

Please read and save this Repair Parts Manual. Read this manual and the General Operating Instructions carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. The Safety Instructions are contained in the General Operating Instructions. Failure to comply with the safety instructions accompanying this product could result in personal injury and/or property damage! Retain instructions for future reference.

SHURflo Commercial-Duty Filter and Rendering Oil Rotary Close-Coupled External Gear Pumps



Refer to form L-4082 for General Operating and Safety Instructions.

Description


SHURflo self-priming, positive displacement, external gear, hot oil pumps feature cast-iron construction, with Viton mechanical seal for high temperature use. This series of non-clogging pumps are highly recommended for high flow waste oil rendering because they are able to pass small non-abrasive particles and reduce oil shear. Features include heavy-duty stainless steel helical non-corrosive gears for quiet and long-life pumping action, carbon graphite bushings and ball bearing drive for continuous use, with a stainless steel adjustable pressure relief valve as standard equipment. This series of pumps can also be used for hot oil or frying oil filtration up to 375° F., meeting NSF-listing requirements. Pumps are configured with motors specifically for hot oil applications where oil is heated prior to pumping and discharge pressure limitations do not exceed 50 PSI with supplied motors. They provide a nearly pulseless flow in applications where small or non-particulate and non-abrasive fluids are pumped. AC ODP single-phase motors have thermal overload protection. Complete package is easy to install, or optional pump heads only can be purchased for custom installations.

Uses: Ideal for a wide range of commercial fat fryer hot oil cooking, filtering, or waste oil rendering applications. This pump can also be used in non-NSF hot oil applications with non-particulate and non-abrasive fluids compatible with pump wet-end construction component materials. Not for use with water-based fluids.

- Pumps meet NSF-listed standards including NSF-accepted paint for hot oil cooking applications.
- Pumps can operate bi-directionally (reverse operation should be used intermittently).
- Pressures to 125 PSI with pump heads.
- Pressures to 50 PSI, maximum viscosity of 100 SSU and maximum specific gravity of 1.1 with configured motors.
- Flows to 10.8 GPM.
- Operating temperatures to 375° F.
- Maximum viscosity of 1000 SSU and maximum specific gravity of 1.1 with pump heads and optional motors at 1725 RPM, and viscosities up to 100,000 SSU at reduced motor speeds.
- Suction lift capabilities up to 12.3 feet of head.
- Maximum RPM: 1725.
- Stainless steel adjustable pressure relief valve standard.
- Port size: 1/2" and/or 3/4".
- ODP single-phase 56C frame motors with 1/2 or 3/4 HP with thermal overload protection.
- 416 SS helical gear set for handling high viscosity fluids and low oil shear.
- 303 SS drive shaft and idler shaft with carbon graphite bushings and a ball bearing drive.
- Seal flush ports for handling fluids of viscosities greater than 2000 SSU.
- Maximum case pressure of 200 PSI.

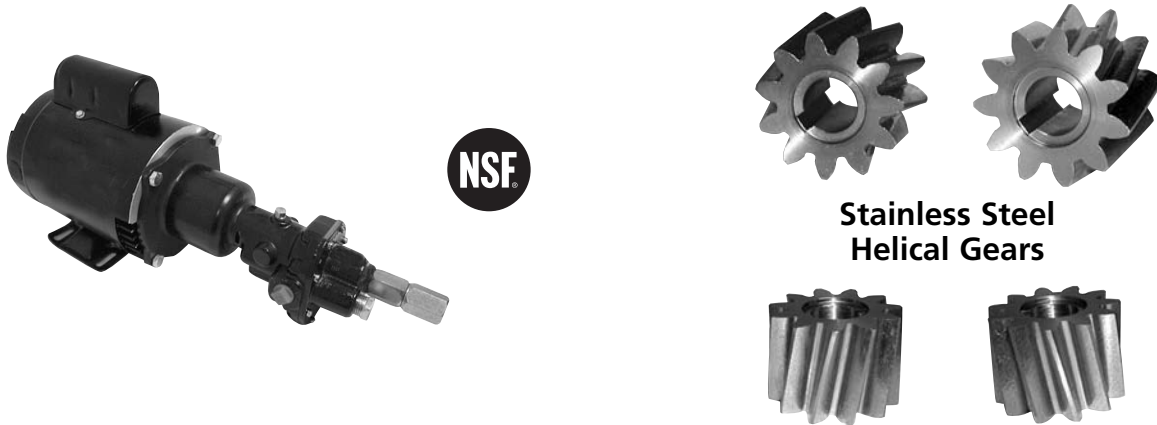
Wet-end parts are constructed from cast iron, steel, stainless steel (303, 17-7, 18-8, 416, 15-7MO), carbon, graphite, Type 1 Ni-Resist, and Viton.

Optional Close-Coupled Gear Speed Reducers are available that mount directly between pump and motor to reduce pump speed for high viscosity or high specific gravity applications (See Appendix 1).

 **WARNING:** Do not use to pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc. Do not use in flammable and/or explosive atmospheres. When pumping hazardous or dangerous materials, use only in room or area designated for that purpose. For your protection, always wear proper clothing, eye protection, etc. in case of any malfunction. For proper handling techniques and cautions, contact your chemical supplier, insurance company and local agencies (fire dept., etc.). Failure to comply with this warning could result in personal injury and/or property damage.

SHURflo Commercial-Duty Filter and Rendering Oil Rotary Close-Coupled External Gear Pumps

Model Ordering Codes and Options



Example Model: NG7V

1st	2nd	3rd	4th
Mounting	Pump Size (Ports)/AC Motor	Options	
(1) NG Motor Mounting (NSF Cast Iron Gear Pump with Viton Seals)	(2) 7 7: 7 GPM (1/2") / 1/2 HP 11: 10.8 GPM (3/4") / 3/4 HP NOTE: 1725 RPM ODP motor Stainless Steel Helical Gears	(3) V Pressure Relief Valve	(4) -PH: Pump Head Only (no motor)

NOTE: Not all order code combinations (configurations) are standard models available from the manufacturer. Custom model configurations may require ordering standard components and/or optional parts that will need to be assembled by the customer.

Manufacturer reserves the right to change model order codes, standard models, specifications, and performance without notification.

Maximum motor speed is 1725 RPM.

Cast iron is not for use with water-based fluids.

Models NG7V, NG11V, NG7V-PH and NG11V-PH

Performance

Models	Port Size*	RPM	Max. Input Torque in.-lbs.	Suction Lift (ft)**	GPM Pumping Free Flow	Cooking Oil at 300° F	
						25 PSI	50 PSI***
Pumps with Motors							
NG7V	1/2"	1725	90	7.9	7.0	6.9	6.8
NG11V	3/4"	1725	90	12.3	10.8	10.7	10.6
Pumps without Motors							
NG7V-PH	1/2"	1725	90	7.9	7.0	6.9	6.8
NG11V-PH	3/4"	1725	90	12.3	10.8	10.7	10.6

Test data taken on cooking oil at 300° F. Do not use with water.

Pump performance when pump is new. As pump wears, the performance will decrease.

(*) Female NPT inlet and outlet (in inches).

(**) Suction lift requires wetted gears and primed seal chamber.

(***) Max. PSI = 50 based on HP of motors supplied (rating may vary based on application; check motor amps on start-up).

NOTES: Consult tables in form L-4082 (General Operating and Safety Instructions) on HP adders and speed recommendations for high viscosity fluids.

Pumps with motors are HP rated to handle up to 50 SSU at 50 PSI and specific gravity of 1.0.

Max. Viscosity = 100 SSU at 1725 RPM with the motor supplied.

Max. Input Torque = See chart above.

Max. RPM = 1725

Max. Specific Gravity = 1.1 at 50 PSI, up to 1.6 at lower PSI & viscosity.

Reverse Rotation = Pumps can be run in reverse rotation. Pressure relief valve will only function if installed on the discharge side of the pump. For continuous reverse rotation, gears need to be reversed and pump head cover rotated 180°.

Flush porting is required beyond 2000 SSU.

Pump heads with optional motors can pump to 1000 SSU at 1725 RPM.

Pumping greater than 1000 SSU requires reduced motor speeds. Max. viscosity is 100,000 SSU at reduced speeds.

Manufacturer reserves the right to change performance without notification.

SHURflo Commercial-Duty Filter and Rendering Oil Rotary Close-Coupled External Gear Pumps

Specifications

Model	AC Motor		Motor NEMA Frame	Motor Voltage	Amps	PH	HZ	Thermal Overload Protection**	Motor RPM	Pump Shaft Size	Motor Shaft	PUMP CONSTRUCTION (Wet End)						Ship Wt. (lbs.)		
	HP	Type										Port ***	Body/Adapter & Cover Castings	Helical Gears	Shaft ****	Bushing Material	Pressure Relief Valve†		Seal & O-Rings*	
Models with Motors																				
NG7V	1/2	ODP	56C	115/208-230	7.2/3.5-3.6	1	50/60	Yes	1450/1725	5/8 Spline	5/8 Keyed	1/2	CI	416 SS	303 SS	CG	Steel & SS	Viton	28	
NG11V	3/4	ODP	56C	115/208-230	10.6/5.2-5.3	1	50/60	Yes	1450/1725	5/8 Spline	5/8 Keyed	3/4	CI	416 SS	303 SS	CG	Steel & SS	Viton	37	
Models without Motors																				
NG7V-PH	-	-	-	-	-	-	-	-	-	5/8 Spline	-	1/2	CI	416 SS	303 SS	CG	Steel & SS	Viton	8	
NG11V-PH	-	-	-	-	-	-	-	-	-	5/8 Spline	-	3/4	CI	416 SS	303 SS	CG	Steel & SS	Viton	11	

CG = Carbon Graphite SS = Stainless Steel CI = Cast Iron ODP = Open Drip-Proof
 (*) Standard Shaft Seals have carbon on Type 1 Ni-Resist faces and 18-8 SS components.
 (**) Manual or Automatic (check motor supplied).
 (***) NPT inlet and outlet (in inches).
 (****) Retaining rings on drive and idler shafts are 15-7 MO SS.
 (†) Models are made of steel and stainless steel (17-7, 303 and/or 18-8).

NOTES: Driver data is subject to change without notice, see label on driver for actual specifications.
 All motors include a base (the base may be removable, movable or welded). Motors are not supplied with power cords.
 Manufacturer reserves the right to change specifications without notification.
 Standard motors listed above are not wash-down or explosion-proof (manufacturer does not stock wash-down or explosion-proof motors).
 Thermal overload protection is standard on all single-phase motors (overload protector may have automatic or manual reset).
 Manufacturer does not specify regulatory compliance for UL, UR, CSA or CE; however most models do comply to UL, UR, CSA and CE.

Models NG7V, NG11V, NG7V-PH and NG11V-PH

Dimensions

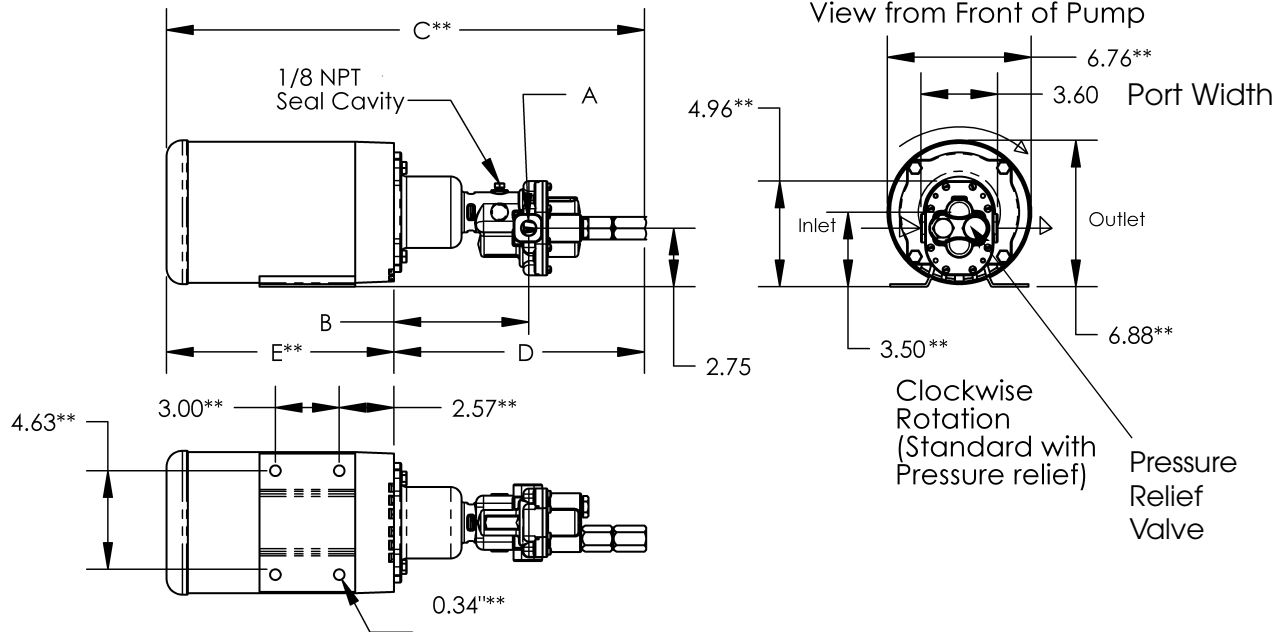


Figure 1 — Dimensions

Dimensions

Model	Port A*	B	Dimensions (in inches)		
			C**	D	E**
Models with Motors					
NG7V	1/2	6.33	21.25	11.76	8.37
NG11V	3/4	6.51	22.50	12.13	9.25
Models without Motors					
NG7V-PH	1/2	6.33	-	11.76	-
NG11V-PH	3/4	6.51	-	12.13	-

(*) Female NPT inlet and outlet (in inches).

(**) This dimension may vary due to motor manufacturer's specifications.

NOTE: Dimensions have a tolerance of (+ or -) 1/8".

Manufacturer reserves the right to change dimensions without notification.

All dimensions in inches unless otherwise specified.

Gear Part Numbers and Dimensions (in inches)

Ref. No.	Description	Part Number	Outer Diameter	Gear Length	Hole Diameter	Material
1	Gear-Helical (R.H.)	23291	1.75	0.75	0.625	416 SS
	Gear-Helical (L.H.)	23292	1.75	0.75	0.625	416 SS
2	Gear-Helical (R.H.)	23124	1.75	1.25	0.625	416 SS
	Gear-Helical (L.H.)	23125	1.75	1.25	0.625	416 SS

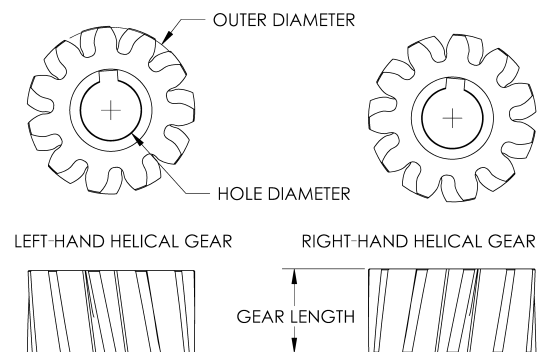
NOTE: All dimensions in inches.

SS = Stainless Steel

Gears should always be replaced as a set (See Gear Kits in Repair Parts).

Kit requires one left and one right gear.

Manufacturer reserves the right to change dimensions without notification.



SHURflo Commercial-Duty Filter and Rendering Oil Rotary Close-Coupled External Gear Pumps

▲WARNING *Check motor. It may be equipped with an automatic resetting thermal protector and may restart unexpectedly (see specifications chart). Protector tripping is an indication of motor overloading as a result of operating the pump at too high a pressure (over 50 PSI), too high of viscosity, too high of specific gravity, excessively high or low voltage, inadequate wiring, incorrect motor connections, too small a motor (sized incorrectly, not enough HP), or a defective motor or pump.*

Do not handle pump with wet hands or when standing in water. Failure to follow the General Safety Information and all warnings could result in fatal electrical shock!

Installation

IMPORTANT: In any installations where property damage and/or personal injury can occur when the pump is not operating due to power outages, discharge line freezing, or any other reason, a back-up system(s) and/or warning system(s) should be used.

In order to safely use this product, familiarize yourself with this pump and also with the liquid (chemical, etc.) that is going to be pumped through the unit. This pump is not suitable for many liquids.

If pump is purchased separately from motor, refer to "Pump Motor or Drive Coupler Replacement" section on page 11 for instructions on mounting pump to motor.

1. Locate the pump as close to the liquid source as possible, making the suction line as short and direct as possible.

PIPING

SUCTION

2. Avoid excessive lengths or number of fittings and bends in the suction line.
3. Attach suction line to suction inlet.
4. It is recommended that same size pipe as pump ports be used or, in cases requiring lengthy piping, the next larger size pipe be used.

5. If suction lift is greater than what is indicated in the performance chart, attach a foot valve below liquid level at end of suction line to ensure positive priming. Also note: If fluid specific gravity is greater than 1.4 or viscosity greater than 500 SSU, a foot valve is also recommended. (100 SSU max. and 1.1 specific gravity max. with standard motor.)

NOTE: If a foot valve (or check valve) is not used in the suction line, it may be necessary to refill the pump every time the unit is stopped and you wish to restart the pump. This depends on the length of time between starts and whether or not the gears are wet enough to close cavities to affect a prime.

6. If solid contaminants are suspected in a liquid, place a filter in the suction line.
7. Be certain all suction piping connections are airtight.

NOTE: Assure airtight pipe connections with the use of a pipe joint sealant.

DISCHARGE

8. Attach discharge piping to the discharge outlet.

▲WARNING *Support pump and piping during assembly and after installation. Failure to do so may cause piping to break, pump to fail, motor bearing failures, etc., all of which can result in property damage and/or personal injury.*

NOTE: Should the pump need to be self-draining, the pump head should be mounted in the vertical position with the suction port facing down. When pumping high viscosity fluids, the vertical position can be used with the suction port facing up and the pump mounted under the source. Increasing the suction pipe size and eliminating bends and elbows also assists in pumping high viscosity fluids. Max. viscosity is 1000 SSU at 1725 RPM. (100 SSU Max. with standard motor.)

9. If a shut-off valve or handgun is required in discharge line, make sure the pressure relief valve for pump protection is positioned on pump discharge port side.

▲WARNING *Shutting off discharge without providing pressure relief can cause extreme over-pressure which can result in pump and/or motor failure. Do not exceed 50 PSI pump or system pressure on standard models.*

10. Operation under shut-off discharge conditions will overheat and damage pump.

NOTE: Globe valves or other restrictive valves should not be used as shut-off mechanism as they are restrictive in nature and will seriously affect pump performance.

11. After all piping and controls (not supplied with unit) have been installed, unit is ready for operation.

Operation

▲CAUTION *Do not run pump dry, as permanent damage to the pump gears, seal, and bearings will result. Suction pressure should never be greater than the discharge pressure.*

1. All pumps must be primed before start-up and the seal chamber needs to be filled (See Figure 2). Never operate a pump unless it is secured to a solid foundation and all safety shields are installed.

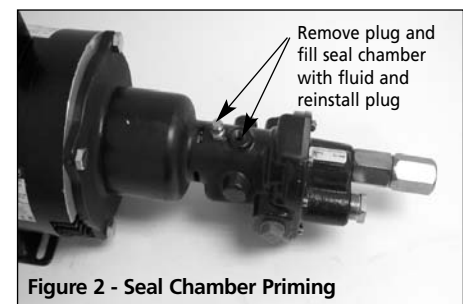


Figure 2 - Seal Chamber Priming

Upon start-up, maintain a minimum of 15 PSI (1 BAR) operating pressure on the pump. This will allow any

Models NG7V, NG11V, NG7V-PH and NG11V-PH

remaining air to be driven from the seal chamber and will ensure liquid circulation to the mechanical seal.

2. Gear pumps are built to very close tolerances and this tolerance must not be altered. The liquids must, therefore, be free of all abrasives. Sand, silt, wettable powders, etc. must be avoided.

NOTE: Cast iron pumps are for oil-based fluids only.

3. When pumping a more viscous (beyond 100 SSU on standard modules) liquid; a slower speed, a larger pipe size pump, and possibly a larger motor should be selected.

NOTE: See performance chart for Max. Torque.

4. Recheck motor and pump rotation. Proper pump rotation is clockwise (CW) looking at the front of the pump when pressure relief valve is installed by manufacturer (See Figure 1).
5. On all standard models, pressure relief valve is always on discharge side (See Figure 1).

PRESSURE RELIEF VALVE

6. Standard model rotary gear pumps are supplied with a built-in internal pressure relief valve (can be externally ported). The valve may be adjusted and used to set system operating pressure, or used as a system pressure relief valve to prevent pump and motor damage that can occur when discharge line is closed off. This relief valve is not factory set. Extended operation (over one minute) under shut-off conditions could cause pump to overheat, leak, and damage itself or overload motor.

7. To increase the pressure relief valve pressure setting, remove cap (See Figure 3 & 13, Ref. No. 31), then loosen lock nut (See Figure 13, Ref.

No. 36), then turn the set screw (See Figure 13, Ref. No. 32) in (clockwise). Turning the set screw out (counterclockwise) will reduce the pressure setting. When desired pressure is achieved, tighten lock nut and reinstall protective cap (See Figure 3).

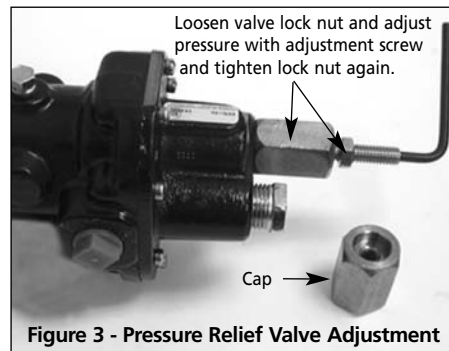


Figure 3 - Pressure Relief Valve Adjustment

8. The pressure relief valve can be converted to an external relief. This will allow the relief to dump back to tank and allow longer periods of relief without pump damage. However, this is not a full-line pressure relief valve, and in cases where frequent extended pressure relief valve operation is anticipated, a full-line external pressure relief valve should be piped in the discharge line and connected either back to the tank or well down-stream of the pump suction inlet (See Figure 4).

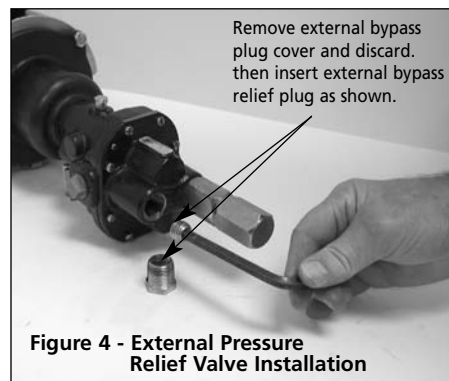


Figure 4 - External Pressure Relief Valve Installation

9. To convert the pressure relief valve to external relief, remove the NPT pipe plug from the pump cover

(See Figure 13, Ref. No. 35) and discard. This plug is next to the pressure relief valve. In the bottom of the NPT hole, there is a second drilled and tapped hole. An optional external bypass plug (See Figure 13, Ref. No. 38 included) should be inserted in this hole and bottomed out. The open NPT port must now be piped back to the tank or well downstream of the pump suction (See Figure 4).

10. Standard models are equipped with pressure relief valves, and the pump can be run in reverse, however, the pressure relief valve will not function. For continuous reverse rotation, the cover plate must be rotated 180° and gears reversed (See Figure 13). This is accomplished by removing the eight cover plate screws, rotating the cover plate, and reattaching the screws. The pressure relief valve should now be on the opposite side. This will allow operation of the pump with a functioning pressure relief valve in reverse rotation. See Maintenance Pump Repair section for disassembly and reassembly instructions.

MECHANICAL SEAL FLUSH INSTALLATION OPTIONS

11. These pumps are equipped with mechanical seals and have been designed with flush ports because mechanical seals require cooling lubrication for long life.
 - a. For fluids with viscosities less than 2000 SSU, a flush is not necessary, but the seal cavity must be pre-filled with either the operating fluid or a neutral fluid. This is to ensure seal cooling and lubrication during start-up (See Figure 2).

CAUTION Failure to provide initial seal prime can result in the mechanical seal overheating with resulting repair costs.

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Operation (Continued)

- b. A flush must be provided for fluids with a viscosity of greater than 2000 SSU. The seal must be cooled and lubricated by a fluid. In the case of high viscosity fluids, due to the precision clearances between the gear teeth and the body, highly viscous fluids will not be able to adequately relieve the air in the seal cavity on start-up. The dry running of a mechanical seal will cause rapid failure.

CAUTION Pumping fluids with viscosities greater than 2000 SSU requires flushing the seal chamber during operation, otherwise seal damage will occur.

EXTERNAL FLUSH

An external flush system is typically recommended for applications where crystallization build-up on the seal is possible. Some dilution of the working material must be acceptable to use an external flush system.

The external flush system (See Figure 5 for typical installation) is commonly used with liquids where city water can be used as the neutral flush fluid. City water is taken from an external source

such as a tap, hose, or special plumbing fixture and is regulated into the seal cavity by means of a needle valve and flowmeter. Use of an anti-siphon check valve is required.

WARNING It is essential that an anti-siphon check valve be installed between the pump and the city water supply to prevent any back flow from possibly contaminating the city water supply. Failure to do so could result in contamination of the water supply with consequential damages. Manufacturer assumes no responsibility for failure of user in not providing safeguards to city water systems.

Step 1: Locate appropriate city water supply and install anti-siphon check valve.

Step 2: Use appropriate pipe nipple to reduce piping to 1/8".

Step 3: Install appropriate needle valve and flowmeter.

Step 4: Connect piping to one of three available seal flush ports on pump.

Step 5: Adjust needle valve to achieve desired flow to seal cavity (recommended 1 to 3 GPH).

INTERNAL FLUSH

Similar to above but internal supply (See Figure 6 for typical installation). Typically recommended for high viscosity

applications ensuring lubrication to the mechanical seal.

In an internal flush system, the fluid is taken from the discharge and regulated from 1 to 3 GPH (Gallons Per Hour) to the seal cavity by means of a flowmeter and needle valve.

Step 1: Select a T pipe coupling that is consistent with discharge pipe size and material. Couple to discharge piping.

Step 2: From this coupling, attach a needle valve with appropriate nipple reducing to 1/8" pipe or tube. Install appropriate flowmeter.

Step 3: Connect 1/8" pipe or tube to one of three available seal cavity flush ports.

Step 4: Adjust needle valve to desired flow into seal cavity (recommended 1 to 3 GPH).

CAUTION For alternate flush systems for hazardous fluid applications, hot liquid transfer, and those not addressed in this booklet, consult a qualified fluid handling specialist for assistance in specifying and installing flush systems according to local, state and federal environmental laws.

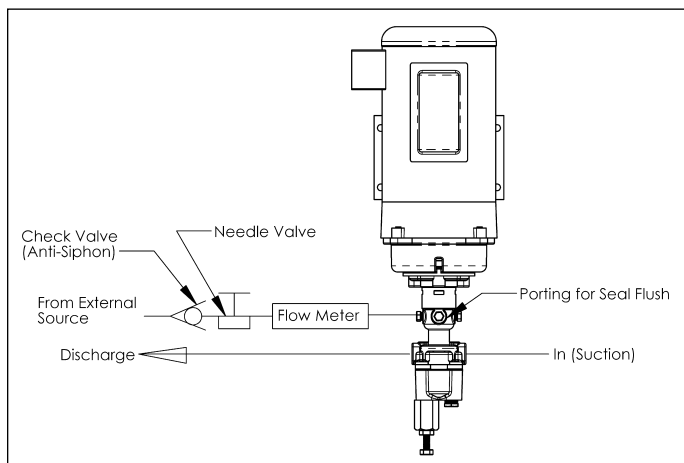


Figure 5 - External Flush

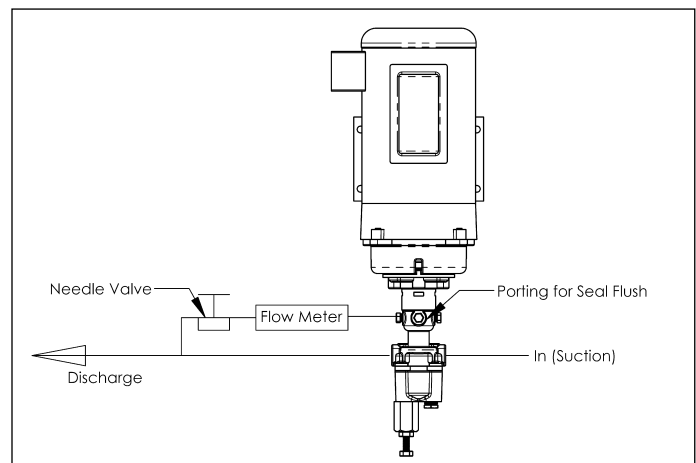


Figure 6 - Internal Flush

Models NG7V, NG11V, NG7V-PH and NG11V-PH

GEAR SPEED REDUCER OPTIONS

A gear reducer can be directly mounted between a standard pump and motor combination. Gear speed reducers are available for applications with high specific gravity, or when viscosities are greater than 100 SSU, using a standard 1725 RPM motor (See Appendix 1). The pump relationship between volume (GPM), pressure (PSI), speed (RPM), viscosity, specific gravity and horsepower is shown on performance chart in Shurflo Motor Manual form L-4082.

12. Unit is ready for operation.

Maintenance

⚠ WARNING *Make certain that the power source is disconnected before attempting to service or disassemble any components!*
If the power disconnect is out of sight, lock it in the open position and tag to prevent application of power.

CLEANING

Clean the suction line filter at regular intervals.

ELECTRIC MOTOR (IF SUPPLIED)

Properly selected and installed, electric motors are capable of operating for years with minimal maintenance. Periodically clean dirt accumulations from open-type motors, especially in and around vent openings, preferably

by vacuuming (avoid imbedding dirt in windings). Oil and maintain as recommended by motor manufacturer.

GENERAL

Periodically check that electrical connections are tight. Pump should be drained if placed in an area that is subject to freezing temperatures and/or lubricated with fluid compatible with pump.

PUMP REPAIR

DISASSEMBLY

(Refer to Figure 13 for Reference Numbers and Figures 8 & 9 for detailed seal and shaft assemblies.)

1. Pump Removal from Motor
 - a. Remove four bolts (Ref. No. 20) from pump body (Ref. No. 19) and gently pull pump assembly from motor.
 - b. Pump drive coupler does not need to be removed from motor unless motor needs to be replaced. (If so, refer to Pump and Motor Drive Coupler Replacement on page 11.)
2. Gear and Shaft Assembly Removal
 - a. Remove cover plate (Ref. No. 34) (held by eight screws, Ref. No. 1) and o-ring gasket (Ref. No. 2). Gently tap cover plate with rubber mallet to free it from

dowel pins. Once cover is removed, the idler shaft and gear assembly can be pulled out of pump body (Ref. No. 19).

- b. Remove the idler gear (Ref. No. 4) from the shaft (Ref. No. 24) by removing retaining rings (Ref. No. 15), then slide gears off the shaft end (Ref. No. 4).
- c. The drive gear (Ref. No 3) can be pulled out. Before drive shaft (Ref. No. 5) can be removed from body (Ref. No. 19), remove woodruff key (Ref. No. 25) by gently tapping key with drift pin. (Do not damage key or keyway upon removal.)

NOTE: The gears are helical gears. It is important that the correct "twist" of the gear is installed in the drive pocket versus the idler pocket for efficient directional operation. Reverse gears for reverse pump operation.

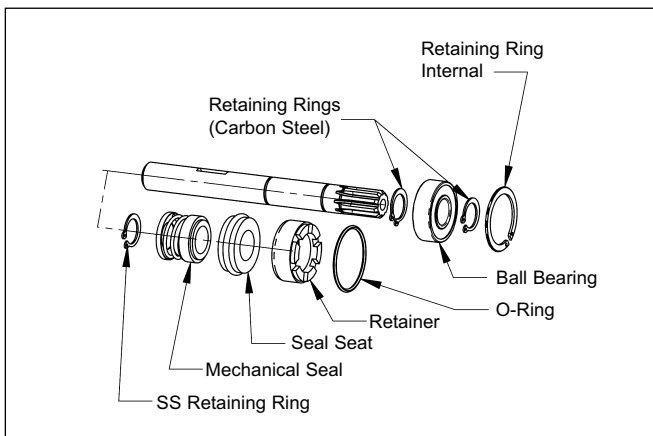


Figure 8 - Shaft and Seal Assembly

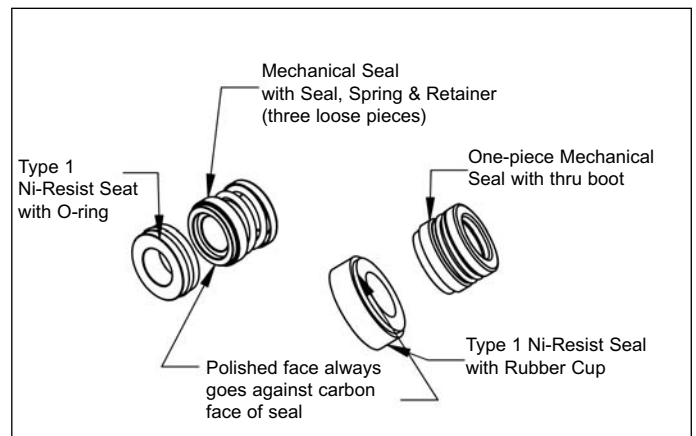


Figure 9 - Seal Types and Parts Identification

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Maintenance (Continued)

3. From the drive shaft end of the gear pump, remove the internal snap ring (Ref. No. 11) from the body (Ref. No. 19). The drive assembly, which consists of the drive shaft (Ref. No. 5), seal assembly (Ref. Nos. 7 & 8), seat retainer (Ref. No. 9), bearing (Ref. No. 10) and retaining rings (Ref. No. 16 & 23), can now be removed from the unit (See Figure 8).

NOTE: The retaining rings (Ref. No. 16 and 23) look alike but are made of different materials. Make sure you identify them properly.

The bearing (Ref. No. 10), seat retainer (Ref. No. 9) and seal (Ref. No. 7) can also be removed (pushed or pulled) from the shaft (Ref. No. 5). Also remove the internal o-ring (Ref. No. 17) from the body (Ref. No. 19). Disassembly is now complete.

4. Inspect pump for wear on pump body, gear, shafts, bushings (bushing replacement is not recommended), bearings and cover. If any components are worn, consider replacing the complete pump. Complete pump heads can be found on Figure 13.

REASSEMBLY

(Refer to Figure 13 for Reference Numbers and Figures 8 & 9 for detailed seal and shaft assemblies.)

1. Shaft/Seal Assembly

- a. Install inside o-ring (Ref. No. 17) into body (Ref. No. 19). Lubricate with light oil.
- b. There are two possible types of seals. One style, the seal is one piece while the other style has a seal boot, spring and spring retainer (See Figure 9). Refer to assembling components on drive shaft (See Figure 8). When installing the seal on the shaft, wet with water and be cautious when sliding it into position.

NOTE: If drive shaft has scratches or rough spots where seal will be positioned, replace shaft. Prior to sliding the seal in place, remove any rough spots on shaft near key retainer ring slots.

The spring retaining washer and spring are behind the seal with the carbon facing towards the splined end of drive shaft.

- c. The seal seats can also be of two styles; one has a rubber boot and the other has an o-ring. Identify which type you have (See Figure 9). Press seal seat into the seal retainer (See Figures 8 & 9) using water as a lubricant. The white shiny Type 1 Ni-Resist face should be visible after pressing the seal to the seal retainer. It is recommended to use a cardboard washer or wood dowel when pushing the seal seat into the seal seat retainer. Any scratches, dirt, or fingerprints on the carbon or Type 1 Ni-Resist faces will cause the seal to leak. The seal seat is stationary in the pump, while the seal on the shaft rotates. The carbon face spinning against the Type 1 Ni-Resist face provides for the sealing surface.
 - d. Slide the seal retainer onto the drive shaft holding seal onto the shaft.
 - e. Slide the drive shaft assembly (Ref. Nos. 7,8,9,10,16 & 23) into the gear pump and secure with the internal retaining ring (Ref. No. 11). (Also see Figure 8.)
- ### 2. Gear and Shaft Installation
- a. Replace the woodruff key (Ref. No. 25) into the drive shaft (Ref. No. 5) using soft jaw pliers, or protect the shaft with rubber while pressing the key in place. Be sure that the key is level and that the key and shaft are free of burrs and scratches.

b. The drive gear (Ref. No. 3) can be dropped in place and must be free to float on the shaft. Do not force the drive gear onto the shaft. For standard clockwise rotation, the drive gear should be the right-hand twist helical gear (See Figure 7).

c. The idler gear (Ref. No. 4) is placed on the idler shaft (Ref. No. 24) over the woodruff key and secured by the two external retaining rings (Ref. No. 15).

d. Slide idler gear and shaft assembly into pump body (Ref. No. 19), rotating gear to get gears to mesh.

e. Ensure that the pump body (Ref. No. 19) and cover (Ref. No. 34) mating surfaces are clear of debris and are dry.

Place new, clean and dry o-ring gasket into the groove on the pump body.

CAUTION *Any foreign or liquid material on the gasket or the gasket surfaces will increase the space between the gears and the cover, and substantially reduce pump performance.*

f. Slide cover over dowel pins (Ref. No. 21).

NOTE: Position cover (Ref. No. 1) with pressure relief valve on the discharge side of the pump—for clockwise rotation, this is the right side of the pump (See Figure 1). If the pump is to be run in reverse direction, rotate cover (Ref. No. 1) 180° so that the relief valve is on the discharge side. Ensure that the gears are installed for proper direction as well (See Figure 7).

The drive shaft assembly will require slight compression as cover is tightened. Replace and tighten cover screws. Alternate from top to bottom and side to side while tightening screws. Torque cover screws to 50 in.-lbs.

g. Reinstall pump to motor, see "Reassembly" section on this page.

Models NG7V, NG11V, NG7V-PH and NG11V-PH

- h. If drive coupler or motor need replacing, see "Pump Motor or Drive Coupler Replacement" section on this page.
- 3. All pumps must be primed before start-up and the seal chamber needs to be filled (See Figure 2).

PRESSURE RELIEF VALVE

DISASSEMBLY AND REASSEMBLY

1. (Refer to Figure 13.) Remove threaded cap (Ref. No. 31) and loosen lock nut (Ref. No. 36) on pressure relief valve adjustment screw (Ref. No. 32) and rotate clockwise (CW) 1-2 turns to pressure relief valve spring retainer (Ref. No. 29).
2. Unscrew and remove adjustment screw (Ref. No. 32), locknut (Ref. No. 36) and fiber washer (Ref. No. 26) by rotating counterclockwise (CCW).
3. Unscrew valve end cap (Ref. No. 30) and o-ring (Ref. No. 37) by rotating counterclockwise (CCW).
4. Remove valve piston (Ref. No. 28), spring retainer (Ref. No. 29), valve spring (Ref. No. 27), cover and/or valve end cap and o-ring (Ref. No. 33), .
5. Unscrew pipe plug (Ref. No. 35) by rotating counterclockwise (CCW).

Inspection of pressure relief valve

components should include piston for wear and erosion, the spring and the o-rings for degradation. Components should be cleaned of accumulated build-up of solid matter. The pressure relief valve cover (Ref. No. 34) needs to be inspected for wear on the piston pressure relief valve seat, the cover face and the bushing pockets. Replace any parts if worn.

To reassemble, reverse the disassembly steps above.

6. All pumps must be primed before start-up and the seal chamber needs to be filled (See Figure 2).

PUMP MOTOR OR DRIVE COUPLER REPLACEMENT

1. The pump comes with a spline coupler. The coupler could be of two types. (See Figures 11 & 12 to identify coupler type.)
2. Apply anti-seize compound to the entire length of the motor shaft and drive coupling spline teeth.
3. Align the keyways of motor shaft and coupling, then install the key (See Figures 10, 11 and 12). Slide the drive coupling onto the motor shaft as far as it will go.
4. Install the set screws into the

coupler and tighten the set screws securing the coupler, key and motor shaft together.

5. The coupling is now ready for final pump motor assembly.
6. Make sure the splines are coated with anti-seize compound or grease. Slide the male spline shaft on the pump head into the female spline now mounted on the motor shaft.
7. Secure the pump to the motor with four bolts.
8. The unit is ready for operation.
9. All pumps must be primed before start-up and the seal chamber needs to be filled (See Figure 2).The pump head will pivot on the motor.

CAUTION Do not run pump dry, as permanent damage to the pump gears, seal, and bearings will result. Suction pressure should never be greater than the discharge pressure.



Figure 10 - Installing the Spline Coupler

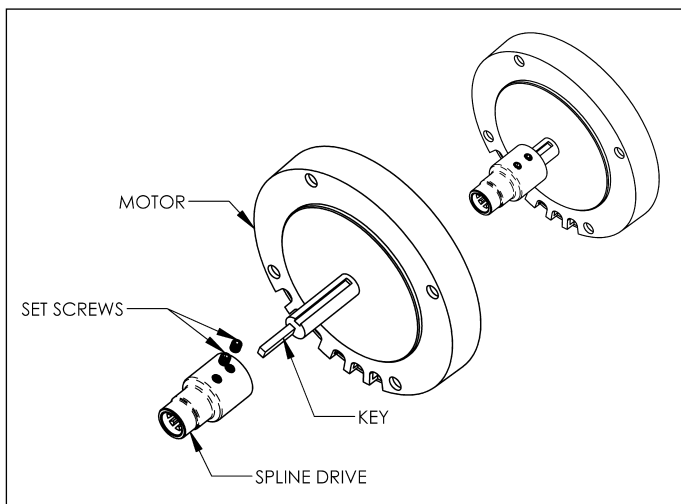


Figure 11 - Type A Motor Shaft Coupler

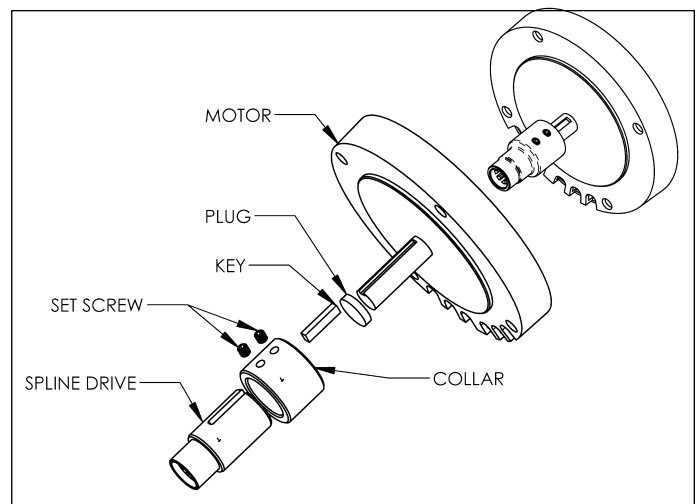


Figure 12 - Type B Motor Shaft Coupler

To order parts, contact a SHURflo Distributor or Order Direct.
Distributors can be found at www.shurfloindustrial.com.

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number
as shown in parts list

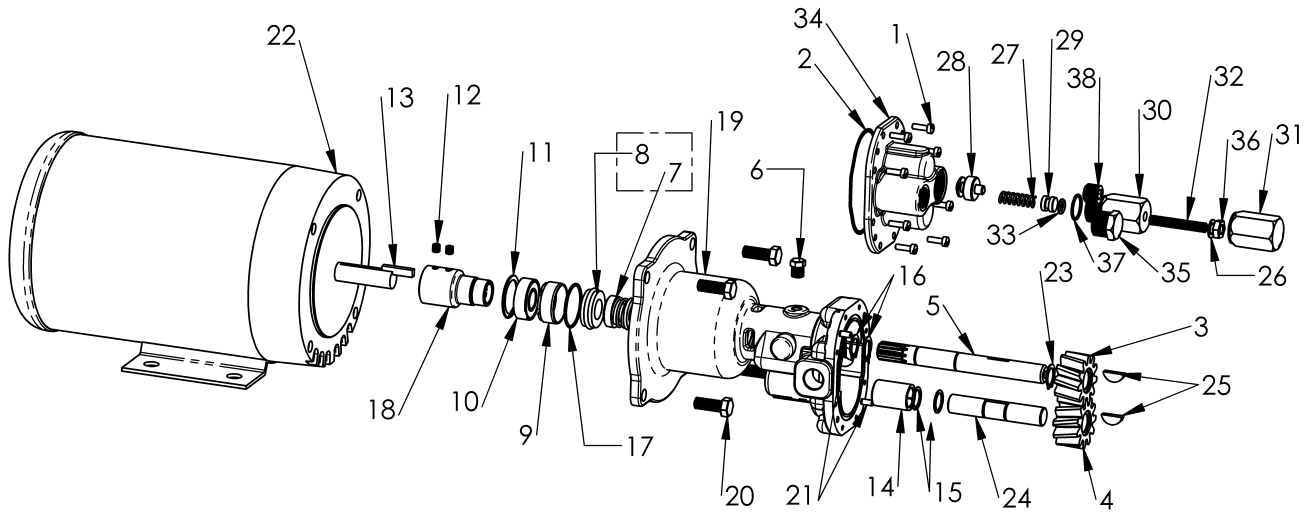


Figure 13 – Repair Parts Illustration

Models NG7V, NG11V, NG7V-PH and NG11V-PH

Repair Parts List

Ref. No.	Included In Kit	Description	Part No. For Model:				Qty.
			NG7V	NG11V	NG7V-PH	NG11V-PH	
1		Screw - Fillister Head	NA	NA	NA	NA	8
2	1, 2	O-Ring - Viton	NA	NA	NA	NA	1
3	1	Gear-Helical (R.H.) - 416 SS (See kit.)	NA	NA	NA	NA	1
4	1	Gear-Helical (L.H.) - 416 SS (See kit.)	NA	NA	NA	NA	1
5		Shaft-Drive - 303 SS	23293	22800	23293	22800	1
6		Plug-Pipe - Steel	23182	23182	23182	23182	1
**7/8		Seal/Seat Assy. - Viton	22850S	22850S	22850S	22850S	1
9		Retainer - YZD	21864	21864	21864	21864	1
10		Bearing	4257	4257	4257	4257	1
11		Retaining Ring	4259	4259	4259	4259	1
12		Set Screw - Steel	22161	22161	22161	22161	2
13		Key	21943	21943	21943	21943	1
14		Bushing - CG	21333	21333	21333	21333	3
15	1	Retaining Ring - Idler Shaft - 15-7 Mo. SS	12840	12840	12840	12840	2
16		Retaining Ring - Drive Shaft - Carbon Steel	5328	5328	5328	5328	2
17		O-Ring - Viton	23359	23359	23359	23359	1
18		Drive Coupling - spline	22802	22802	22802	22802	1
19		Body-Gear Pump - CI	NA	NA	NA	NA	1
20		Hex Head Screw	NA	NA	NA	NA	4
21		Dowel Pin	NA	NA	NA	NA	2
22		*Motor (See Specifications.)	24878S	24876S	NA	NA	1
23		Retaining Ring - 15-7 Mo. SS	12582	12582	12582	12582	1
24		Shaft - 303 SS	21307	21313	21307	21313	1
25	1	Key - Woodruff	4432	12841	21307	21313	2
26	2	Washer (Fiber)	22507	22507	22507	22507	1
27	2	Spring - 17-7 SS	4354	4354	4354	4354	1
28	2	Piston - Relief Valve - 303 SS	NA	NA	NA	NA	1
29		Spring Retainer - 17-4 SS	21422	21422	21422	21422	1
30		Cap - Relief Valve - Steel	23416	23416	23416	23416	1
31		Cap - Threaded	23415	23415	23415	23415	1
32		Screw - Pressure Relief - 18-8 SS	23414	23414	23414	23414	1
33	2	O-Ring - Viton	NA	NA	NA	NA	1
34		Cover - CI	23290	23290	23290	23290	1
Optional		Optional Non-Relief Cover	23004S	23004S	23004S	23004S	1
35		Pipe Plug	21419	21419	21419	21419	1
36		Nut - Jam	23413	23413	23413	23413	1
37	2	O-Ring - Viton	NA	NA	NA	NA	1
38		Set Screw External Relief Valve - 17-4 SS (not installed at factory)	21709	21709	21709	21709	1
2, 3, 4, 15 & 25		Kit 1 - Gear Kit	24780	24781	24780	24781	
2, 26, 27, 28, 33 & 37		Kit 2 - Relief Valve Kit	24782	24782	24782	24782	
		Complete Pump Heads*	NG7V-PH	NG11V-PH	NG7V-PH	NG11V-PH	

(*) Motor specifications are found in the motor specifications chart in this manual.

(**) Mech. seal and seat sold as set only (Ref. Nos. 7&8) – carbon Type 1 Ni-Resist faces with 18-8 SS components.

NOTES: SS = Stainless Steel CI = Cast Iron CG = Carbon Graphite YZD = Yellow Zinc Dichromate
Optional Close-Coupled Gear Speed Reducers are available (See Appendix 1).

SHURflo Commercial-Duty Filter and Rendering Oil Rotary Close-Coupled External Gear Pumps

Appendix 1 - Optional C-Flanged Pump Speed Gear Reducers

GEAR SPEED REDUCER OPTIONS

A gear reducer can be directly mounted between a standard pump and motor combination. Gear speed reducers are available for applications with high

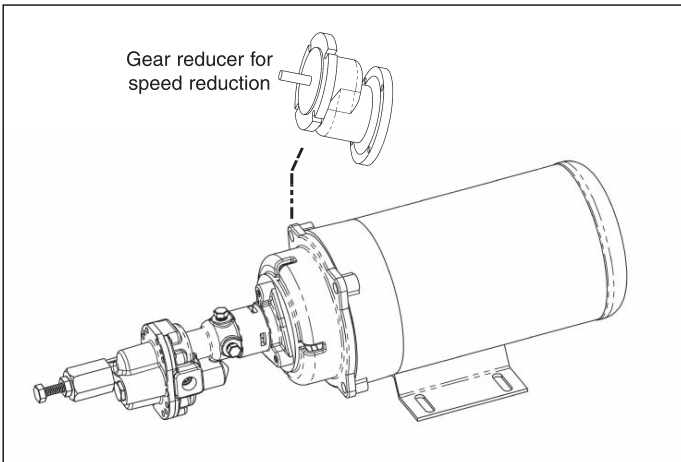
specific gravity, or when viscosities are greater than 1000 SSU, using a standard 1725 RPM motor. The pump relationship between volume (GPM), pressure (PSI), speed (RPM), viscosity, specific

gravity and horsepower is shown on performance chart in Shurflo Motor Manual form L-4082.

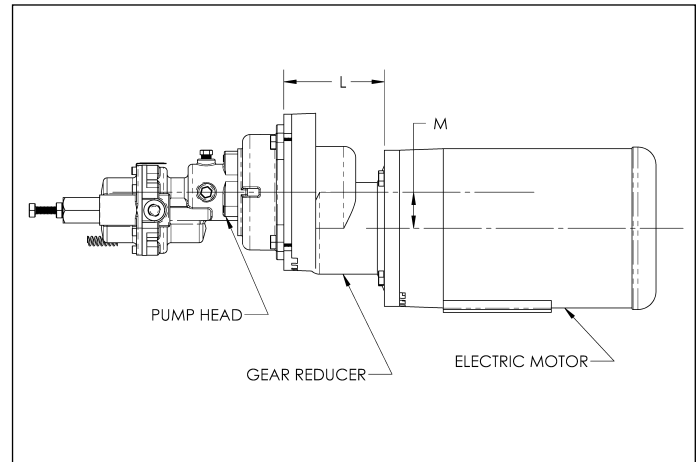
Model Number	Description	L*	M*	RPM Out**	Ship Weight (lbs.)
AGR56C600	Gear Reducer, 56C to 56C, 3.0 ratio	5.177	1.675	583	21
AGR56C900	Gear Reducer, 56C to 56C, 2.0 ratio	5.177	1.675	875	21
AGR56C1200	Gear Reducer, 56C to 56C, 1.5 ratio	5.177	1.675	1167	21

(*) L dimension (in inches) is length of the gear reducer. M dimension (in inches) is the offset of the reducer output centerline from the motor centerline. All reducers may be rotated in 90° increments, changing the orientation of the offset from top to side to bottom.

(**) Based on 1750 RPM motor speed.



Disassemble Pump From Motor and Insert Gear Reducer



Gear Reducer Installed between Pump and Motor (References L and M are dimensions in chart above.)

Limited Warranty on SHURflo Commercial-Duty Filter and Rendering Oil Rotary External Gear Pumps

SHURflo warrants to the original purchaser of its products (the "Purchaser") that such products will be free from defects in material and workmanship under normal use for the period of one (1) year, and accessories will be free from defects in material and workmanship under normal use for the period of ninety (90) days.

"Normal use" does not include use in excess of recommended maximum speeds, pressures, vacuums and temperatures, or use requiring handling of fluids not compatible with component materials. This warranty does not cover freight damage, freezing damage, normal wear and tear, or damage caused by misapplication, fault, negligence, alterations, or repair that affects the performance or reliability of the product.

THIS WARRANTY IS EXCLUSIVE. SHURflo MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

SHURflo's obligation under this warranty is, at SHURflo's option, to either repair or replace the product upon return of the entire product to the SHURflo factory in accordance with the return procedures set forth below. **THIS IS THE EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.**

IN NO EVENT SHALL SHURflo BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, WHETHER FOR BREACH OF ANY WARRANTY, FOR NEGLIGENCE, ON THE BASIS OF STRICT LIABILITY, OR OTHERWISE.

Only authorized distributors can return products for Warranty. Contact your distributor or visit www.shurfloindustrial.com to find a distributor for product support.

Distributors can obtain an RMA # and contact person's name by contacting SHURflo's customer service at 800-854-3218 (Ext. 6788 or Ext. 6651).

Return Procedures for Distributors

All pumps or products must be flushed of any chemical (ref. OSHA Section 0910.1200 (d)(e)(f)(g)(h) and hazardous chemicals must be labeled before being shipped* to SHURflo for service or warranty consideration. SHURflo reserves the right to request a Material Safety Data sheet from the Purchaser for any pump or product SHURflo deems necessary. SHURflo reserves the right to "disposition as scrap" pumps or products returned which contain unknown substances, or to charge for any and all costs incurred for chemical testing and proper disposal of components containing unknown substances. SHURflo requests this in order to protect the environment and personnel from the hazards of handling unknown substances.

Be prepared to give SHURflo full details of the problem, including the following information:

1. Model number, purchase date and from whom you purchased your pump.

2. A brief description of the pump problem, including the following:

- Liquid pumped. State the pH and any non-soluble materials, and give the generic or trade name.
- Temperature of the liquid and ambient environment.
- Suction lift or vacuum (measured at the pump).
- Discharge pressure.
- Size, type, and mesh of the suction strainer.
- Drive type (gas engine/electric motor; direct/belt drive; tractor PTO) and rpm of pump.
- Viscosity (of oil, or other than water weight liquid).
- Elevation from the pump to the discharge point.
- Size and material of suction and discharge line.

SHURflo may request additional information, and may require a sketch to illustrate the problem. Distributors should contact the factory to receive a return material authorization before sending the product. All pumps returned for warranty work should be sent shipping charges prepaid to:

[RMA# and Contact Person]
SHURflo
375 Fifth Avenue NW
New Brighton, Minnesota 55112

*Carriers, including U.S.P.S., airlines, UPS, ground freight, etc., require specific identification of any hazardous materials being shipped. Failure to do so may result in a substantial fine and/or prison term. Check with your shipping company for specific instructions.



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