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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 Canada representative. Always give complete name of part, part number and material with model number and serial number of pump when ordering repair parts. The pump model number and serial number are on the nameplate.

In the Viking model number system, basic size letters are combined with series number.



KK-480

UNMOUNTED PUMP	UNITS
J-480	Units are designated by the unmounted pump model numbers followed by "Arrangement" indicating drive style.
K-480	
KK-480	
L-480	
LQ-480	13-Direct Connected
LL-480	53-Belt Driven
	70-Commercial Speed Reducer
	90-Commercial Gear Motor

This manual deals only with Series 480 Heavy Duty Bracket Mounted Pumps. Pump specifications and recommendations are listed in Catalog Section 3, series 480 Heavy Duty Bracket Mounted Pumps.

DANGER

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

1. THAT ANY PRESSURE IN CHAMBER HAS BEEN COMPLETELY VENTED THROUGH SUCTION OR DISCHARGE LINES OR OTHER APPROPRIATE OPENINGS OR CONNECTIONS.
2. THAT THE DRIVING MEANS (MOTOR, TURBINE, ENGINE, ETC.) HAS BEEN "LOCKED OUT" OR MADE NON-OPERATIONAL SO THAT IT CANNOT BE STARTED WHILE WORK IS BEING DONE ON PUMP.
3. THAT YOU KNOW WHAT LIQUID THE PUMP HAS BEEN HANDLING AND THE PRECAUTIONS NECESSARY TO SAFELY HANDLE THE LIQUID. OBTAIN A MATERIAL SAFETY DATA SHEET (MSDS) FOR THE LIQUID TO BE SURE THESE PRECAUTIONS ARE UNDERSTOOD.

FAILURE TO FOLLOW ABOVE LISTED PRECAUTIONARY MEASURES MAY RESULT IN SERIOUS INJURY OR DEATH.

ROTATION: 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 pump models. Options may include a return to tank relief valve
4. Relief valve bonnet (see page 11) must *always* point towards suction side of pump.
5. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure.

MAINTENANCE

Series 480 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: All pumps are greased at the factory.

CLEANING PUMP: Keep pump as clean as possible. This will facilitate inspection, adjustment and repair.

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. 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 480 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. Mechanical seal installation sleeve
5. Bearing lock nut wrench or hammer and punch
6. Spanner wrench, adjustable pin type for use on end caps (Source: #482 J. H. Williams & Co. or equal) or hammer and punch
7. Brass bar
8. Arbor press

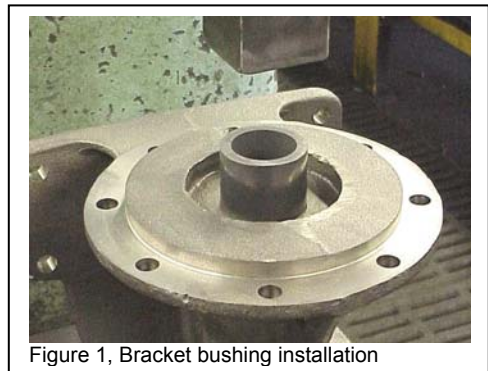


Figure 1, Bracket bushing installation

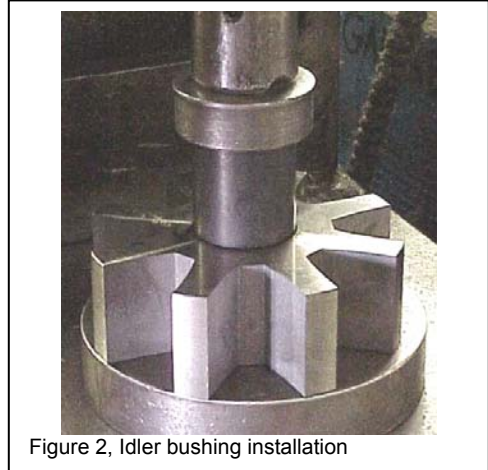


Figure 2, Idler bushing installation

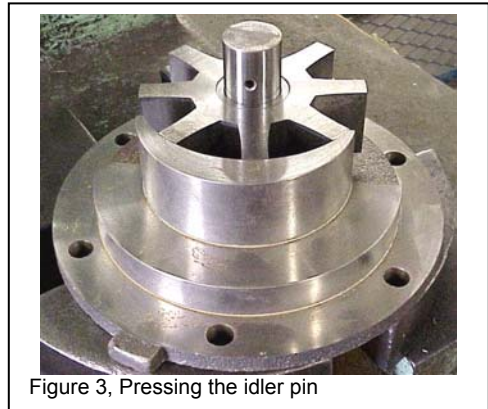


Figure 3, Pressing the idler pin

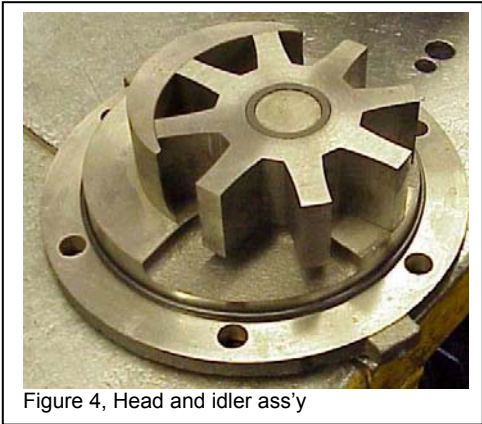
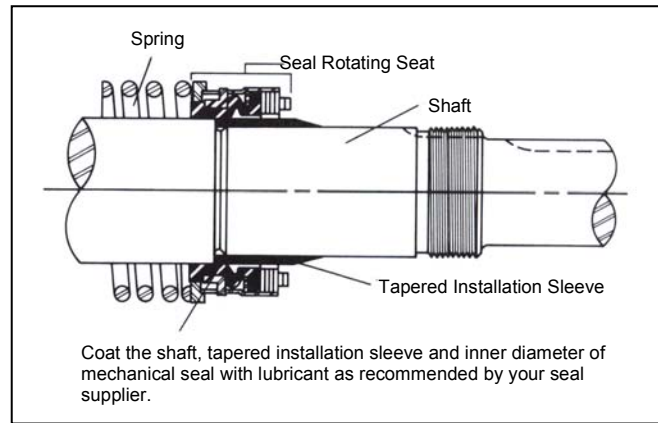
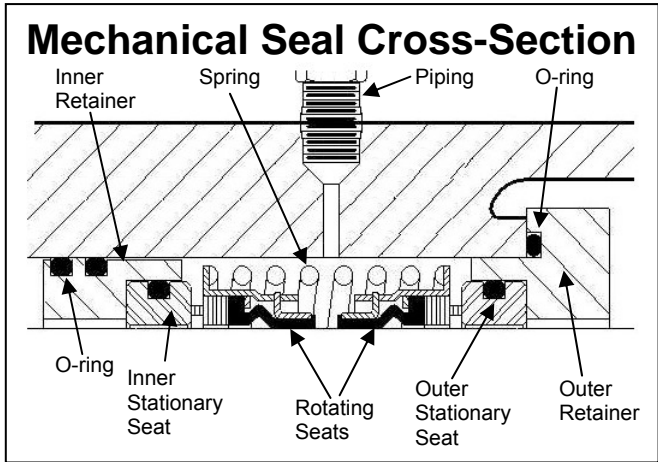


Figure 4, Head and idler ass'y

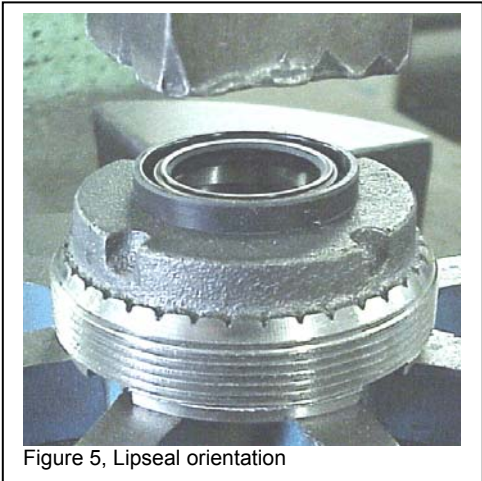


Figure 5, Lipseal orientation

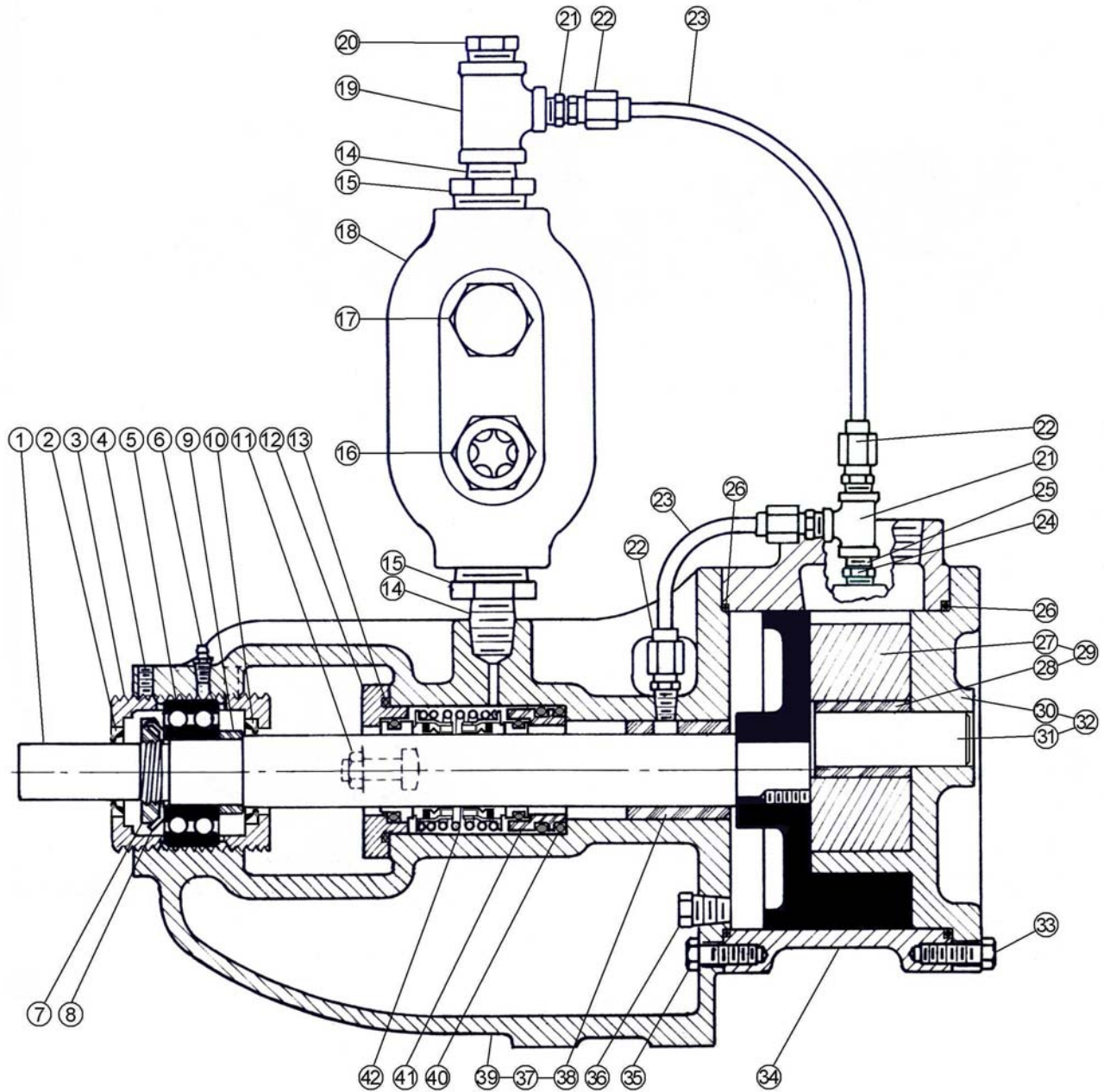


Figure 6, Inner seal seat retainer ass'y



Figure 7, Outer seal seat retainer ass'y

AMMONIA PUMP



ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Rotor and shaft ass'y	11	Retainer fasteners	22	Pipe to tube connector	33	Head fasteners
2	Lip seal (Outer)	12	Outer SSR*	23	Tubing	34	Casing
3	End cap	13	Outer SSR* o-ring	24	Pipe tee	35	Bracket fasteners
4	Set screws	14	Pipe nipple	25	Pipe Nipple	36	Pipe plug
5	Ball Bearing	15	Reducer bushing	26	Casing o-ring gasket	37	Bracket bushing
6	Grease fitting	16	Site glass	27	Idler	38	Bracket
7	Lock nut	17	Pipe plug	28	Idler bushing	39	Bracket & bushing ass'y
8	Lock washer	18	Dash pot	29	Idler & bushing ass'y	40	Inner SSR* o-rings
9	Bearing Spacer	19	Pipe tee	30	Head	41	Inner SSR*
10	Lip Seal (Inner)	20	Pipe plug	31	Idler pin	42	Double mechanical seal
		21	Reducer bushing	32	Head & Idler ass'y		

SSR*- Seal Seat Retainer

DISSASSEMBLY

1. Drain a fluid from the pump through the plugged drain hole on the bracket close to the bottom of the casing. Vent the reservoir by loosening the pipe plug in the top, and drain the seal chamber by loosening the seal seat retainer.
2. Mark head and casing before disassembly to insure proper reassembly. The idler pin, which is offset in pump head, must be positioned toward and equal distance between port connections to allow for proper flow of liquid through pump.
3. Remove head from pump. *Do not allow idler to fall from idler pin.* Tilt top of head back when removing to prevent this. 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 8
4. Remove idler and bushing assembly from the head and idler pin.
5. Loosen the setscrews on the adjusting nuts and remove the outer adjusting nut only. Figure 20, page 8.
6. Insert length of hardware or brass through port opening between rotor teeth to keep p shaft from turning. Bend up tang of the lock-washer and remove the lock nut and lock washer from shaft.
7. Loosen the fasteners from the seal seat retainer and pull it away from the seal chamber to free the spring on the seal.
8. Tap the shaft forward and remove the rotor and shaft assembly from the pump carefully.
9. Remove the outer seal seat retainer, rotating elements and the inner seal seat retainer from the bracket.
10. Remove the inner adjusting nut.
11. Clean all parts thoroughly and examine for wear or damage. Check lip seals, ball bearing, bushing and idler pin and replace if necessary. Check all other parts for nicks, burrs, excessive wear and replace if necessary.
12. Wash bearings in clean solvent. Blow out bearings with compressed air. Do not allow bearings to spin; turn them slowly by hand. Spinning bearings will damage race and balls. Make sure bearings are clean, then lubricate with non-detergent SAE 30 weight oil and check for roughness. Roughness can be determined by turning outer race by hand. Be sure shaft is free from nicks, burrs and foreign particles that might damage bracket bushing. Scratches on shaft in seal area will provide leakage paths under mechanical seal.
13. The casing and bracket bushing can be checked for wear or damage while assembled.

If needed remove the bracket bushing with the casing still mounted, by standing the unit on the casing in a press and proceed to push the bushing out of the bracket.



Figure 8, Installing the inner seal seat retainer



Figure 9, Installing the Seal



Figure 10, Outer seal seat retainer installed

ASSEMBLY

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. The double mechanical seal is designed to seal a fluid between the 2 ends of the seal. This fluid acts as a barrier fluid, which will prevent the ammonia inside the pump from leaking. If the inner portion of the seal fails the fluid in the sight glass on the dashpot will discolor or change in level. The pressure of the fluid within the seal chamber must be greater than the pressure in the pump behind the rotor. While the pump is operating there will be a greater pressure supplied by the discharge port, but if the pump is stopped the pressure will equalize. If the pump is to stop operating the pressure in the seal should be supplied by a source other than the discharge port.

1. Press lip seals into the adjusting nuts with the lip facing away from the threads, Figure 5, page 3.
2. Wet the idler bushing and the bore on the idler gear with soapy water, then setup the idler and bushing in a press. Be sure that the idler bushing is aligned straight before pressing. Press the bushing slowly, and with constant force. Stopping and starting will crack the bushing. Figure 2, page 3.
3. Coat idler pin with non-detergent SAE 30 weight oil and place idler and bushing on the head with the idler pin in placed in the idler bushing and aligned to be pressed into the head. Figure 3, page 2
4. Press the idler pin into the head while using the idler and bushing assembly as a guide.
5. Wet the bracket bushing and the bore on the bracket with soapy water, then setup the bracket and bushing in a press. Be sure that the bracket bushing is aligned straight before pressing. Press the bushing slowly, and with constant force. Stopping and starting will crack the bushing. Figure 1, page 2.
6. Be sure all components are clean prior to any further installation
7. Put the orings on the driving ring diameter.

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

8. Lubricate the stationary seal seats, driving ring and seal seat retainer.
9. With the polished faces out, press one stationary seat into the seal seat retainer and one into the driving ring, while protecting the face. Figure 6 and 7, page 3.
10. Lubricate the seal chamber
11. Push the driving ring into the seal chamber with the stationary seal element facing out. While protecting the seal face, push the driving ring into the bracket bushing. Figure 8, page 5.

Prior to installing rotating portion of mechanical seal, prepare and organize rotor shaft, head and idler assemblies, bearing components and appropriate o-rings for quick assembly. Once the rotating portion of mechanical seal is installed on rotor shaft, it is necessary to assemble parts as quickly as possible to insure that seal does not stick to shaft in wrong axial position. The seal should be expected to stick to the shaft after several minutes setting time.

12. Place the inner rotating seat in the seal chamber, lapped contact surface against the stationary seal seat.
13. Place the spring on the inner rotating seat.
14. With the polished face out slide the outer rotating seat over the seal installation sleeve and onto the shaft and into the spring. Figure 9, page 5
15. Place the seal seat retainer with the stationary seat facing the seal chamber in the seal chamber and fasten down with the seal retainer fasteners, but do not tighten. The retainer should be able to move during the following steps. Figure 10, page 5.
16. Place the sleeve installation guide on the shaft.

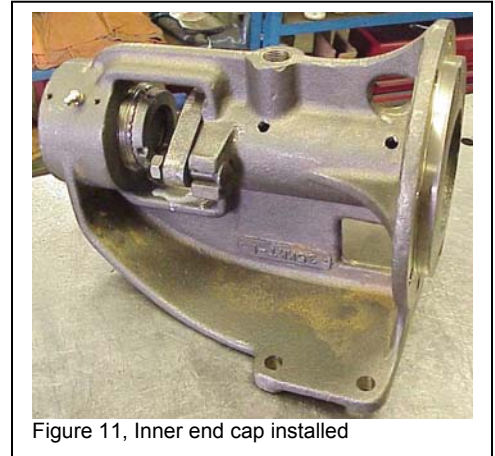


Figure 11, Inner end cap installed

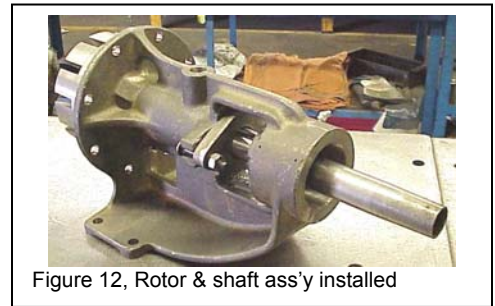


Figure 12, Rotor & shaft ass'y installed

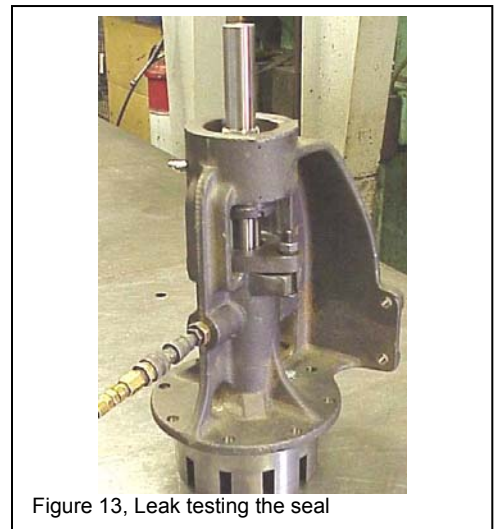


Figure 13, Leak testing the seal



Figure 14, Bearing spacer

17. Coat the inner diameter of the seal, the seal installation sleeve and the shaft with a lubricant recommended by your seal supplier.
18. Start the end of the shaft and seal installation sleeve into the bracket bushing and slowly push the shaft through. Continue until the rotor and shaft assembly is all of the way into the bracket. Figure 12, page 6.
19. Remove the tapered installation sleeve from the shaft.
20. Connect a compressed air line to the tapped hole on the bracket, and with soapy water check the seal seat retainer and tapped hole over the bracket bushing for leaks. If leaks occur then the seal must be removed and inspected for cuts or nicks in the elastomers.
21. Slide bearing spacer over shaft, passed the threads and against the shoulder on the shaft. Figure 14, page 6.
22. With the ball bearing on the bench, hold the grease gun tip against the bearing and apply grease to the top of the bearing all the way around the diameter. Place the ball bearing on the shaft and push it against the bearing spacer. See figure 15. Hold the grease gun tip against the bearing and apply grease to the top of the bearing as before.
23. Put the lock washer and lock nut on shaft. Insert piece of hard wood or brass through port opening between rotor teeth to keep shaft from turning. Tighten the lock nut with a lock nut wrench or hammer and punch (If using a hammer and punch: gently tap the lock nut tight). One tang of lock washer will line up with a slot in the lock nut. Bend that tang into the slot. Figure 16.
24. Put the outer end cap and lip seal assembly on the shaft and turn it into the bracket until it is against the bearing. Figure 17
25. Place an o-ring over the step on the bracket, mount the casing on the bracket, and install the bracket bolts but do not tighten. Figure 18
26. Then stand the bracket assembly on the casing, and turn the shaft to determine if the rotor is rotating free inside the casing. If not, tap the casing from side to side with a soft headed hammer until the rotor does not touch the casing. Tighten the bracket bolts evenly on the casing. Return the pump to the foot on the bracket.
27. Install the head and idler assembly on pump with one o-ring on the head between them. If the pump head and casing were marked before disassembly simply match up the markings. If not, be sure the idler pin, which is offset in pump head, is centered between the ports where the distance between the ports is the shortest. Tighten head the head bolts evenly. Figure 19, page 8.
28. Perform the end clearance adjustment.
29. Tighten the seal seat retainer fasteners evenly and in small increments.
30. Test the seal again for leaks with soapy water and compressed air. Figure 21, page 9.
31. If needed reinstall the reservoir and all tubing. Figures 22 and 23, page 9.
32. Pneumatic test your pump for leaks. See Page 9
33. Return the pump to service.



Figure 15, Ball bearing installation



Figure 16, Lock-nut & lock-washer



Figure 17, Tighten down the outer end cap

END CLEARANCE ADJUSTMENT

1. Loosen setscrews over outer and inner end caps. Figure 20.
2. Turn inner end cap clockwise, viewed from shaft end, about 2 or 3 turns.
3. Turn outer end cap clockwise until the rotor is tight against the head and the shaft cannot be turned.
4. Make a reference mark on bracket end, opposite a notch on outer end cap.
5. Back off the outer end cap required number of notches to obtain the required end clearance. Each notch is 0.0025 inches. Consult the factory for your specific end clearance requirement.

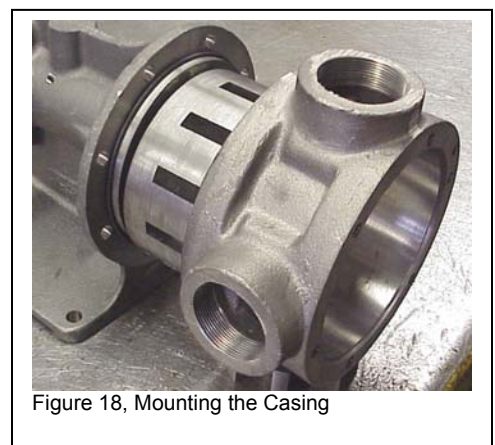


Figure 18, Mounting the Casing

6. Tighten the inner end cap with the spanner wrench to pull the bearing and shaft away from the head and tight against the outer end cap. Do not over tighten the end cap.
7. Tighten down the setscrews on the outer and inner end caps.

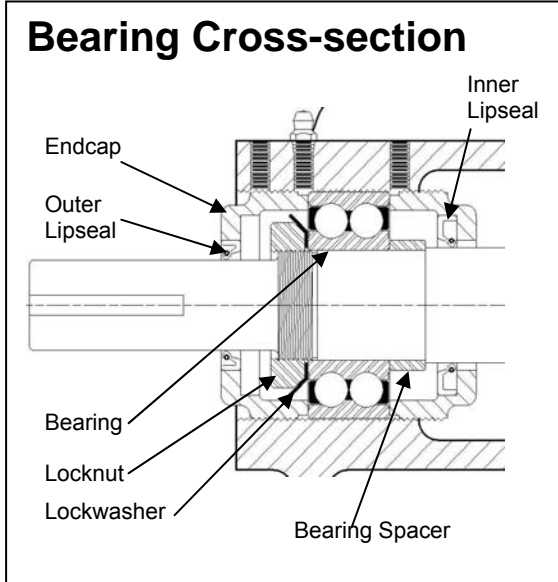
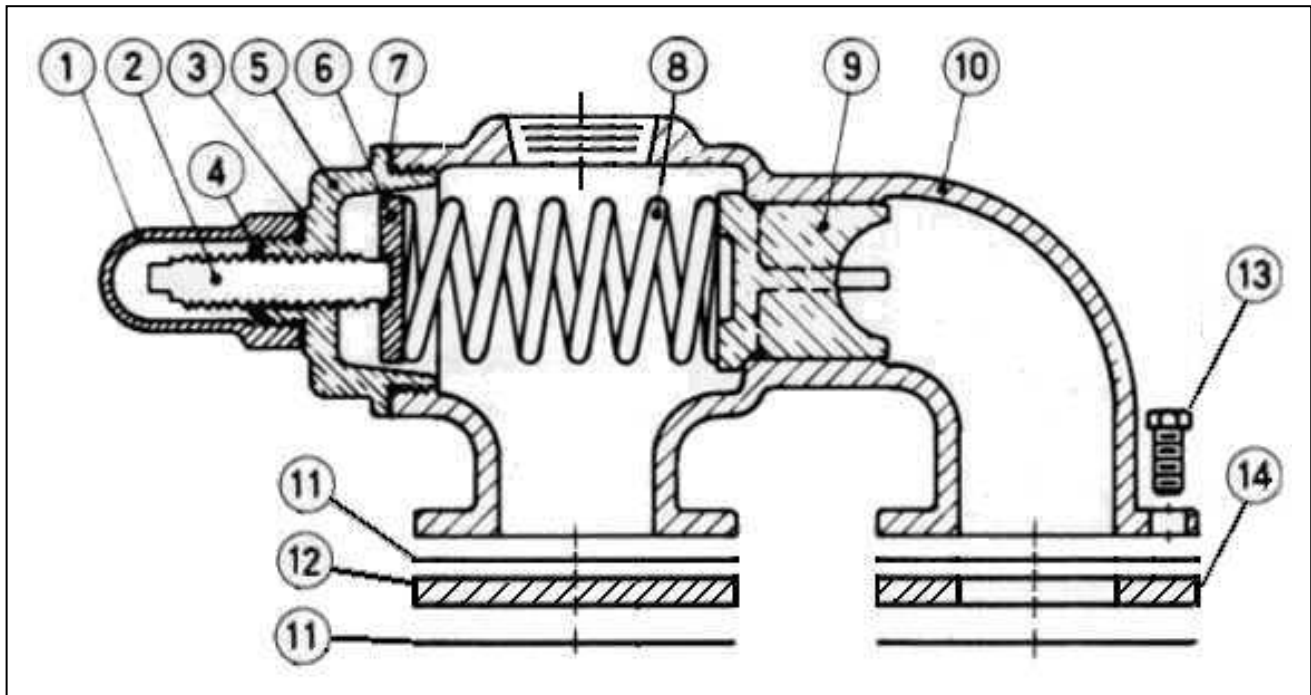


Figure 19, Mounting the head and idler



Figure 20, Tightening the set screws

PRESSURE RELIEF VALVE INSTRUCTIONS



ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Bonnet	5	End cap	10	Poppet
2	Adjusting Screw	6	Spring Guide	11	Relief valve port gasket
3	Bonnet o-ring	7	Cap Gasket	12	Blanking plate
4	Lock nut	8	Spring	13	Relief valve fasteners
		9	Casing	14	Spacer Plate

DISASSEMBLY

Mark valve and head before disassembly to insure proper reassembly.

1. Remove the relief valve from the head, making note which port has the blanking plate on it.
2. Remove the bonnet.
3. Measure and record length of adjusting screw protruding out of the end cap.
4. Loosen locknut and back out adjusting screw until spring pressure is released.
5. Remove relief valve cap, spring guide, spring and poppet from valve body.
6. Clean and inspect all parts for wear or damage and replace as 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

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 the bonnet, which covers the adjusting screw.
2. Loosen the locknut, which locks the adjusting screw so that the pressure setting will not change during operation of pump.
3. Install a pressure gauge in discharge line for actual adjustment operation.
4. Turn adjusting screw in to increase pressure and out to decrease pressure.
5. Closing a valve in the piping stopping all flow, the 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

Ammonia pumps should never have integral relief valves. Use only return to tank relief valves of inline relief valves. 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.

PNEUMATIC TESTING

1. Seal the ports with pipe plugs or plates and gaskets. Be sure to provide a male air line connection to one of the ports.
2. Apply air pressure to the pump.
3. Spray or brush the externals with soapy water and watch for growing air bubbles around the seal, fitting, and gaskets.
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 21, Testing the seal again



Figure 22, Bushing flush tube installed



Figure 23, Reservoir and tubing installed



Figure 24, Pneumatic testing

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
	Viscosity is higher than expected
Insufficient Pressure	Relief valve set too low
	Air or gases in the fluid
	Pump internals are worn
	Insufficient volume being pumped
	Wrong rotation
	Improper clearances in the internals
Loss of suction after a period Of operation	Suction line is leaking (letting air into the pump)
	Packing is too loose or the mechanical seal is leaking
	Leaking Gaskets
Excessive power requirement	Viscosity too high
	Discharge pressure is too high
	Insufficient lubrication
	Shaft or rotor is bent, misalignment or packing gland is too tight
Noisy operation with good Performance	Misalignment of coupling
	Worn bearings
Noisy operation with poor or No performance	Cavitation – Not enough fluid getting to the pump
	Worn bearings or bushings
Leaking around the shaft	Packing is loose, or needs replacement
	Mechanical seal is damaged or misaligned
	Shaft is scored
	Shaft is bent

PUMP INSPECTION REPORT

DATE: _____

PUMP MODEL: _____ SERIAL _____

NUMBER: _____

CUSTOMER: _____

SALES ORDER NUMBER: _____ REFERENCE _____

RENCE: _____

APPLICATION AND/OR PROBLEM: _____

DESCRIPTION	STANDARD DIMENSIONS	EX. CL. (IF ANY)	ACTUAL	WEAR
ROTOR O.D.				
ROTOR I.D.				
ROTOR TOOTH LENGTH				
IDLER O.D.				
IDLER (BUSHING) I.D.				
IDLER TOOTH LENGTH				
IDLER PIN O.D.				
SHAFT O.D.				
SHAFT BUSHING I.D.				
CRESCENT LENGTH				
CASING I.D.				
END CLEARANCE				

COMMENTS & RECOMMENDATIONS: _____



TECHNICAL SERVICE MANUAL

HEAVY-DUTY BRACKET MOUNTED AMONIA PUMPS

SERIES 480

SIZES J, K, KK, L, LQ AND LL

SECTION 3
BULLETIN TSM480
ISSUE A



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 start-up, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. If, during said warranty period, any products sold by Viking prove to be defective in workmanship or material under normal use and service, and if such products are returned to Viking's factory at Windsor, Ontario, transportation charges prepaid, and if the products are found by Viking to be defective in workmanship or material, they will be replaced or repaired free of charge, FOB Windsor, Ontario.

Viking assumes no liability for consequential damages of any kind and the purchaser by acceptance of delivery assumes all liability for the consequences of the use or misuse of Viking products by the purchaser, his employees or others. Viking will assume no field expense for service or parts unless authorized by it in advance.

Equipment and accessories purchased by Viking from outside sources which are incorporated into any Viking product are warranted only to the extent of and by the original manufacturer's warranty or guarantee, if any.

THIS IS VIKING'S SOLE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WHICH ARE HEREBY EXCLUDED, INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. No officer or employee of IDEX Corporation or Viking Pump Canada is authorized to alter this warranty.

