

TECHNICAL SERVICE MANUAL: INSTALLATION, OPERATION & MAINTENANCE**VIKING
PUMP®**LIQUID SPECIFIC PRODUCT LINE:
CAST IRON ASPHALT PUMPS

230 SERIES™

SIZES: KK, LQ, Q, M, N

TSM 1472

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Issue A

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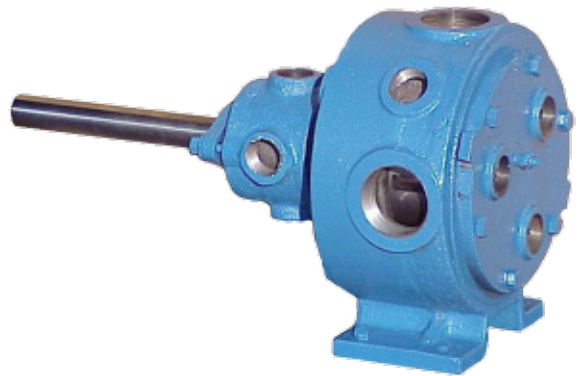
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MODEL NUMBER CHART

UNMOUNTED PUMP	UNITS
KK-230	Units are designated by the unmounted pump model numbers followed by "Arrangement" indicating drive style. 13 - Direct Connected 53 - V-Belt Drive 70 - Commercial Speed Reducer
LQ-230	
Q-230	
M-230	
N-230	

KK-230

(SHOWN WITH JACKETED CASING, HEAD, & ROTOR BEARING SLEEVE)



INTRODUCTION

The illustrations used in this manual are for identification purposes only and cannot be used for ordering parts.

Obtain a parts list from your Viking Pump® representative. Always give a complete name of part, part number and material with the 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. This manual only applies to the pump models specified in the **"Model Number Chart" on page 1**. Pump specifications and recommendations are listed in the Catalog Sections, which are available at vikingpump.com.

SPECIAL INFORMATION

ROTATION

Rotary gear pumps operate equally well in a clockwise or counterclockwise rotation. The 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 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 are not available with a relief valve.
3. If pump rotation is reversed during operation, pressure protection must be provided on **both** sides of pump.
4. Relief valve bonnet must **always** point towards suction side of pump. If pump rotation is reversed, remove pressure relief valve and turn end for end. **"Figure 2" on page 2** and **"Figure 3" on page 2** show the 2 possible configurations, **"Figure 2" on page 2** has side suction and top discharge. **"Figure 3" on page 2** has top suction and side discharge. The shaft turns in the opposite direction on the second pump.
5. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure.

MECHANICAL SEALS

SPECIAL MECHANICAL SEALS can be installed either next to rotor hub or behind the bracket bushing.

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

FIGURE 1



FIGURE 2



FIGURE 3



MAINTENANCE

These 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. Do not over-grease. Applications involving very high or low temperatures will require other types of lubrication. Consult factory with specific lubrication questions.

PACKING ADJUSTMENT

New packed pumps require initial packing adjustment to control leakage as packing "runs in". The adjustment should be made while the pump is operating with normal operating pressure on the discharge of the pump. Make initial adjustments carefully and do not over-tighten packing gland. Evenly tighten the gland fasteners until the leak is reduced to a very slow drip. If over tightened the packing will over heat, score the shaft and reduce life. After initial adjustment, inspect periodically for increased leakage and re-adjust. Once the gland has been tightened to the stuffing box, loosen the packing gland and add one ring to the stuffing box, then adjust again. Refer to instructions under "**Disassembly: Packed Pumps**" on page 4, and "**Assembly: Packed Pumps**" on 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 lubricant and rust preventative suitable to the application 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. Tighten all pump assembly bolts before putting pump in service after being stored.

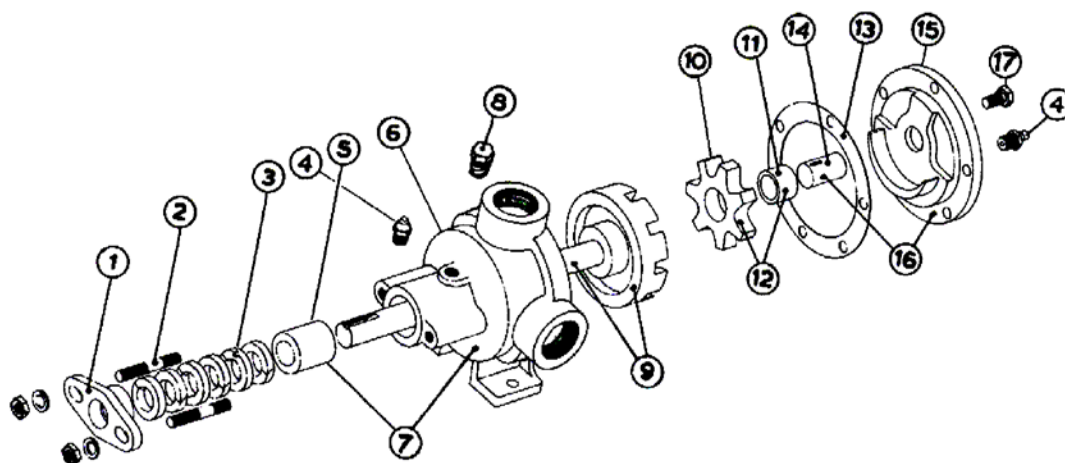
SUGGESTED REPAIR TOOLS

The following tools must be available to properly repair these 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)
Small for 1/4 inch and 3/8 inch cross section packing
Large for 3/8 inch and larger cross section packing
4. Arbor press

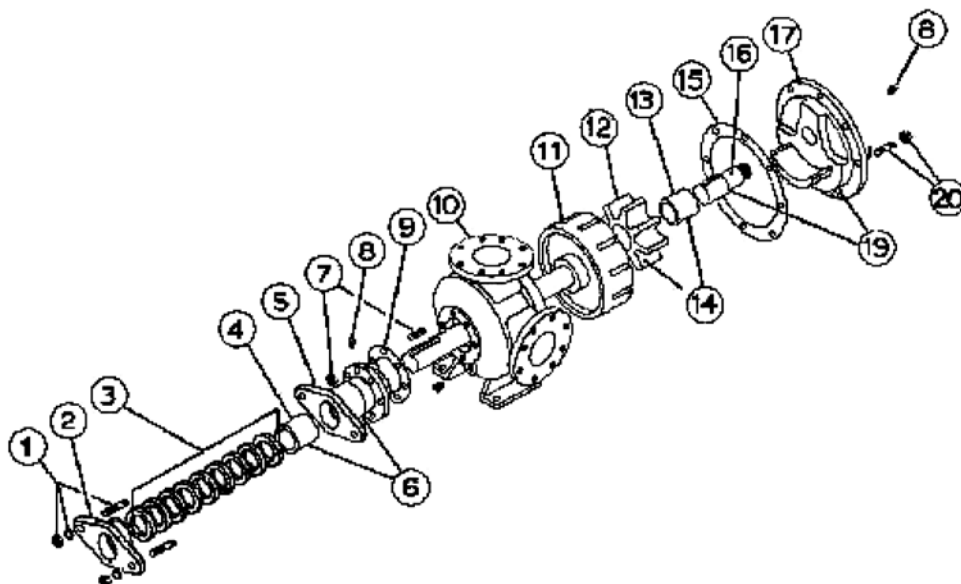
Strainers: Use a strainer on the suction side of the pump to prevent foreign material from entering the pump causing damage to the gears, and casing or lock-up the pump. Keep the strainer on the suction side of the pump clean and free of debris. A blocked strainer will not allow sufficient liquid to reach the pump. The lack of liquid reaching the pump will create cavitation. Cavitation is when the liquid vaporizes on its way to the pump, then returns to a liquid form on the surfaces of the pump. This is very noisy, damaging to a pump, and seriously affects the output.

**FIGURE 4: EXPLODED VIEW FOR PACKED PUMPS — MODEL KK-230
(WITH NON-JACKETED ROTOR BEARING SLEEVE)
NOTE: IMAGE IS REPRESENTATIVE ONLY**



Item	Name Of Part	Item	Name Of Part	Item	Name Of Part
1	Packing Gland	7	Jacketed Casing & Bushing Assembly	13	Head Gasket
2	Packing Gland Fasteners	8	Pipe Plug	14	Idler Pin
3	Packing Rings	9	Rotor & Shaft Assembly	15	Head
4	Grease Fitting	10	Idler	16	Head & Idler Pin Assembly
5	Rotor Bearing Sleeve Bushing	11	Idler Bushing	17	Head Fasteners
6	Jacketed Casing	12	Idler & Bushing Assembly		

FIGURE 5: EXPLODED VIEW FOR PACKED PUMPS — MODELS LQ-230, Q-230, M-230, N-230
(KK-230 WITH JACKETED ROTOR BEARING SLEEVE IS BOLT-ON AS SHOWN BUT WITH 2" NPT JACKETED CASING)
NOTE: IMAGE IS REPRESENTATIVE ONLY



Item	Name Of Part	Item	Name Of Part	Item	Name Of Part
1	Packing Gland Fasteners	8	Grease Fitting	15	Head Gasket
2	Packing Gland	9	Rotor Bearing Sleeve Gasket	16	Idler Pin
3	Packing Rings	10	Jacketed Casing	17	Head
4	Rotor Bearing Sleeve Bushing	11	Rotor & Shaft Assembly	19	Head & Idler Pin Assembly
5	Rotor Bearing Sleeve (RBS)	12	Idler	20	Head Fasteners
6	Rotor Bearing Sleeve & Bushing Assembly	13	Idler Bushing	21	Pipe Plug
7	Rotor Bearing Sleeve Fasteners	14	Idler & Bushing Assembly		

⚠ 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.

DISASSEMBLY: PACKED PUMPS

NOTE: For large pump models the use of a lifting device is advised.

1. Remove the packing gland fastener, and pull the gland out of the stuffing box, and off of the shaft.
2. Mark head and casing before disassembly to insure proper re-assembly. The idler pin, which is offset in pump head, must be positioned toward and centered between the port connections to allow for proper flow of liquid through pump. **"Figure 1" on page 2.**

Remove head from pump. Do not allow idler to fall from idler pin. Tilt top of head back and down when removing to prevent this. The idler and bushing should stay on the idler pin. 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" on page 10.**

The gaskets must be totally removed. Use new gasket when assembling pump.

3. Remove idler and bushing assembly from the idler pin.
4. Tap the shaft forward with a softheaded hammer, and pull it out of the casing and bushing assembly. Large assemblies can be supported with a hoist and rope or strap around a rotor tooth.

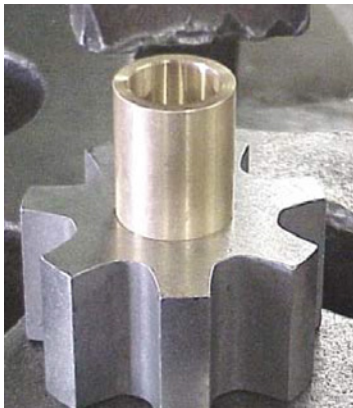
5. The packing may be removed with a packing puller. In some cases two pullers will be required, or pushed out with a chisel and a hammer from the bushing side (be careful not to damage the bushing). If removal, still cannot be done with the pullers, or chisel, stand the casing on the face of the stuffing box and press the bushing out through the packing area. This will remove all of the packing with the bushing.
 6. Clean all parts thoroughly and examine for wear and damage. Check all parts for nicks, burrs, excessive wear and replace if necessary.
 7. Check the bearings for roughness. Roughness can be determined by turning the inner and outer race in opposite directions by hand. Note if the motion is smooth and free or rough and stiff. Smooth and free is desired.
 8. The casing bushing can also be inspected while still in the casing. If replacement is necessary, and not already removed in step 5, stand the unit on the head-mounting surface and push the bushing out with a round bar through the packing end of the casing.
- NOTE:** For Q, M, and N models, the rotor bearing sleeve can be removed from the casing to make removal of the bushing easier.
9. If the idler pin is worn, remove the grease fitting, and support the casing on the crescent side as close as possible to the idler pin. Press the pin out.
 10. If the idler bushing is worn it can be pressed out of the idler. However the idler will likely be worn as much as the bushing, therefore it is recommended that the complete assembly be replaced.

ASSEMBLY: PACKED PUMPS

Rotary gear pumps are supplied with a wide variety of bushing materials. These materials should not all be treated the same. See **"Bushing Materials"** on page 9.

1. Press the idler bushing into the idler gear. **"Figure 6"** on page 5. Refer to Installation of Carbon Graphite Bushing see page 11.

FIGURE 6: IDLER BUSHING PRESS FIT



NOTE: Some bushings have a small step in the diameter on one end to assist in the alignment and starting.

2. Coat the idler pin with non-detergent SAE 30 weight oil and using the idler bushing as a guide, press the idler pin into the head with the tapped hole in and the groove pointing toward the center of the crescent. **"Figure 7"** on page 5.
3. Install the casing bushing. If the bushing has a lubrication groove, install bushing with the lubrication hole aligned with the grease-fitting hole on the casing. **"Figure 8"** on page 5. If carbon graphite, refer to **"Installation: Carbon Graphite Bushings"** on page 9.

FIGURE 7: PRESSING THE IDLER PIN



FIGURE 8: CASING BUSHING ORIENTATION



NOTE: Q, M, N and R pumps have RBS bushings installed in the rotor bearing sleeve which is mounted on the back side of the casing. **"Figure 15"** on page 6 & **"Figure 16"** on page 6.

4. Coat the shaft of the rotor and shaft assembly with non-detergent SAE 30 weight oil. Start the end of shaft in the casing bushing and slowly push the shaft through bushing. Continue until the rotor and shaft assembly cannot move any further. **"Figure 9"** on page 6.
5. Perform all step in **"End Clearance Adjustment"** on page 9.
6. Use only new packing suitable for the liquid being pumped. Install the packing, staggering the joints from one side of shaft to other, **"Figure 12"** on page 6. If needed, lubricate packing rings with oil, grease or graphite to aid assembly. Use the packing gland or a length of pipe to seat each packing ring, **"Figure 13"** on page 6.
7. Install packing gland, capscrews and nuts. Make sure the gland is installed square and nuts are only finger tight. **"Figure 14"** on page 6. Refer to **"Packing Adjustment"** on page 3 after the pump is assembled and installed.

8. Replace the grease fittings and pipe plugs.
9. Lubricate all grease fittings with multi-purpose grease.

DANGER !

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

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

FIGURE 9: CASING, ROTOR & SHAFT ASSEMBLY



FIGURE 10: PACKED CROSS SECTION

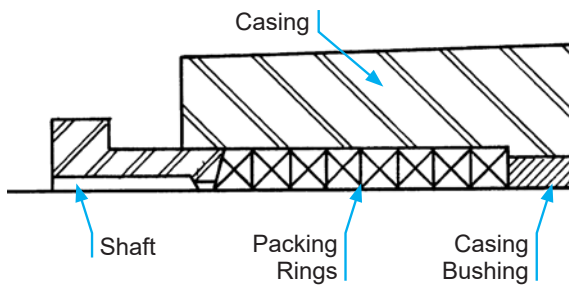


FIGURE 11: MOUNTING HEAD



FIGURE 12: ALTERNATE THE PACKING CUTS



FIGURE 13: PUSHING IN THE PACKING RINGS



FIGURE 14: GLAND & FASTENERS INSTALLED



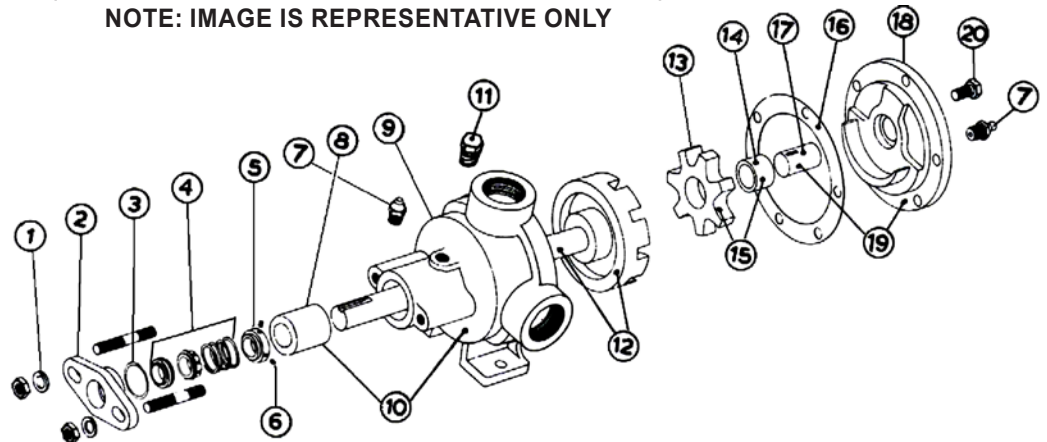
FIGURE 15: RBS BUSHING INSTALLATION



FIGURE 16: INSTALLING THE SEAL

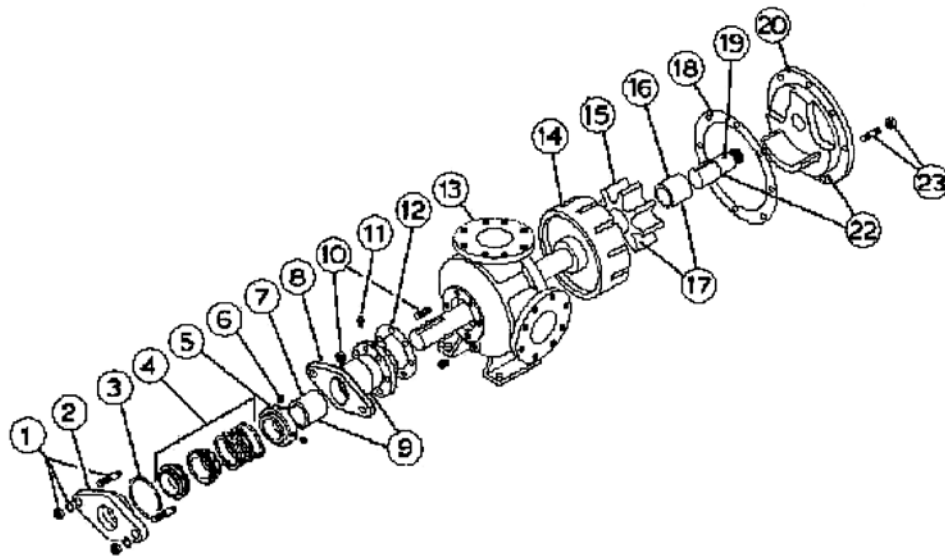


**FIGURE 17: EXPLODED VIEW FOR MECHANICAL SEAL PUMPS — MODEL KK-230
(WITH NON-JACKETED ROTOR BEARING SLEEVE)
NOTE: IMAGE IS REPRESENTATIVE ONLY**



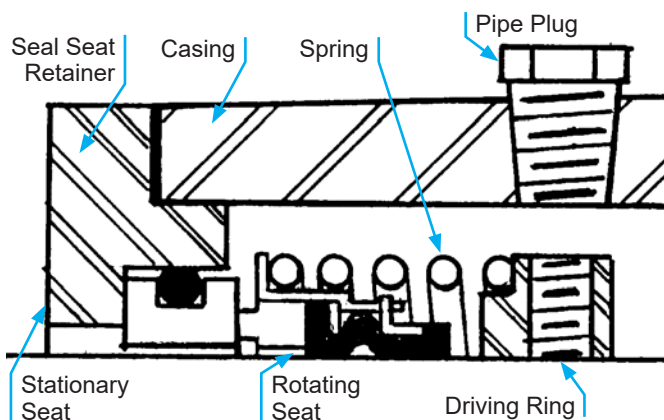
Item	Name Of Part	Item	Name Of Part	Item	Name Of Part
1	Seal Seat Retainer Fasteners	8	Casing Bushing	15	Idler & Bushing Assembly
2	Seal Seat Retainer	9	Jacketed Casing	16	Head Gasket
3	Retainer O-Ring	10	Jacketed Casing & Bushing Assembly	17	Idler Pin
4	Mechanical Seal Assembly	11	Pipe Plug	18	Head
5	Driving Ring	12	Rotor & Shaft Assembly	19	Head & Idler Pin Assembly
6	Set Screw	13	Idler	20	Head Fasteners
7	Grease Fitting	14	Idler Bushing		

**FIGURE 18: EXPLODED VIEW FOR MECHANICAL SEAL PUMPS — MODELS LQ-230, Q-230, M-230, N-230
(KK-230 WITH JACKETED ROTOR BEARING SLEEVE IS BOLT-ON AS SHOWN BUT WITH 2" NPT JACKETED CASING)
NOTE: IMAGE IS REPRESENTATIVE ONLY**



Item	Name Of Part	Item	Name Of Part	Item	Name Of Part
1	Seal Seat Retainer Fasteners	9	Rotor Bearing Sleeve & Bushing Assembly	17	Idler & Bushing Assembly
2	Seal Seat Retainer	10	Rotor Bearing Sleeve Fasteners	18	Head Gasket
3	Retainer O-Ring	11	Grease Fitting	19	Idler Pin
4	Mechanical Seal Assembly	12	Rotor Bearing Sleeve Gasket	20	Head
5	Driving Ring	13	Jacketed Casing	22	Head & Idler Pin Assembly
6	Set Screws	14	Rotor & Shaft Assembly	23	Head Fasteners
7	Rotor Bearing Sleeve Bushing	15	Idler		
8	Rotor Bearing Sleeve (RBS)	16	Idler Bushing		

FIGURE 19: MECHANICAL SEAL CROSS SECTION



⚠ 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.

DISASSEMBLY: SEALED PUMPS

1. Remove the fasteners from the seal seat retainer and pull it away from the seal chamber. Remove the rotating seat and the spring from the shaft.
2. Remove the pipe plug from the casing in the side of the seal chamber and loosen the 2 setscrews on the driving ring through the tapped hole in the side of the seal chamber. **"Figure 22" on page 8**
3. Remove the driving ring from the shaft.
4. Do steps 2 through 4 under **"Disassembly: Packed Pumps"** on page 4.
5. Do steps 6, through 10 under **"Disassembly: Packed Pumps"** on page 4

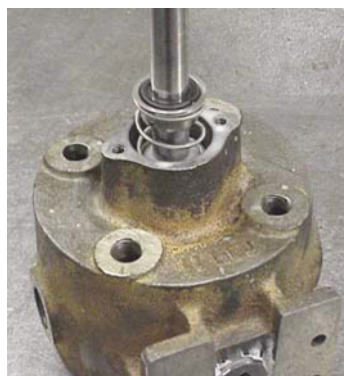
FIGURE 20: INSTALL STATIONARY SEAT



FIGURE 21: SETTING THE DRIVING RING



FIGURE 22: INSTALLING; ROTATING SEAL COMPONENTS



ASSEMBLY: SEALED PUMPS

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

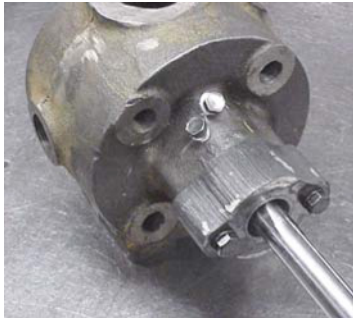
The principle of the mechanical seal is that contact between the rotary and stationary members. These parts are lapped to a high finish and their sealing effectiveness depends on complete contact.

A number of pumps are supplied with special mechanical seals. These special seals are not discussed in this TSM. Information is available by contacting the factory. When requesting special seal information, be sure to give pump model number and serial number.

There is a wide variety of bushing materials available, these materials should not all be treated the same. See **"Bushing Materials"** on page 9.

1. Repeat steps 1 through 5 of **"Assembly: Packed Pumps"** on page 5.
2. Clean the oil off of the shaft, and apply lubricant as recommended by your seal supplier to the shaft, the inner diameter of the rotating element, and the outer diameter of the stationary element of the mechanical seal.
3. Place the O-ring in the small groove in the seal seat.
4. Press the stationary seat into the seal seat retainer while protecting the face as pictured in **"Figure 20"** on page 8.
5. Place the spring on driving ring with the setscrews already started in the threads. Put the spring and ring on the shaft.

FIGURE 23: SEAL SEAT RETAINER INSTALLED



6. Slide the rotary member with the lapped contact surface facing away from spring onto shaft until it is in the spring. **"Figure 21" on page 8.**
7. Push the seal seat, spring and driving ring into the stuffing box so that the driving ring is visible through the access hole in the side of the seal chamber. Rotate the shaft until the setscrews are accessible, then tighten down the two setscrews on the ring. **"Figure 22" on page 8**
8. Put the seal seat retainer on the shaft with the stationary element facing toward the rotating element on the shaft.
9. Start the fasteners on the retainer, and tighten by hand until the seal faces touch and a small amount of pressure is applied by the spring. Check that the retainer is centered and square with the shaft.
10. Tighten the fasteners evenly and in small increments. **"Figure 23" on page 9.**
11. Replace the pipe plug in the hole in the side of the seal chamber.
12. Replace the grease fittings and pipe plugs.
13. Lubricate all grease fittings with multi-purpose grease.

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.

INSTALLATION: 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. Lubricate the bushing and bore with soapy water.
3. Be certain the bushing is started straight.
4. Do not stop pressing operation until bushing is in proper position. Starting and stopping will result in a cracked bushing.
5. Check bushing for cracks after installation.

BUSHING MATERIALS

Viking bushing material recommendations.

Material	Appearance	Installation Lubricant	Operating Lubrication
Bronze	Yellowish	Not Required	Required
Carbon	Black	Soapy Water	Not Required
Iron	Steel	Oil or Anti-Seize	Required
Nitralloy	Steel	Oil or Anti-Seize	Required
Tungsten	Steel	Oil or Anti-Seize	Not Required

END CLEARANCE ADJUSTMENT

1. The rotor and shaft assembly must be in the casing as far as possible.
2. Measure the distance between the rotor teeth and the outer face of the casing. **"Figure 24" on page 9**
3. Measure the distance between the mounting surface and the first step on the head. **"Figure 25" on page 9**
4. Subtract the two measurements and add your required end-clearance.
5. Use 0.015" gaskets to attain the thickness as calculated above.
6. Place the gaskets on the head. **"Figure 11" on page 6.**
7. With the idler and bushing on the idler pin, place the head and idler inside the rotor teeth.
8. Rotate into the proper position while pushing the head to the casing.
9. Bolt into place and tighten evenly.

FIGURE 24: MEASURE THE ROTOR TO CASING



FIGURE 25: MEASURE THE HEAD



PNEUMATIC TESTING

1. Seal the ports with pipe plugs. Be sure to provide a male air line connection to one of the ports.
2. Apply approximately 50 psi of air pressure to the pump. **"Figure 26" on page 10**
3. Spray or brush the externals with soapy water and watch for growing air bubbles on any pump component. These bubbles will indicate where leaks are occurring.
4. Relieve the pressure from the pump.
5. Carefully disconnect the air supply.
6. Remove the plugs or covers from the ports.
7. Return the pump to service.

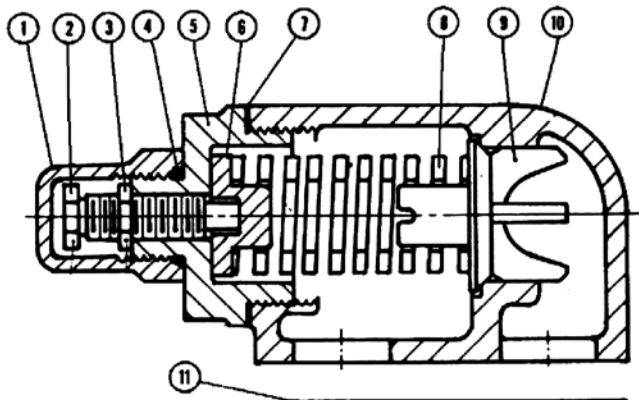
FIGURE 26: PNEUMATIC TESTING



PRESSURE RELIEF VALVE INSTRUCTIONS

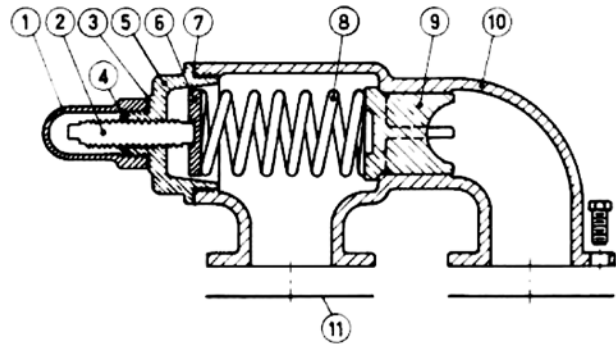
"A" SIZE

NOTE: Image is representative only.



"B" & "C" SIZE

NOTE: Image is representative only.



Relief Valve - List of Parts

1.	Bonnet	7.	Cap Gasket
2.	Adjusting Screw	8.	Spring
3.	Bonnet O-Ring	9.	Poppet
4.	Lock Nut	10.	Relief Valve Body
5.	End Cap	11.	Relief Valve Port Gasket
6.	Spring Guide		

⚠ 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.

DISASSEMBLY

Mark valve and head before disassembly to ensure proper reassembly.

1. Remove bonnet.
2. Measure and record length of adjusting screw protruding out of the end cap.
3. Loosen locknut and back out adjusting screw until spring pressure is released.
4. Remove relief valve cap, spring guide, spring and poppet from valve body. Clean and inspect all parts for wear or damage and replace as necessary.

ASSEMBLY

1. Clean and inspect all parts for wear or damage and replace as necessary. Insert the poppet, spring, and spring guide into the valve body. **"Figure 27" on page 11, "Figure 28" on page 11.**
2. Put two gaskets on the cap, and install it into the relief valve body.
3. Put the adjusting screw into the relief valve cap so that the portion protruding out of the end cap is the same as that measured from disassembly. **"Figure 29" on page 11**
4. Lock the adjusting screw into location with the lock nut.
5. Put the O-ring over the threads on the relief valve cap and install the bonnet. **"Figure 30" on page 11**

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 **"Figure 2" on page 2** and **"Figure 3" on page 2**.

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. Install a pressure gauge in discharge line for actual adjustment operation. **Do this with all pressure relieved from the system.**
2. Carefully remove the bonnet which covers the adjusting screw.
3. Loosen the lock nut which locks the adjusting screw so that the pressure setting will not change during operation of pump.
4. With the pump operating, read the pressure from the gauge. There will be a leak around the adjusting screw.
5. Turn adjusting screw in to increase pressure and out to decrease pressure. Remember that the relief valve should not open during normal conditions.
6. Closing a valve in the piping will stopping all flow. A pressure gauge on the discharge port of the pump will show the maximum pressure that the relief valve will allow while pump is in operation..

IMPORTANT ORDERING INFORMATION

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.

FIGURE 27: POPPET



FIGURE 28: SPRING & RETAINER



FIGURE 29: END CAP, SCREW & NUT



FIGURE 30: BONNET



TROUBLESHOOTING

No discharge	Pump priming may be required
	Suction lift is too great
	Relief valve is stuck open
	Strainer needs cleaning
	Wrong direction of rotation
Insufficient discharge volume	Air leaks in suction
	Speed is too slow
	Relief valve is set too low
	Suction lift too high for liquid handled (this is very important on hot or volatile fluids)
	Suction line is not submerged
	Suction piping too small in diameter, or foot valve is too small
	Wrong rotation
	Pump internals worn
	Air or gases in suction piping
Insufficient pressure	Viscosity is higher than expected
	Relief valve set too low
	Air or gases in the fluid
	Pump internals are worn
	Insufficient volume being pumped
	Wrong rotation
Loss of suction after a period of operation	Improper clearances in the internals
	Suction line is leaking (letting air into the pump)
	Packing is too loose or the mechanical seal is leaking
Excessive power requirement	Leaking Gaskets
	Viscosity too high
	Discharge pressure is too high
	Insufficient lubrication
Noisy operation with good performance	Shaft or rotor bent, misalignment or packing gland is too tight
	Misalignment of coupling
Noisy operation with poor or no performance	Worn bearings
	Cavitation – Not enough fluid getting to the pump
Leaking around the shaft	Worn bearings or bushings
	Packing is loose, or needs replacement
	Mechanical seal is damaged or misaligned
	Shaft is scored
	Shaft is bent

TECHNICAL SERVICE MANUAL: INSTALLATION, OPERATION & MAINTENANCE

LIQUID SPECIFIC PRODUCT LINE:
CAST IRON ASPHALT PUMPS

230 SERIES™

SIZES: KK, LQ, Q, M, N

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VIKING PUMP®

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