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## INTRODUCTION

The illustrations 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 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 (123 and 4123) indicating both unmounted or mounted pump unit.

UNMOUNTED PUMP		UNITS
PACKED	MECH. SEAL	
H123	H4123	Units are designated by the un-mounted pump model numbers followed by a letter(s) indicating drive style.  <b>V = V-Belt</b> <b>D = Direct Connected</b> <b>R = Viking Speed Reducer</b> <b>P = Commercial Speed Reducer</b>
HL123	HL4123	
K123	K4123	
KK123	KK4123	
LQ123	LQ4123	
LL123	LL4123	

This manual deals only with Series 123 and 4123 heavy-duty Steel External Bracket Mounted Pumps. Refer to Figures 1 through 16 for general configuration and nomenclature used in this manual. Pump specifications and recommendations are listed in Catalog Section 151, Series 123 and 4123 Heavy-Duty Steel External Bracket Mounted Pumps.

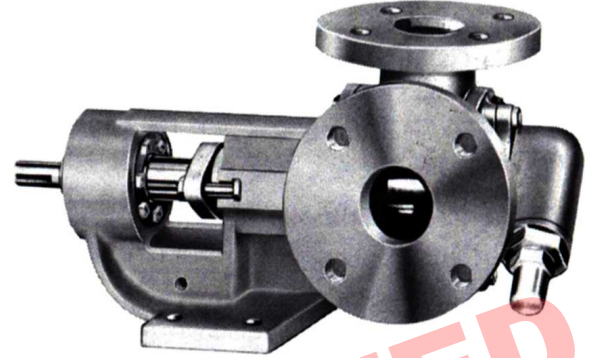


FIGURE 1  
SIZES H AND HL

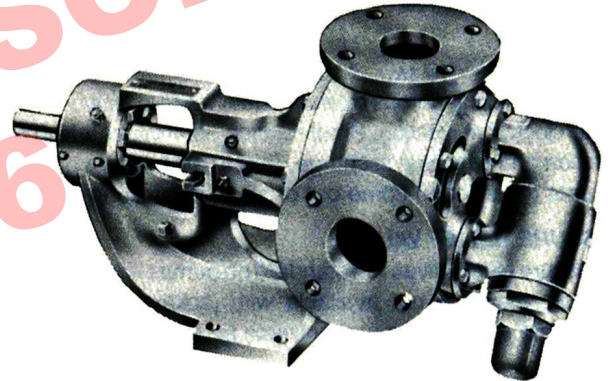


FIGURE 2  
SIZES K AND KK

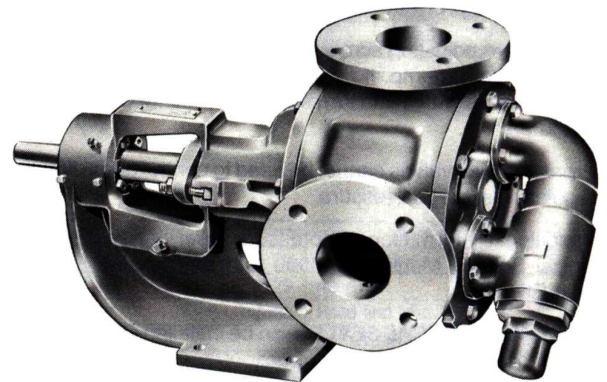


FIGURE 3  
SIZES LQ AND LL

## 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 CHAMBER HAS BEEN COMPLETELY VENTED THROUGH 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.

**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 placement 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 those pump models designed to accept a relief valve. Options may include a return to tank relief valve and a jacketed relief valve. Pumps equipped with a jacketed head plate are generally not available with a relief valve.
3. If pump rotation is to be 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 Figures 1 and 2.**
5. Pressure relief valves cannot 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.

**SPECIAL MECHANICAL SEALS:** Extra care should be taken in repair of pumps with mechanical seals. Read and follow all special information supplied with pump.

## MAINTENANCE

Series 123 and 4123 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.

**LUBRICATION:** External lubrication must be applied slowly with a handgun to all lubrication fittings every 500 hours of operation with multi-purpose grease, NLGI # 2. Do not over-grease. Applications involving very high or low temperatures will require other types of lubrication. **Refer to Engineering Service Bulletin ESB-515.** Consult factory with specific lubrication questions.

**PACKING ADJUSTMENT:** New packed pumps require initial packing adjustment to control leakage as packing "runs in". Make initial adjustments carefully and do not over-tighten packing gland. After initial adjustment, inspection will reveal need for packing gland adjustment or packing replacement. **Refer to instructions under DISASSEMBLY, page 4,** and **Assembly, page 5,** regarding repacking pump.

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

**STORAGE:** If pump is to be stored, or not used for six months or more, pump must be drained and a light coat of non-detergent SAE 30 weight oil must be applied to all internal pump parts. Lubricate fittings and apply grease to 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 123 and 4123 pumps. These tools are in addition to standard mechanics' tools such as open end wrenches, pliers, screwdrivers 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 (packed pumps)  
Large for 0.375 inch and up cross section packing
4. Mechanical seal installation sleeve  
2-751-005-630 for 2.4375 inch Q-M4123
5. Bearing locknut spanner wrench  
(Source: #471 J.H. Williams & Co. or equal)
6. Spanner wrench, adjustable pin type for use on double end caps (Source #482 J.H. Williams & Co or equal)
7. Brass Bar
8. Arbor Press

# PACKED PUMPS

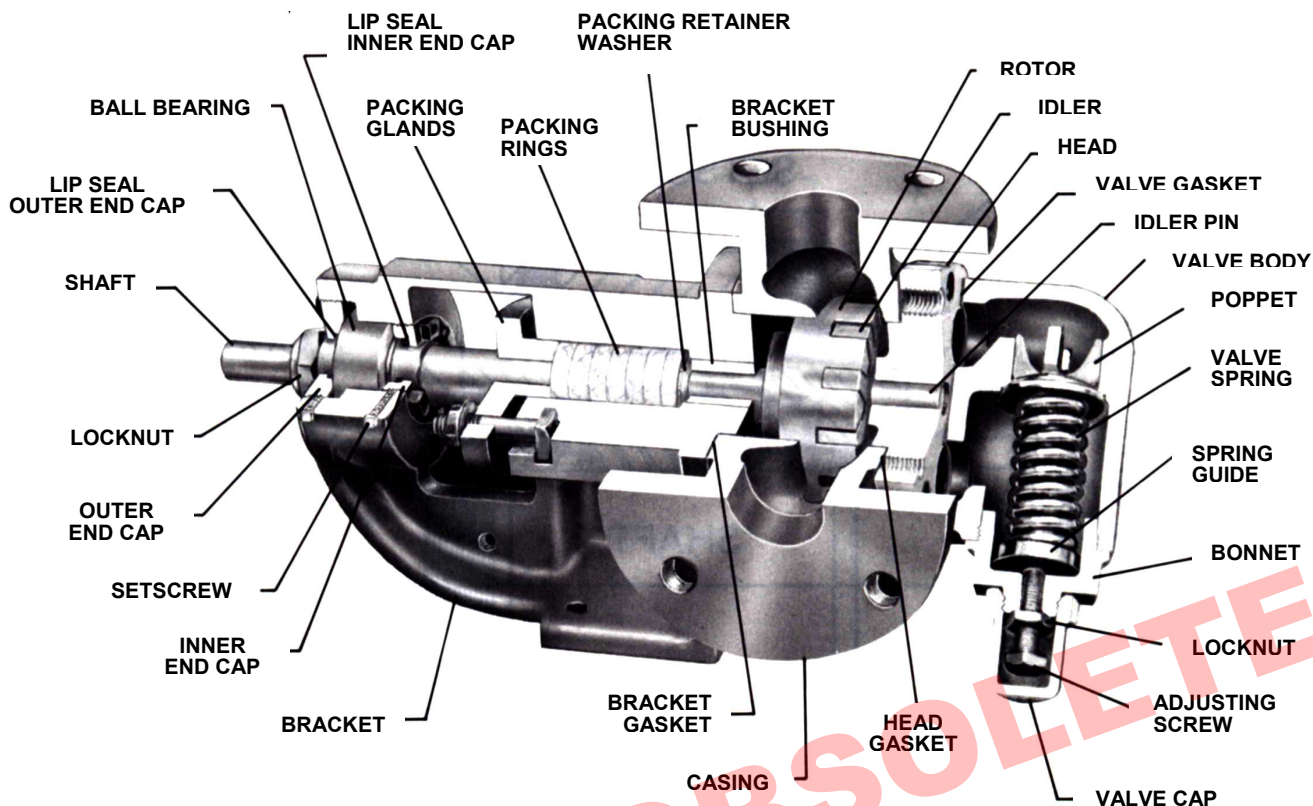
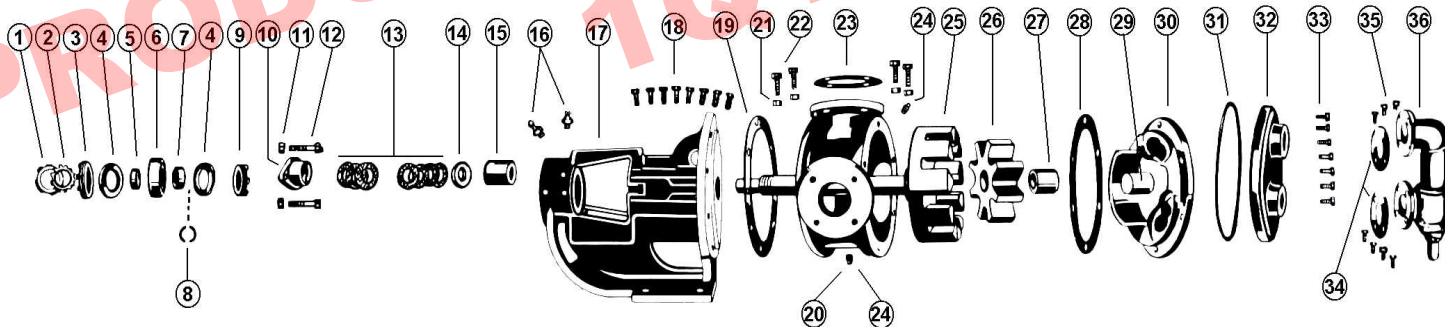


FIGURE 4  
CUTAWAY VIEW OF HL123 WITH CALLOUTS

EXPLODED VIEW FOR MODELS H123, HL123, K123  
KK123, LQ123 AND LL123 (MODEL KK123 SHOWN)



ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	13	Packing	25	Rotor and Shaft
2	Lockwasher	14	Packing Retainer Washer	26	Idler and Bushing
3	End Cap, (outer)	15	Bracket Bushing	27	Idler Bushing
4	Lip Seal for End Cap	16	Grease Fitting	28	Head Gasket
5	Bearing Spacer Collar (outer)	17	Bracket and Bushing	29	Idler Pin
6	Ball Bearing	18	Capscrew for Bracket	30	Head and Idler Pin
7	Bearing Spacer Collar (inner)	19	Bracket Gasket	31	Gasket for Jacketed Head Plate
8	Ring, Half Round (not H,HL)	20	Casing	32	Jacketed Head Plate
9	End Cap, (inner)	21	Nut for Flanges	33	Capscrew for Head
10	Packing Gland	22	Capscrew for Flanges	34	Relief Valve Gasket
11	Packing Gland Nut	23	Pipe Flange Gasket	35	Cascrew for Valve
12	Packing Gland Capscrew	24	Pipe Plug	36	Internal Relief Valve



# DISASSEMBLY

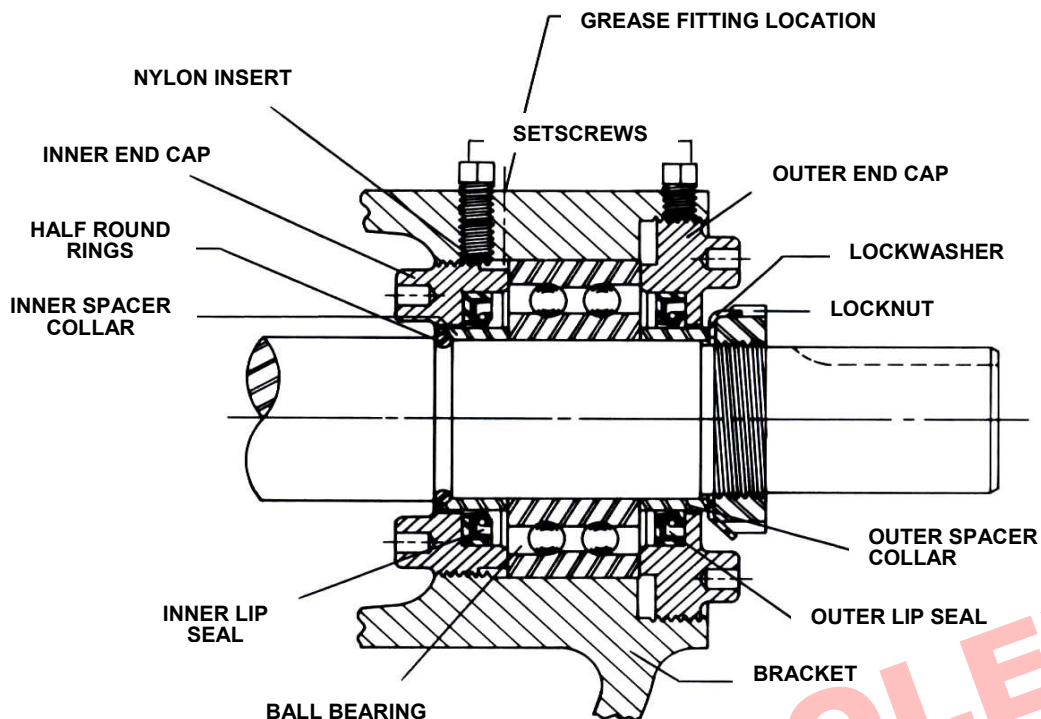


FIGURE 5

## DANGER

BEFORE OPENING ANY VIKING PUMP LIQUID CHAMBER (PUMPING CHAMBER, RESERVOIR, RELIEF VALVE ADJUSTING CAP FITTING ETC.) BE SURE:

1. THAT ANY PRESSURE IN CHAMBER HAS BEEN COMPLETELY VENTED THROUGH 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.

## DISASSEMBLY

1. Mark head and casing before disassembly to insure proper reassembly. The idler pin, which is offset in pump head, must be positioned toward and equal distance between port connections to allow for proper flow of liquid through pump.

Remove head from pump. Do not allow idler to fall from idler pin. Tilt top of head back when removing to prevent this. Avoid damaging head gasket. If pump is furnished with pressure relief valve, it need not be removed from head or disassembled at this point. **Refer to Pressure Relief Valve Instructions**, page 12.

If pump has jacketed head plate, it will separate from head when it is removed. The gasket between head and jacket head plate must be totally removed. Use new gasket when assembling pump.

2. Remove idler and bushing assembly.
3. Insert length of hardwood or brass through port opening between rotor teeth to keep shaft from turning. Bend up tang of lockwasher and with a spanner wrench remove locknut and lockwasher from shaft. Remove length of hardwood or brass from port opening.
4. Remove packing gland nuts.
5. Tap shaft forward approximately 0.50 inch and remove pair of half round rings under inner bearing spacer collar. There is no half round rings on H and HL size pumps.

## DISASSEMBLY

- Carefully remove rotor and shaft to avoid damaging bracket bushing.
- Remove packing gland from side of bracket.
- Loosen setscrews. Two on H and HL size pumps, four on all other sizes. With a spanner wrench, remove both end caps with lip seals. Remove ball bearing. Refer to **Figure 5**.
- Remove packing and packing retainer washer.
- Clean all parts thoroughly and examine for wear and damage. Check lip seals, ball bearing, bushings and idler pin and replace if necessary. Check all other parts for nicks, burrs, excessive wear and replace if necessary.

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

If bearings have roughness, bearings will need to be replaced.

- Casing can be checked for wear or damage while mounted on bracket.

## ASSEMBLY

- Install bracket bushing. If bracket bushing has a lubrication groove, install bushing with groove at 6:00 o'clock position in bracket. If carbon graphite, **Refer to Installation of Carbon Graphite Bushings**, page 11.
- Coat shaft of rotor shaft assembly with non-detergent SAE 30 weight oil. Start end of shaft in bracket bushing turning from right to left, slowly pushing rotor in casing.
- Place packing retainer washer in bottom of packing chamber and pack pump with new packing. Use packing suitable for liquid being pumped. Install packing, staggering the joints from one side of shaft to other. Lubricate packing rings with oil, grease or graphite to aid assembly. A length of pipe will help to seat each packing ring.
- Install packing gland, capscrews and nuts Back rotor and shaft out of casing just far enough to insert packing gland through side opening of bracket over end of shaft. Make sure gland is installed square and nuts are tightened evenly. Tighten nuts wrench tight then back off until gland is slightly loose.
- Coat idler pin with non-detergent SAE 30 weight oil and place idler and bushing on idler pin in head. If replacing carbon graphite bushing, **Refer to Installation Of Carbon Graphite Bushings**, page 11.
- Using a .010 to .015 inch head gasket, install head and idler assembly on pump. Pump head and casing were marked before disassembly to insure proper reassembly. If not, be sure idler pin, which is offset in pump head, is positioned toward and equal distance between port connections to allow for proper flow of liquid through pump.

If pump is equipped with jacketed head plate, install at this time along with new gasket.

Tighten head capscrews evenly.

If pump was equipped with a relief valve and it was removed during disassembly, install on head with new gaskets. Relief valve adjusting screw cap must always point toward suction port. **Refer to Figures 1, 2 and 3** on page 1. For relief valve repair or adjustments, **Refer to Pressure Relief Valve Instructions**, page 12.

- Slide inner spacer collar over shaft with recessed end facing rotor. H and HL size bearing spacer collars are not recessed. Place pair of half round rings on shaft and slide inner bearing spacer collar over half round rings to lock them in place. There is no pair of half round rings on H and HL size pumps. **Refer to Figure 5**, page 4.
- Press lip seal, lip facing end of shaft, in inner end cap and insert end cap through shaft end of bracket. Turn end cap clockwise, looking at shaft end, until it engages threads. End cap spanner wrench holes must be facing rotor. Turn end cap with spanner wrench until it projects slightly from opening on side of bracket. End cap must not be turned so far that lip seal drops off end of spacer collar on shaft or end cap becomes disengaged from threads. **Refer to Figure 5**, page 4.

If this happens, remove inner spacer collar, half round rings and end cap and start over at Step 7.

- Pack ball bearing with multi-purpose grease, NLGI #2. Place on shaft and push or gently drive in place in bracket.
- Press lip seal, lip facing end of shaft, in outer end cap and insert end cap in bracket. Turn end cap in bracket until it is tight against bearing. **Refer to Figure 5**, page 4.
- Put lockwasher and locknut on shaft. Insert length of hardwood or brass through port opening between rotor teeth to keep shaft from turning. Tighten locknut to 50-70 ft.- lbs. Torque (H, HL) or 100-130 ft. - lbs. Torque (K, KK, LQ, LL) . Bend one tang of lockwasher into slot of locknut. If tang does not line up with slot, tighten locknut until it does. Failure to tighten locknut or engage lockwasher tang could result in early bearing failure and cause damage to pump. Remove length of hardwood or brass from port opening.
- Adjust pump end clearance. **Refer to Thrust Bearing Adjustment**, page 11,
- Lubricate all grease fittings with multi-purpose grease NLGI #2.

### 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.

# MECHANICAL SEAL PUMPS

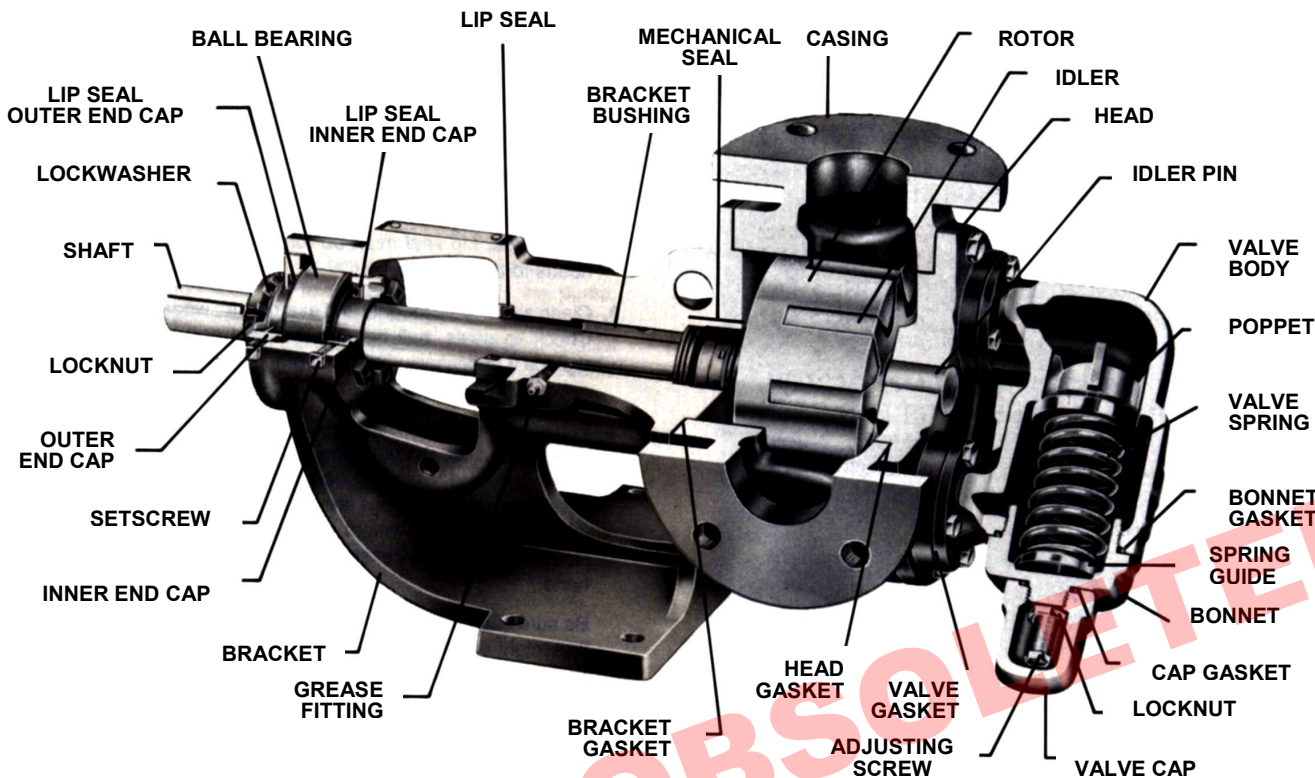
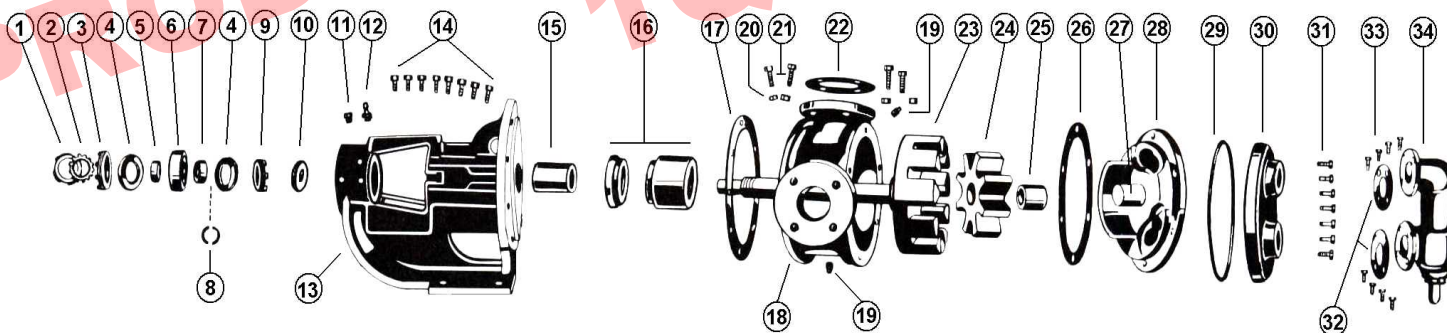


FIGURE 6  
CUTAWAY VIEW OF KK 4123 WITH CALLOUTS

EXPLODED VIEW FOR MODELS H4123, KL4123, K4123, KK4123, LQ4123 AND LL4123 - (MODEL KK4123 SHOWN)



ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	13	Bracket and Bushing	25	Idler Bushing
2	Lockwasher	14	Capscrew for Bracket	26	Head Gasket
3	End Cap, (outer)	15	Bracket Bushing	27	Idler Pin
4	Lip Seal for End Cap	16	Mechanical Seal	28	Head and Idler Pin
5	Bearing Spacer Collar (outer)	17	Bracket Gasket	29	Gasket for Jacketed Head Plate
6	Ball Bearing	18	Casing	30	Jacketed Head Plate
7	Bearing Spacer Collar (inner)	19	Pipe Plug	31	Capscrew for Head
8	Ring, Half Round (not H,HL)	20	Nut for Flanges	32	Relief Valve Gasket
9	End Cap, (inner)	21	Capscrew for Flanges	33	Capscrew for Valve
10	Lip Seal for Seal Chamber	22	Pipe Flange Gasket	34	Internal Relief Valve
11	Pressure Relief Plug	23	Rotor and Shaft		
12	Grease Fitting	24	Idler and Bushing		

## 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 CHAMBER HAS BEEN COMPLETELY VENTED THROUGH 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. Mark head and casing before disassembly to insure proper reassembly. The idler pin, which is offset in pump head, must be positioned toward and equal distance between port connections to allow for proper flow of liquid through pump.

Remove head from pump. Do not allow idler to fall from idler pin. Tilt top of head back when removing to prevent this. Avoid damaging head gasket. If pump is furnished with pressure relief valve, it need not be removed from head or disassembled at this point. **Refer to Pressure Relief Valve Instructions**, page 12.

If pump has jacketed head plate, it will separate from head when it is removed. The gasket between head and jacket head plate must be totally removed. Use new gasket when assembling pump.

2. Remove idler and bushing assembly.
3. Insert length of hardwood or brass through port opening between rotor teeth to keep shaft from turning. Bend up tang of lockwasher and with a spanner wrench remove locknut and lockwasher from shaft. Remove length of hardwood or brass from port opening.

4. Tap shaft forward approximately 0.50 inch and remove pair of half round rings under inner spacer collar. There is no pair of half round rings on H and HL size pumps.
5. Carefully remove rotor and shaft to avoid damaging bracket bushing.
6. Remove rotary member of seal from shaft and stationary seal seat from bracket.
7. Loosen setscrews. Two for H and HL size pumps, four for all other sizes. With spanner wrench remove both end caps and lip seals. Remove ball bearing and spacer collars. **Refer to Figure 5**, page 4.
8. Examine seal chamber lip seal and remove if it shows wear or damage. Lip seal must be removed if bracket bushing needs to be replaced.
9. Clean all parts thoroughly and examine for wear or damage. Check lip seals, ball bearing, bushing and idler pin and replace if necessary. Check all other parts for nicks, burrs, excessive wear and replace if necessary.

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

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

10. Casing can be checked for wear or damage while mounted on bracket.



# ASSEMBLY

## Standard Mechanical Seal (Synthetic Rubber Bellows Type)

The seal used in this pump is simple to install and good performance will result if care is taken during installation.

The principle of the mechanical seal is contact between the rotary and stationary members. These parts are lapped to a high finish and their sealing effectiveness depends on complete contact.

Viking furnishes a number of heavy-duty pumps with special mechanical seals installed in the packing end of the pump. These special seals are not discussed in TSM 151.1. Information is available by contacting the factory. When requesting special seal information, be sure to give pump model number and serial number.

1. Install bracket bushing. If bracket bushing has a lubrication groove, install bushing with groove at 6:00 o'clock position in bracket. If carbon graphite, **Refer to Installation of Carbon Graphite Bushings**, page 11.
2. Install lip seal in bracket. **Refer to Figure 7.**

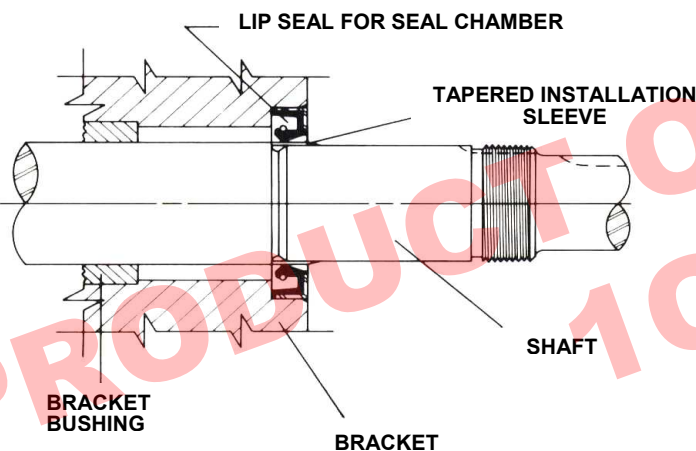


FIGURE 7

Prior to installing rotating portion of mechanical seal, prepare and organize rotor shaft, head and idler assemblies and appropriate gaskets for quick assembly.

Once rotating portion of mechanical seal is installed on rotor shaft, it is necessary to assemble parts as quickly as possible to insure that seal does not stick to shaft in wrong axial position. The seal should be expected to stick to the shaft after several minutes setting time.

Never touch sealing faces with anything except clean hands or clean cloth. Minute particles can scratch the seal faces and cause leakage.

3. Coat idler pin with non-detergent SAE 30 weight oil and place idler and bushing on idler pin in head. If replacing a carbon graphite bushing, **Refer to installation of Carbon Graphite Bushings**, page 11.

4. Clean rotor hub and bracket seal housing bore. Make sure both are free from dirt and grit. Coat outer diameter of seal seat and inner diameter of seal housing bore with non-detergent SAE 30-weight oil.
5. Start seal seat in seal housing bore, **Refer to Figure 8.** If force is necessary, protect seal face with a clean cardboard disc and gently tap in place with a piece of wood.

**COAT SEAL SEAT AND SEAL HOUSING BORE WITH NON-DETERGENT SAE 30 WEIGHT OIL BEFORE ASSEMBLY.**

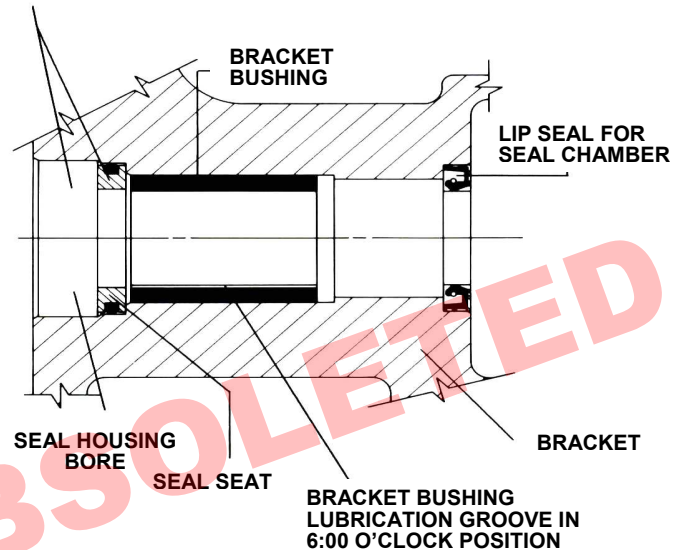
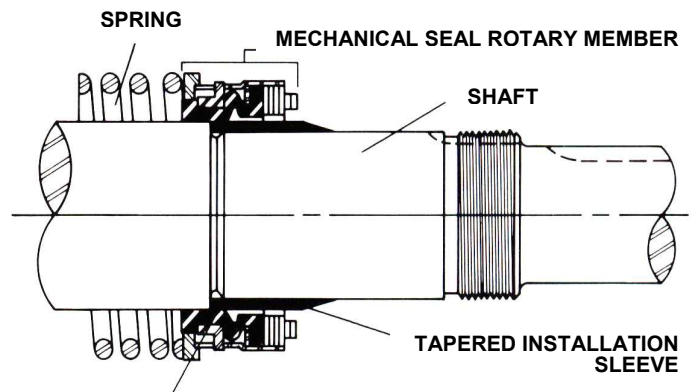


FIGURE 8

6. Place tapered installation sleeve on shaft, **Refer to Figure 9.** Sleeve is furnished with H, HL, K, KK, LQ and LL size replacement mechanical seals. Coat rotor shaft, tapered installation sleeve and inner diameter of mechanical seal rotary member with a generous amount of non-detergent SAE 30 weight oil. Petrolatum may be used but grease is not recommended.



**COAT ROTOR SHAFT, TAPERED INSTALLATION SLEEVE AND INNER DIAMETER OF MECHANICAL SEAL WITH NON-DETERGENT SAE 30 WEIGHT OIL BEFORE ASSEMBLY.**

FIGURE 9



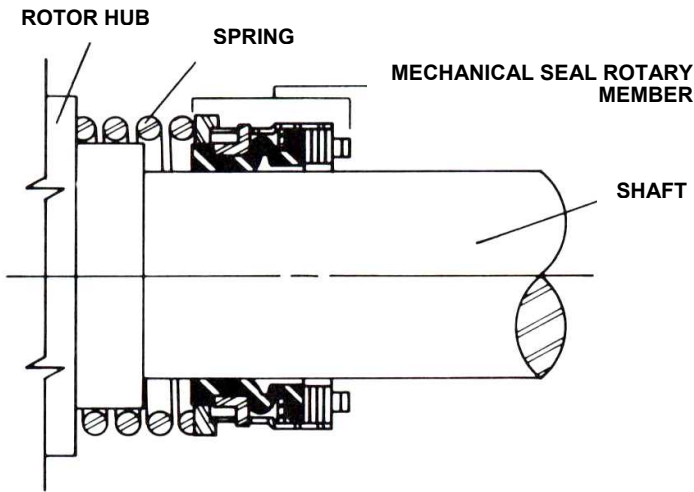


FIGURE 10

7. Place seal spring on shaft against rotor hub. **Refer to Figure 10.**
8. Slide rotary member, lapped contact surface facing away from spring, over installation sleeve on shaft until it is against spring.

Do not compress spring.

9. Coat rotor shaft with non-detergent SAE 30 weight oil. Start end of shaft in bracket bushing and turn from right to left, slowly pushing until the ends of the rotor teeth are just below the face of the casing.

Leave the rotor in this position. Withdrawal of rotor and shaft may displace the carbon seal rotating face and result in damage to the seal.

10. Using a .010 to .015 inch head gasket, install head and idler assembly on pump. Pump head and casing were marked before disassembly to insure proper reassembly. If not, be sure idler pin, which is offset in pump head, is positioned toward and equal distance between port connections to allow for proper flow of liquid through pump.

If pump is equipped with jacketed head plate, install at this time along with new gasket.

Tighten head capscrews evenly.

If pump was equipped with a relief valve and it was removed during disassembly, install on head with new gaskets. Relief valve adjusting screw cap must always point toward suction port. **Refer to Figures 1, 2 and 3** on page 1. For relief valve repair or adjustments, **Refer to Pressure Relief Valve Instructions**, page 12.

11. Slide inner spacer collar over shaft with recessed end facing rotor. H and HL size bearing spacer collars are not recessed.

Place pair of half round rings to lock them in place. There is not pair of half round rings on H and HL size pumps. **Refer to Figure 5**, page 4.

12. Press lip seal, lip facing end of shaft, in inner end cap and insert end cap through shaft end of bracket. Turn end cap clockwise, looking at shaft end, until it engages threads. End cap spanner wrench tools must be facing rotor. Turn end cap with spanner wrench until it projects slightly from opening on side of bracket. End cap must not be turned so far that lip seal drops off end of spacer collar on shaft or end cap becomes disengaged from threads. **Refer to Figure 5**, page 4.

If this happens, remove inner spacer collar, half round rings and end cap and start over at Step 11.

13. Pack ball bearing with multi-purpose grease, NLGI #2. Place on shaft and push or gently drive in place in bracket.
14. Press lip seal, lip facing end of shaft, in outer end cap and insert end cap in bracket. Turn end cap in bracket until it is tight against bearing. **Refer to Figure 5**, page 4.

15. Put lockwasher and locknut on shaft. Insert length of hardwood or brass through port opening between rotor teeth to keep shaft from turning. Tighten locknut to 50-70 ft.-lbs. Torque (H, HL) or 100-130 ft. - lbs. Torque (K, KK, LQ, LL) . If tang does not line up with slot, tighten locknut until it does. Failure to tighten locknut or engage lockwasher tang could result in early bearing failure and cause damage to pump.

Remove length of hardwood or brass from port opening.

16. Adjust pump end clearance. **Refer to Thrust Bearing Adjustment**, page 11.
17. Lubricate the grease fitting over the seal chamber with petroleum jelly, petrolatum (Vaseline) or other similar low melting point lubricant. Lubricate all other grease fittings with multi-purpose grease, NLGI #2.

## 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.

# ASSEMBLY

## Optional Mechanical Seal (Teflon Fitted Type)

The seal type shown in Figures 11, 12 and 13 can be installed as an alternate to the standard mechanical seal (synthetic rubber bellows type). These seals are setscrew driven and the stationary seats have anti-rotation pins, which mate with slots in the end of the bracket bushing.

1. Install bracket bushing. If bracket bushing has a lubrication groove, install bushing with groove at 6:00 o'clock position in bracket. If carbon graphite, **Refer to Installation of Carbon Graphite Bushings**, page 11.
2. Install lip seal in bracket.
3. Clean rotor hub and bracket seal housing bore. **Refer to Figure 11**. Make sure both are free from dirt and grit. Coat outer diameter of seal seat gasket and inner diameter of seal housing bore with non-detergent SAE 30-weight oil.

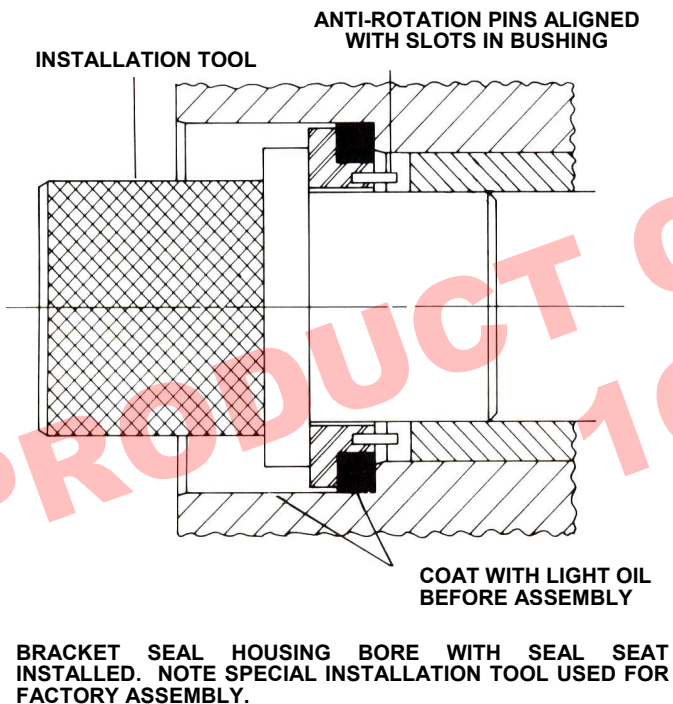
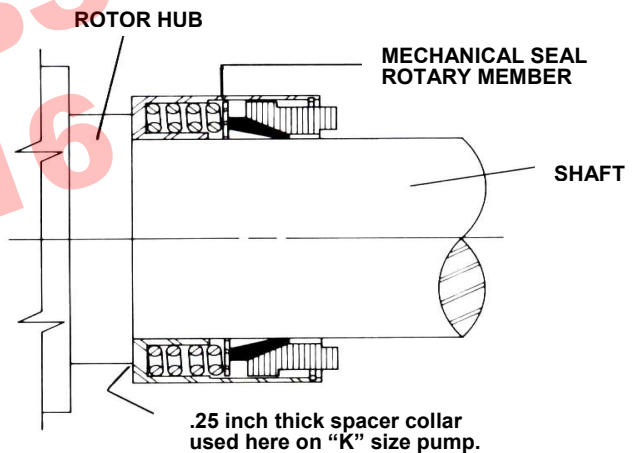
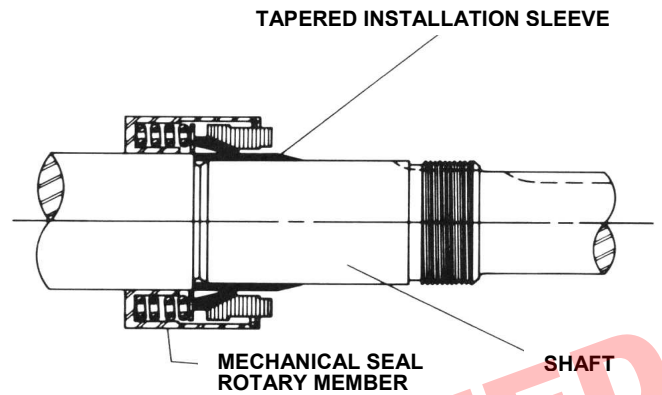


FIGURE 11

4. Start seal seat in seal housing bore. Make sure seat anti-rotation pins are aligned to engage slots in end of bracket bushing. **Refer to Figure 11**.
5. Using a cardboard disc to protect lapped face of seal seat, press seal seat assembly to bottom of seal housing bore using a piece of wood. An arbor press can also be used to install the seal seat. Seal seat must be started square and carefully pressed to bottom of seal housing bore.

K size pumps require a 0.25-inch spacer between seal and rotor hub to properly position seal on shaft.

6. Place tapered installation sleeve (furnished with H, HL, K, KK, LQ and LL size replacement mechanical seals) on shaft. **Refer to Figure 12**. Coat inner diameter of seal rotary member, tapered installation sleeve and the shaft with a generous quantity of non-detergent SAE 30 weight oil. Place rotary member on shaft over sleeve and against hub of rotor. **Refer to Figure 13**.



Some Teflon seals are equipped with holding clips, which compress the seal springs. Remove holding clips to release springs after seal is installed on shaft. Tighten all drive setscrews securely to shaft.

**AT THIS POINT, FINISH ASSEMBLY PROCEDURES STARTING AT STEP 9, PAGE 9 (STANDARD MECHANICAL SEAL).**

## THRUST BEARING ADJUSTMENT

1. Loosen setscrews over outer and inner end caps. Two for H and HL size pumps, four for all other sizes.
2. Turn inner end cap clockwise, viewed from shaft end, until it projects slightly from bracket exposing approximately three threads.
3. Turn outer end cap clockwise until rotor is tight against head and rotor shaft cannot be turned.
4. Make a reference mark on bracket end, opposite a notch on outer end cap. Back off outer end cap required number of notches. **See Figure 14.**

Each 0.25 travel on circumference of end cap is equivalent to approximately .0115 inch for all sizes.

5. End clearances set per Step 4 are adequate for viscosity's up to 750 SSU (SAE 20-lube oil at room temperature). Higher viscosity liquids require additional end clearances.

As a general guideline, for viscosity's between 750 and 7500 SSU (heavier lube oils) double the amount of end clearance indicated in Step 4; for viscosity's between 7500 and 75,000 SSU (e.g., resins) triple the amount an for viscosity's greater than 75,000 SSU (e.g., black strap molasses) use 4 times the amount.

6. Tighten inner end cap with a spanner wrench. Tap spanner wrench lightly but **DO NOT OVER TIGHTEN**, as it will damage the threads.
7. Tighten setscrews that hold inner and outer end caps to prevent their turning in bracket.
8. Rotor and shaft should turn smoothly by hand one complete revolution. If rotor and shaft doesn't turn smoothly, go back and repeat Thrust Bearing Adjustment Steps 1 through 8.

## INSTALLATION OF CARBON GRAPHITE BUSHINGS

When installing carbon graphite bushings, extreme care must be taken to prevent breaking. Carbon graphite is a brittle material and 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 bushing is started straight.
3. Do not stop pressing operation until bushing is in proper position, starting and stopping will result in a cracked bushing.
4. Check bushing for cracks after installation.

Carbon graphite bushings with extra interference fits are frequently furnished for high temperature operation. These bushings must be installed by a shrink fit.

1. Heat bracket or idler to 750° F.
2. Install cool bushings with a press.
3. If facilities are not available to reach 750° F. temperature, it is possible to install with 450° F. temperature; however, the lower the temperature, the greater the possibility of cracking bushing.

Consult factory with specific questions on high temperature applications. **Refer to Engineering Service Bulletin ESB-3.**

Pump Size	Turn Outer End Cap C.C.W.	
	No. of Notches*	Or Length on O.D., Inches
H - HL	3	0.50
K - LL	3	0.656

\*Each small notch on outer end cap represents .001 inch end clearance



# PRESSURE RELIEF VALVE INSTRUCTIONS

# 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 CHAMBER HAS BEEN COMPLETELY VENTED THROUGH 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.

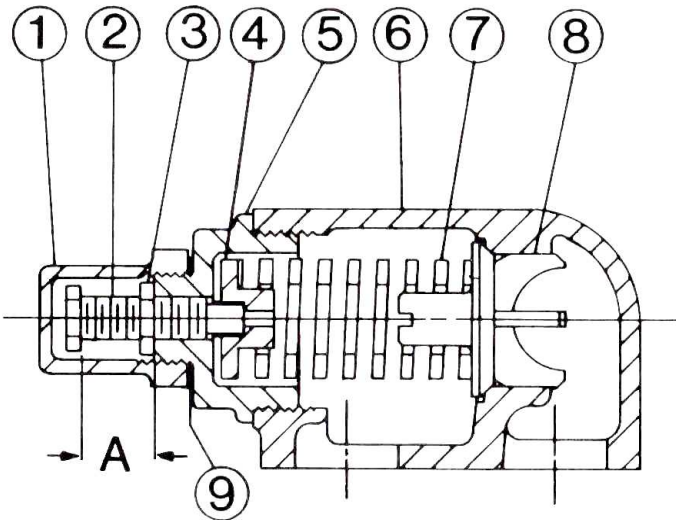


FIGURE 15  
SIZE H AND HL

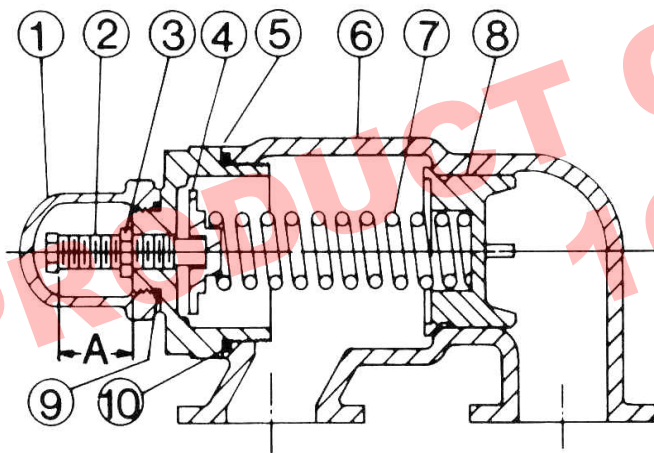


FIGURE 16  
SIZE K. KK. LQ AND LL

### 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          | 10. Bonnet Gasket |

Mark valve and head before disassembly to insure proper reassembly.

1. Remove valve cap.
2. Measure and record length of extension of adjusting screw. Refer to "A" on Figures 15 and 16.
3. Loosen locknut 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 replace as necessary.

## 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.

## ASSEMBLY

Reverse procedures outlined under Disassembly. If valve is removed for repairs, be sure to replace in same position. Relief valve adjusting screw cap must **always** point towards suction side of pump. If pump rotation is reversed, remove relief valve and turn end for end. **Refer to Figures 1, 2, and 3, page 1.**

## PRESSURE ADJUSTMENT

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

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

## IMPORTANT

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

## WARRANTY

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