

TECHNICAL SERVICE MANUAL: INSTALLATION, OPERATION & MAINTENANCE



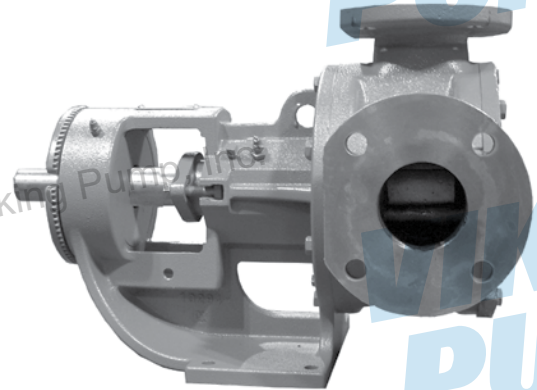
**HEAVY-DUTY BRACKET MOUNTED PUMPS
MODEL LV3900
MAINTENANCE AND REPAIR INSTRUCTIONS**

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INTRODUCTION

This bulletin deals exclusively with the Model LV3900 Heavy Duty Pump. The illustrations used are to help you identify pump parts by name and to assist in the maintenance and repair of your pump.

When ordering repair parts, secure a parts list from your Viking representative and be sure to give the complete part name and material as well as the pump model and serial number.



**MODEL LV3900
FIGURE 1**

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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, power takeoff, 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.

To extend the life of the LV3900, it is recommended that the pump be operated within the catalog ratings whenever possible.

Catalog Ratings		
Nominal Flow	GPM	140
	m ³ /h	32
Pressure Range	PSI	200 PSI: 100 SSU and above. (Contact factory for pressures greater than 200 PSI)
	Bar	14 Bar: 20 cSt and above 7 Bar: below 20 cSt
Temp. Range	(°F)	+ 225
	(°C)	+ 120
Viscosity Range		Up to 750 SSU

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 pump's rated pressure, speed, 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.

Rotation: The Model LV3900 is bi-rotational. When rotating CW, the suction port is the side port. When rotating CCW, the suction port is the top port.

MAINTENANCE

Model LV3900 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: Before each use, external lubrication should be applied slowly with a handgun at all 4 lubrication fittings provided. A good quality of general purpose grease is satisfactory in the majority of cases, however, applications involving very high or low temperatures may require other types of lubricants. Do not over-grease. Consult the factory if you have specific lubrication questions.

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

CLEANING PUMP: It is good practice to keep pump as clean as possible. This will facilitate inspection, adjustment and repair work and help prevent omission of lubrication to fittings covered or hidden with dirt.

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

SUGGESTED REPAIR TOOLS: The following tools must be available to properly repair Model LV3900 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
3. Packing hooks, flexible
4. Bearing locknut spanner wrench (Source: #471 J. H. Williams & Co. or equal)
5. Spanner wrench, adjustable pin type for use on double end caps (Source: #482 J. H. Williams & Co. or equal)
6. Brass bar
7. Arbor press

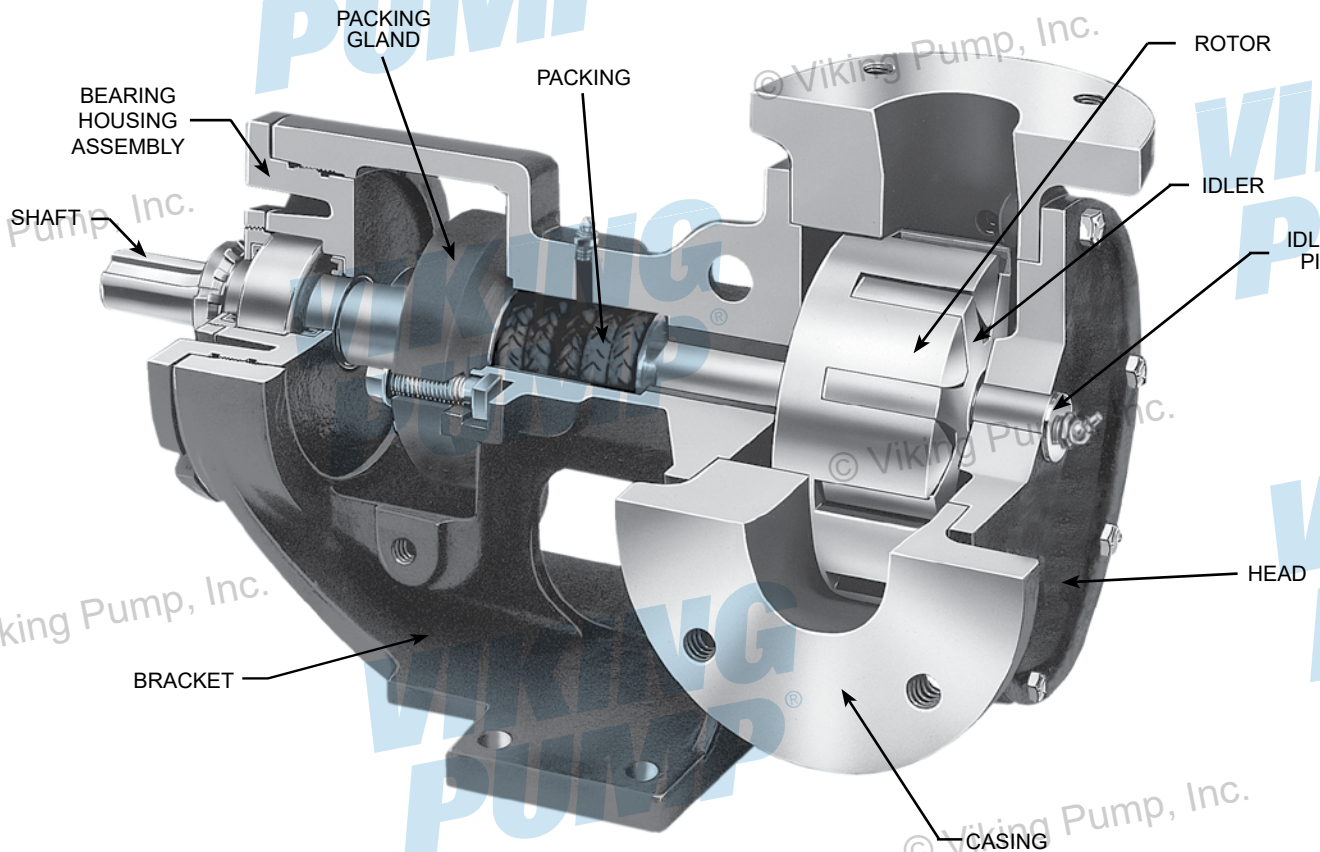


FIGURE 2
(PUMP SHOWN FOR NOMENCLATURE REFERENCE ONLY)

EXPLODED VIEW - MODEL LV3900 (FOR PARTS IDENTIFICATION)

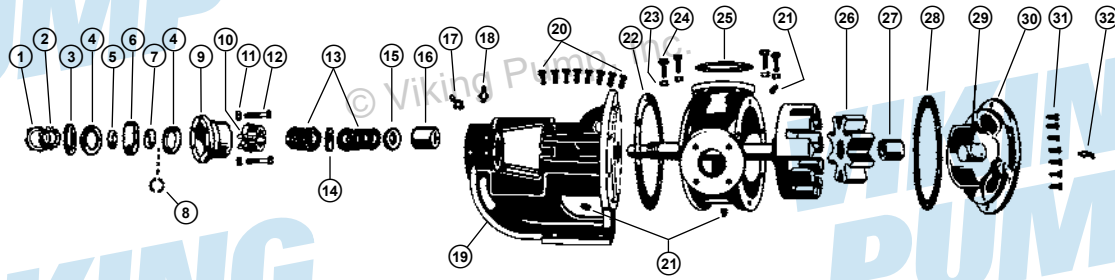


FIGURE 2

ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Locknut	13	Packing	25	Pipe Flange Gasket
2	Lockwasher	14	Lantern Ring	26	Idler, Idler Disc, and Lipseal
3	End Cap for Bearing Housing	15	Packing Retainer Washer	27	Idler Bushing
4	Lipseal for Bearing Housing	16	Bracket Bushing	28	Head Gasket
5	Bearing Spacer Collar (Outer)	17	Pressure Relief Plug	29	Idler Pin
6	Ball Bearing	18	Grease Fittings	30	Head and Idler Pin
7	Bearing Spacer Collar (Inner)	19	Bracket and Bushing	31	Capscrew for Head
8	Ring, Half Round	20	Capscrew for Bracket	32	Grease Fitting
9	Bearing Housing	21	Pipe Plug		
10	Packing Gland	22	Back Flange Gasket		
11	Packing Gland Nut	23	Nut		
12	Packing Gland Capscrew	24	Studs		

DISASSEMBLY

1. Mark head and casing before disassembly to insure proper reassembly. The idler pin, which is offset in pump head, must be positioned toward and equal distance between port connections to allow for proper flow of liquid through 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.
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.
4. Loosen two setscrews in the face of the bearing housing and remove the bearing housing assembly from the bracket. **Refer to Figure 5.**
5. Remove pair of half round rings under the inner spacer collar from the shaft.
6. Remove packing gland capscrews, slide packing gland out of stuffing box, remove packing and lantern ring.
7. Carefully remove rotor and shaft to avoid damaging bracket bushing.
8. Loosen two radial setscrews in flange of bearing housing and with a spanner wrench remove the outer end cap with lipseal and outer bearing spacer collar.
9. Remove the double row ball bearing, lipseal and inner bearing spacer collar from the bearing housing.
10. 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.

11. 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-o'clock position in bracket.
2. Coat shaft of rotor shaft assembly with light oil. Start end of shaft in bracket bushing turning from right to left, slowly pushing rotor in casing.
3. Coat idler pin with light oil and place idler and bushing on idler pin in head.
4. 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.
Tighten head capscrews evenly.
5. When assembling packed pump, use packing suitable for liquid being pumped. Install packing, staggering the joints from one side of shaft to other. Lubricate packing rings with oil, grease, or graphite to aid assembly. **NOTE:** Be sure the lantern ring is positioned below the grease fitting. Install and seat each ring of packing one at a time, staggering the ring joints from one side of the shaft to the other. Lubricate the packing rings with oil, grease or graphite to aid assembly. A length of pipe or tubing will

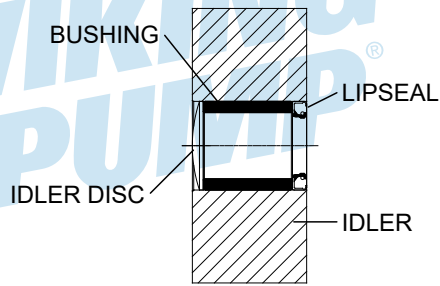


FIGURE 3

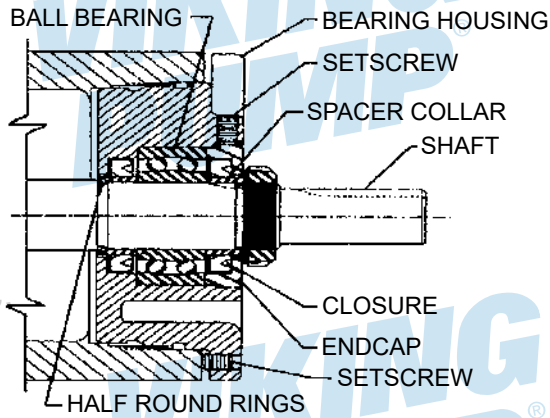


FIGURE 4

help to install and seat each packing ring. Install packing gland, capscrews, and nuts. Make sure gland is installed square and nuts are tightened evenly. Tighten nuts until packing gland is snug against packing.

6. Slide the inner spacer collar over the shaft with recessed end facing rotor.
7. Install the lip seal (lip toward end of shaft) in the bearing housing and turn the bearing housing into the bracket.
8. Pack the ball bearing with grease, place on the shaft and push or drive into place in the housing.
9. 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.
10. 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 90-110 Ft. - lbs. Torque. Bend one tang of lockwasher into slot of locknut. If tang does not line up with slot, tighten locknut until it does. Failure to tighten locknut or engage lockwasher tang could result in early bearing failure and cause damage to pump.
Remove length of hardwood or brass from port opening.

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

See Fig. 5

1. Loosen the two set screws "A" in the outer face of the bearing housing "B" clockwise until it cannot 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 "B" 1.25" length measured on the outside of the bearing housing.

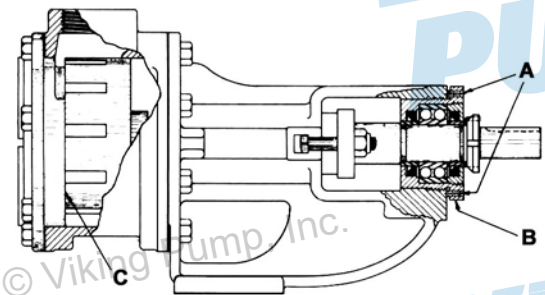


FIGURE 5

3. Tighten the two self locking type "Allen" set screws "A" 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 notches and check again.
4. High viscosity liquids require additional end clearances. The amount of extra end clearance depends on the amount of the liquid pumped. For specific recommendations, consult the factory. Each additional 1/4" on the outside diameter of the bearing housing is equivalent to an extra end clearance of .001".

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ESB-515

Effective 25-July-19

LUBRICATION OF VIKING PUMPS

Usage of Grease	General Description of Grease Used by Viking	Viking Recommended Supplier
Grease used for anti-friction bearings, sleeve bearings and lantern rings	Premium EP, Multi-purpose polyurea base grease	Any NLGI Grade 2 premium quality, multi-purpose, polyurea grease
Grease used for bracket bushing when seal is behind rotor	Petrolatum	Chevron Petrolatum Snow White
Grease used for O-Pro™ Seal	Edible Grease, aluminum complex	Chevron FM ALC EP 0, 1, 2

Lubricate each grease fitting every 500 hours of operation or every six months, whichever occurs first. If service is severe, grease more often. Be sure the grease is compatible with the grease used by Viking. Grease used for the bracket bushing and O-Pro™ Seal should be compatible with the liquid being pumped.

Reservoir on Ammonia Pumps: The Series 4924A ammonia pumps are shipped without oil in the reservoir. Before start-up, fill the reservoir with one pint of Light Refrigeration Oil that is compatible with the Neoprene seal and with a maximum viscosity of 15,000 SSU at operating temperature. Drain and refill the reservoir after the first 200 hours of operation and every 1000 hours thereafter. Refer to Technical Service Manual TSM 1467.

Pumping Chamber of Stainless Pumps: All internal parts are coated with test fluid to avoid galling when the pump is first installed. Be sure the pump is kept full of liquid when in operation to prevent damage to the pump.

LUBRICATION OF VIKING REDUCERS

Viking gear reducers, "A", "B", "C" sizes use SAE 30 oil above 32°F and SAE 10W oil below 32°F.

- A Size: 3/8 PT. (6 oz.)
- B Size: 1/2 PT. (8 oz.)
- C Size: 2-1/4 PT. (36 oz.)

Viking gear reducers are shipped less oil. Before start-up, fill to proper level with quantity and type of oil shown in box at left. After first 100 hours of operation, drain and refill with new lubricant. Check lubricant level every 2000 hours or every six months. Once each year, drain and refill.

LUBRICATION OF VIKING ASSOCIATIVE EQUIPMENT

Check any motor, coupling, gear reducer or other drive equipment for manufacturer's instructions and lubricate as recommended.



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.

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