



TECHNICAL SERVICE MANUAL

HEAVY-DUTY BRACKET MOUNTED PUMPS
 SERIES 125 AND 4125
 SIZES G-LL

SECTION	TSM 141.1
PAGE	1 OF 16
ISSUE	E

CONTENTS

Introduction	1
Safety Information	2
Special Information	3
Maintenance	3
Packed Pumps	4
Mechanical Seal Pumps	7
Standard Rubber Bellows Type (Sizes G, H, HL, K, KK, L, LQ & LL)	8
Optional PTFE Seal	10
Standard Rubber Bellows Type (Sizes AK & AL)	13
Thrust Bearing Adjustment	14
Installation of Carbon Graphite Bushings	14
Pressure Relief Valve Instructions	15

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 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 (125 and 4125) and used to indicate either an unmounted pump or mounted pump unit.

UNMOUNTED PUMP		UNITS
PACKED	MECH. SEAL	
G125	G4125	Units are designated by the unmounted pump model numbers followed by a letter indicating drive style. V = V-belt D = Direct Connected R = Viking Speed Reducer P = Commercial Speed Reducer
H125	H4125	
HL125	HL4125	
AK125	AK4125	
AL125	AL4125	
K125	K4125	
KK125	KK4125	
L125	L4125	
LQ125	LQ4125	
LL125	LL4125	

This manual deals only with Series 125 and 4125 Heavy Duty Bracket Mounted Pumps. Refer to Figures 1 through 19 for general configuration and nomenclature used in this manual. Pump specifications and recommendations are listed in Catalog Section 141, Series 125 and 4125 Heavy Duty Bracket Mounted Pumps.

FIGURE 1
 Sizes G, H and HL



FIGURE 2
 Sizes AK and AL

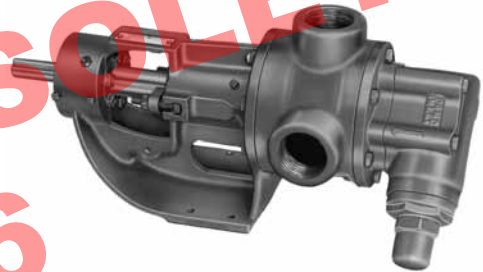


FIGURE 3
 Sizes K, KK and L



FIGURE 4
 Sizes LQ and LL



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

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.

ROTATION: Viking pumps operate equally well in a clockwise or counterclockwise rotation. Shaft rotation determines which port is suction and which is discharge. The port in the 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 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 or a jacketed relief valve. Pumps equipped with a jacketed head plate are not available with an integral 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 Figures 1, 2, 3 and 4, page 1.
5. Viking integral 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.

SPECIAL MECHANICAL SEALS can be installed either next to the rotor hub or in the stuffing box. Consult the factory for non-standard seal arrangements.

Extra care must be taken in the repair of pumps with mechanical seals. Read and follow all special information supplied with the pump and seal.

MAINTENANCE

Series 125 and 4125 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 hand gun 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 the 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 the packing gland. After initial adjustment, periodic inspection will reveal the need for packing gland adjustment or packing replacement. Refer to instructions under Disassembly, page 5, and Assembly, page 5, regarding repacking the pump.

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 the 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 125 and 4125 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 (packed pumps)
Viking Part No. 2-810-049-999-00; G-HL
Viking Part No. 2-810-042-999-00; AK-LL
4. Mechanical seal installation sleeve.
Viking Part No. 2-751-001-730 for 0.75 inch seal; G4125
Viking Part No. 2-751-002-730 for 1.12 inch seal;
H & HL4125
Viking Part No. 2-751-003-730 for 1.44 inch seal;
AK - LL4 125
5. Bearing locknut spanner wrench.
Viking Part No. 2-810-043-375-00
6. Spanner wrench, adjustable pin type for use on double end caps. Viking Part No. 2-810-008-375-00
7. Brass bar.
8. Arbor press.
9. Standard 5/16" 12 point socket.

PACKED PUMPS

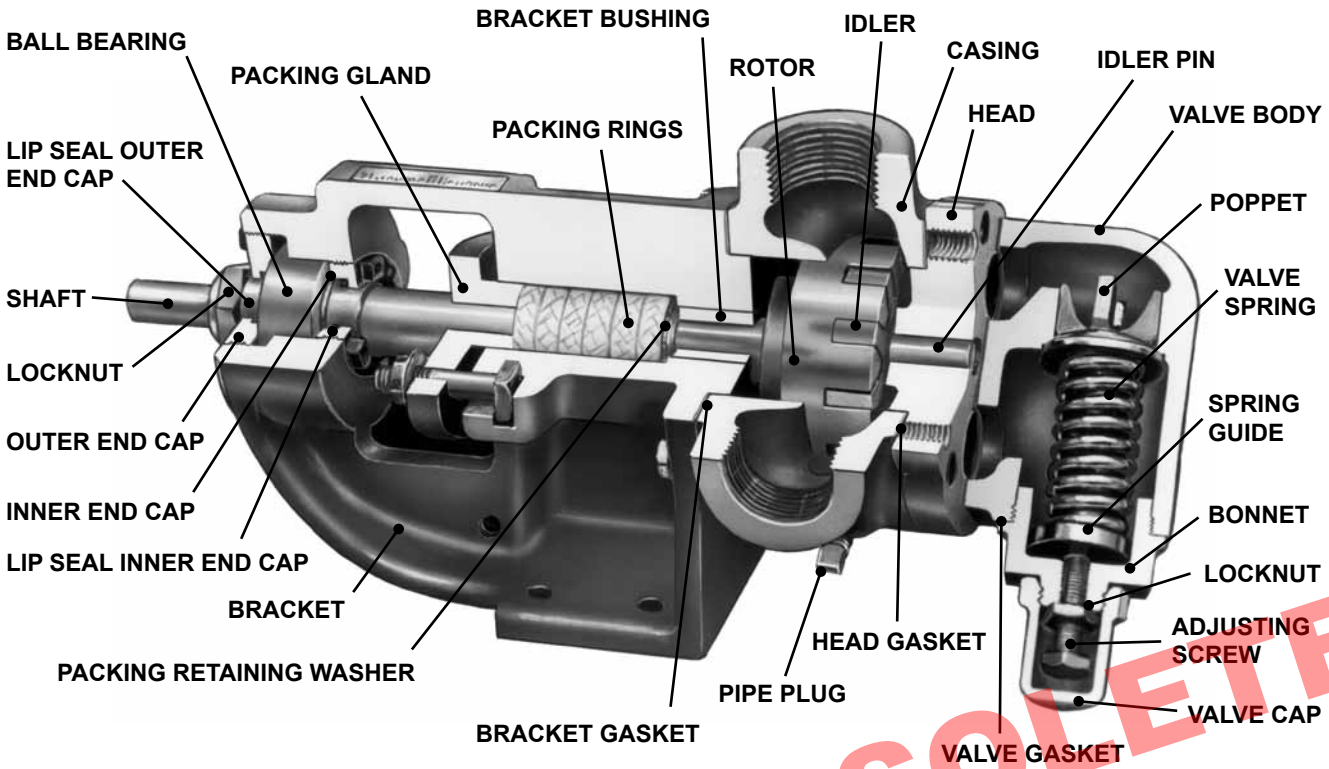
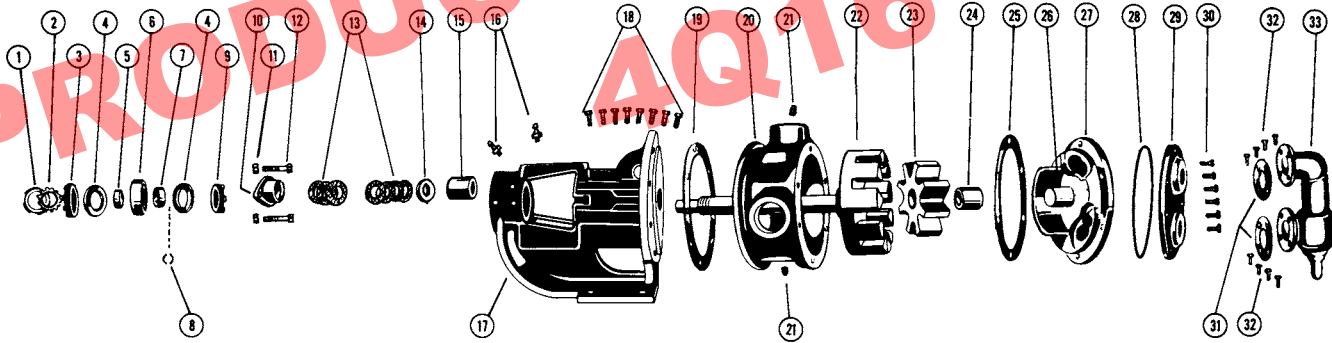


FIGURE 5
CUTAWAY VIEW OF G125 WITH CALLOUTS



EXPLODED VIEW OF MODELS G125, H125, HL125, AK125, AL125, K125, KK125, L125, LQ125 AND LL125
(MODEL KK125 SHOWN)

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	12	Packing Gland Capscrews	23	Idler and Bushing Assembly
2	Lockwasher (Not G)	13	Packing	24	Idler Bushing
3	End Cap (Outer)	14	Packing Retaining Washer	25	Head Gasket
4	Lip Seal for End Cap	15	Bracket Bushing	26	Idler Pin
5	Bearing Spacer Collar (Outer)	16	Grease Fittings	27	Head and Idler Pin Assembly
6	Ball Bearing	17	Bracket and Bushing Assembly	28	O-Ring for Jacketed Head Plate
7	Bearing Spacer Collar (Inner)	18	Capscrews for Bracket	29	Jacketed Head Plate
8	Ring, Half Round (Not G, H, HL)	19	Bracket Gasket	30	Capscrews for Head
9	End Cap (Inner)	20	Casing	31	Relief Valve Gaskets
10	Packing Gland	21	Pipe Plug	32	Capscrews for Valve
11	Packing Gland Nuts	22	Rotor and Shaft Assembly	33	Internal Relief Valve

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

Tilt the top of the head back when removing the head to prevent the idler from falling from the idler pin. Remove the head from the pump. Avoid damaging the head gasket. If the pump is furnished with a pressure relief valve, it need not be removed from the head or disassembled at this point. **Refer to Pressure Relief Valve Instructions, page 15.**

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

2. Remove the idler and bushing assembly.
3. Insert a length of hardwood or brass through the port opening between the rotor teeth to keep the shaft from turning. Bend up the tang of the lockwasher and with a spanner wrench remove the locknut and lockwasher from the shaft. There is no lockwasher on G size pumps.
4. Remove the packing gland nuts.
5. Tap the shaft forward approximately 0.5 inch and remove the pair of half round rings under the inner bearing spacer collar. There is no pair of half round rings on G, H and HL size pumps.

6. Carefully remove the rotor and shaft to avoid damaging the bracket bushing.
7. Remove the packing gland from the side of the bracket.

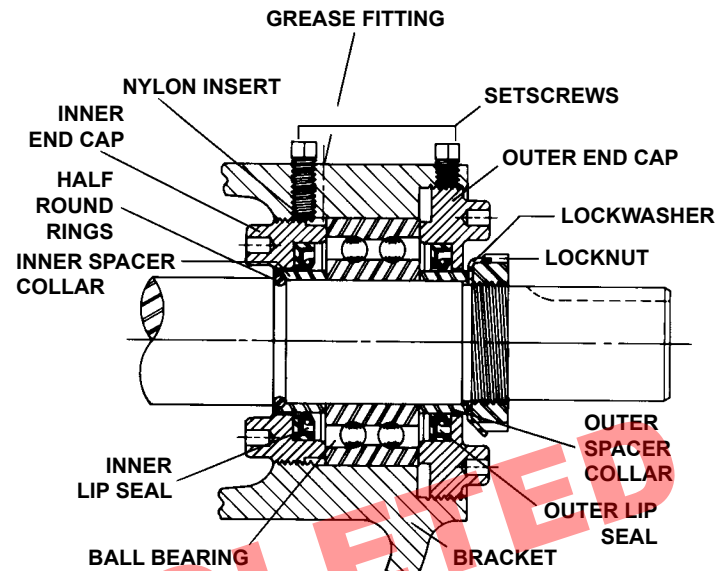


FIGURE 6

8. Loosen the setscrews. Two on G, H and HL size pumps, four on all other sizes. With a spanner wrench, remove both end caps with lip seals. Remove the ball bearing and spacer collars. **Refer to Figure 6.**
9. Remove the packing and packing retainer washer.
10. Clean all parts thoroughly and examine for wear and damage. Check the 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 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.
11. Casing can be checked for wear or damage while mounted on the bracket.

ASSEMBLY

1. Install the bracket and/or idler bushing. If the bracket bushing has a lubrication groove, install the bushing with the groove at 12:00 o'clock position in bracket. If replacing carbon graphite, **Refer to Installation of Carbon Graphite Bushings, page 14.**
2. Coat the shaft of the rotor shaft assembly with non-detergent SAE 30 weight oil. Start the end of the shaft in the bracket bushing turning from right to left, slowly pushing the rotor in the casing.

3. Place the packing retainer washer in the bottom of the packing chamber. Use packing suitable for the liquid being pumped. Lubricate the packing rings with oil, grease or graphite to aid assembly. A length of pipe will help to seat each packing ring. (Install packing, staggering the joints from one side of shaft to other.)
4. Install the packing gland, capscrews and nuts. Back the rotor and shaft out of the casing just far enough to insert the packing gland through the side opening of the bracket over the end of the shaft. Make sure the gland is installed square and the nuts are tightened evenly. Tighten the nuts wrench tight then back off until the gland is slightly loose.
5. Coat the idler pin with non-detergent SAE 30 weight oil and place the idler and bushing on the idler pin in the head.
6. Using a .010 to .015 inch head gasket, install the head and idler assembly on the pump. 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.

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

Tighten the head capscrews evenly.

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

Place pair of half round rings on the shaft and slide the inner bearing spacer collar over the half round rings to lock them in place. There is no pair of half round rings on G, H and HL size pumps. **Refer to Figure 6, page 5.**

8. Press the lip seal, the lip facing the end of the shaft, in the inner end cap and insert the end cap through the shaft end of the bracket. Turn the end cap clockwise, looking at the shaft end, until it engages the threads. The end cap spanner wrench holes must be facing the rotor. Turn the end cap with a spanner wrench until it projects slightly from the opening on the side of the bracket. The end cap must not be turned so far that the lip seal drops off the end of the spacer collar on the shaft or end cap becomes disengaged from the threads. **Refer to Figure 6, page 5.**

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

9. Pack the ball bearing with multi-purpose grease, NLGI #2. Place on the shaft and push or gently drive in place in the bracket.
10. Press the lip seal, the lip facing the end of the shaft, in the outer end cap and insert the end cap in the bracket. Turn the end cap in the bracket until it is tight against the bearing. **Refer to Figure 6, page 5.**
11. Put the lockwasher and locknut on the shaft. Insert a length of hardwood or brass through the port opening between the rotor teeth to keep the shaft from turning. Tighten the locknut and bend one tang of the lockwasher into the slot of the locknut. There is no lockwasher on G size pumps.
12. Adjust pump end clearance. **Refer to Thrust Bearing Adjustment, page 13.**
13. 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

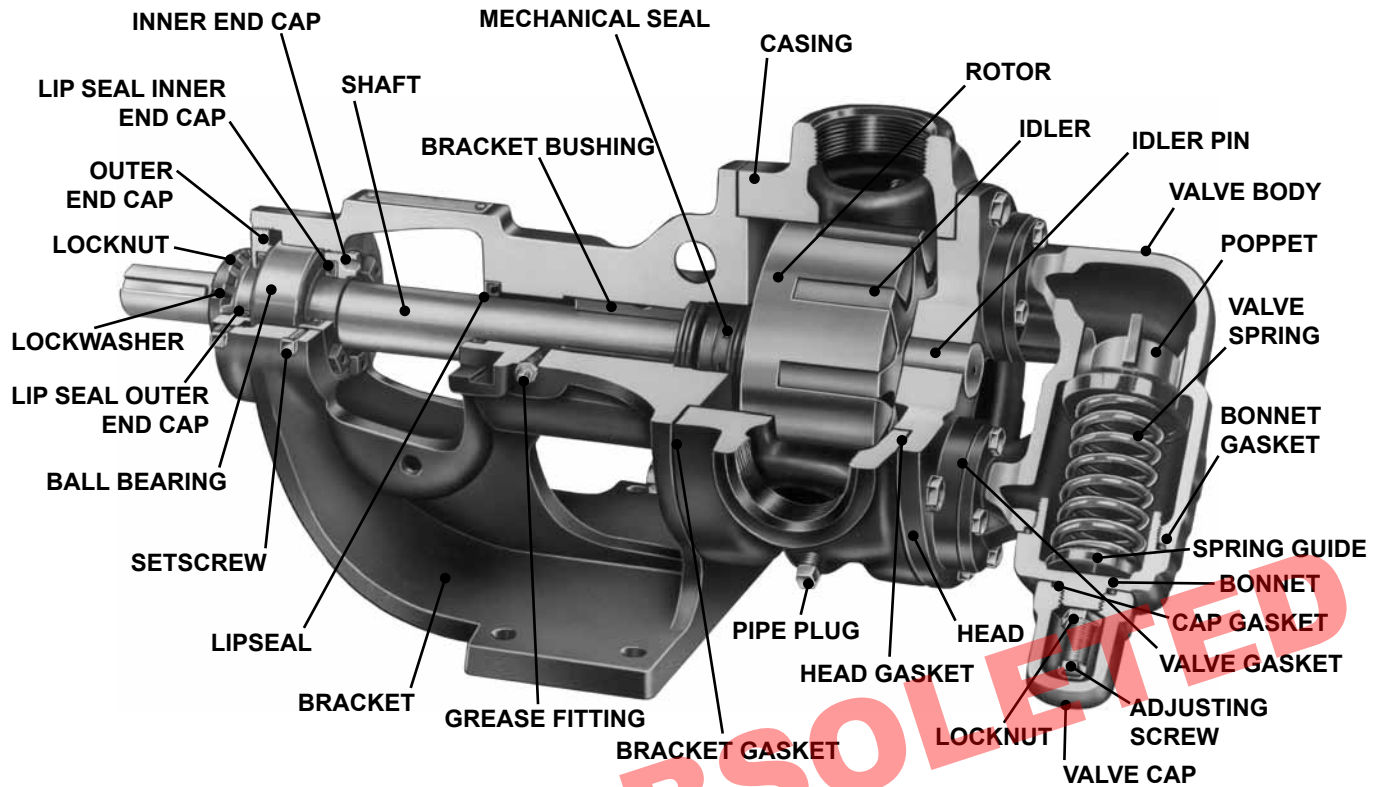
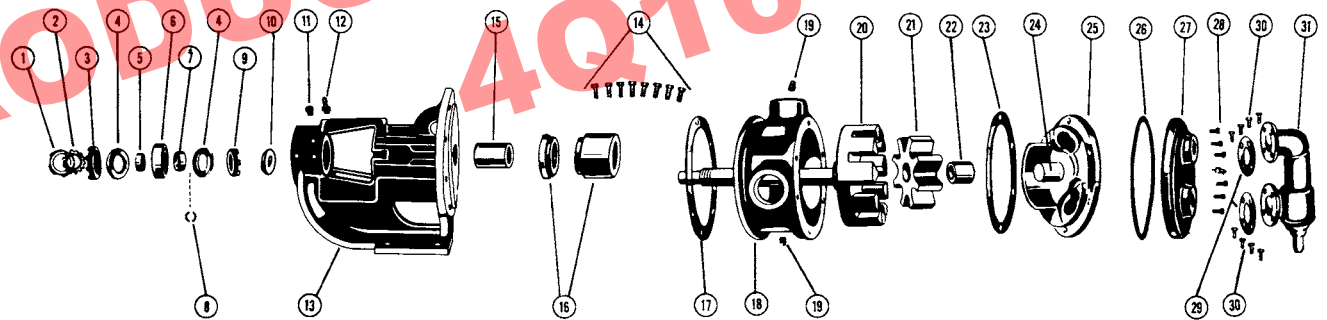


FIGURE 7
CUTAWAY VIEW OF KK4125 WITH CALLOUTS



EXPLODED VIEW FOR MODELS G4125, H4125, HL4125, K4125, KK4125, L4125, LQ4125 AND LL4125
(MODEL KK4125 SHOWN)

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

5. Carefully remove the rotor and shaft to avoid damaging the bracket bushing.
6. Remove the rotary member of the seal from the shaft and the stationary seal seat from the bracket.
7. Loosen the setscrews. Two on G, H and HL size pumps, four for all other sizes. With a spanner wrench, remove both end caps and lip seals. Remove the ball bearing and spacer collars. **Refer to Figure 6, page 5.**
8. Examine the seal chamber lip seal and remove if it shows wear or damage. The lip seal must be removed if the bracket bushing needs to be replaced.
9. Clean all parts thoroughly and examine for wear or damage. Check the 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 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.

Be sure the shaft is free from nicks, burrs and foreign particles that might damage the bracket bushing. Scratches on the shaft in the seal area will provide leakage paths under the mechanical seal.
10. Casing can be checked for wear or damage while mounted on the bracket.

ASSEMBLY

Standard Mechanical Seal

(Synthetic Rubber Bellows Type)

Sizes G, H, HL, K, KK, L, LQ and LL

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 this manual (**TSM141.1**). Information is available by contacting the factory. When requesting special seal information, be sure to give the pump model number and serial number.

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

Tilt the top of the head back when removing the head to prevent the idler from falling. Remove the head from the pump. Avoid damaging the head gasket. If the pump is furnished with a pressure relief valve, it need not be removed from the head or disassembled at this point. **Refer to Pressure Relief Valve Instructions, page 15.**

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

2. Remove the idler and bushing assembly.
3. Insert a length of hardwood or brass through the port opening between the rotor teeth to keep the shaft from turning. Bend up the tang of the lockwasher and with a spanner wrench remove the locknut and lockwasher from the shaft. There is no lockwasher on G size pumps.
4. Tap the shaft forward approximately 0.5 inch and remove the pair of half round rings under the inner spacer collar. There is no pair of half round rings on G, H and HL size pumps.

1. Install the bracket bushing. If the bracket bushing has a lubrication groove, install the bushing with the groove at the 12:00 o'clock position in the bracket. If replacing carbon graphite bushings, **Refer to Installation of Carbon Graphite Bushings, page 14.**
2. Install the lip seal in the bracket. **Refer to Figure 8, page 9.**

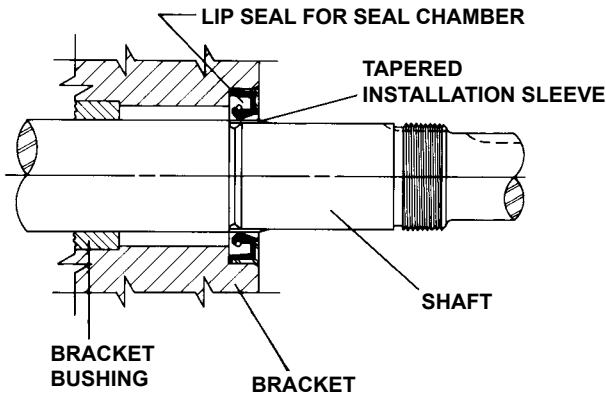


FIGURE 8

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

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

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

3. Coat the idler pin with non-detergent SAE 30 weight oil and place the idler and bushing on the idler pin in the head. If replacing a carbon graphite bushing, Refer to Installation of Carbon Graphite Bushings, page 14.
4. Clean the rotor hub and bracket seal housing bore. Make sure both are free from dirt and grit. Coat the outer diameter of the seal seat and the inner diameter of the seal housing bore with non-detergent SAE 30 weight oil.
5. Start the seal seat in the seal housing bore, Refer to Figure 9. If force is necessary, protect the seal face with a clean cardboard disc and gently tap it in place with a piece of wood.
6. Place the tapered installation sleeve on the shaft, Refer to Figure 10. Sleeve is furnished with H, HL, K, KK, L, LQ and LL size replacement mechanical seals. Coat the rotor shaft, tapered installation sleeve and inner diameter of the mechanical seal rotary member with a generous amount of non-detergent SAE 30 weight oil. Petrolatum may be used but grease is not recommended.
7. Place the seal spring on the shaft against the rotor hub. Refer to Figure 11.
8. Slide the rotary member, the lapped contact surface facing away from the spring, over the installation sleeve on the shaft until it is against the spring.

Do not compress the spring.

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

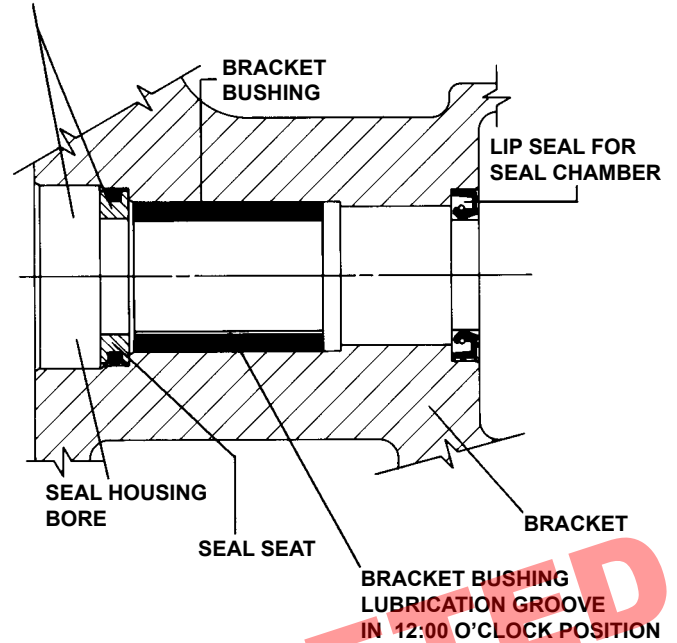
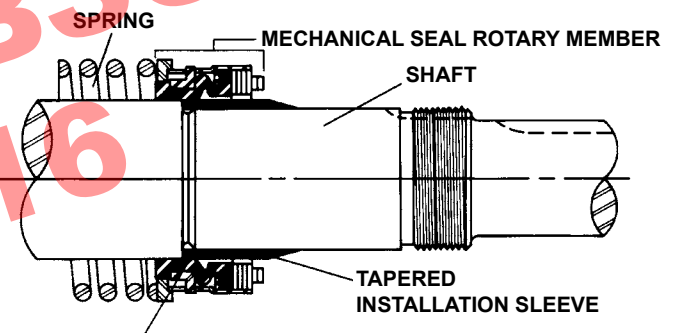


FIGURE 9



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

FIGURE 10

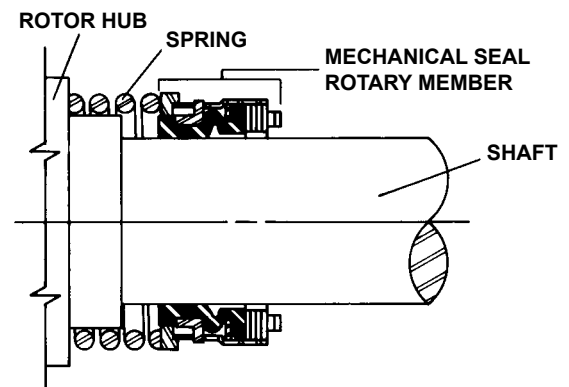


FIGURE 11

9. Coat the rotor shaft with non-detergent SAE 30 weight oil. Start the end of the shaft in the 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 the 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 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.

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

Tighten the head capscrews evenly.

Remove the tapered installation sleeve from the shaft.

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

Place the pair of half round rings on the shaft and slide the inner bearing spacer collar over the half round rings to lock them in place. There is no pair of half round rings on G, H and HL size pumps. **Refer to Figure 6, page 5.**

12. Press the lip seal, lip facing the end of the shaft, in the inner end cap and insert the end cap through the shaft end of the bracket. Turn the end cap clockwise, looking at the shaft end, until it engages the threads. End cap spanner wrench holes must be facing the rotor. Turn the end cap with a spanner wrench until it projects slightly from opening on the side of the bracket. The end cap must not be turned so far that the lip seal drops off the end of the spacer collar on shaft or the end cap becomes disengaged from the threads. **Refer to Figure 6, page 5.**

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

13. Pack the ball bearing with multi-purpose grease, NLGI #2. Place on the shaft and push or gently drive into place in the bracket.
14. Press the lip seal, lip facing the end of the shaft, in the outer end cap and insert the end cap in the bracket. Turn the end cap in the bracket until it is tight against the bearing. **Refer to Figure 6, page 5.**
15. Put the lockwasher and locknut on the shaft. Insert a length of hardwood or brass through the port opening between the rotor teeth to keep the shaft from turning. Tighten the locknut and bend one tang of the lockwasher into the slot of the locknut. There is no lockwasher on G size pumps.
16. Adjust the pump end clearance. **Refer to Thrust Bearing Adjustment, page 14.**
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.

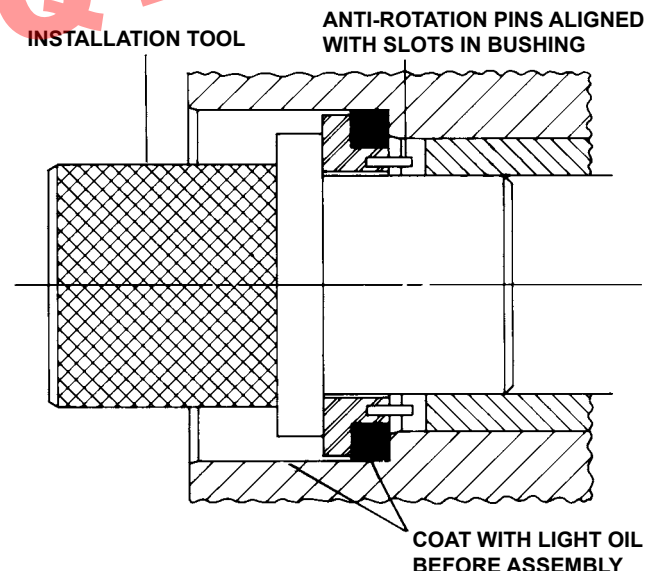
Failure to properly mount guards may result in serious injury or death.

ASSEMBLY

Optional Mechanical Seal (PTFE Fitted Type)

The seal type shown in **Figures 12, 13 and 14** 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 the bracket bushing. If the bracket bushing has a lubrication groove, install the bushing with the groove at the 12:00 o'clock position in the bracket. If carbon graphite, **Refer to Installation of Carbon Graphite Bushings, page 14.**
2. Install the lip seal in the bracket.
3. Clean the rotor hub and bracket seal housing bore. **Refer to Figure 12.** Make sure both are free from dirt and grit. Coat the outer diameter of the seal seat gasket and the inner diameter of seal housing bore with non-detergent SAE 30 weight oil.
4. Start the seal seat in the seal housing bore. Make sure the seat anti-rotation pins are aligned to engage the slots in the end of the bracket bushing. **Refer to Figure 12.**



BRACKET SEAL HOUSING BORE WITH SEAL SEAT INSTALLED. NOTE SPECIAL INSTALLATION TOOL USED FOR FACTORY ASSEMBLY.

FIGURE 12

- Using a cardboard disc to protect the lapped face of the seal seat, press the seal seat assembly to the bottom of the seal housing bore using a piece of wood. An arbor press can also be used to install the seal seat. The seal seat must be started square and carefully pressed to the bottom of the seal housing bore.

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

- Place the tapered installation sleeve (furnished with H, HL, K, KK, L, LQ and LL size replacement mechanical seals) on the shaft. Refer to Figure 13. Coat the inner diameter of the seal rotary member, tapered installation sleeve and the shaft with a generous quantity of non-detergent SAE 30 weight oil. Place the rotary member on the shaft over the sleeve and against the hub of the rotor. Refer to Figure 14.

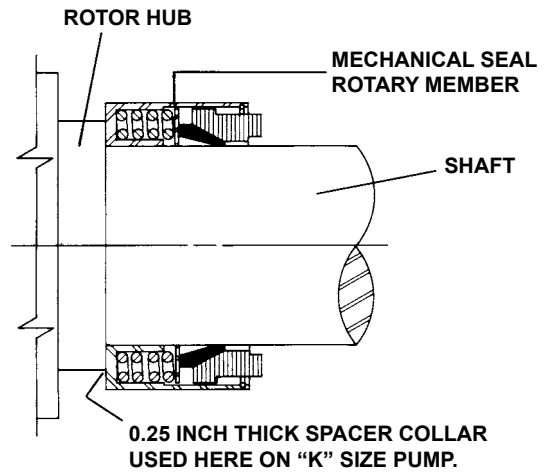


FIGURE 14

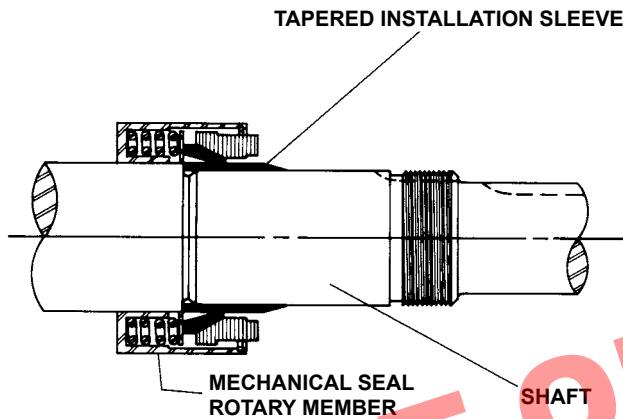
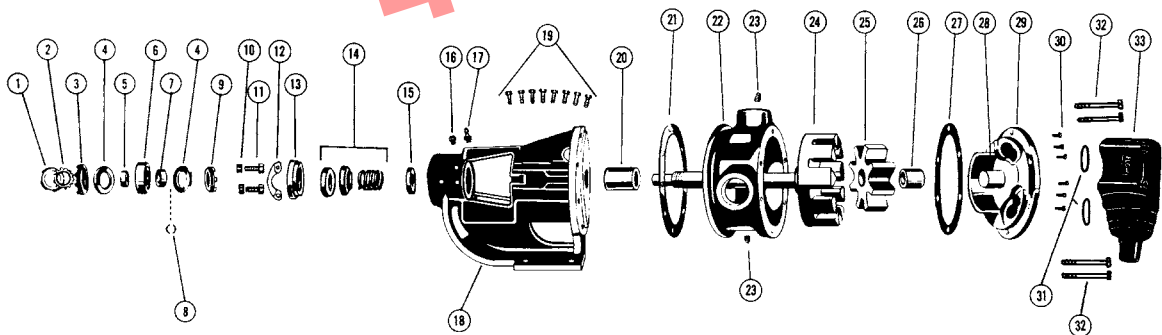


FIGURE 13

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

AT THIS POINT, FINISH ASSEMBLY PROCEDURES STARTING AT STEP 9, PAGE 10 (STANDARD MECHANICAL SEAL).

EXPLODED VIEW OF MODELS AK4125 AND AL4125 (MODEL AK4125 SHOWN)



ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	12	Seal Plate	23	Pipe Plug
2	Lockwasher (Not G)	13	Seal Holder	24	Rotor and Shaft Assembly
3	End Cap (Outer)	14	Mechanical Seal	25	Idler and Bushing Assembly
4	Lip Seal for End Cap	15	Set Collar with Setscrews	26	Idler Bushing
5	Bearing Spacer Collar (Outer)	16	Pipe Plug	27	Head Gasket
6	Ball Bearing	17	Grease Fitting	28	Idler Pin
7	Bearing Spacer Collar (Inner)	18	Bracket and Bushing Assembly	29	Head and Idler Pin Assembly
8	Ring, Half Round	19	Capscrews for Bracket	30	Capscrews for Head
9	End Cap (Inner)	20	Bracket Bushing	31	Relief Valve Gaskets
10	Seal Holder Nut	21	Bracket Gasket	32	Capscrews for Relief Valve
11	Seal Holder Capscrew	22	Casing	33	Internal Relief Valve

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

Tilt the top of the head back when removing the head to prevent the idler from falling. Remove the head from the pump. Avoid damaging the head gasket. If the pump is furnished with a pressure relief valve, it need not be removed from the head or disassembled at this point. **Refer to Pressure Relief Valve Instructions, page 15.**

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

2. Remove the idler and bushing assembly.
3. Insert a length of hardwood or brass through the port opening between the rotor teeth to keep the shaft from turning. Bend up the tang of the lockwasher and with a spanner wrench remove the locknut and lockwasher from the shaft.
4. Rotate the shaft so that the two setscrews for the set collar can be seen through the seal access hole on the left side of the pump (viewed from the shaft end). These two setscrews must be loosened before the shaft can be removed from the pump. **Refer to Figure 15, page 13.**

5. Remove the seal holder nuts, seal holder plate and the capscrews.
6. Seal holder cannot be removed until the shaft is removed.
7. Tap the shaft forward approximately 0.5 inch and remove the pair of half round rings under the inner spacer collar.
8. Carefully remove the rotor and shaft to avoid damaging the bracket bushing.
9. Remove the seal holder, seal seat and rotary member of the seal from the side opening in the bracket.
10. Loosen the four setscrews over the outer and inner end caps. With a spanner wrench remove both end caps and lip seals. Remove the ball bearing and spacer collars. **Refer to Figure 6, page 5.**
11. Clean all parts thoroughly and examine for wear or damage. Check the 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 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 roughness. Roughness may be determined by turning the outer race by hand.

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

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

ASSEMBLY

Standard Mechanical Seal (Synthetic Rubber Bellows Type) Sizes AK and AL

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.

1. Install the bracket bushing. If the bracket bushing has a lubrication groove, install the bushing with the groove at the 12:00 o'clock position in the bracket. If carbon graphite, **Refer to Installation of Carbon Graphite Bushings, page 14.**
2. Coat the shaft of the rotor shaft assembly with non-detergent SAE 30 weight oil. Start the end of the shaft in the bracket bushing turning from right to left, slowly pushing the rotor into the casing.
3. Coat the idler pin with non-detergent SAE 30 weight oil and place the idler and bushing on the idler pin in the head. If replacing carbon graphite bushing, **Refer to Installation of Carbon Graphite Bushings, page 14.**

- Using a .010 to .015 inch head gasket, install the head and idler assembly on the pump. 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.

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

Tighten the head capscrews evenly.

- Examine the set collar to be sure there are no burrs or scratches and that the setscrews are withdrawn so the shaft will not be scratched when the set collar is installed.
- Place the seal set collar on the shaft, push into the seal chamber so the centerline of the setscrew coincides with the centerline of the access hole on the left side of the bracket (viewed from the shaft end). **Refer to Figure 15.** Tighten the setscrews to secure the set collar to the shaft.
- Slide the spring over the shaft into the seal chamber on the set collar pilot. Place the tapered installation sleeve on the shaft. **Refer to Figure 10, page 9.**

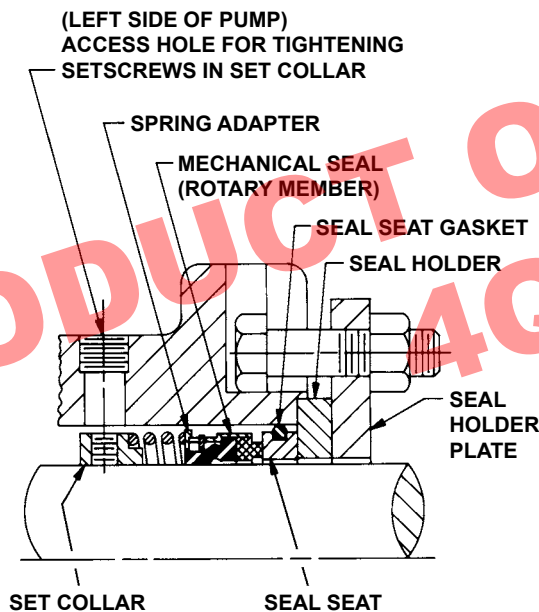


FIGURE 15

- Apply a generous amount of non-detergent SAE 30 weight oil to the large diameter of the shaft, the tapered installation sleeve and the inner diameter of the mechanical seal rubber parts.
- Slide the rotary member, lapped contact surface facing away from the spring, over the installation sleeve on the shaft until it is against the spring.
Do not compress the spring.
- Lubricate the outer diameter of mechanical seal O-ring seal seat gasket and flush the lapped seal faces with non-detergent SAE 30 weight oil.

- Press the stationary seal seat in the bore until the back, unlapped face, is just inside the bore. Position the stationary seal seat by the installing seal holder and secure the seal holder to the machined face of the bracket with the seal holder plate.
- Tighten the nuts securing the seal holder plate evenly so the seal holder will not be distorted.
- Remove the tapered installation sleeve.
- Slide the inner bearing spacer collar over the shaft with the recessed end facing the rotor.

Place the pair of half round rings on the shaft and slide the inner bearing spacer collar over the half round rings to lock them in place. **Refer to Figure 6, page 5.**

- Press the lip seal, lip facing the end of the shaft, in the inner end cap and insert the end cap through the shaft end of the bracket. Turn the end cap clockwise, looking at the shaft end, until it engages the threads. End cap spanner wrench holes must be facing the rotor. Turn the end cap with a spanner wrench until it projects slightly from the opening on the side of the bracket.

The end cap must not be turned so far that the lip seal drops off the end of the spacer collar on the shaft or the end cap becomes disengaged from the threads. **Refer to Figure 6, page 5.**

If this happens, remove the inner spacer collar, half round rings and end cap and start over at Step 15.

- Pack the ball bearing with multi-purpose grease, NLGI #2. Place on the shaft and push or gently drive into place in the bracket.
Install the outer spacer collar.
- Press the lip seal, lip facing the end of the shaft, in the outer end cap and insert the end cap in the bracket. Turn the end cap in bracket until it is tight against the bearing. **Refer to Figure 6, page 5.**
- Insert a length of hardwood or brass through the port opening between the rotor teeth to keep the shaft from turning. Put the lockwasher and locknut on the shaft, tighten and bend the tang of the lockwasher into the slot of the locknut.
- Adjust the pump end clearance. **Refer to Thrust Bearing Adjustment, page 14.**
- 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.

THRUST BEARING ADJUSTMENT

1. Loosen the setscrews over the outer and inner end caps. Two for G, H and HL size pumps, four for all other sizes.
2. Turn the inner end cap clockwise, viewed from the shaft end, until it projects slightly from the bracket exposing approximately three threads.
3. Turn the outer end cap clockwise until the rotor is tight against the head and the rotor shaft cannot be turned.
4. Make a reference mark on the bracket end, opposite a notch on the outer end cap. There are no notches on G size pumps. Back off the outer end cap the required number of notches. **Refer to Figure 16.**

Each 0.25 inch travel on the circumference of the end cap is equivalent to approximately .002 inch end clearance for G size pumps and .0015 inch for all other sizes.

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

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

For specific recommendations for end clearances for viscosity or for operating temperatures above 225°F, check with your Viking representative or consult the factory.

6. Tighten the inner end cap with a spanner wrench. Tap the spanner wrench lightly but **DO NOT OVER TIGHTEN** as it will only damage the threads.
7. Tighten all setscrews that hold inner and outer end caps to prevent their turning in the bracket.
8. Rotor and shaft should turn smoothly by hand one complete revolution. If the 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 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 the pressing operation until the bushing is in the proper position. Starting and stopping will result in a cracked bushing.
4. Check the 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 the bracket or idler to **750°F**.
2. Install the 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 the bushing.

Consult the 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
G	—	0.38"
H - HL	3	0.5"
AK - LL	5	0.66"

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

FIGURE 16

PRESSURE RELIEF VALVE INSTRUCTIONS

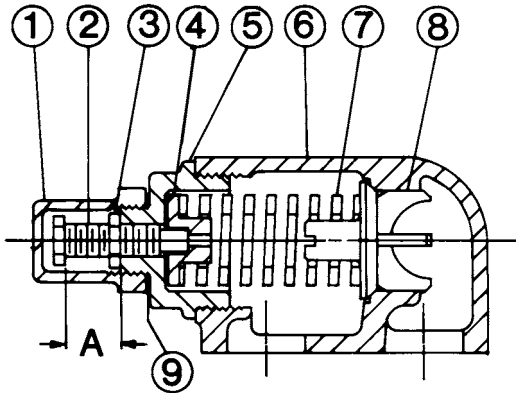


FIGURE 17
Sizes G, H and HL

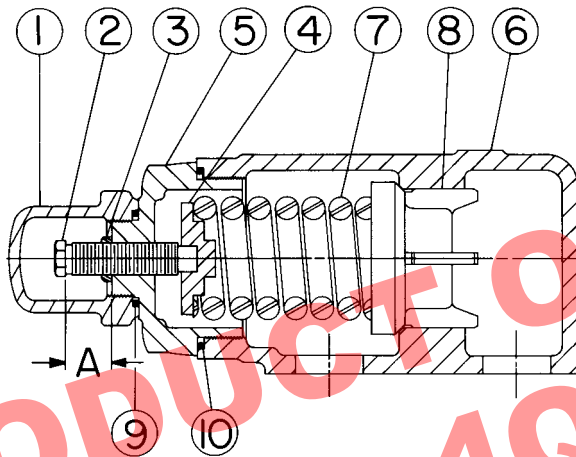


FIGURE 18
Sizes AK and AL

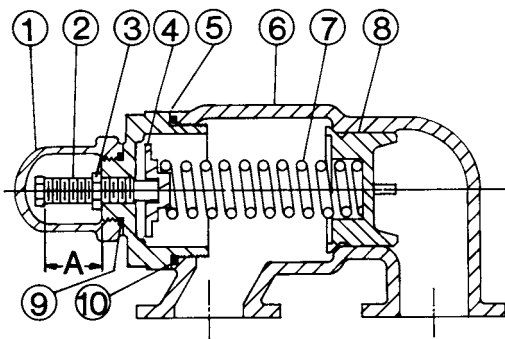


FIGURE 19
Sizes K, KK, L, LQ and LL

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 |

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 17, 18 and 19.
3. Loosen the locknut and back out the adjusting screw until the 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**. If the valve is removed for repairs, be sure to replace in the same position. Relief valve adjusting screw cap must **always** point towards the suction side of the pump. If pump rotation is reversed, remove the relief valve and turn end for end. Refer to Figures 1, 2, 3 and 4, page 1.

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. 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.
2. Install a pressure gauge in the discharge line for actual adjustment operation.
3. Turn the adjusting screw in to increase the pressure and out to decrease the pressure.
4. With the discharge line closed at a point beyond the pressure gauge, gauge will show the maximum pressure the valve will allow while the pump is in operation.

IMPORTANT

In ordering parts for pressure relief valve, always give 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.

**VIKING
PUMP****IDEX
CORPORATION**

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.

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, LOSS OR UNREALIZED SALES, REVENUES, PROFITS, INCOME, COST SAVINGS OR BUSINESS, LOSS 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.

THIS WARRANTY IS AND SHALL BE VIKING'S SOLE AND EXCLUSIVE WARRANTY AND SHALL BE 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.

See complete warranty at www.vikingpump.com.