INSTRUCTION MANUAL

Titan

MANUFACTURING, INC.

INTERNAL GEAR PUMP

TITAN G-4124A SERIES=> FLANGED

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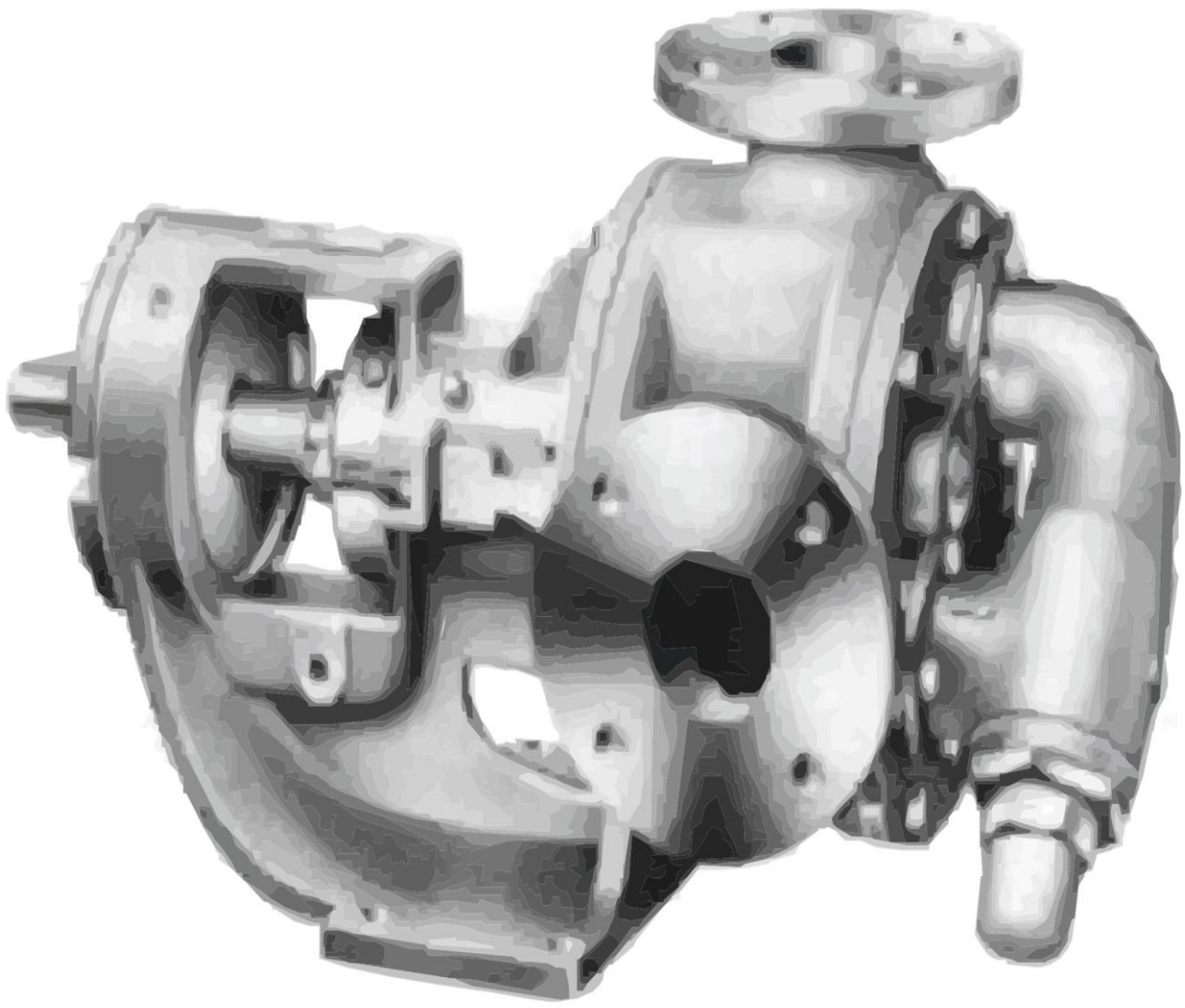
MODELS:

G-H, G-HL, G-K, G-KK, G-L, G-LQ, G-LL, GLS, G-Q, G-QS



Contents

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-H and G-HL

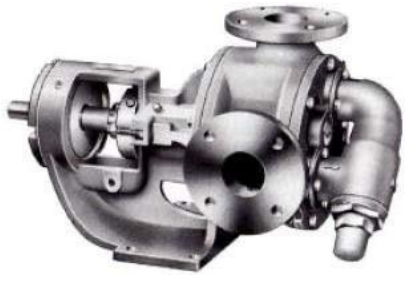


Figure 2,
Models: G-K, G-KK and G-L

Figure 3,
Models: G-LQ, G-LL and LS

Figure 4,
Model: G-Q

Figure 5,
Model: G-QS

PUMP MODELS		UNITS
PACKING	**MECHANICAL SEAL**	
G-H EG	G-H SM	
G-HL EG	G-HL SM	
G-K EG	G-K SM	
G-KK EG	G-KK SM	
G-L EG	G-L SM	SM = Mechanical Seal
G-LQ EG	G-LQ SM	
G-LL EG	G-LL SM	EG = Packing
G-LS EG	G-LS SM	
G-Q EG	G-Q SM	
G-QS EG	G-QS SM	

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 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.

4. Pressure relief valves cannot 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.

Maintenance

G 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.

Lubrication: External lubrication must be applied slowly with a hand gun to all lubrication fittings every 500 hours of operation with multi-purpose grease. Do not over-grease. Applications involving very high or low temperatures will require other types of lubrication. Consult factory with specific lubrication questions.

Packing Adjustment: New packed pumps require initial packing adjustment to control leakage as packing "runs in". 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," page 5, regarding repacking pump.

Cleaning Pump: Keep pump as clean as possible. This will facilitate inspection, adjustment and repair work and help prevent overlooking a dirt covered grease fitting.

Storage: If pump is to be stored, or not used for 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 G pump series. These tools are in addition to standard mechanics' tools such as open-end wrenches, pliers, screwdrivers, etc.

1. Soft headed hammer
2. Allen wrenches (some mechanical seals and set collars)
3. Packing hooks, flexible (packed pumps)
4. Spanner wrench, adjustable pin type for use on bearing housing.
5. Brass bar
6. Arbor press

DISASSEMBLY

1. Mark head, casing, bearing carrier and bracket before disassembly to insure proper reassembly. Measure space there is between bracket and bearing carrier. 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 Instruction, page 9. Insert length of hardwood or brass through port opening between rotor teeth to keep shaft from turning. Bend up tang of lock washer and with a spanner wrench, remove locknut and lock washer from shaft.

2. Remove screw from end cap and with a spanner wrench loosen it without remove it. Loosen two setscrews in the face of the bearing housing and remove the bearing housing assembly from the bracket. Remove pair of half round rings under the inner spacer collar from the shaft. There are no half round rings on the G-H, G-HL, and G-Q and G-QS size pumps. See figure 6 and 7.

3. Remove setscrew from head and with a soft headed hammer hit casing sides to remove carefully head from pump. Remove it towards you slowly to not allow idler to fall from idler pin.

4. Remove idler and bushing assembly.

5. Remove packing gland caps crews, slide packing gland out of stuffing box, and remove packing. For G-Q and G-QS models remove seal holder

Mechanical Seal Disassembly

Follow these instructions if pump is furnished with mechanical seal.

A) Remove the pipe plug in the bracket.

B) Inject compressed air through that hole towards mechanical seal face to push it outside.

C) Push carefully the rotary face of the mechanical seal with 2 flat face screwdrivers. Remove the mechanical seal rotary face and the spring without damaging the elastomeric part.

D) Loosen the mechanical seal collar setscrews. Carefully remove rotor and shaft to avoid damaging bracket bushing.

Packing disassembly

If pump is furnished with packing it can be removed after removing the rotor and shaft. Remove packing retaining washer.

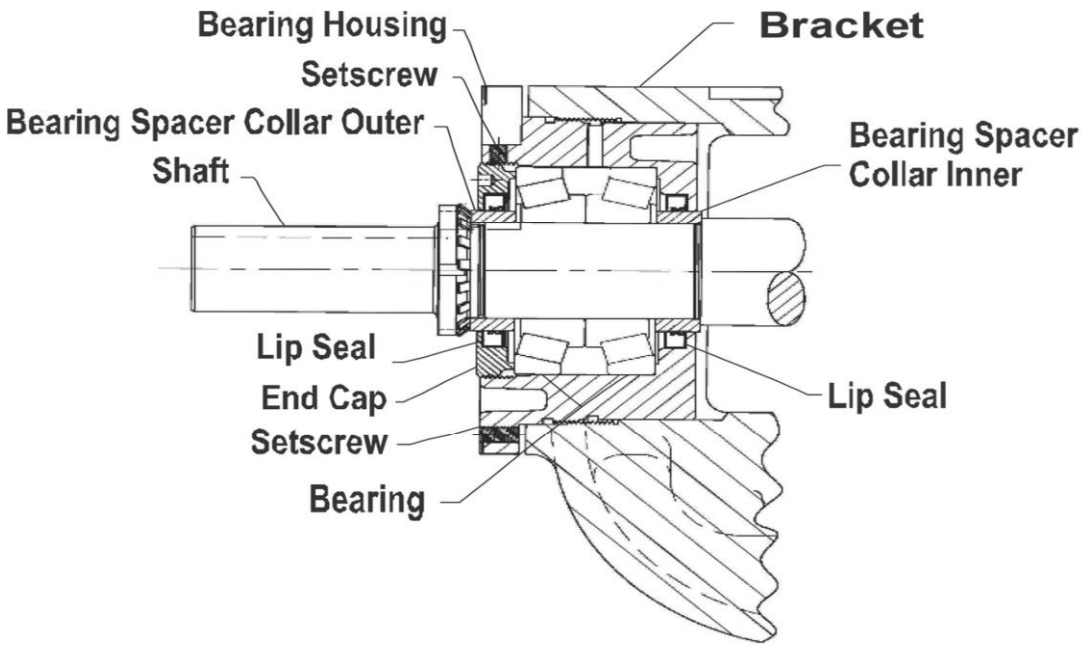


Figure 6 Model: **G-Q, G-QS**

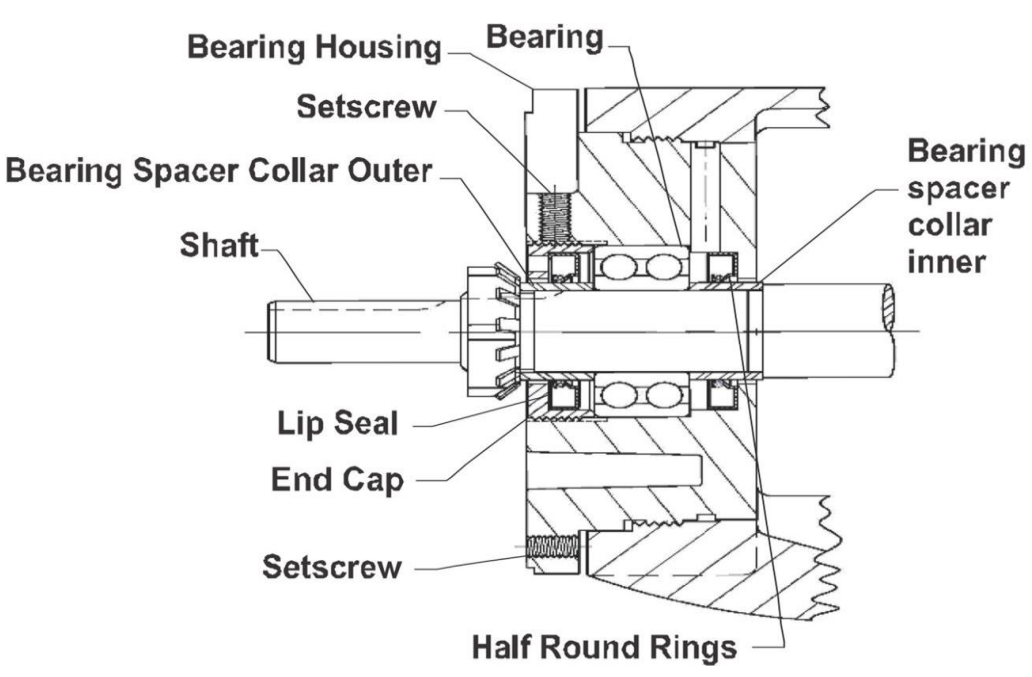


Figure 7
Model: G-K, G-KK, G-L, G-H, G-HL, G-LQ, G-LL, G-LS.

6. Remove setscrews from casing and check casing for wear or damage.

7. 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. Do not intermix inner and outer races of tapered roller bearing (G-Q and G-QS sizes).

Bearing Housing disassembly

1. Remove inner and outer bearing spacer collars from bearing housing.
2. Remove end cap from bearing housing (it was previously loosen) and remove ball bearing. (See point 2 on page 5)
3. Check lip seals for wear and replace them if necessary. Hold the little Teflon bolt that comes with bearing housing in order not to lose it.

ASSEMBLY

1. Install bracket bushing, bracket gasket and casing. If bracket bushing has a lubrication groove, install bushing with groove at 6.00 o'clock position in bracket. If carbon graphite, consult your nearest distributor.

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. If replacing with carbon graphite bushing, consult your nearest distributor.

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 caps crews 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.

Install packing gland, caps crews, and nuts. Make sure gland is installed correctly and nuts are tightened evenly. Tighten nuts until packing gland is snug against packing.

Bearing Housing Assembly

If lip seals are going to be replaced, follow these instructions.

1. Install one of the lip seals in the bottom of the bearing housing. The lip must point out outside the bearing housing. Push the lip seal carefully with a washer and hammer. Care do not damage it. Install the other lip seal in the end cap. The lip must point out at the bottom. Clean any dirt it may have.

2. Pack the ball bearing with grease.

3. Install the bearing spacer collar in the outer end cap. Avoid damaging the lip seal.

4. 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.

5. Slide inner spacer collar. 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 G-HL size pumps. Assembly bearing housing on the bracket.

6. Put lock washer and locknut on shaft. Insert length of hardwood or brass through port opening between rotor teeth to keep shaft from turning. Tighten locknut to 50-70 ft. – lbs. Torque (G-H, G-HL) or 100-130 ft. – lbs. Torque (K, KK, L, LQ, LL). Bend one tang of lock washer into slot of locknut. If tang does not line up with slot, tighten locknut until it does. Failure to tighten locknut or engage lock washer tang could result in early bearing failure and cause damage to pump. Remove length of hardwood or brass from port opening.

7. Adjust pump end clearance as in "Thrust Bearing Adjustment" page 9.

8. Lubricate all grease fittings with multi-purpose grease.

Mechanical Seal Installation

1. - Clean rotor shaft and seal housing bore. Make sure they are free of dirt, grit and scratches. Gently radius leading edge of the shaft diameter over which seal is to be placed.

2. - Slide collar and spring at the bottom of the seal housing bore so setscrews are directly below seal access holes (Second hole for mechanical seal type 1) on side of bracket. Tighten all setscrews securely to shaft. Verify rotor and shaft assembly is completely touching the head before install the parts of the mechanical seal.

3. - Lubricate rotary member of the mechanical seal and slide it on the shaft with the face pointing out outside. Slide it until touch it with the mechanical seal spring.

4. - Lubricate the stationary face for the mechanical seal and slide it on the shaft. Lapped face must point out to interior side. Install the seal gland. For Q and QS models, install the seal holder after the stationary face for the mechanical seal and finally the seal holder plate. Install caps crews and nuts and tighten securely.

Important Note: If the pump was assembled with packing and you need to change it to mechanical seal, rotor and shaft assembly must be changed also.

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

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.

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 the distributor.

Pump Model	Standard End Clearance (inches)
G-H G-HL	0.003
G-K, G-KK G-L, G-LQ, G-LL G-LS	0.005
G-Q, G-QS	0.010

Table 1.

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.

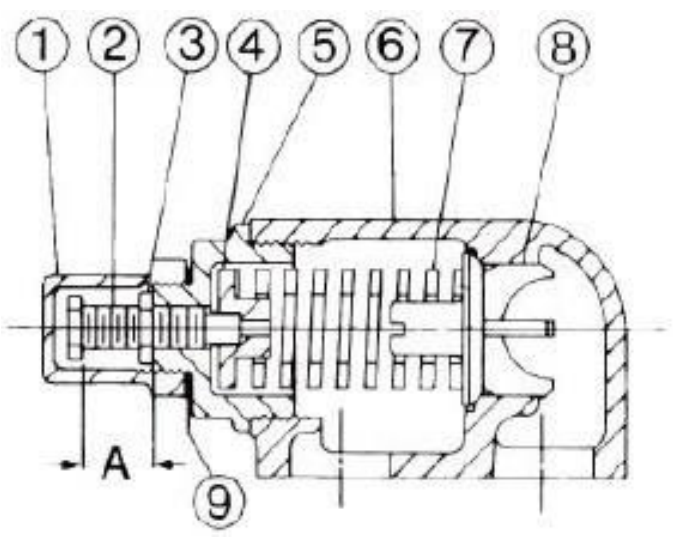


Figure 8
Model: G-H and G-HL

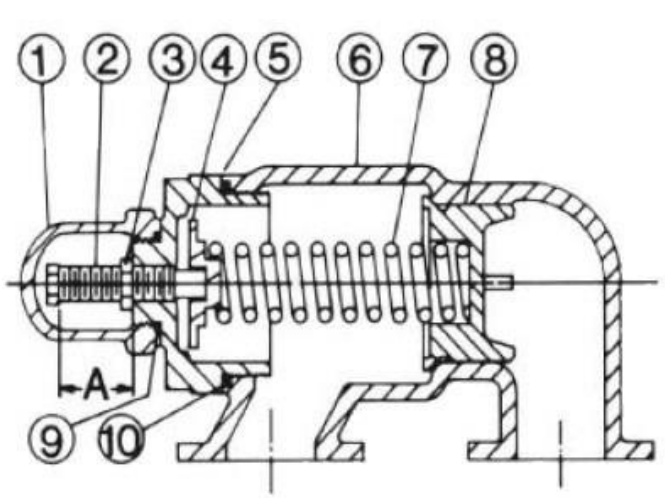


Figure 10
Model: G-K, G-KK, G-L, G-LQ, G-LL and G-LS

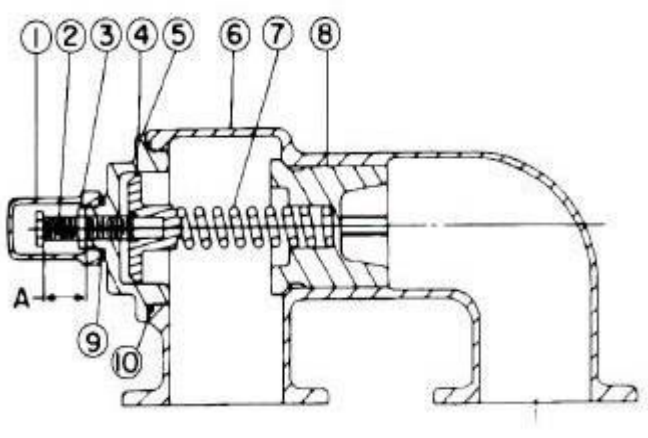


Figure 9
Model: G-Q and G-QS

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 Gasket

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 8, 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. 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 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.

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 were liquid is flowing be at least three times bigger than the pipe area.

Checking pump performance

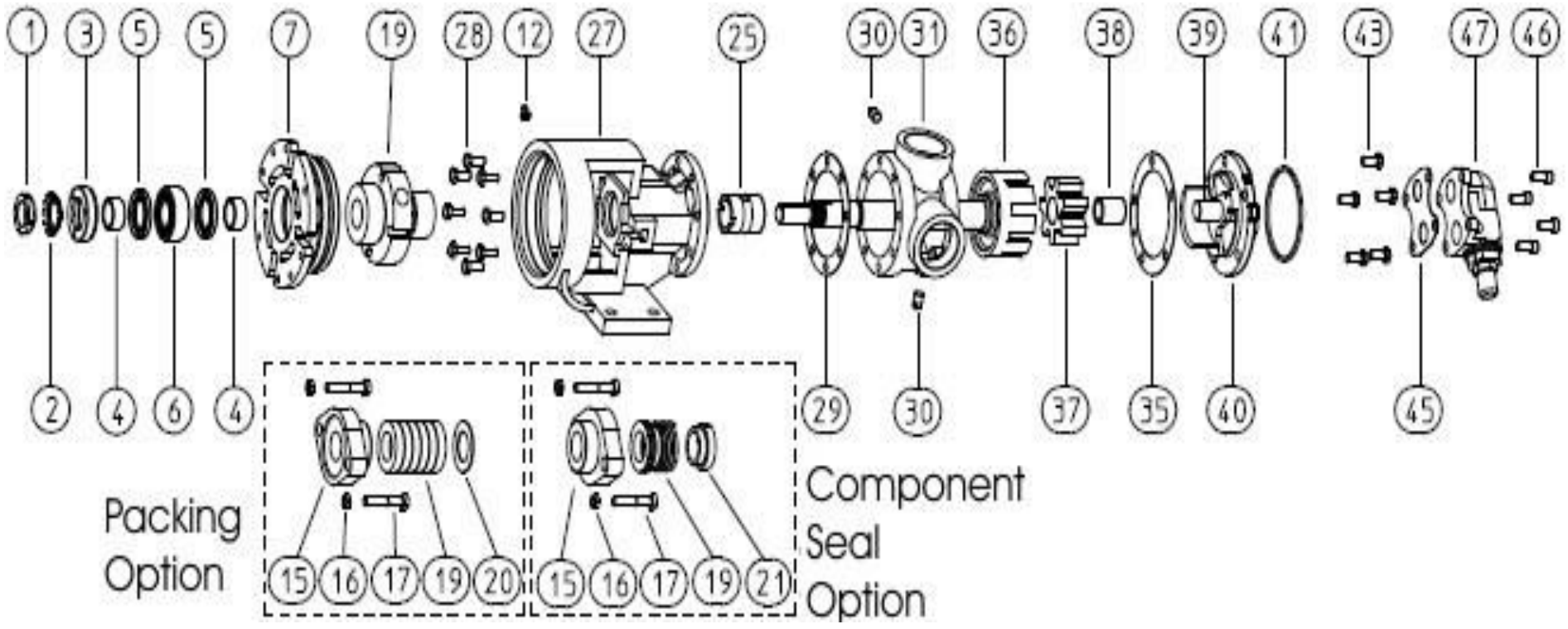
Every pump is performance tested before being shipped from our factory. Pumps must be mounted properly in order to operate at their full design capability and meet their life expectancy.

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.

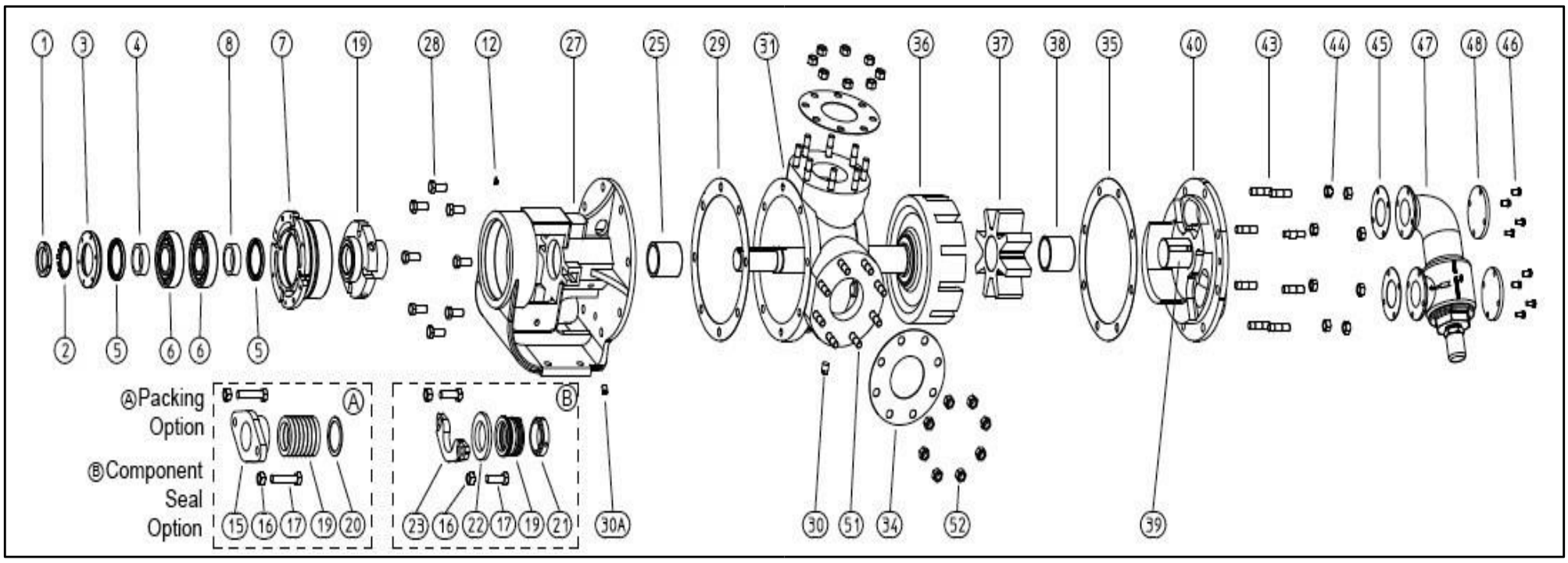
Problem	Possible Cause
No Liquid Delivered	1. Pump not primed 2. Rotating in wrong direction. 3. Inlet fit too high, check this with gauge at pump inlet. 4. Clogged inlet line. 5. Air pockets or vapor lock. 6. Air leaks in inlet line. 7. Lost friction higher than the one reported.
Insufficient liquid 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. 6. Check pressure setting. 7. Improper mounting. 8. Check alignment thoroughly.



This is only a representative exploded View. Model G-HL. When order parts, be sure to give Part NO., Name of Part, Material, Model & Serial NO. Of pump as it appears on nameplate.

Item	Description
1	Locknut
2	Lock washer
3	End Cap for Bearing Housing
4	Bearing Spacer Collar (2 Req’d)
5	Lip Seal (2 Req’d)
6	Ball Bearing
7	Bearing Housing
12	Grease Fitting, (Straight) (2 Req'd)
15	Packing/Mechanical Seal Gland
16	Packing/Seal Gland Nut, Self-Locking (2
17	R Packing/Seal Gland Cap screw (2 Req’d)
19	Packing (5 Req’d)
	Component Mechanical Seal
20	Packing Retaining Washer
21	Mechanical Seal Collar
25	Bracket Bushing
27	Bracket and Bushing
28	Cap screw for Bracket (8 Req’d)
29	Bracket Gasket
30	Pipe Plug (4 Req’d)
31	Casing
35	Head Gasket
36	Rotor and Shaft
37	Idler and Bushing Assembly
38	Idler Bushing
39	Idler Pin, Plain
40	Head (Plain) and Plain Idler Pin Assembly
	Head (Valve Type) and Plain Idler Pin Assay
43	Cap screw For Plain or Valve Type Head (5 Req’d)
45	Relief Valve Gasket
46	Socket Head Cap screw Valve (4-Req’d)
47	Internal Relief Valve (Complete)
50	Cartridge Seal Washers (2 Req’d)
56	Suck back Line Assembly for Component Se
1-7	Bearing Housing Assembly (Complete)
	Bearing Housing Set Screw (2-Req’d)
	Insert (2-Req’d). Used with End Cap Set
	End Cap Set Screw



Exploded View. Model G-Q.

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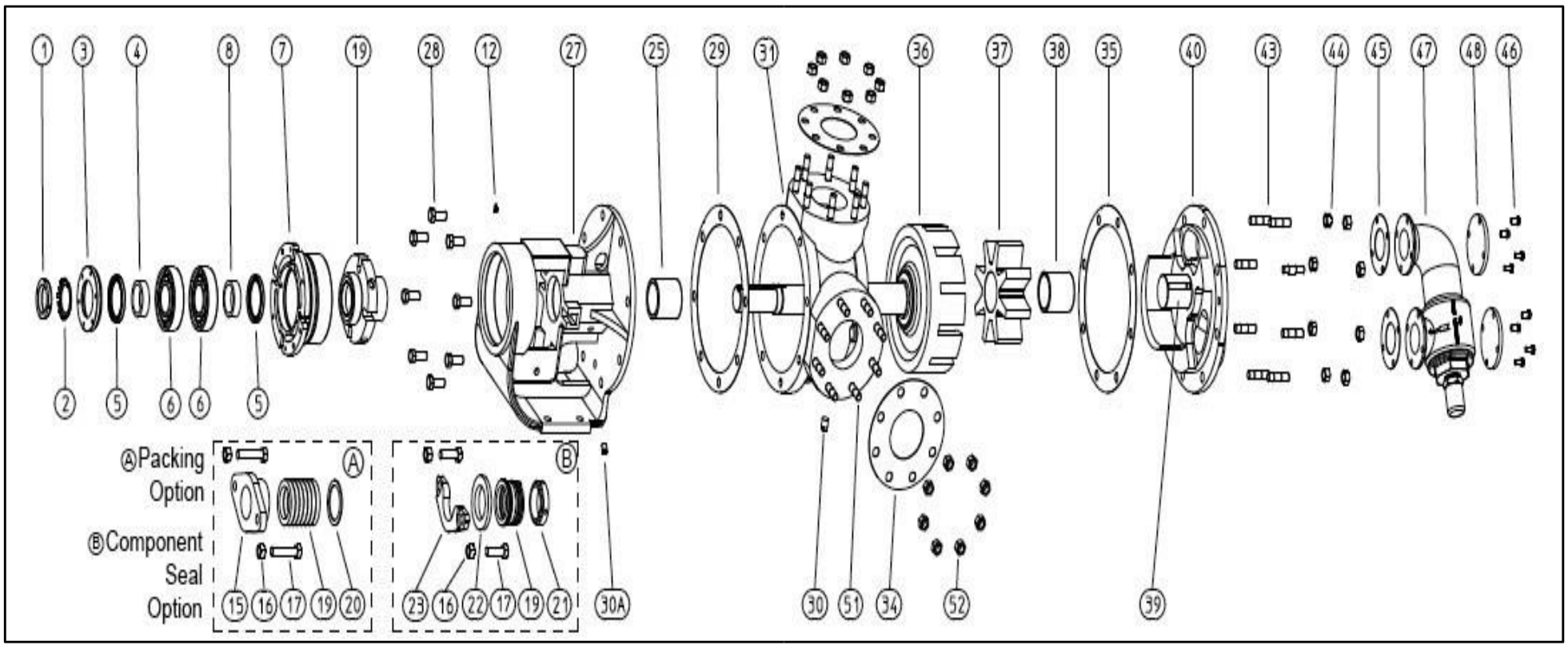
Item	Description
1	Locknut
2	Lock washer
3	End Cap for Be a ring Housing
4	Be a ring Spacer Collar (Outer)
5	Lip Seal (2 Req'd)
6	Roller Be a ring (2 Req'd)
7	Be a ring Housing
8	Be a ring Spacer Collar (Inner)
12	Grease Fitting (2 Req'd)
15	Packing Gland
16	Packing / Seal Gland Nut, Self-Locking (2 Req'd)
17	Packing / Seal Gland Cap screw (2 Req')
19	Packing (7 Req')
	Mechanical Seal (Complete)
20	Packing Retaining Washer
21	Mechanical Seal Collar
22	Seal Holder
23	Seal Holder Plate
25	Bracket Bushing
27	Bracket and Bushing
28	Cap screw for Bracket (8 Req'd)
29	Bracket Gasket
30	Pipe Plug (1 Req'd)
30A	Pipe Plug (4 Req'd)
31	Casing
34	Pipe Flange Gasket (2 Req'd)
35	Head Gasket
36	Rotor and Shaft
37	Idler and Bushing Assembly
38	Idler Bushing
39	Idler Pin, Lube
40	Head (Plain) and Lube Idler Pin Assembly
	Head (Valve Type) and Lube Idler Pin
43	Stud for Head, (8 Req'd)
44	Nut for Head (8 Req'd)
45	Relief Valve or Cover Plate Gasket (2
46	Cap screw for Valve or Cover Plate s (8
47	Internal Relief Valve (Complete)
48	Cover Plate (For Plain Head Pump) (2 Req'd)
51	Stud for Flanges, (16 Req'd)
52	Nut for Flanges (16 Req'd)
1-8	Bearing Housing Assembly (Complete)
	Bearing Housing Screw (2 Req'd)
	Insert (Used with End Cap)
	End Ca p for Screw (2Req'd)



Exploded View. Model G-Q.

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Titan MANUFACTURING, INC.

DISTRIBUTOR DATA