

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 316 Stainless Steel Rotary Pedestal External Gear Pumps

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

## Description

SHURflo self-priming, positive displacement, external rotary gear pumps operate bi-directionally (reversible) and provide a nearly pulseless flow for a wide range of industrial, marine, agricultural, and commercial chemical-duty applications. Ryton PPS (Polyphenylene Sulfide) spur gears provide quiet operation and chemical compatibility with no metal-to-metal contact. Pumps can operate in a temperature range of 32° F to 280° F.

Quality features include a keyed 316 stainless steel shaft supported by a ball bearing and carbon graphite bushings. Wet-end parts are constructed of 316 stainless steel, Ryton PPS, graphite, graphoil, carbon, ceramic, and seal material (Teflon® or Viton).

Uses: For use with non-particulate and non-abrasive fluids compatible with pump wet-end construction component materials.

- Capacities up to 24.8 GPM.
- Maximum pressure to 125 PSI and working casing pressure to 200 PSI.
- Max. RPM: 1725.
- Suction lift to 19.5 ft.
- Temperature ranges from 32° to 280° F.
- Large female NPT ports allow use with viscous fluids.
- Pumps can be long-coupled with electric motors to handle up to 500 SSU at 1725 RPM or run at reduced speeds to handle a wide range of pump fluid viscosities and specific gravity up to 100,000 SSU. (Maximum torque loads are found in the performance chart.)
- Viton or Teflon® mechanical seals (standard) with carbon on ceramic faces with engineered flush chamber for internal or external flush to handle viscosities beyond 2000 SSU.
- Pumps can operate bi-directionally (reversible).
- Ball bearing shaft support allows for pulley drive.

**REPAIR SEALS AND OPTIONS** – Standard seals are Viton or Teflon® (Buna-N is optional) with carbon on ceramic faces. Seals can be located in the repair parts list pages in this manual. When switching between optional mechanical seals, be sure to order the matching o-rings in the same material. These can be found in the repair parts list pages in this manual.

**NOTE:** This series of gear pumps is also available as close-coupled models equipped with motors.



**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 a 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 316 Stainless Steel Rotary Pedestal External Gear Pumps

## Model Ordering Codes and Options



**Example Model: GPSV2** (will require 3/4 HP ODP motor with >1.15 Service Factor\*)  
(motor not supplied with pedestal pump)

1st	2nd	3rd	4th
Mounting	Material	Seal (Mech)	Gear** Size: Ports
GP: Gear Pedestal	S: 316 Stainless Steel	V: Viton T: Teflon	2: 3/8" 4: 1/2" 6: 1"

**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.

(\*) ODP motors have > 1.15 service factors. Due to service factor, it is recommended TEFC motors are oversized by one HP increment.

Pedestal Pumps are not supplied with a motor.

(\*\*) Gears are made of Ryton PPS (Polyphenylene Sulfide).

Maximum motor speed is 1725 RPM.

# Viton Models GPSV2, GPSV4 and GPSV6 Teflon® Models GPST2, GPST4 and GPST6

## Performance (with Oil)

Viton Pump Models	Teflon Pump Models	*Port Size	Max. Input Torque in.-lbs.	Pump RPM	Suction** Lift (ft)	Free Flow GPM	HP	GPM Pumping 10 Wt. Oil at 70° F (500 SSU)											
								25 PSI		50 PSI		75 PSI		100 PSI		125 PSI			
GPSV2	GPST2	3/8"	45	900	1.5	2.5	1/4	2.5	1/4	2.4	1/4	2.3	1/4	2.1	1/4	1.8	1/3		
				1200	2.2	3.3	1/4	3.3	1/4	3.2	1/4	3.1	1/3	2.9	1/3	2.6	1/2		
				1725	3.5	4.8	1/4	4.8	1/3	4.7	1/2	4.6	1/2	4.4	3/4	4.1	3/4		
GPSV4	GPST4	1/2"	90	900	5.1	5.6	1/3	5.5	1/3	5.4	1/2	5.3	3/4	5	1	4.5	1		
				1200	6.7	7.5	1/3	7.4	1/2	7.3	3/4	7.2	1	6.9	1	6.4	1½		
				1725	12.3	10.8	1/2	10.7	3/4	10.6	3/4	10.5	1	10.2	1½	9.7	1½		
GPSV6	GPST6	1"	160	900	8.1	12.6	1/2	12.5	3/4	12.3	1	12.1	1	11.7	1½	11.1	1½		
				1200	11.7	16.7	3/4	16.6	1	16.4	1½	16.2	1½	15.8	2	15.2	2		
				1725	19.5	24.8	3/4	24.7	1	24.5	1½	24.3	2	23.9	3	23.3	3		

Test data taken on SAE 10 wt oil at 70° F (500 SSU).

Performance in water will decrease by about 10%, and HP required will also be reduced by 10% (see the chart below).

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.

**NOTES:** Max. PSI = 125

Max. Viscosity = 500 SSU at 1725 RPM with standard spur gears

Max. RPM = 1725

Max. Specific Gravity = 1.1 at 125 PSI, up to 1.6 at lower PSI & viscosity.

Max. Input Torque = See chart above.

Reverse Rotation = Pumps can be run in reverse rotation.

The pump relationship between volume (GPM), pressure (PSI), speed (RPM) and horsepower is shown on performance chart in Shurflo Motor Manual form L-4082. When pumping a more viscous liquid, a slower speed, a larger pipe size pump, and possibly a larger motor should be selected. Manufacturer reserves the right to change performance without notification.

## Performance (with Water)

Viton Pump Models	Teflon Pump Models	*Port Size	Max. Input Torque in.-lbs.	Pump RPM	Suction** Lift (ft)	Free Flow GPM	HP	GPM Pumping Water at 90° F (31 SSU)											
								25 PSI		50 PSI		75 PSI		100 PSI		125 PSI			
GPSV2	GPST2	3/8"	45	900	1.2	2.4	1/4	2.3	1/4	2.1	1/4	1.8	1/4	1.5	1/3	1.1	1/3		
				1200	1.8	3.2	1/4	3.1	1/4	2.9	1/3	2.6	1/3	2.3	1/2	1.9	1/2		
				1725	3.0	4.6	1/3	4.5	1/2	4.2	1/2	4.0	1/2	3.7	3/4	3.3	3/4		
GPSV4	GPST4	1/2"	90	900	4.5	5.5	1/4	5.1	1/4	4.5	1/3	4.1	1/3	3.7	1/2	3.1	1/2		
				1200	6.0	7.3	1/3	7.0	1/3	6.3	1/2	5.9	1/2	5.5	3/4	4.9	3/4		
				1725	11.0	10.5	1/2	10.2	1/2	9.5	3/4	9.1	3/4	8.7	1	8.1	1		
GPSV6	GPST6	1"	160	900	7.0	12.6	1/2	12.0	3/4	10.9	3/4	10.1	1	9.1	1½	8.1	2		
				1200	10.0	16.7	3/4	16.1	3/4	15.0	1	14.2	1½	13.2	2	12.2	2		
				1725	17.0	24.0	1	23.4	1	22.3	1½	21.5	2	20.5	3	19.5	3		

Test data taken with water at 90° F (31 SSU).

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.

**NOTES:** Max. PSI = 125

Max. Viscosity = 500 SSU at 1725 RPM with standard spur gears

Max. RPM = 1725

Max. Specific Gravity = 1.1 at 125 PSI, up to 1.6 at lower PSI & viscosity.

Max. Input Torque = See chart above.

Reverse Rotation = Pumps can be run in reverse rotation.

The pump relationship between volume (GPM), pressure (PSI), speed (RPM) and horsepower is shown on performance chart in Shurflo Motor Manual form L-4082. When pumping a more viscous liquid, a slower speed, a larger pipe size pump, and possibly a larger motor should be selected. Manufacturer reserves the right to change performance without notification.

# SHURflo 316 Stainless Steel Rotary Pedestal External Gear Pumps

## Specifications

Model	Max. RPM	NPT Inlet & Outlet Port	PUMP CONSTRUCTION (Wet End)								Shipping Weight (lbs.)
			Pump Shaft Size	Motor Adapter	Bushing Material	Body & Cover Castings	Gear Material	Shaft, Keys & Clip	Gasket Material	O-Rings & Seals*	
<b>316 SS Models with Viton</b>											
GPSV2	1725	3/8"	1/2 Keyed	CI	CG	316 SS	Ryton PPS	316 SS	Graphoil	Viton	7.1
GPSV4	1725	1/2"	5/8 Keyed	CI	CG	316 SS	Ryton PPS	316 SS	Graphoil	Viton	9.0
GPSV6	1725	1"	3/4 Keyed	CI	CG	316 SS	Ryton PPS	316 SS	Graphoil	Viton	11.8
<b>316 SS Models with Teflon®</b>											
GPST2	1725	3/8"	1/2 Keyed	CI	CG	316 SS	Ryton PPS	316 SS	Graphoil	Teflon®	7.1
GPST4	1725	1/2"	5/8 Keyed	CI	CG	316 SS	Ryton PPS	316 SS	Graphoil	Teflon®	9.0
GPST6	1725	1"	3/4 Keyed	CI	CG	316 SS	Ryton PPS	316 SS	Graphoil	Teflon®	11.8

**NOTE:** (\*) Standard Shaft Seals have carbon on ceramic faces and 316 SS components.

Manufacturer reserves the right to change specifications without notification.

SS = Stainless Steel

CI = Cast Iron

CG = Carbon Graphite

Ryton = PPS (Polyphenylene Sulfide)

# Viton Models GPSV2, GPSV4 and GPSV6 Teflon® Models GPST2, GPST4 and GPST6

## Dimensions

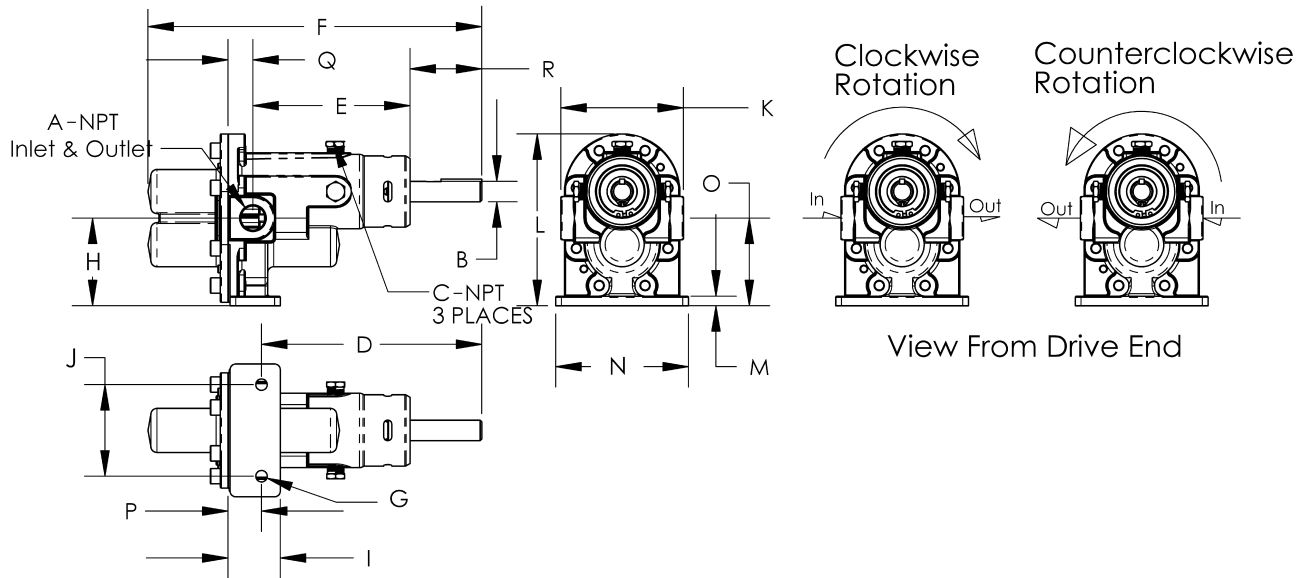


Figure 1

Model No.	Port Shaft			Dimensions (in inches)														
	A*	B**	C*	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
GPSV2, GPST2	3/8	1/2	1/8	5.39	3.85	8.18	9/32	2.15	1.25	2.25	3.00	4.21	0.25	3.25	2.80	0.81	0.60	1.75
GPSV4, GPST4	1/2	5/8	1/8	6.54	4.72	9.32	13/32	2.40	1.44	2.88	3.50	4.65	0.28	3.5	3.15	0.75	0.70	1.87
GPSV6, GPST6	1	3/4	1/8	7.82	5.66	11.38	13/32	2.94	1.82	3.32	4.40	5.83	0.30	4.18	3.94	1.125	1.035	2.25

(\*) Standard NPT (female) pipe thread inlet and outlet (in inches).

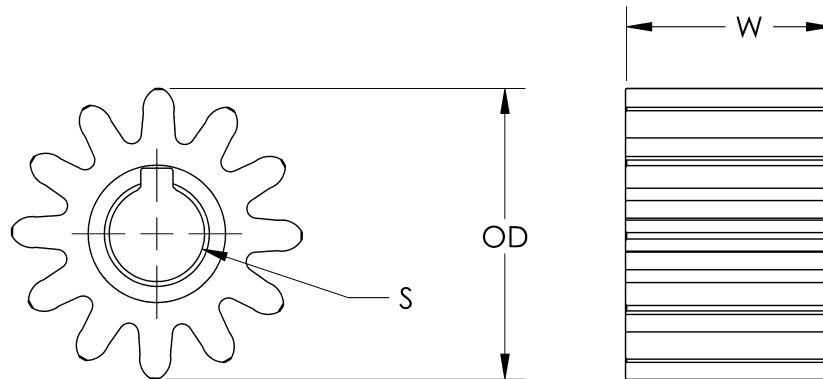
(\*\*) Shaft is slotted for key.

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

Manufacturer reserves the right to change dimensions without notification.

# SHURflo 316 Stainless Steel Rotary Pedestal External Gear Pumps

## Gear Identification and Dimension Chart



### Gear Part Numbers and Dimensions (in inches)

Gear-Ryton (PPS) Black Spur	13879	12764	13883
Gear Outside Diameter (OD)	1.50	1.75	2.33
Gear Width (W)	0.75	1.25	1.50
Shaft Size (S)	0.50	0.63	0.79

Ryton = PPS (Polyphenylene Sulfide)

**NOTE:** Manufacturer reserves the right to change dimensions without notification.

Figure 2 - Gear Identification and Dimension Chart

# Viton Models GPSV2, GPSV4 and GPSV6 Teflon® Models GPST2, GPST4 and GPST6

**⚠ 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 125 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.

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 (See Figure 1 for proper rotation).
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.

**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 500 SSU at 1725 RPM.

9. If a shut-off valve or hand gun is

required in discharge line, provide a pressure relief valve for pump protection.

**⚠ WARNING** *Shutting off discharge without providing pressure relief can cause extreme overpressure which can result in pump and/or motor failure. Do not exceed 125 PSI pump or system pressure.*

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

**NOTE:** Globe valve 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 3). Never operate a pump unless it is secured to a solid foundation and all safety shields are installed.

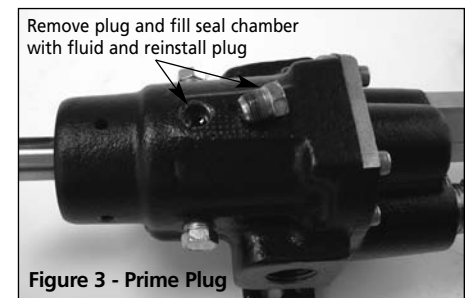


Figure 3 - Prime Plug

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

# SHURflo 316 Stainless Steel Rotary Pedestal External Gear Pumps

## Operation (Continued)

- 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.
  3. When pumping a more viscous (beyond 500 SSU) 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. Pump rotation is by-directional (See Figure 1).

## PRESSURE RELIEF VALVE

5. Standard models do not include a pressure relief valve. If discharge is going to be shut off, an external pressure relief valve should be installed.

## GEAR PUMP GASKET ADJUSTMENT FOR TEMPERATURE (see Appendix 1)

6. For operation in fluid temperatures above 120° F, stainless steel pump models must have the gasket thickness adjusted. Use Appendix 1 to identify pump, temperature and gasket recommendations for adjusting the cover clearance prior to operation in elevated temperatures or viscosities above 500 SSU.

**▲ CAUTION** *Failure to adjust pump cover clearances for operating temperatures above 120° F. will result in severe pump and/or motor damage.*

**NOTE:** When pumping fluids of high viscosity (>500 ssu), the required torque and HP can be reduced by adding a gasket for increased gear clearance.

## DRIVE CONNECTIONS

**NOTE:** Pedestal Gear Pumps will operate equally well in either direction (See Figure 1). When looking at the pump drive shaft end and rotating the shaft clockwise, the discharge port is on the right-hand side. When turning counter-clockwise, the discharge port is on the left-hand side.

## DIRECT COUPLING DRIVES

Never use a rigid coupling between the pump and the motor. Some degree of flexibility must be allowed at the coupling to avoid excessive side loading of the motor and pump bearings. Any flexible coupling rated for the horsepower load and speed is satisfactory. Care should be taken that the pump and motor shaft are in alignment. Misalignment will cause unnecessary loads on the pump and motor bearings.

**NOTE:** Unit is not recommended for direct drive by engine (gasoline or diesel). If engine drive is desired, a "V"-belt arrangement is recommended to reduce torque pulsations on the pump.

## PULLEY DRIVE

In some cases, a reduction in pump speed is essential. This may be accomplished through a belt and pulley drive. Bear in mind, however, that belt tension adds a side thrust to the pump drive shaft which results in extra bearing loading and wear with resulting shortened pump life. Adjust belt tension to belt manufacturers' recommendations.

7. For pulley-driven pumps, a single 1/2 (A or 4L section) "V" belt is satisfactory for drive sizes and speeds up to 1 HP, 3450 RPM. For larger drive sizes, double "V" belts are recommended. Maximum pump RPM is 1725.
8. Install safety guards, shield, etc., around all moving parts.

**▲ WARNING** *Failure to install proper safety guards, shields, etc. can result in property damage and/or personal injury. Follow all electrical and safety codes, as well as United States National Electrical Code (NEC) and Occupational Safety and Health Act (OSHA).*

9. When using an electric motor, make necessary electrical connections for the voltage outlet supply and double-check all connections. Check power connections for proper voltage. (Refer to wiring diagram on motor nameplate or inside the terminal box for the proper connections.) See General Safety Information.

**IMPORTANT:** Electrical circuit must be properly fused.

## MECHANICAL SEAL FLUSH INSTALLATION OPTIONS

10. These stainless steel 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 3).

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

- b. For high viscosity fluids, a flush will be necessary. 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 stainless steel 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



# Viton Models GPSV2, GPSV4 and GPSV6 Teflon® Models GPST2, GPST4 and GPST6

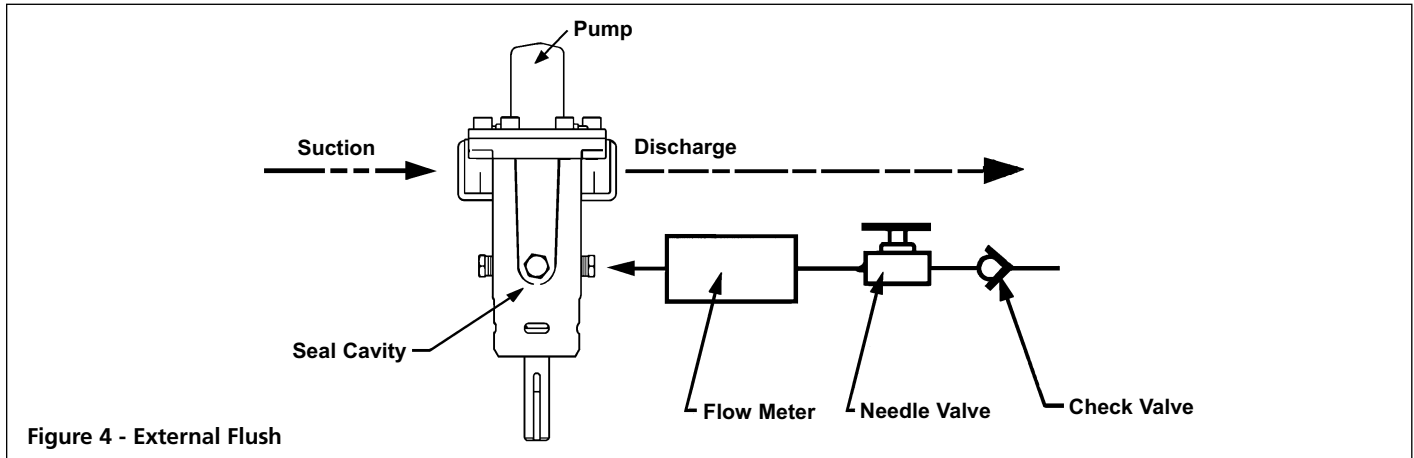


Figure 4 - External Flush

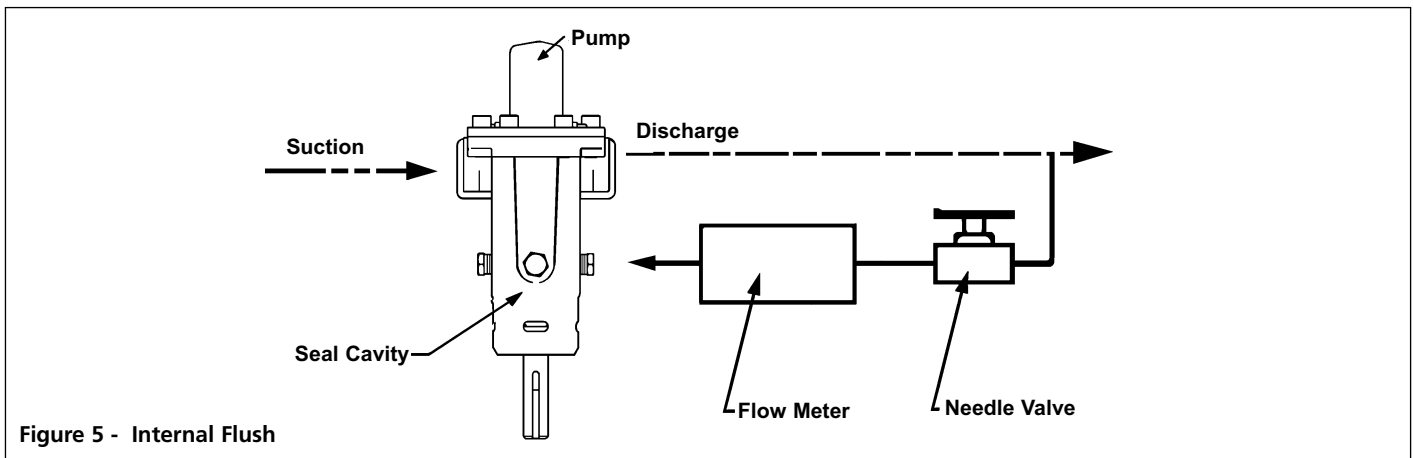


Figure 5 - Internal Flush

will cause rapid failure. A flush must be provided for fluids with a viscosity of greater than 2000 SSU.

**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 4 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 flow meter. 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 flow meter.

**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 5 for typical installation). Typically recommended for high viscosity applications ensuring lubrication to the mechanical seal.

# SHURflo 316 Stainless Steel Rotary Pedestal External Gear Pumps

## Operation (Continued)

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 flow meter 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 flow meter.

**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.

11. 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 (NOT 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

Check the pump to motor shaft alignment at regular intervals.

Periodically check that electrical connections are tight. Pump should be drained if placed in an area that is subject to

freezing temperatures and should not be operated until temperature permits.

To store the pump, place a small quantity of light oil or some other storage preservative compatible with your application in the pump and rotate the shaft very slowly to work the oil throughout the gears and the body.

## PUMP REPAIR

### DISASSEMBLY

(Refer to Figure 11 for Reference Numbers and Figures 6, 7, 8 & 9 for detailed seal and shaft assemblies.)

#### 1. Gear Removal

- a. Remove cover plate (Ref. No. 2) (held by eight screws) and gasket (Ref. No. 3) if needed. 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. 11).
- b. Remove the idler gear (Ref. No. 6) from the shaft (Ref. No. 7) by removing retaining rings (Ref. No. 5), then slide gears off the shaft end.

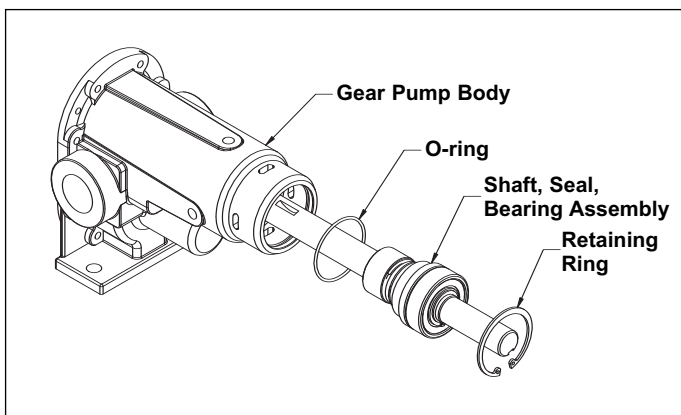


Figure 6 - Shaft, Seal and Bearing Assembly

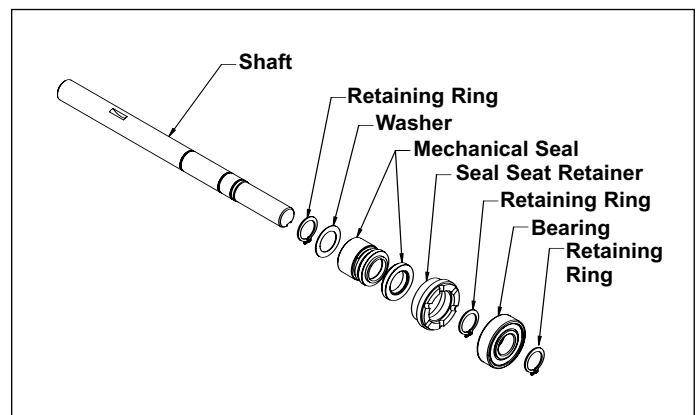


Figure 7 - Shaft, Seal and Bearing Assembly (detail view)

# Viton Models GPSV2, GPSV4 and GPSV6 Teflon® Models GPST2, GPST4 and GPST6

- c. The drive gear (Ref. No. 6) can be pulled out. Before drive shaft (Ref. No. 9) can be removed from body (Ref. No. 11), remove woodruff key (Ref. No. 8) by gently tapping key with drift pin. (Do not damage key or keyway upon removal.)
- 2. From the drive shaft end of the gear pump, remove the internal snap ring (Ref. No. 12) from the body (Ref. No. 11). The drive assembly, which consists of the drive shaft (Ref. No. 9), seal assembly (Ref. Nos. 17 & 18), seat retainer (Ref. No. 15), bearing (Ref. No. 14) and retaining rings (Ref. No. 13), can now be removed from the unit (See Figure 6). Also remove the internal o-ring (Ref. No. 19) from the body.

### REASSEMBLY

(Refer to Figure 11 for Reference Numbers and Figures 6, 7, 8 & 9 for detailed seal and shaft assemblies.)

- 1. Shaft/Seal Assembly
  - a. Install inside o-ring (Ref. No. 19) into body (Ref. No. 11). Lubricate with water.
  - 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. 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 8). (For the Teflon seal, see the following note and Figure 10.)

- c. Refer to assembling components on drive shaft (See Figure 7). When installing the seal on the shaft, wet with water and be cautious when sliding it into position. The spring retaining washer and spring are behind the seal with the carbon ceramic facing towards the keyed end of drive shaft (See Figure 7).
- d. Press seal seat into the seal retainer (See Figure 9) using water as a lubricant. The white shiny ceramic face should be visible after pressing the seal into 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 ceramic faces will cause the seal to leak.

The seal seat is stationary in the pump, while the seal on the shaft rotates, providing for the sealing surface.

**NOTE:** When installing the seat for the Teflon seal, an anti-rotation pin must be installed into the seat retainer. The anti-rotation pin (Ref. No 20) is a small spring pin which must be installed into the seat retainer in the small hole. About 1/8" to 3/16" of the pin should be exposed inside of the seat retainer (Figure 9). The seal seat is then installed into the seat retainer.

**IMPORTANT!** The notch on the back of the seat retainer must be aligned to the anti-rotation pin when pressing the seat into place.

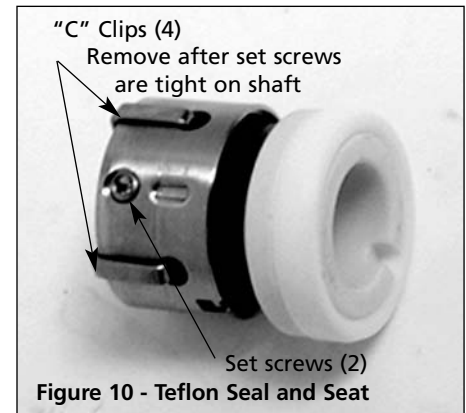


Figure 10 - Teflon Seal and Seat

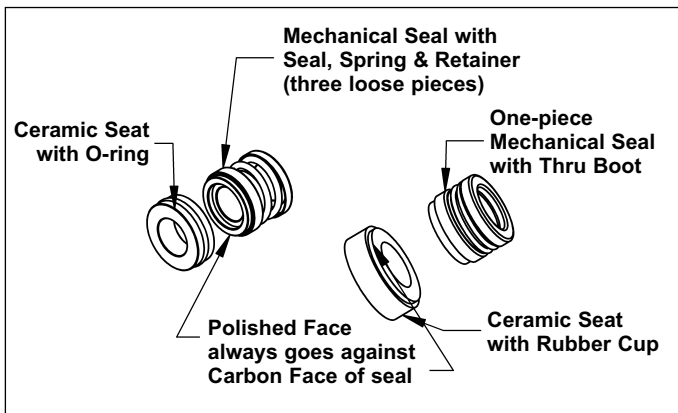


Figure 8 - Seal Types and Parts Identification

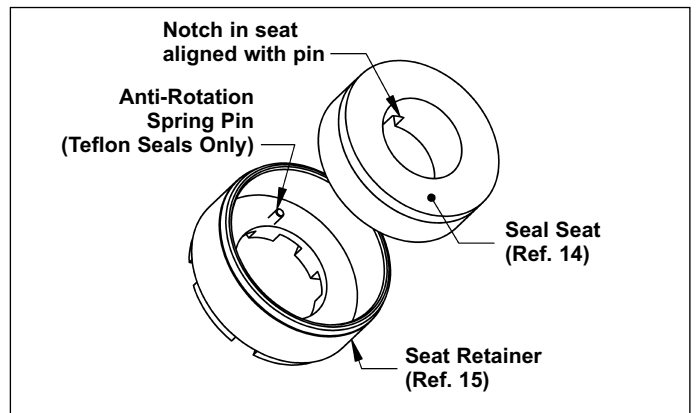


Figure 9 - Seal Seat and Retainer Assembly

# SHURflo 316 Stainless Steel Rotary Pedestal External Gear Pumps

## Maintenance (Continued)

**NOTE:** When installing the Teflon seal, the procedure is modified. The seat retainer/seal seat/anti-rotation pin assembly is then placed over the shaft assembly and against the ball bearing. The polished face of the ceramic should be showing. The mechanical seal comes with several "C" clips on either side (Figure 10).

The purpose of these clips is to establish the correct seal compression. These are removed only in the very last step of the operation. Do not remove these clips until the last step. Failure to do this will prevent correct installation of the Teflon seal with resulting leakage and or immediate failure of the seal. Note that the working height of the Teflon seal is different than that of either the Viton or Buna-booted seals. As such, the seal will not align to or use the retaining ring. Discard the retaining ring (Ref. No. 13) that was behind the standard seal that came with the pump. The mechanical seal is placed on the shaft with the polished carbon face against the polished ceramic of the seat. Do not use any lubricants when installing the seal other than very clean water. The use of lubricants can cause weeping of the mechanical seal Teflon wedges. Make sure that all of these components are installed tight against each other (ball bearing, seat retainer with seat, and the mechanical seal).

Tighten the set screws on the mechanical seal so that it is tight to the shaft (See Figure 10). Now remove the "C" clips from the seal to actuate the springs and spring tension on the seal face. The seal is now installed. Unlike the "boot" seals in Viton and Buna, an external retaining ring (Ref. No. 13) is not required to hold the seal. The set screws accomplish that. The Teflon mechanical seal is shorter than the boot seal. As such, it will not extend all of the way to the retaining ring groove. This is normal.

- a. Slide the seal retainer and bearing onto the drive shaft and install retaining ring, holding the bearing and seal onto the shaft (See Figures 6 and 7).
  - b. Slide the drive shaft assembly (Ref. Nos. 9, 13, 14, 15, 17 & 18) into the gear pump and secure with the internal retaining ring (Ref. No. 12). (Also see Figure 6.)
- ### 2. Gear Installation
- a. Replace the woodruff key (Ref. No. 8) into the drive shaft (Ref. No. 9) 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. 6) can be dropped in place and must be free to float on the shaft. Do not force the drive gear onto the shaft.
  - c. The idler gear (Ref. No. 6) is placed on the idler shaft (Ref. No. 7) over the woodruff key and secured by the two external retaining rings (Ref. No. 5).
  - d. Slide idler gear and shaft assembly into pump body (Ref. No. 11), rotating gear to get gears to mesh.
  - e. Ensure that the gasket surfaces are clear of debris, and dry off surfaces.  
Place new, clean and dry gasket (Ref. No. 3) on the pump body by sliding gasket over dowel pins. To identify the right thickness of gasket to use, refer to Appendix 1.

**CAUTION** *Any foreign material or liquid 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 (Ref. No. 2) over dowel pins (Ref. No 1). Replace and tighten cover screws. Alternate from top to bottom and side to side while tightening screws. Torque cover screws (See Appendix 1).
- g. Reinstall pump and install safety shields and guards.
- h. All pumps must be primed before start-up and the seal chamber needs to be filled (See Figure 3).

**To order parts, contact a SHURflo Distributor or Order Direct.**  
*Distributors can be found at [www.shurfloindustrial.com](http://www.shurfloindustrial.com).*

Please provide following information:

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

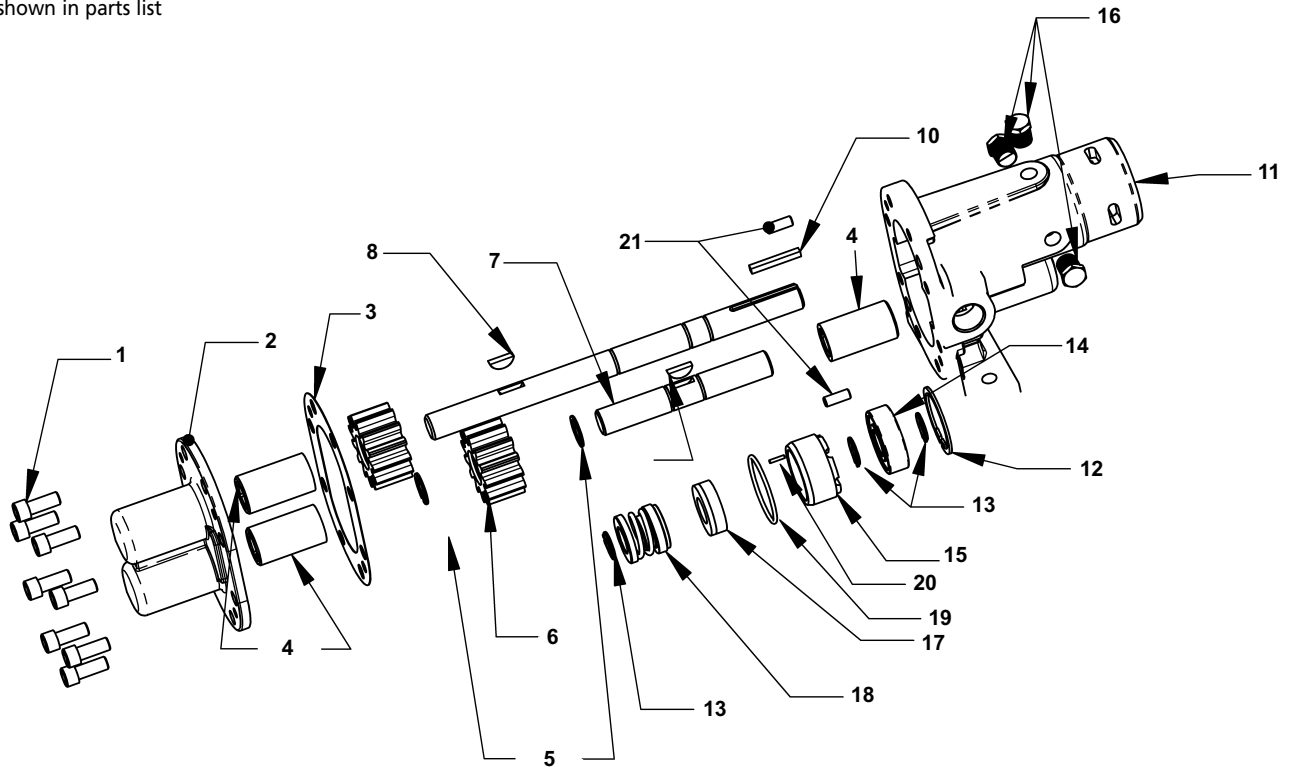


Figure 11 – Repair Parts Illustration

# SHURflo 316 Stainless Steel Rotary Pedestal External Gear Pumps

## Repair Parts List

Ref. No.	Included In Kit	Description	Part No. for Pump Model						Qty.
			GPSV2	GPSV4	GPSV6	GPST2	GPST4	GPST6	
1		Soc. Hd. Screw	19888	19888	19888	19888	19888	19888	8
2		Cover - 316 SS***	21870S	21871S	21872S	21870S	21871S	21872S	1
3	1	Gasket - Graphoil	22115	22116	19931	22115	22116	19931	1
Optional		High Temperature Gasket Kit	24436	23956	23982	24436	23956	23982	
4		Bushing - Carbon Graphite	21222	21223	21179	21222	21223	21179	3
5	1, 2, 3, 4	Ext. Ret. Ring	21094	12840	21063	21094	12840	21063	2
6	1, 2, 3, 4	Gear - Ryton PPS	13879	12764	13883	13879	12764	13883	2
7	2	Idler Shaft - 316 SS	21876	21877	21878	21876	21877	21878	1
8	1, 2, 3, 4	Woodruff Key - 316 SS	21301	12841	12841	21301	12841	12841	2
9	3, 4	Drive Shaft - 316 SS	22167	21874	22171	22167	21874	22171	1
10	3, 4	Square Key - 316 SS	21436	21437	21437	21436	21437	21437	1
11		Body - 316 SS***	19747S	21114S	19753S	19747S	21114S	19753S	1
12	3, 4	Int. Ret. Ring - 316 SS	04303	04259	19942	04303	04259	19942	1
13	3, 4	Ext. Ret. Ring	21093	12582	15952	21093	12582	15952	3
14	3, 4	Ball Bearing	04306	04257	19988	04306	04257	19988	1
15	3, 4	Retainer - 316 SS	21969	21968	22144	21969	21968	22144	1
16		Pipe Plug - 316 SS	21059	21059	21059	21059	21059	21059	3
*17/18	3	Mech Seal/Seal Seat (Standard)	24766S	24767S	24768S	24612S	24613S	24614S	1
Optional	3	Mech Seal/Seal Seat (Viton)	Std.	Std.	Std.	24766S	24767S	24768S	1
**Optional	3	Mech Seal/Seal Seat (Teflon®)	24612S	24613S	24614S	Std.	Std.	Std.	
Optional	4	Mech Seal/Seal Seat (Buna)	24604S	24605S	24606S	24604S	24605S	24606S	
19	3	O-Ring (Standard)	22173	22174	22343	22191	22192	22193	1
Optional	3	O-Ring (Viton)	Std.	Std.	Std.	22173	22174	22343	1
Optional	3	O-Ring (Teflon®)	22191	22192	22193	Std.	Std.	Std.	
Optional	4	O-Ring (Buna)	21303	21913	23447	21303	21913	23447	
**20		Anti-Rotation Pin	22537	22537	22537	22537	22537	22537	1
21		Dowel Pin	21056	21056	21056	21056	21056	21056	1
3, 5, 6, 8		Kit 1 - Gear Repair Kit	22278	22279	22280	22278	22279	22280	
5, 6, 7, 8		Kit 2 - Idler Shaft/Gear Assy. Kit	22437	22438	22439	22437	22438	22439	
5, 6, 8, 9, 10, 12, 13, 14, 15, 17/18, 19		Kit 3 - Dr. Shaft/Gear Assy. Kit (Viton or Teflon®)	22441V	22444V	22447V	22441T	22444T	22447T	
5, 6, 8, 9, 10, 12, 13, 14, 15, 17/18, 19		Kit 4 - Dr. Shaft/Gear Assy. Kit (Buna)	22441B	22444B	22447B	22441B	22444B	22447B	

**NOTE:** For operating temperatures greater than 120° F. or high viscosities, gasket thickness must be adjusted.  
 (\*) Mech. seal and seat sold as set only (Ref. Nos. 17 & 18). Teflon® and Viton seals consist of carbon ceramic faces with 316 SS components.  
 Buna seals have 18-8 stainless steel components.  
 (\*\*) When ordering the Teflon® seal, Anti-Rotation Pin is required (Ref. No. 20).  
 (\*\*\*) Body and cover supplied with carbon graphite bushings installed.  
 When converting to a different seal/seat material, remember to order the o-ring (Ref. No. 19) of the same material.  
 SS = Stainless Steel  
 Ryton = PPS (Polyphenylene Sulfide)  
 Kits 2 - 4 do not ship with gaskets.



## Appendix 1 - Gear Pump Gasket Adjustment for Temperature

Gear pump is factory assembled to operate within a temperature range of 70° – 120° F (20° – 50° C). For temperatures outside this range, please see the table below for your series and port size pump.

**NOTE:** Always refer to the original owner's manual repair and maintenance sections on pump disassembly and assembly for more detailed instructions.

**NOTE:** When pumping fluids of high viscosity (>500 SSU), the required torque and HP can be reduced by adding a gasket for increased gear clearance.

Gasket Installation Instructions (refer to assembly diagram below):

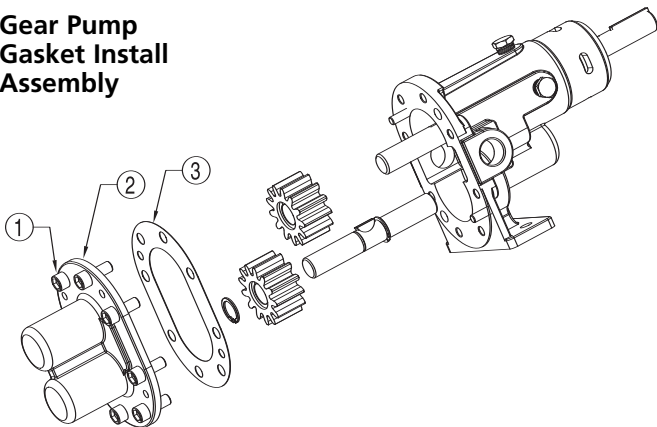
1. Turn off power to pump, turn off inlet and outlet valves, and relieve pressure in lines.
2. Allow pump to cool.

3. Remove cover screws (1), cover (2) and gasket (3). Be sure to mark proper orientation of cover and pump body.
4. Replace gaskets (3) per instructions listed in table.
5. Replace cover (2) and cover screws (1) according to orientation marked in step 3.
6. Tighten cover screws (1) in sequence listed on diagram. Use torque specifications listed in table.

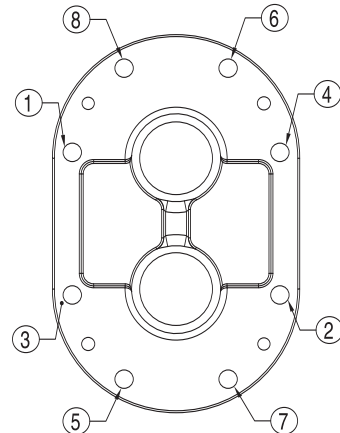
Kit PN	NPT Port Size	Temp Range	Instructions	Bolt Torque	
Stainless Steel Gear Pump Series	24436	Pumps with 3/8" ports	Up to 120° F (50° C)	<b>Use standard graphoil gasket as shipped (0.010" thick)*</b>	75 in.-lbs. (8.5 N-m)
			120° F – 280° F (50° C – 138° C)	Use optional thicker (0.015") graphoil gasket	
	23956	Pumps with 1/2" ports	Up to 120° F (50° C)	<b>Use standard graphoil gasket as shipped (0.010" thick)*</b>	75 in.-lbs. (8.5 N-m)
				120° F – 280° F (50° C – 138° C)	
	23982	Pumps with 1" ports	Up to 70° F (20° C)	Use optional thinner (0.010") graphoil gasket	75 in.-lbs. (8.5 N-m)
			70° F – 120° F (20° C – 50° C)	<b>Use standard graphoil gasket as shipped (0.015" thick)*</b>	
120° F – 280° F (50° C – 138° C)			Use 2X optional thinner (for a total of 0.020") graphoil gasket		

### \*Standard Set-up

**Gear Pump Gasket Install Assembly**



**Bolt Tightening Sequence**



**Pentair Water**

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