



TECHNICAL SERVICE MANUAL

BEHIND THE ROTOR SEAL HEAVY DUTY PUMPS
 SERIES 4124B AND 4224B CAST IRON
 SIZES G, H, HL, AK, K, KK, L, LQ, LL

SECTION	TSM 628
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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 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.

In the Viking model number system, basic size letters are combined with series number (4124B, 4224B) indicating basic pump construction material.

This manual deals only with Series 4124B (non-jacketed) and 4224B (jacketed) Heavy Duty Bracket Mounted Pumps. **Refer to Figures 1 through 7** for general configuration and nomenclature used in this manual. Pump specifications and recommendations are listed in Catalog Section 628, Viking Behind the Rotor Seal Internal Gear Pumps.

UNMOUNTED PUMP		UNITS
G4124B		B = Bracket Mounted Pump with Mechanical Seal Behind the Rotor
H4124B	H4224B	
HL4124B	HL4224B	Units are designated by the unmounted pump model numbers followed by a letter indicating drive style.
AK4124B		
K4124B	K4224B	
KK4124B	KK4224B	
L4124B	L4224B	V = V-Belt
LQ4124B	LQ4224B	D = Direct Connected
LL4124B	LL4224B	R = Viking Speed Reducer
		P = Commercial Speed Reducer

Note: Series 4124B and 4224B pumps fitted with optional pinned-seat seals (the abrasive liquid seals used in 4624B Series pumps) should reference Technical Service Manual 410.4 for information on seal replacement.



FIGURE 1 - K4124B



FIGURE 2 - L4224B

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. 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 plate are generally 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 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.
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 these pumps. Be sure to read and follow all special instructions supplied with your pump.

MAINTENANCE

Series 4124B & 4224B 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. **Refer to Engineering Service Bulletin ESB-515.** Consult factory with specific lubrication questions. Applications involving very high or low temperatures will require other types of lubrication.

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.

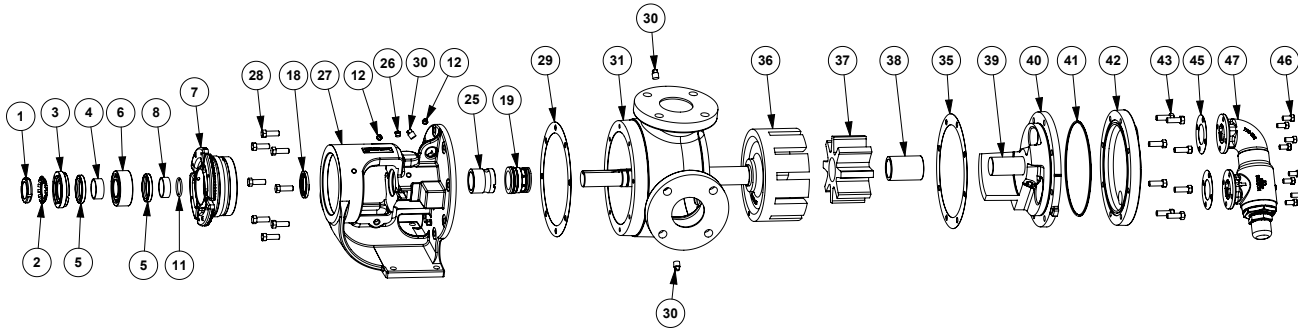
STORAGE: If pump is to be stored, or not used for six months or more, pump must be drained and a light coat of light oil must be applied to all internal pump parts.

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. 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 series 4124B & 4224B 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. Mechanical seal installation sleeve
2-751-001-730 for 0.75 inch seal; G pumps.
2-751-002-900 for 1.125 inch seal; H-HL pumps.
2-751-003-900 for 1.4375 inch seal; AK,K,KK pumps.
4. Bearing locknut spanner wrench
(Source: #471 J. H. Williams & Co. or equal)
5. Spanner wrench, adjustable pin type for use on bearing housing (Source: #482 J. H. Williams & Co. or equal)
6. Brass or hardwood bar
7. Arbor press

REPAIR: MODELS G, H, HL, AK, K, KK, L, LQ AND LL BEHIND THE ROTOR COMPONENT MECHANICAL SEAL PUMPS



ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	19	Mechanical Seal	38	Idler Bushing
2	Lockwasher	25	Bracket Bushing	39	Idler Pin
3	End Cap	26	Pressure Relief Fitting for Bracket	40	Head and Idler Pin Assembly
4	Bearing Spacer Collar (Outer)	27	Bracket	41	Gasket for Jacket Head Plate (4224B)
5	Lip Seal	28	Capscrew for Bracket	42	Jacket Head Plate (4224B)
6	Ball Bearing	29	Bracket Gasket	43	Capscrew for Head
7	Bearing Housing	30	Pipe Plug	45	Relief Valve Gasket
8	Bearing Spacer Collar (Inner)	31	Casing (Tapped or Flanged)	46	Capscrew for Relief Valve
11	Ring, Half Round (Not G, H, HL)	35	Head Gasket	47	Internal Relief Valve
12	Grease Fitting	36	Rotor and Shaft		
18	Lip Seal	37	Idler		

FIGURE 3 - EXPLODED VIEW SERIES 4124B MODELS

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 head and casing before disassembly to insure proper reassembly. The 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 the 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 7.**

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. **Note:** G size uses sealed bearings and does not have a lock washer, lip seals or half-round rings.
4. Loosen two setscrews in the face of the bearing housing and remove the bearing housing assembly from the bracket. **Refer to Figure 4.**
5. Remove pair of half round rings under the inner spacer collar from the shaft. There are no half round rings on the G, H and HL size pumps.

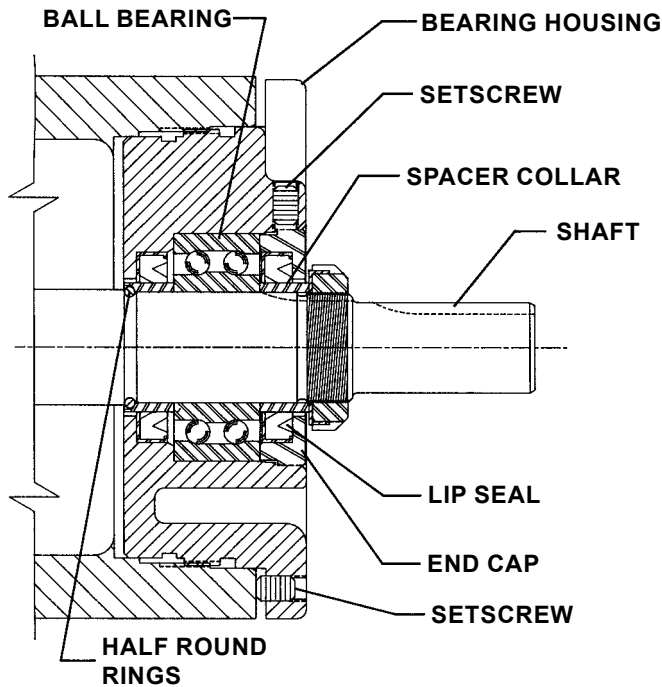


FIGURE 4

6. Carefully remove rotor and shaft to avoid damaging bracket bushing. If damaged or worn, remove bushing.
7. Remove bracket lip seal (Item 18).
8. Loosen two radial setscrews in flange of bearing housing and with a spanner wrench remove the outer end cap with lip seal and outer bearing spacer collar. **Note:** G size uses sealed bearings and does not have a lock washer, lip seals or half-round rings.
9. Remove the double row ball bearing, lip seal and inner bearing spacer collar from the bearing housing. **Note:** G size uses sealed bearings and does not have a lock washer, lip seals or half-round rings.
10. Remove the rotary member of the mechanical seal from the rotor shaft. Remove the seal seat from the bracket.
11. 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 light oil and check for roughness. Roughness can be determined by turning outer race by hand.

Note: G size uses sealed bearings

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

ASSEMBLY

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 6.** Make sure slots in the face of the bushing are towards rotor end of the bracket.

2. Clean rotor shaft and seal housing bore. Make sure they are free of dirt, grit and scratches. Gently radius leading edge of shaft diameter over which seal is to be placed.
Never touch mechanical seal faces with anything except clean hands or clean cloth. Minute particles can scratch the seal faces and cause leakage.
3. Place tapered installation sleeve on the shaft. Coat tapered sleeve and inside of the rotary member with a generous quantity of light oil. Grease is not recommended. Start rotary member on shaft and over tapered sleeve. **Refer to Figure 5.**

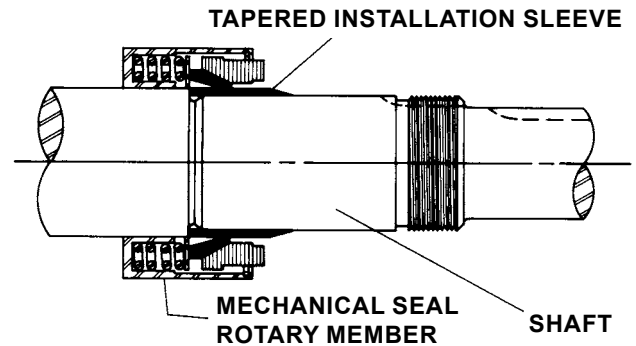


FIGURE 5

4. Move rotary member all the way on the rotor shaft until it is against the rotor hub. If the seal uses setscrews to secure the seal to the shaft, tighten the setscrews once the seal is in place. Some PTFE seals are equipped with holding clips which compress the seal springs. Remove holding clips to release springs after seal is installed on shaft.
5. Lubricate outer diameter of seal seat gasket with oil. Press seal seat into bore until back, unlapped face bottoms in bore. Make sure the seat anti-rotation pins are aligned with slots in the bracket bushing.
6. Coat rotor shaft and face of mechanical seal with light oil. Start end of shaft in bracket bushing turning from right to left, slowly pushing rotor in casing.
7. Coat idler pin with light oil and place idler and bushing on idler pin in head. If replacing with carbon graphite bushing, **Refer to installation of Carbon Graphite Bushings, page 6.**
8. 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 the equal distance between port connections to allow for proper flow of liquid through pump. If pump is equipped with jacketed headplate, install at this time along with new gasket.
9. Tighten head capscrews evenly.
10. Install bracket lip seal (Item 18, lips toward head end).
11. Slide inner spacer collar over shaft with recessed end facing rotor. G, 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 the G, H and HL size pumps.

12. Install the lip seal (lip toward end of shaft) in the bearing housing and turn the bearing housing into the bracket.
13. Pack the ball bearing with grease, place on the shaft and push or drive into place in housing.
14. Install the lip seal (with lip toward end of shaft) and bearing spacer collar in the outer end cap and turn the end cap into the bearing housing until tight against the bearing. Lock in place with two set screws in the flange of the bearing housing. **Note:** G size has no lip seal.
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 20-30 ft.-lbs. torque (G), 50-70 ft.-lbs. torque (H, HL) or 100-130 ft.-lbs. torque (AK, K, KK, L, 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.

Note: G size has no lockwasher.

Remove length of hardwood or brass from port opening.

3. Tighten the two self-locking type "Allen" set screws, in the outboard face of the bearing housing, with equal force against the bracket. Your pump is now set with standard end clearances and locked.

NOTE: Be sure the shaft can rotate freely. If not, back off additional length on outside diameter and check again.

4. High viscosity liquids required additional end clearances. The amount of extra end clearance depends on the viscosity of the liquid pumped. For specific recommendations, consult your Viking Pump distributor.

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 for idler to 750°F.
2. Install cool bushing 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 factory with specific questions on high temperature applications. **Refer to Engineering Service Bulletin ESB-3.**

THRUST BEARING ADJUSTMENT SIZE G, H, HL, AK, K, KK, L, LQ, & LL PUMPS

1. Loosen the two set screws in the outer face of the bearing housing and turn this thrust bearing assembly clockwise until it can no longer be turned by hand. Back off counter-clockwise until the rotor shaft can be turned by hand with a slight noticeable drag.
2. For standard end clearance, back off the thrust bearing assembly the required length measured on the outside diameter of the bearing housing. **See Table 1.**

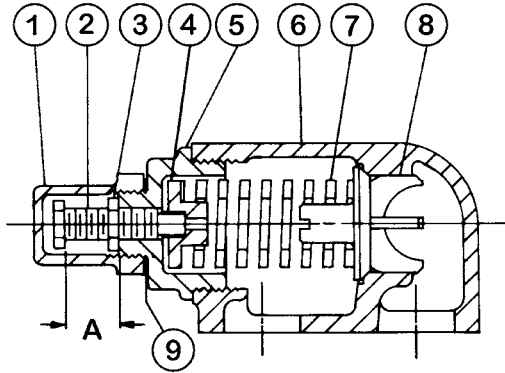
PUMP	STANDARD END CLEARANCE	TURN BEARING HOUSING CCW LENGTH ON OD (INCH)	ADDITIONAL LENGTH ON OD BEARING HOUSE FOR 0.001" END CLEARANCE
G 4124B	0.003"	0.60"	0.20"
H & HL 4124B	0.003"	0.75"	0.22"
H & HL 4224B	0.007"	1.5"	
AK4124B	0.005"	1.25"	0.25"
K & KK 4124B	0.005"	1.25"	
K & KK 4224B	0.010"	2.5"	
L, LQ, LL 4124B	0.005"	1.25"	
L, LQ, LL 4224B	0.010"	2.5"	

TABLE 1

RELUBRICATION

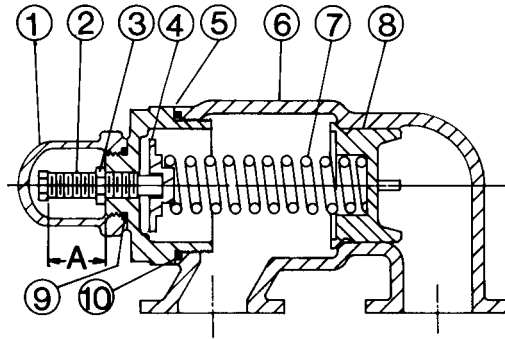
Before putting pump back into service, add grease to the bracket grease fitting until it comes out of the relief fitting on the opposite side of the bracket (use petroleum jelly, petrolatum or other similar low melting point lubricant). Regrease the bearing housing until grease comes out of the shaft end lip seal (use multi-purpose grease NLGI #2).

PRESSURE RELIEF VALVE INSTRUCTIONS



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

FIGURE 6
SIZES G, H AND HL



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

FIGURE 7
SIZES K, KK, L, LQ AND LL

DISASSEMBLY

DANGER !

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

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

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

Mark 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 Figure 6 and Figure 7.
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 if necessary.

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.

VIKING PUMP

TECHNICAL SERVICE MANUAL

BEHIND THE ROTOR SEAL HEAVY DUTY PUMPS
SERIES 4124B AND 4224B CAST IRON
SIZES G, H, HL, AK, K, KK, L, LQ, LL

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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 adjusting operation.
3. Turn adjusting screw in to increase pressure and out to decrease pressure.
4. With discharge line closed at 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.

AUSTRALIAN DISTRIBUTOR



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VIKING PUMP

WARRANTY

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

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

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