

# INSTRUCTION MANUAL



## **INTERNAL GEAR PUMP**

TITAN G-4195 SERIES =>NPT

Models: G-GG4195, G-HL4195, G-HJ4105, G-AK4195,  
G-AL4195, G-AS4195.



## Contents

Maintenance  
Thrust bearing adjustment  
Pressure Relief Valve Instructions  
Recommendations

## Introduction

Always give a complete name of part, part number and material with the model number and serial number of pump when ordering spare parts. The pump unit model and serial number are on the nameplate. This manual deals with the following models:



**Figure 1,**  
**Models: G-GG4195, G-HJ4195 and G-HL4195**



**Figure 2,**  
**Models: G-AK4195, G-AL4195 and G-AS4195**

## **Danger**

Before opening any 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 works is being done on pump.
3. That you know what liquid the pump has been handling and the precautions Necessary so safely handle the liquid.

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

**Rotation:** G-4195 series pumps operate equally well in a clockwise or counterclockwise Rotation. Shaft rotation determines which port is suction and which discharge is. Port In area where pumping elements (gear teeth) come out of mesh is suction port.

### **Pressure relief valves.**

1. G series 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. If pump rotation is to be reversed during operation, Pressure protection must be provided on both sides of pump.
3. 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. Refer to figure 3.
4. Pressure relief valves should not be used to control pump flow or regulate Discharge pressure.

**Pumps with modifications:** Extra care should be taken in repair of these pumps. Be sure to read and follow all special instructions supplied with your pump.

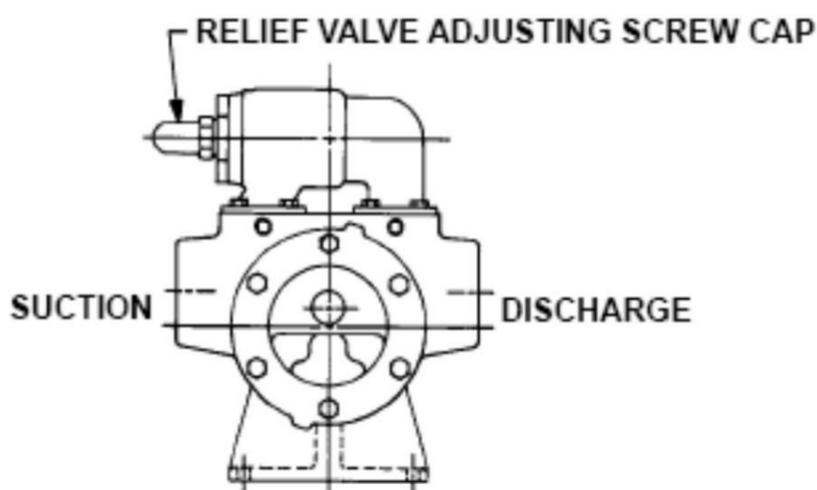


Figure 3.

## *Maintenance*

G-4195 series 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 to provide long service life.

**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 three 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. It is recommendable to rotate 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 G4195 pump series. These tools are in addition to standard mechanics' tools such as opened wrenches, pliers, screwdrivers, etc.

- Soft headed hammer
- Allen wrenches (some mechanical seals and set collars)
- Brass bar
- Arbor press
- Spanner wrench, adjustable pin type for use on bearing housing.
- Snap ring pliers

## *DISASSEMBLY*

1. Mark the head and casing disassembly to insure proper reassembly.

NOTE: The four valve cap screws, valve and gasket must be removed from pump before the six head cap screws are removed. Relief valve on models G-AK4195, G-AL4195 and G-AS4195 is located on top of pumps (refer to figure 2). Remove the head cap screws.

2. Tilt the top of the head back when removing to prevent the idler from falling off the idler pin.

3. Remove idler and bushing assembly.

4. Insert a brass bar or piece of hardwood in the port opening and between the rotor teeth to keep the shaft from turning. Turn the locknut counterclockwise and remove locknut. See Figure 4 or 5, page 5.

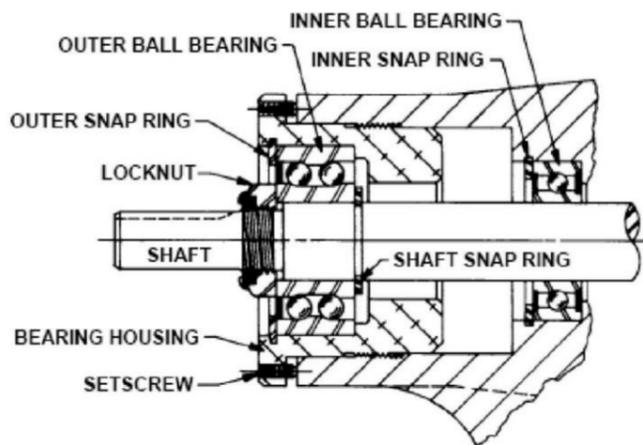


Figure 4. Thrust bearing assembly G-GG, G-HJ and G-HL models.

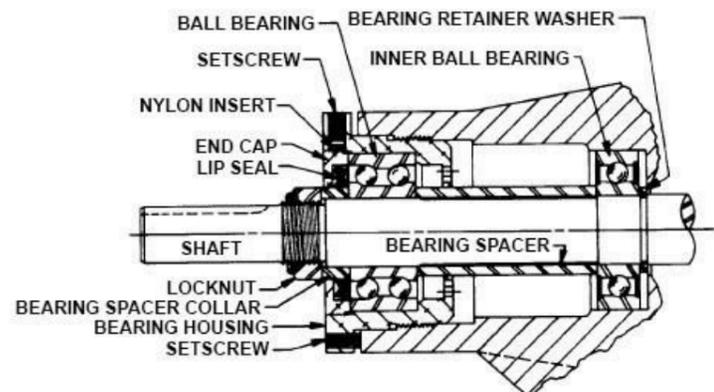


Figure 5. Thrust bearing assembly G-AS, G-AK and G-AL models.

Loosen the end cap for bearing housing on models G-AK, G-AL and G-AS before removing the bearing housing.

5. Loosen the two setscrews in the face of the bearing housing and turn the thrust bearing assembly counterclockwise and remove from casing. See Figure 4 or 5.

6. Remove the brass bar or piece of hardwood from the port opening.

Models G-GG, G-HJ, and G-HL: Remove the snap ring from the shaft. See Figure 4.

Models G-AS, G-AK, G-AL: Remove the bearing spacer from the shaft. See Figure 5.

7. The rotor and shaft can now be removed by tapping on the end of the shaft with a lead hammer or, if using a regular hammer, use a piece of hardwood between the shafts and hammer. The rotary member of the seal will come out with the rotor and shaft.

G-AS, G-AK, G-AL: Remove the bearing retainer washer. The washer may have stayed with the rotor and shaft when removed or is against the ball bearing. See Figure 5.

Remove the mechanical seal rotary member and spring from the rotor and shaft assembly.

8. G-GG, G-HJ, and G-HL: Remove the inner snap ring and single row ball bearing from the casing. G-AS, G-AK, G-AL: Remove the single row ball bearing from the casing.

9. Remove the seal seat or stationary part of the seal from the casing. Disassemble the thrust bearing assembly.

10. G-GG, G-HJ, and G-HL: Remove the outer snap ring from the bearing housing and remove the ball bearing. See Figure 4. G-AS, G-AK, G-AL: Loosen the two setscrews in the flange outside diameter. Rotate the end cap and lip seal counterclockwise and remove. Remove the ball bearing. See Figure 5.

11. - Clean all parts thoroughly and examine for wear and damage. Check ball bearings, 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. When making major repairs, such as replacing a rotor and shaft, it is advisable to also install a new mechanical seal head and idler pin, idler and bushing.

12. - Check casing for wear or damage, particularly in the area between the ports.

## ASSEMBLY

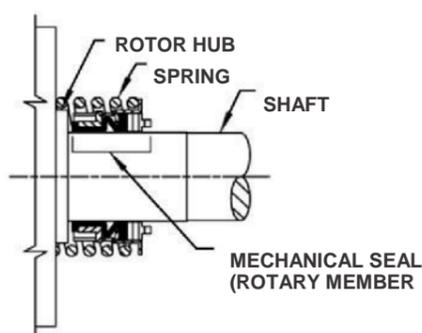
### **Standard Mechanical Seal**

Read carefully before reassembling pump. The seal used in this pump is simple to install and good performance will result if care is taken during installation. The principle of a mechanical seal is contact between the rotary and stationary members. These parts are lapped to a high finish and their sealing effectiveness depends on complete contact.

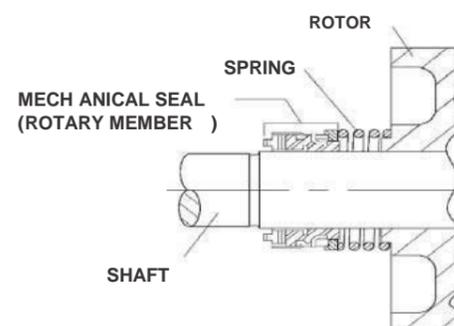
Prior to installing the rotary portion of the mechanical seal, prepare and organize the rotor shaft, head and idler assemblies and appropriate gaskets for quick assembly.

Once the rotary portion of the mechanical seal is installed on the rotor shaft, it is necessary to assemble the parts as quickly as possible to insure the seal does not stick to the shaft in the wrong axial position. The seal will stick to the shaft after several minutes setting time.

1. Clean the bracket with compressed air. Coat the outer diameter of seal seat and inner diameter of seal housing bore with light oil.
2. Start the seal seat in the seal housing bore. If force is necessary protect the seal face with a clean cardboard disc and gently tap it in place with a piece of wood. Be sure the seal seat is completely seated in the bore.
3. Coat the rotor shaft and inner diameter of the mechanical seal rotary member with a generous amount of non-detergent light oil. Grease is not recommended.
4. Place the seal spring on the shaft against the rotor hub. Refer to Figures 6 and 7.



**Figure 6. G-GG, G-HJ, G-HL**



**Figure 7. G-AS, G-AK, G-AL**

5. Slide the rotary member on shaft until just contacting the spring. Do not compress the spring. Care must be taken not to move carbon face or not to move out of its position. Coat mechanical seal faces with light oil.
6. Coat the rotor shaft with non-detergent oil. Install the rotor and shaft into the casing, slowly pushing until the ends of the rotor teeth are just below the face of the casing. Take care not to damage the seal seat.
7. Place the O-ring or gasket on the head and install the head and idler assembly on pump. The pump head and casing were marked before disassembly to insure proper reassembly. If not, be sure the idler pin, which is offset in the pump head, is positioned up and equal distance between port connections to allow for proper flow of liquid through the pump. Tighten the head cap screws evenly.

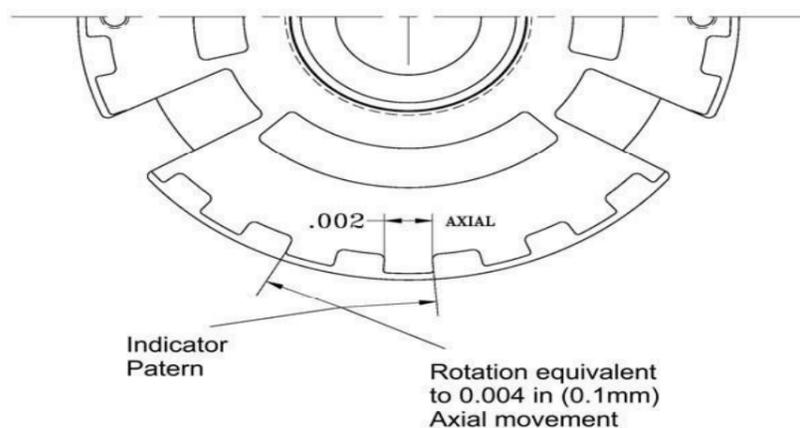
8. On models G-AS, G-AK, G-AL: Install the bearing retainer washer over the shaft before installing the ball bearing. Install the ball bearing in the casing with sealed side towards head end of the pump. Drive the bearing into the bore. Tap the inner race with a brass bar and lead hammer to position the bearing.
9. On models G-GG, G-HJ, G-HL: Drive the bearing into the bore. Tap the inner race with a brass bar and lead hammer to position bearing. Install the inner snap ring.
10. On models G-GG, G-HJ, G-HL: Install the shaft snap ring in groove in the shaft. See Figure 4, page 5. On models G-AS, G-AK, G-AL: Install the bearing spacer over the shaft and against the single row ball bearing. See Figure 5, page 5.
11. Insert a brass bar or piece of hardwood through the port opening between the rotor teeth to keep the shaft from turning.
12. Start the thrust bearing assembly into casing. Turn by hand until tight. This forces the rotor against the head. See bearing housing assembly on page xxx.
13. Replace and tighten the locknut or shaft.
14. Remove the brass bar or hardwood from port opening.

## **THRUST BEARING ADJUSTMENT**

See figures 4 and 5.

Loosen the two screws in the face of the thrust bearing assembly. If the shaft cannot be rotated freely, turn the thrust bearing assembly counterclockwise until the shaft can be turned easily. To set end clearance:

1. While turning the rotor shaft, rotate the thrust bearing assembly clockwise until a noticeable drag occurs. This is zero end clearance.
2. Mark the position of the bearing housing with respect to the casing. Rotate the thrust bearing assembly counterclockwise to a distance in which you get 0.003" measured on outside of bearing housing. See figure 8.
3. After the adjustment is made, tighten the two setscrews in the face of the bearing housing assembly to secure the position.



Pump Model	Standard End Clearance (inches)
G-GG4195	0.003
G-HJ4195, G- HL4195	0.003
G-AK4195,G-AS4195, G-AL4195	0.003

## Bearing Housing Assembly

Clean all parts thoroughly and examine for wear or damage.

1. On models G-GG, G-HJ, G-HL: Install the ball bearing into the bearing housing with shield side toward the coupling end of the shaft. Install the snap ring into bearing housing to retain ball bearing. This snap ring has a tapered edge to fit tapered groove in bearing housing. The tapered edge is located away from the ball bearing.

2. On models G-AS, G-AK, G-AL: Install the ball bearing into the bearing housing. Install the lip seal in the bearing housing end cap. The lip should face towards the end of the shaft. Put the bearing spacer collar in the lip seal and install in the bearing housing and tighten the set screws securely.

Note: Avoid damaging the ball bearing.

## Installation of Carbon Graphite Bushings

When installing the carbon graphite bushings, extreme care must be taken to prevent breaking. Carbon graphite is a brittle material and is easily cracked. If cracked, the bushing will quickly disintegrate.

1. - A press must be used for installation. Using a lubricant and adding a chamfer on the bushing and the mating part will help in installation.

2. - Be certain the bushing is started straight. Do not stop pressing the operation until the bushing is in the proper position, as starting and stopping may result in a cracked bushing.

3. - Check the bushing for cracks after installation.

## PRESSURE RELIEF VALVE INSTRUCTIONS

### Disassembly

### 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.

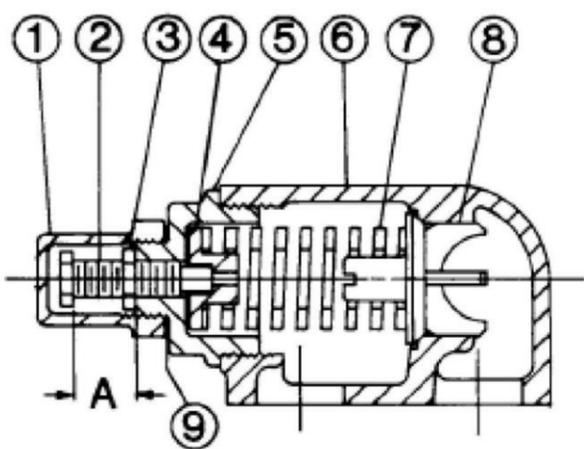


Figure 9. G-GG, G-HJ, G-HL

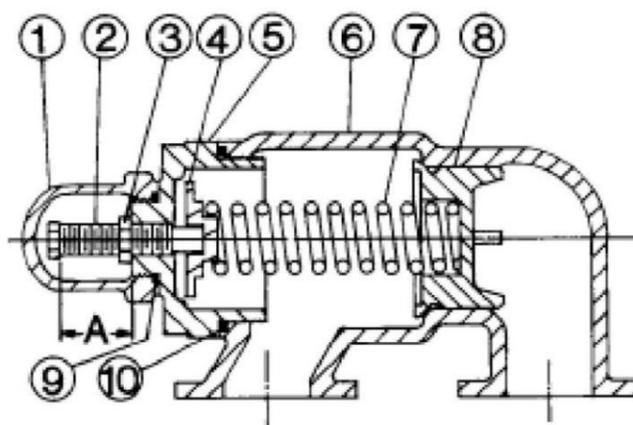


Figure 10. G-AS, G-AK, G-AL

PARTS LIST (all models)	
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	

PARTS LIST (all models)	
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 O-ring

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 9 and Figure 10.
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. Verify the length of extension of adjusting screw. Refer to "A" on Figure 9 and Figure 10. If pump rotation is reversed, remove relief valve and turn end for end.

### **DANGER**

Before starting pump, be sure all drive equipment guards are in place. Failure to properly mount guards may result in serious injury or death. **Pressure Adjustment**

If a new spring is installed or if 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 the 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 the 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 the name of the part wanted. When ordering springs, be sure to give pressure setting desired.

**Installation.** Prior to installing the pump and the drive, test the rotation of the driver to make sure it will operate the pump in the desired direction of rotation.

**Alignment.** Driver and pump units must be accurately aligned in order to avoid excessive wear on bushings. After the unit is mounted, the pump should be checked to be sure it operates freely without blinding.

**Piping.** Pipe strain can distort the pump components, thus increasing wear, causing bearing misalignment, or breaking parts. Pipe supports and expansion joints should be used to avoid weight and stresses on the pump. Please verify that flanges or unions fit without forcing. The inlet pipe should be as short and straight as possible to minimize suction pressure losses. Excessive restrictions at the inlet can cause cavitation resulting in poor performance, noise, vibration, or pump damage. Slope the inlet pipe appropriately to avoid air pockets. It is recommended that the pump be installed below the liquid level. The outlet pipe should be the more straight and with the less number of restrictions as possible. Pump port size does not necessarily establish correct pipe size. It depends on fluid quantity and viscosity.

**Prime.** If pump fails to deliver liquid after a minute, stop the pump and prime it by pouring some liquid into the discharge side of the pump.

**Strainer.** A strainer, of ample size and regularly cleaned, should be used in the inlet piping to prevent foreign material from entering the pump. It is very important that the area where liquid is flowing be at least three times bigger than the pipe area.

### **Checking pump performance**

Every pump is performance tested before being shipped from our factory. Pumps must be mounted properly in order to operate at their full design capability and meet their life expectancy. Listed below is a more detailed list of pump/system problems with possible solutions. This list is to assist the salesman and other Viking representatives in troubleshooting system problems.

This troubleshooting checklist applies to different positive displacement principles. Since the majority of the pumps sold are internal gear, several comments pertain to the internal gear pumps.

**NOTE:** To properly identify pump problems, it is necessary to have gauges on both the inlet and outlet ports of the pump. This is necessary to identify high suction condition, correlate between discharge pressure and horsepower requirement, relief valve settings, etc.

<b><u>Problem</u></b>	<b><u>Possible Cause</u></b>
<b>No Liquid Delivered</b>	<ol style="list-style-type: none"><li>1. Pump not primed.</li><li>2. Rotating in wrong direction.</li><li>3. Inlet fit too high, check this with gauge at pump inlet.</li><li>4. Clogged inlet line.</li><li>5. Air pockets or vapor lock.</li><li>6. Air leaks in inlet line.</li><li>7. Lost friction higher than the one reported.</li></ol>

**Insufficient liquid delivered**

1. Air leaks in inlet line.
2. Air leaks through packing or mechanical seal.
3. Speed too slow.
4. Excessive lift at inlet. Check this with gauge at the Pump inlet.
5. Viscosity of liquid too high for size and length of inlet pipe.
6. Foot valve or end of inlet pipe not immersed deeply enough in liquid.
7. Foot valve, if used, too small, stuck, or not working properly.
8. Partial air pockets or vapor lock.
9. Pump damaged by foreign matter or misalignment.
10. Excessive clearance in pump caused by wear or Corrosion.

**Insufficient discharge pressure**

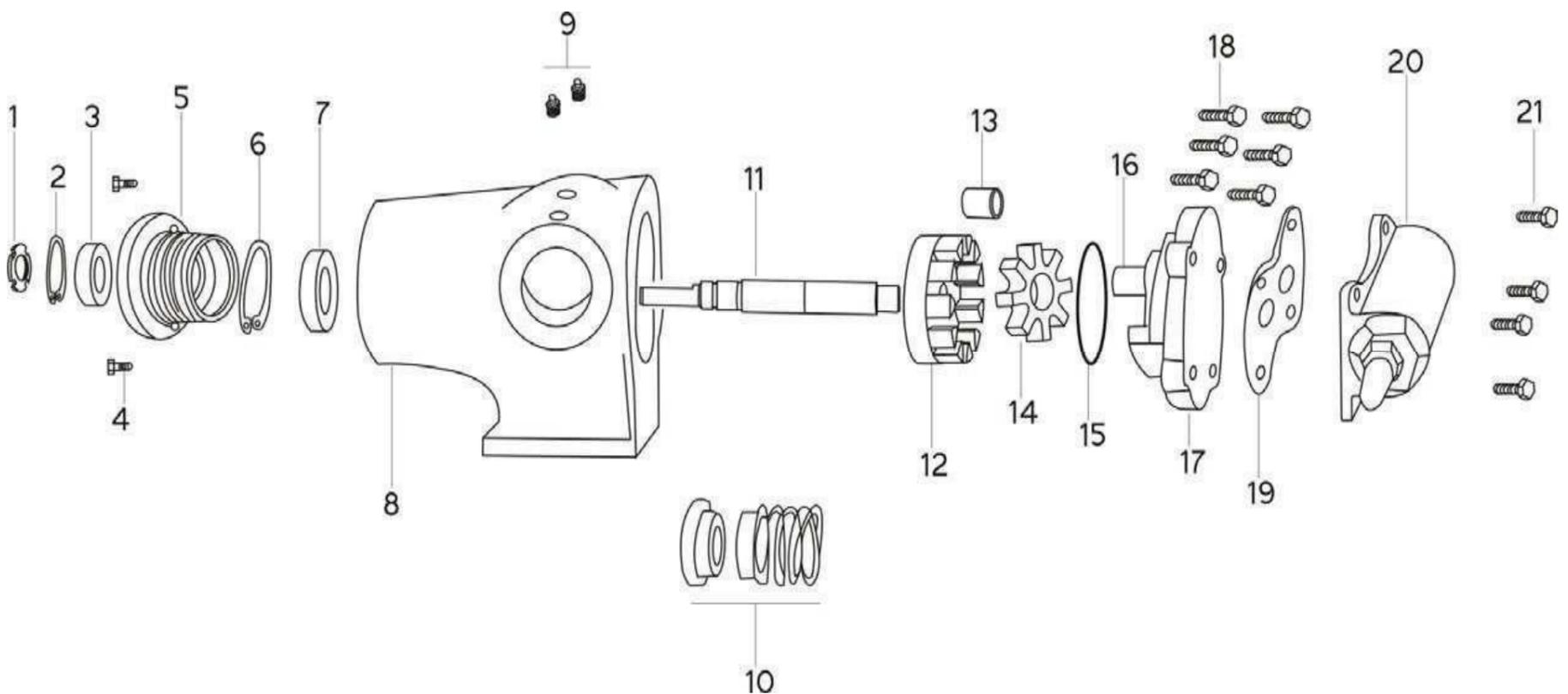
1. Low speed.
2. Air on fluid.
3. Air leaks in inlet line or through gland.
4. Excessive lift at inlet.
5. Mechanical defects.

### Pump takes too much power

1. Speed too high.
2. Liquid more viscous than previously anticipated.
3. Operating pressure higher than specified. Check this with gauge at the pump outlet.
4. Outlet line obstructed.
5. Mechanical defect, such as bent shaft, packing gland too tight, or misalignment of piping.
6. Relief valve not operating properly.

### Excessive noise

1. Starved pump.
2. Air leaks in inlet line.
3. Air or gases in liquid.
4. Pump speed too high.
5. Relief valve chatter. Check pressure setting.
6. Improper mounting. Check alignment thoroughly



This is only a representative exploded View.

**Model: G-GG4195.**

When order parts, be sure to give Part number, Name of the part, material, model , serial number of the pump as it appears on nameplate.

Item	Description
1	Locknut 1-1/8" NF Self Locking
2	Bearing Space Collar
3	End Cap for Bearing Housing
4	Lip seal for Bearing Housing
5	Ball Bearing (2-Row)
6	Bearing Housing with Setscrews
7	Bearing Spacer
8	Ball Bearing (1-Row)
9	Bearing, Retainer Washer
10	Casing, Opposite Ports
11	O-Ring Valve Gasket (2 Req)
12	Internal Relief Valve Complete
13	Pipe Plug-1/4" (2 Req)
14	Cap screw for valve (8-req'd)
15	Rotor and Shaft
16	Mechanical Seal(complete)
17	Idler Bushing
18	Idler and Bushing
19	O-rings Gasket for head
20	Idler Pin, Lube
21	Check Valve (2 Req)
22	Head (Plain) and Lube Idler Pin
23	Cap screws for head (6-req'd)
24	Pipe Plug-1/8"
2 thru 6	Bearing housing Assembly (Complete)





**MANUFACTURING, INC.**

**DISTRIBUTOR DATA**

--