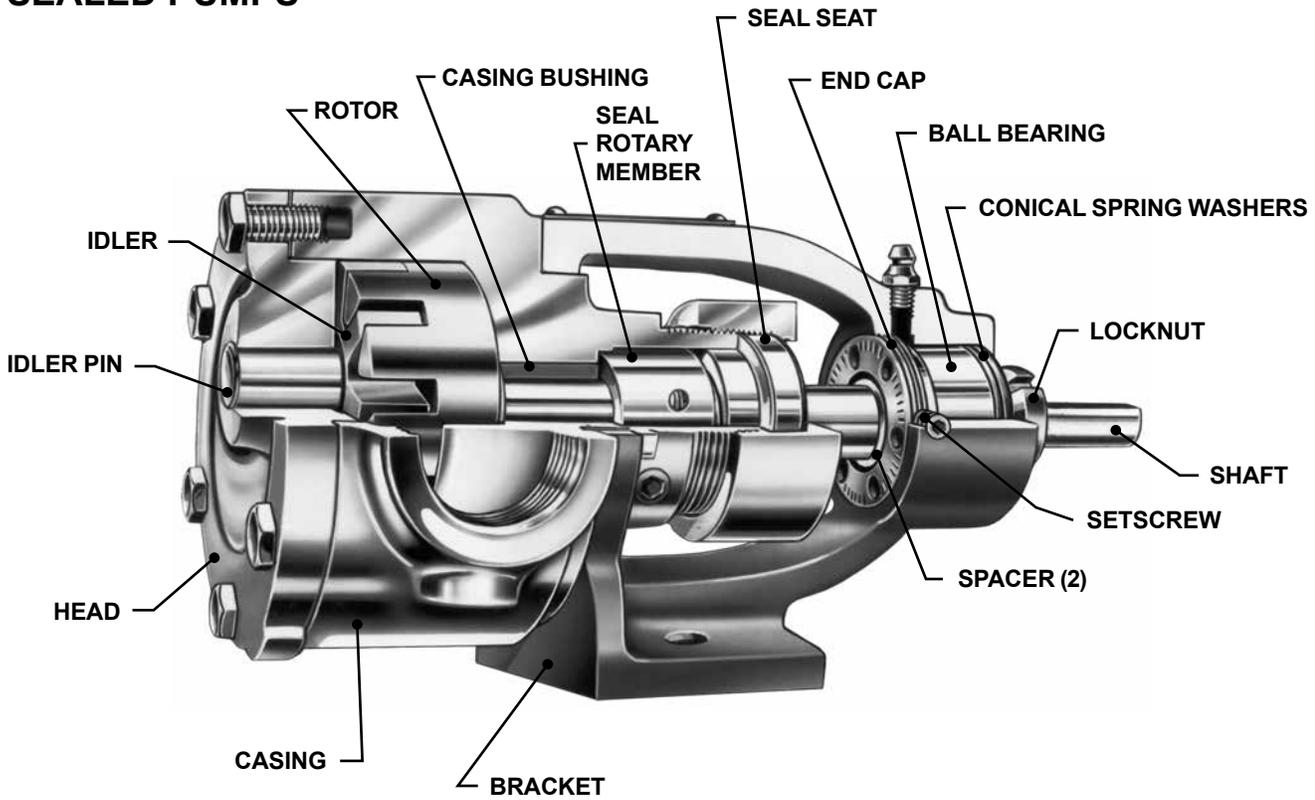


FIGURE 2
SECTIONAL VIEW 4724 SERIES

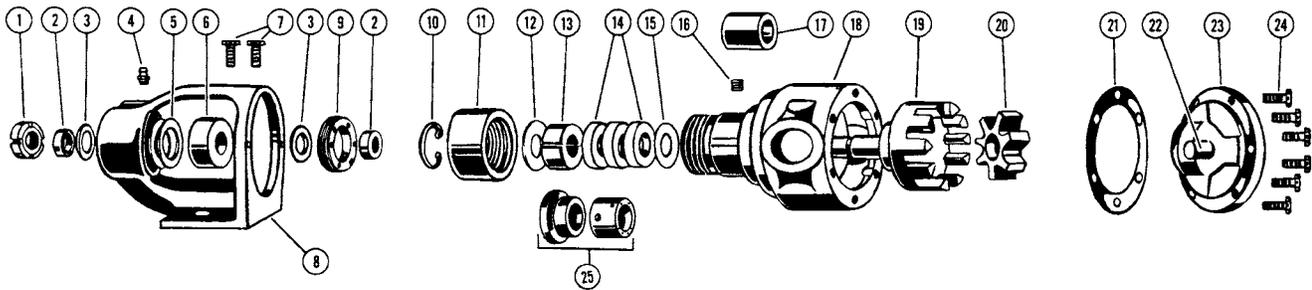


FIGURE 3
EXPLODED VIEW SERIES 724 AND 4724 PUMP SECTIONAL VIEW

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Nut, Self Locking	10	Internal Retaining Ring	19	Rotor and Shaft
2	Collar, Bearing Spacer (2)	11	Nut, Packing Gland	20	Idler
3	Lipseal (2)	12	Washer, Packing Gland Retainer	21	Gasket, Head
4	Grease Fitting	13	Packing Gland, Split	22	Idler Pin
5	Conical Spring Washer (2)	14	Packing	23	Head
6	Ball Bearing, 2 Row Plain	15	Washer, Packing Retainer	24	Capscrews, Head (6)
7	Capscrew, Bracket (2)	16	Pipe Plug, 1/8"	25	Mechanical Seal (4724 Series)
8	Bracket	17	Bushing, Casing		
9	End Cap, Bearing Housing	18	Casing		

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. **CAUTION:** When the head is being removed from the pump (See Figure 2), the idler usually stays on the idler pin, but will fall off if the inside of the head is tilted downward. A fall on a hard surface can damage the idler. If the idler should fall, check carefully and file or stone all nicked or rough places before reassembly.

Remove the head from the pump. If the pump has a relief valve on head, the valve may have to be removed before removing the head.

2. Remove the head gasket. If a new gasket is not available, the original gasket may be re-used provided it was not damaged when removing the pump head.
3. Remove idler from the idler pin. If the idler pin is worn, both the idler pin and idler bushing should be replaced. On the F & FH size the idler & bushing assembly must be replaced. The idler pin may be removed from the head by pressing the pin out with a suitable press.
4. Remove the bearing locknut with a spanner wrench using a suitable wrench on the flat of the shaft to hold the shaft from turning. A piece of brass rod or wood inserted in the port area and between the rotor teeth will also hold the shaft from turning. Remove this piece of brass after locknut is removed.

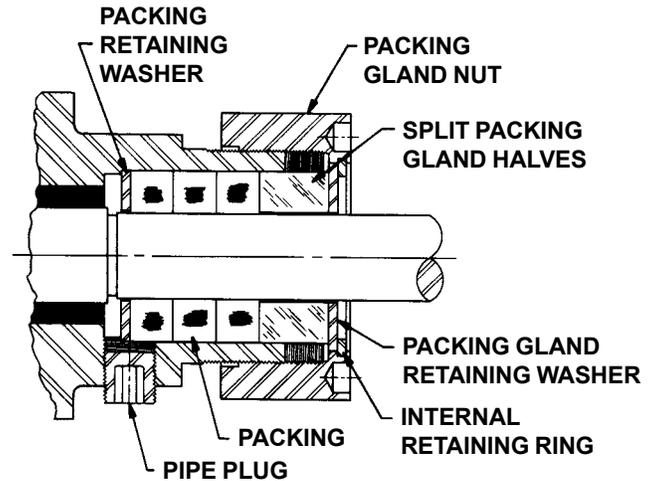


FIGURE 4
PACKING AREA CROSS SECTION
(SERIES 724)

5. Remove bracket capscrews and disassemble bracket from casing.
6. **REMAINING DISASSEMBLY PROCEDURE** for the Series 724 packed pump. (Refer to Figure 4).

Remove the packing gland nut, packing gland retainer washer, and split packing gland halves. The internal retaining ring, does not need to be removed at this point. To remove the rotor and shaft, push or tap with a soft hammer toward the head. The packing and packing retainer washer can now be removed.

7. **REMAINING DISASSEMBLY PROCEDURE** for the Series 4724 mechanical seal pump. (Refer to Fig. 5). Remove the 1/8" socketed head pipe plug on the casing and loosen the two Allen head setscrews on the mechanical seal.

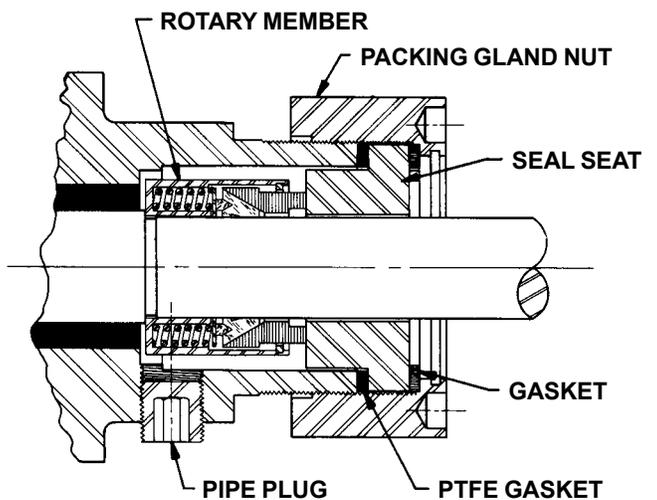


FIGURE 5
MECHANICAL SEAL AREA CROSS SECTION
(SERIES 4724)

Remove the packing gland nut and seal seat. Inspect the gaskets and the seal seat for wear. If the seal is to be re-used, remove the rotating part of the mechanical seal as follows: Remove the head and idler. Push the rotor and shaft out until the outer end of the seal is approximately flush with the first undercut on the shaft. Then draw rotor shaft back into the casing and re-install head and idler on the casing as shown in **Figure 6**. This has positioned the rotary member beyond the casing. Now place the wire spanner wrench (Provided in the instruction envelope) under the rotary member as shown in **Figure 6**. Place the seal seat on the rotary member and push downward firmly. In this position install two installation clips on rotary member (Provided in instruction envelope) 180° apart before removing the rotary member of the seal. The installation clips remove the load within the seal and permits easier disassembly and re-assembly of the seal. Again remove the head and idler permitting the rotor and shaft to be removed.

8. To remove the thrust bearing parts, **Figure 7**, first loosen the setscrew which locks the end cap. Next remove the end cap allowing ball bearing and conical spring washers to be removed. The bearings should be washed thoroughly and examined. If there is any evidence of wear or damage a new bearing should be used.
9. The casing should be examined for wear, particularly at the I.D. between the port openings.
10. The casing bushing should be inspected and if it shows signs of wear, should be replaced.

Examine the lipseals in the bracket and end cap. These lipseals are important to this assembly and should be replaced if not in first-class condition. They are a grease seal for the ball bearing and also act as a shield to keep dirt or debris from entering the bearing.

When installing new lipseals, be sure they are assembled with the lips facing as shown in **Figure 7**.

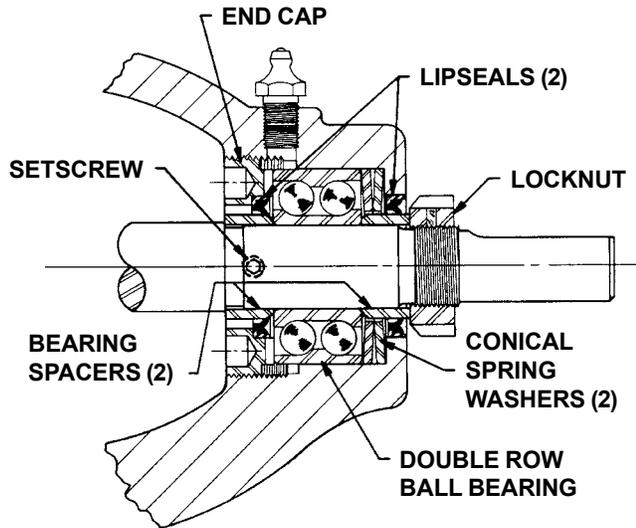


FIGURE 7
THRUST BEARING AREA CROSS SECTION

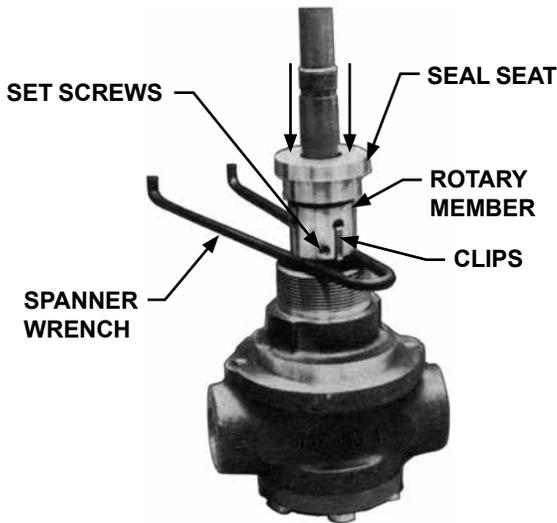


FIGURE 6

If it is necessary to install a new carbon graphite bushing, extreme care should be taken to prevent breaking, as it is a brittle material and easily cracked. If cracked, this bushing will quickly disintegrate. An arbor press should always be used in installing carbon graphite bushings. Be sure the bushing is started straight. **DO NOT STOP** the pressing operation until the bushing is in proper position. Starting and stopping this operation may result in cracking.

ASSEMBLY

1. Install the rotor and shaft. Be sure shaft is free from burrs and foreign particles that might damage the bracket bushing.
2. Place a head gasket on the head. With the idler on the idler pin, put the head and idler on the pump and tighten the capscrews evenly. Tilt the top of the head away from the pump slightly until the crescent enters the inside diameter of the rotor and rotate the idler until its teeth mesh with the rotor teeth. This will help in putting the head on the pump.

3. REASSEMBLY OF SERIES 724 (Refer to Fig. 4).

With the pump in a vertical position, install the packing retainer washer in the bottom of the stuffing box and install three rings of packing. It is a good practice to install a new set of packing. Install three rings of packing with the joints staggered. Install the two split packing gland halves. Place the packing gland retainer washer on the split packing gland halves and assemble the packing gland nut to the casing. (Skip to step number 4).

REASSEMBLY OF SERIES 4724 (Refer to Fig. 5).

Assemble mechanical seal with installing clips in place. Check shaft step to be sure it doesn't have any burrs. **DO NOT BREAK EDGE ON STEP SINCE FULL EDGE IS REQUIRED TO SUPPORT THRUST OF ROTOR SHAFT.** Coat the inside of the rotary member with light oil.

Place the rotary member on the shaft and slide over the bearing step. **THIS SHOULD PRACTICALLY FALL INTO PLACE. NO FORCE SHOULD BE USED.** As shown in **Figure 6** place the wire spanner wrench under the rotary member and place the seal seat above. Push the seal seat against the rotary member until installation clips are loose and can be removed. Remove the wire spanner wrench. Remove the seal seat and install the PTFE gasket and assemble the seal seat in the casing. Place the gasket in the packing gland and tighten gland to the casing. Using an Allen wrench tighten the two small setscrews on the mechanical seal through the 1/8" pipe access hole. Replace the 1/8" socket head pipe plug.

4. (Refer to Fig. 7). Place the two conical spring washers with the I.D.'s in contact, (the O.D.'s will then be separated) into the thrust bearing area of the bracket. Next place the double row ball bearing and the end cap containing a lipseal into position. Tighten the end cap by hand until resistance is felt, then tighten half turn additional.

5. Place a bearing spacer collar on the shaft with the bevel on the O.D. pointing toward the drive end. Place the casing and shaft assembly in the bracket assembly and tighten with the two bracket capscrews. Insert the second bearing spacer collar (beveled edge first) over the end of the shaft and against the ball bearing.

Place the bearing locknut on the shaft and tighten. Use a suitable wrench on the flat of the shaft to keep it from turning.

IMPORTANT: Adjust end clearance before operating pump.

END CLEARANCE ADJUSTMENT

1. The two conical spring washers produce a thrust load on the outer race of the double row ball bearing pushing it towards the head. End clearance adjustments are made by rotating the end cap in a clockwise or counterclockwise motion.

To set the end clearance rotate the end cap using the wire spanner wrench in a clockwise direction while viewing from the shaft end, until noticeable drag occurs while turning the shaft. This produces zero end clearance.

To set the proper running end clearance, rotate end cap in the opposite direction (counterclockwise) three notches which is equivalent to .003 end clearance. Each notch represents .001 end clearance.

2. Retighten setscrew locking the end cap in place.

INSTALLATION OF NEW PACKING

Install three rings of packing with the joints staggered. Loosen the packing gland nut by turning counterclockwise viewing from the shaft end. Install the split packing gland halves and slide packing gland retainer washer into place. Install internal retaining ring.

The packing is now ready for adjustment. Since the stainless steel pump shaft has a tendency to become hot when packing is over-tightened, the packing must be carefully adjusted. During first few days, tighten packing slowly allowing adequate leakage as packing "runs-in". The packing when properly adjusted must have slight leakage to achieve proper operation and life. After initial adjustments occasional adjustment will be required during operation.

PRESSURE RELIEF VALVE INSTRUCTIONS

1. Remove valve cap.
2. Measure and record the length of extension of the adjusting screw, **See (A) Figure 9.**
3. Loosen the lock nut and back out adjusting screw until spring pressure is released.
4. Remove bonnet, spring guide, spring and poppet from valve body. Clean and inspect all parts for wear or damage and repair or replace as necessary.

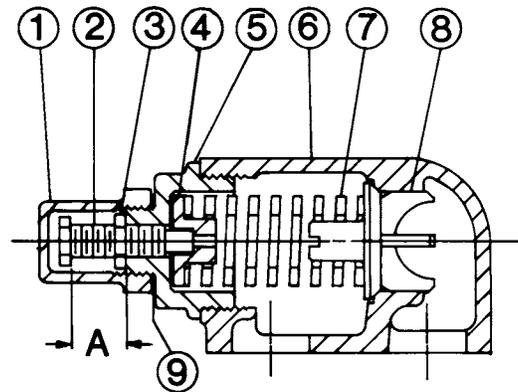


FIGURE 8
VALVE - G SIZE

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

ASSEMBLY

Reverse the procedure outlined under disassembly. If valve is removed for repairs, be sure to replace in same position. The valve cap should point towards the suction port.

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

Do not run with valve in full bypass for more than 30 seconds at a time. If the pressure setting of the valve is to be changed from that which the factory has set, the following instructions should be carefully followed: Remove the valve cap which covers the adjusting screw, and loosen the lock nut which locks the adjusting screw so pressure setting will not change during operation of pump. A pressure gauge in the discharge line must be near a port and must be used for actual adjustment operation. The adjusting screw should be turned in for increasing the pressure or turned out for decreasing the pressure. With the discharge line closed at a point beyond the pressure gauge, the gauge will show the maximum pressure the relief valve will allow while pump is in operation.

IMPORTANT

In ordering parts for relief valve on head, always be sure to give Model and Serial Number of pump as it appears on name plate and the name of the part wanted. When ordering springs, be sure to give the pressure setting desired.

VIKING PUMP

WARRANTY

Viking pumps, strainers and reducers are warranted to be free of defects in material and workmanship under normal conditions of use and service. The warranty period varies by type of product. A Viking product that fails during its warranty period under normal conditions of use and service due to a defect in material or workmanship will be repaired or replaced by Viking. At Viking's sole option, Viking may refund (in cash or by credit) the purchase price paid to it for a Viking product (less a reasonable allowance for the period of use) in lieu of repair or replacement of such Viking product. Viking's warranty is subject to certain restrictions, limitations, exclusions and exceptions. A complete copy of Viking's warranty, including warranty periods and applicable restrictions, limitations, exclusions and exceptions, is posted on Viking's website (www.vikingpump.com/warranty/warranty-info). A complete copy of the warranty may also be obtained by contacting Viking through regular mail at Viking Pump, Inc., 406 State Street, Cedar Falls, Iowa 50613, USA.

THIS WARRANTY IS AND SHALL BE VIKING'S SOLE AND EXCLUSIVE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT, ALL OF WHICH OTHER WARRANTIES ARE EXPRESSLY EXCLUDED.

THE RIGHTS AND REMEDIES UNDER THIS WARRANTY ARE AND SHALL BE THE SOLE AND EXCLUSIVE RIGHTS AND REMEDIES AGAINST VIKING. EXCEPT FOR THE SPECIFIC LIABILITIES AND OBLIGATIONS PROVIDED UNDER THIS WARRANTY, VIKING SHALL HAVE NO LIABILITY OR OBLIGATION WITH RESPECT TO ANY PRODUCT CLAIMED TO BE DEFECTIVE IN ANY MANNER.

UNDER NO CIRCUMSTANCES SHALL VIKING BE LIABLE UNDER THIS WARRANTY OR OTHERWISE FOR SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, LOST OR UNREALIZED SALES, REVENUES, PROFITS, INCOME, COST SAVINGS OR BUSINESS, LOST OR UNREALIZED CONTRACTS, LOSS OF GOODWILL, DAMAGE TO REPUTATION, LOSS OF PROPERTY, LOSS OF INFORMATION OR DATA, LOSS OF PRODUCTION, DOWNTIME, OR INCREASED COSTS, IN CONNECTION WITH ANY PRODUCT, EVEN IF VIKING HAS BEEN ADVISED OR PLACED ON NOTICE OF THE POSSIBILITY OF SUCH DAMAGES AND NOTWITHSTANDING THE FAILURE OF ANY ESSENTIAL PURPOSE OF ANY PRODUCT.