

“H” Design Series

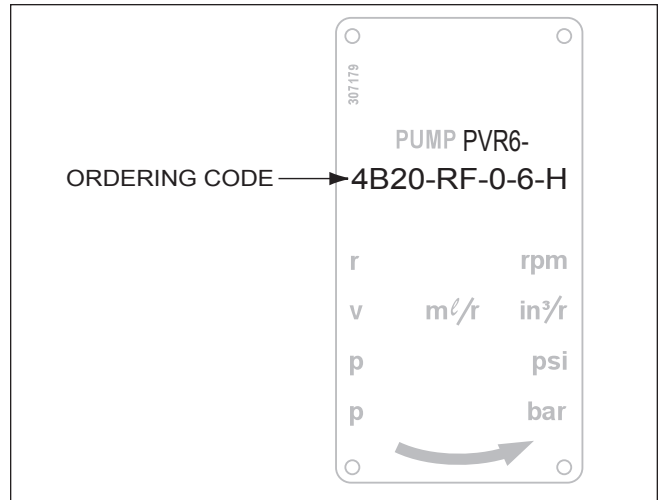
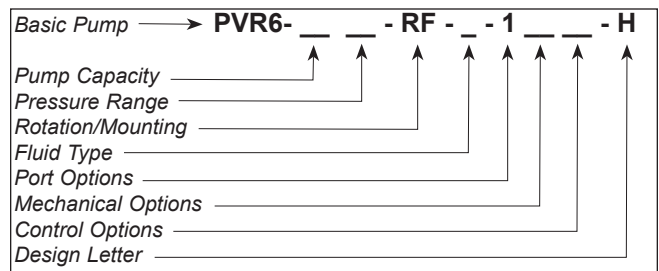


Figure 1

This service manual applies to products with Ordering Codes like the sample shown below.



CAUTION - Before performing any service operation on any pump, be sure that all pressure has been relieved from BOTH SIDES of the system.



CAUTION - Before performing any service operation on any pump, disconnect or lock off power supply.



CAUTION - Before starting pump, be sure that any resulting machine function will not endanger persons or equipment.

PRODUCT IDENTIFICATION

Each pump has an Ordering Code stamped on its nameplate. See Figure 1 above for the location of the Ordering Code.

INSTALLATION

PUMP DRIVE AND MOUNTING

When mounting the pump and motor, care must be taken to align the pump and motor shafts within .003 T.I.R. (0.076 mm) direct inline through a jaw type/flexible web coupling. This is recommended for all pumps. Tire-type flexing elements and chain-type drives are not recommended. With belt drives, please consult factory.

To avoid axial and radical end loading of the pump shaft, do not couple the pump and motor shafts rigidly. Allow freedom at the coupling for the two shafts to ride independently.

To prevent end loading, the space between the pump and motor shaft ends should be 1/2 inch (12.7 mm) for PVR6 pumps, or as the coupling manufacturer specifies.

Installation (Continued...)

PIPING AND RESERVOIR

The pump should be mounted with a minimum number of elbows or fittings. The pump suction should be at least 1 inch (25.4 mm) tube/pipe for PVR6 pumps.

For any system and combination of piping except High Water Based Fluids (HWBF), the vacuum at the pump inlet must not exceed seven inches of Mercury, (5 inch Hg. for fire resistant fluids). HWBF Pumps are to have a positive inlet head in the range of 0.5-inch Hg. to 20 inch Hg.

Piping should be done with pickled pipe or seamless tubing free of dirt and scale. Do not use galvanized or other pipe that tends to flake off.

A 100-mesh screen (60 mesh for fire resistant and HWBF) should be used on the pump suction line. The screen should be located approximately two inches (50.8 mm) from the bottom of the tank. All lines returning oil to the tank should discharge at least two inches (50.8 mm) below the minimum oil level and should be separated from the pump suction area by means of a baffle. These lines should also include a 10-micron return line filter, with the exception of the case drain line.

The pump case drain should be connected directly to the tank. Pressure in excess of 10 psi (0.7 bar) in the case drain line can result in shaft seal leakage. It is recommended that the case drain be returned to the tank by a separate 3/8 inch (9.5 mm) line.

STARTUP PROCEDURES

The following instructions apply for initial startup of the hydraulic pump. After an extended shutdown period, start with item 5.



CAUTION - Never start a new pump installation against a blocked system.

1. Check the nameplate for model number and rpm. The arrow on the pump casting indicates direction of rotation.
2. Pump suction line should extend below the lowest point of oil level but not less than two inches (50.8 mm) above reservoir bottom.
3. The pump and motor shafts must be aligned within .003 inches (0.076 mm). See Pump Drive and Mounting directions above for restrictions.

4. Connect the case drain directly to tank (or to a heat exchanger if the pump will be deadheading for long periods of time during operation), using a full-size line corresponding to the case drain in the pump or manifold. If connected to a heat exchanger, the case drain line should be protected with a 10 psi (0.7 bar) maximum relief valve in parallel with the heat exchanger. No other return lines should be connected in common with the case drain return.

5. Rotate pump and motor by hand to insure free rotation.

6. Set the machine controls to open the circuit and allow free flow from the pump back to tank or connect the pump outlet line directly to tank. Jog the motor on and off several times (on, two seconds, off three seconds) until the pump is primed. Check pump for proper direction of rotation during the jogging.

7. After the pump has been primed, run it for several minutes at lower than normal pressures with an open or intermittently open system which permits oil flow. This will purge entrapped air from the pump and system.

8. Neither volume adjustment nor pressure adjustment should be adjusted until the pump has been primed and running, and air is purged.

9. After air has been purged from the system, the system can be closed and the pump adjusted to the required operating pressure.

10. If necessary, the volume adjustment can be adjusted to the required operating pressure.

11. When replacing pumps, the suction screen in the reservoir must be removed and thoroughly cleaned. Also, the suction line from the reservoir to the pump should be flushed inside and out to remove any contaminants. Pieces of metal from a damaged pump can back up into this line. If they are not removed, they will be drawn into the new pump and destroy it. Start unit by using proper pump start-up procedure items 1 through 10.



CAUTION - If both pressure and volume modifications are supplied on the pump, the pressure should be adjusted before the volume. Volume should be adjusted at minimum pump pressure or at deadhead. Stop adjustment at the volume screw when pressure begins to drop.

OPERATION

PRESSURE AND VOLUME ADJUSTMENTS

Pressure Control

All pumps are adjusted to reduced pressure before shipment and must be readjusted to the required system pressure after installation and start-up.

The pressure adjusting screw is located at the end face of the compensator chamber. See parts page item number 30. The adjusting screw has a right hand thread; clockwise adjustment increases pressure; counterclockwise reduces pressure.

A pressure gauge located at the pump must be used when making adjustment to insure the pressure settings do not exceed limits specified for the particular pump of maximum system pressure.

Make all pressure settings with pump operating against a closed circuit, that is with the output of the pump blocked, and then check pressure throughout the pump flow range.

Volume Control

Adjust volume at minimum pump pressure or at pump deadhead. The volume adjusting screw is directly opposite the pressure adjusting screw, see parts page item number 55. The adjusting screw has a right hand thread, turning the screw clockwise decreases the maximum volume, turning the screw counterclockwise increases the maximum volume. Pumps are set at a maximum rated volume at the factory unless otherwise specified.

Stop adjustment of the volume screw when pressure begins to drop. See Sales Catalog for complete pump performance specifications.

ADJUSTMENT PROCEDURES

To adjust the maximum output volume, use the following steps:

1. Set the pump at minimum pressure.
2. Hand tighten the volume screw until it touches the pressure ring. **NOTE:** The pump should be at full flow for this step.
3. See Pressure and Volume Adjustment Sensitivity chart below.
4. Deadhead the pump, turn the volume screw the proper number of turns to obtain the flow desired.
5. Return pump to flow condition and check flow rate. If output flow is incorrect, switch pump to deadhead and readjust per above.



CAUTION - Turning the maximum volume control in too far can force the pressure ring over center and destroy the pump.

PRESSURE and VOLUME ADJUSTMENT SENSITIVITY

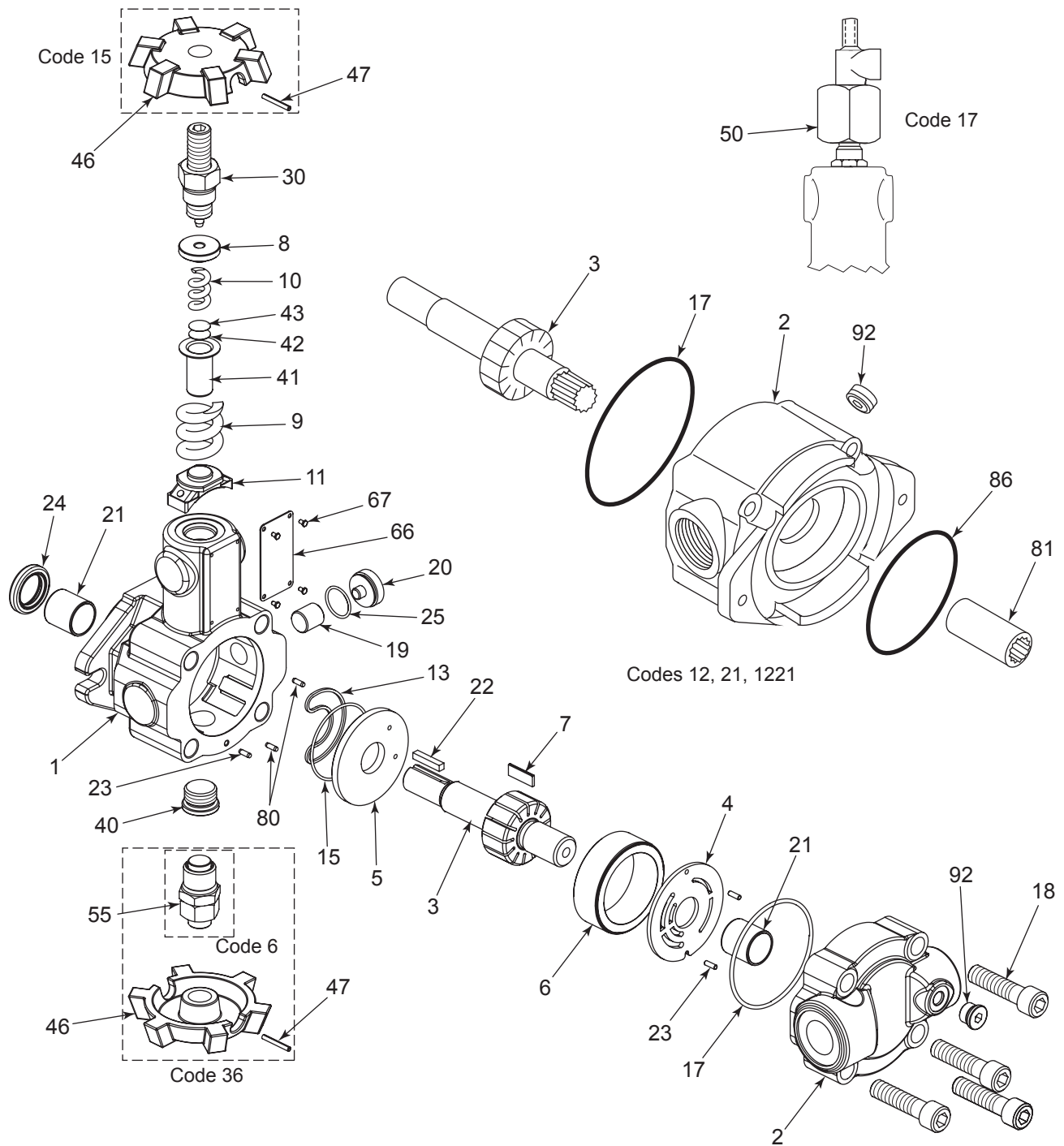
			PUMP SIZE		4B		6B		8B	
			PRESSURE CODE		20		06		15	
Pressure Adjustment	Pressure	psi	315	220	315	210	240			
	Change/Turn	(bar)	(21.7)	(15.2)	(21.7)	(14.5)	(16.6)			
	Maximum Torque	ft.-lbs. (m.kg)	8.0 (1.10)	2.7 (0.37)	6.8 (0.94)	2.7 (0.37)	6.8 (0.94)			
Volume Adjustment	Flow	gpm	3.4		4.6		4.6			
	Change/Turn	(lpm)	(12.9)		(17.4)		(17.4)			
	Approx. Min.	gpm	1.0		1.0		1.0			
	Flow Adjust.	(lpm)	(3.7)		(3.7)		(3.7)			
	Maximum Torque	ft.-lbs. (m.kg)	5.5 (0.76)		3.5 (0.48)		3.5 (0.48)			

PVR6 PARTS LIST

ITEM NO.	CODE	PART NO.	DESCRIPTION	QTY. REQ.	ITEM NO.	CODE	PART NO.	DESCRIPTION	QTY. REQ.
1		550177	Pump Body	1	13		307257	Teflon Seal Ring	1
1	4B	550660	Pump Body	1	15	Buna-N	124194	O-Ring	1
2		550541	Cover	1	15	Viton	147177	O-Ring	1
2	4B	550658	Cover	1	17	Buna-N	144929	O-Ring	1
2	6B,8B,10B; 12, 1221	550547	Cover	1	17	Viton	144966	O-Ring	1
2	4B; 21	550659	Cover	1	18		198297	Soc. Hd. Cap Screw	4
3		407929	Rotorshaft	1	18	4B - 21; 6B, 8B, 10B; 21, 1221	198301	Soc. Hd. Cap Screw	4
3	4B	407930	Rotorshaft	1	19		252792	Thrust Screw	1
3	4B, 12	506066	Rotorshaft	1	20		250371	Thrust Screw Plug	1
3	6B,8B,10B; 12	506069	Rotorshaft	1	21		163797	Bushing	2
3	6B,8B,10B; 1221	550325	Rotorshaft	1	22		126225	Key	1
3	4B; 21	550326	Rotorshaft	1	23		004223	Roll Pin	3
3	6B,8B,10B; 21	550327	Rotorshaft	1	24		130795	Lip Seal	1
4	4B,6B	550101	Port Plate Assembly	1	25	Buna-N	104617	O-Ring	1
4	8B	550074	Port Plate Assembly	1	25	Viton	166069	O-Ring	1
4	10B	550280	Port Plate Assembly	1	30		309977	Pressure Adj. Screw Ass'y.	1
5		550351	Thrust Plate	1	40	Buna-N	250058	SAE O-Ring Plug	1
6	4B	114592	Pressure Ring	1	40	Viton	254789	SAE O-Ring plug	1
6	6B	112021	Pressure Ring	1	41		306466	Spring Retainer	1
6	8B	123175	Pressure Ring	1	42		144927	Shim (.005)	1
6	10B	251715	Pressure Ring	1	43		144928	Shim (.0149)	1
7	4B	250516	Vane Kit (Set of 13)	1	46	15, 36	252152	Handwheel	1
7	6B,8B,10B	250517	Vane Kit (Set of 13)	1	47	15, 36	261323	Spring Pin	1
8		306465	Spring Seat	1	50	17	350952	Dual Pressure Control Ass'y.	1
8	6B3L,6B5L, 8B3L, 8B5L	350988	Spring Seat	1	53	8, 9	256508	Flow Control Valve	1
8	10B3L,10B5L	166620	Spring Seat	1	55	6, 36	450196	Volume Adj. Screw Ass'y.	1
9	4B20	165223	Governor Spring	1	66		307179S	Name Plate	1
9	6B06	149917	Governor Spring	1	67		250597	Self-Tapping Screw	4
9	8B06	251193	Governor Spring	1	80		002586	Dowel Pin	2
9	6B15,8B15	165225	Governor Spring	1	81	1221, 21	350663	Spline Coupling	1
9	6B20,8B20	165226	Governor Spring	1	85*	1221, 21	147655	Flange Cover (Shipping)	1
9	6B3L,8B3L	257653	Governor Spring	1	86	Viton	112222	O-Ring	1
9	10B3L	109792	Governor Spring	1	86	1221, 21	111298	O-Ring	1
9	6B5L,8B5L	255809	Governor Spring	1	92		256708	SAE O-Ring Plug	1
9	10B5L	113079	Governor Spring	1	93*		166288	Caplug (C-D)	1
10	6B06,8B06	165221	Follower Spring	1	94*		160259	Caplug (In)	1
10	10B10	165220	Follower Spring	1	95*		137020	Caplug (Out)	1
10	6B15,8B15	165222	Follower Spring	1	96*	1221, 21	130437	Caplug (Flange)	2
11	4B	144926	Ring Shoe Assembly	1	97*	12, 21,1221	253841	Spline Warning Tag	1
11	6B	144913	Ring Shoe Assembly	1	98*		143391	Grease	A.R.
11	8B	162770	Ring Shoe Assembly	1	99*		132779	LED Plate #250	A.R.
11	10B	350448	Ring Shoe Assembly	1					
11	6B3L, 6B5L	112022	Ring Shoe Assembly	1					
11	8B3L,8B5L	123174	Ring Shoe Assembly	1					

* Not Shown

PVR6 PARTS DRAWING



PVR6 KIT LIST

WEAR PLATE KITS		SEAL KITS		ROTATING KITS		COMPLETE REBUILD KITS	
Includes Items: 4 & 5		Includes Items: 13,15,16,17,24,28,30,99		Includes Items: 3, 6 & 21		Includes Items: All Kits Listed Here Plus Item 11.	
Model	Kit Number	Model	Kit Number	Model	Kit Number	Model	Kit Number
4B	257094	All Buna-N, HW	257093	4B	250758	4B	257095
6B	250747	All Viton	250457	4B-21	250815	4B-12	257096
8B06/15	250748			6B	250760	6B	250822
10B10	254911			6B-12	254763	6B-12	250826
		VANE KITS		6B-21	250817	8B15	250823
		Includes Items: 7		8B	250759	8B15-12	250827
		Model	Kit Number	8B-12	250762	10B	254917
		4B	250516	8B-21	250816	10B-12	254918
		6B, 8B, 10B	250517	10B	254912	10B-21	254919

PVR6 PUMP REPAIR PROCEDURES

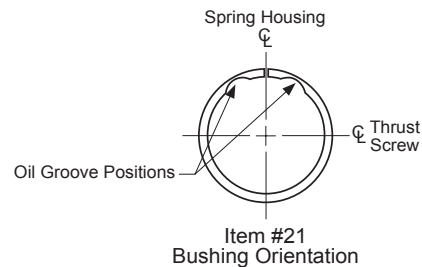
DISASSEMBLY PROCEDURE

NOTE: Disassembling pump to change components, or for any other reason, may void the warranty. Refer to Policy Statement and Discounts Summaries.

1. Remove the key (22) in the rotor shaft keyway.
2. A small amount of oil may remain in the pump. Remove the four cover bolts and slide the cover back far enough on the shaft to break the seal between the housing and cover to allow the pump to drain.
3. Remove the cover (2). Take care to avoid damage to the bearing with the end of the shaft when the cover is removed.
4. The port plate (4) may come out with the cover. Do not let it drop off the locating pins.
5. Remove the vanes (7) with a long nosed pliers or tweezers. There is one vane in each slot, 13 vanes total.
6. Remove the rotorshaft (3) from the pump. Be sure that the key (22) has been removed from the keyway so that it will not damage the shaft seals when the rotorshaft is removed.
7. Turn the pressure adjustment screw (30) counterclockwise to release the tension on the governor spring.
8. Remove the pressure ring (6), ring shoe (11), governor spring (9), retainer (41) and follower spring (10).
9. If the shaft seal (24) are to be removed they should be pushed out from the inside of the housing at this time. Care must be taken not to damage the journal bearing in the housing while the shaft seal is being removed. It is recommended that the shaft seal be replaced whenever the pump is disassembled for maintenance. The seal cannot be reused once they have been removed.
10. The bushings (21) in the pumps are assembled with a press fit. If they are to be removed at this time, the bushing in the housing should be pressed out from the front. The cover bearing should be pulled out using an expanding type puller. The bushings should not be reused once they have been removed.
11. It is unlikely that further disassembly will be necessary in order to perform routine maintenance on the pump.

REASSEMBLY PROCEDURE

1. Clean and inspect parts to determine which parts are worn enough to require replacement.
2. Assemble the new bushings (21) in the housing and cover. The bushing OD's should be lubricated before they are pressed in the bores. Care must be taken to orient the "split" and the "oil groove" in the bushing as shown in the illustration below.



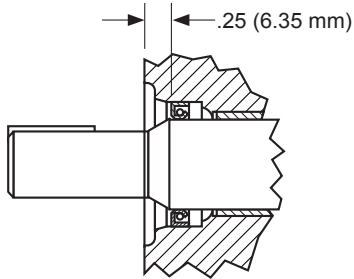
3. After the bearings are in place, check to see that the rotor shaft will fit into the bearings and provide a smooth turning fit. If the shaft turns hard, the bearings should be removed and the bore checked closely for nicks or burrs before pressing in the new bearings.
4. Check all of the replacement parts for nicks or burrs and then lubricate them with clean oil before reassembly.
5. Worn port and thrust plates should not be reground to clean up the wear surface. If the plates are ground, the assembly clearance will become excessive and the seal rings in the thrust plate may rupture. Replace worn port and thrust plates if necessary.
6. Assemble the springs (9, 10) and ring shoe (11), pressure ring (6) and rotorshaft (3).
7. To assure proper vane assembly, place the vanes (7) with the beveled edge out against the pressure ring.
8. Assemble the square seal rings into the cavity in the back of the thrust plate. The soft rubber seal ring (15) should be assembled first and the hard seat ring (13) should be assembled on top of them. Stretch the larger soft seal ring slightly so it clings to the ID at the cavity. Apply clean oil or STP to the back of the thrust plate before it is placed in the locating pins in the body to help hold the parts together while they are assembled.
9. Before fitting the cover into the housing, check to assure that the bore in the port plate is concentric to the bearing bore in the cover. If the bores are not concentric, the port place must be relocated 180° on the locating pins.

PVR6 PUMP REPAIR PROCEDURES (Continued...)

10. Assemble the cover (2) and port plate (4) onto the housing and align the bolt holes. Rotate the shaft (3) as the bolts are tightened to assure that the vanes are not cocked.

11. Torque the cover bolts (18) to 50 lbs-ft (67.8 Nm). The shaft should turn by hand when assembly is complete.

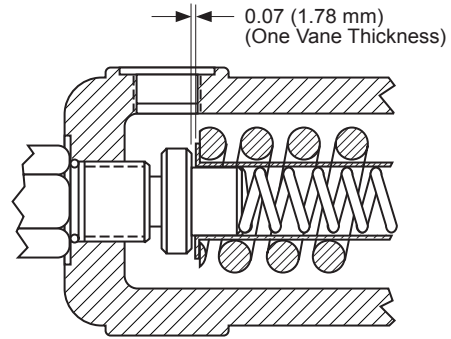
12. Lubricate the ID of the shaft seal (24) and press it into the housing to the depth shown below. Note the "lip to the inside" orientation of the seal.



13. Adjust the pressure adjustment screw (30) until it just touches the spring and then give it one more turn clockwise.

14. Turn pump upside down. Pour one cup of good grade hydraulic fluid into the intake port while slowly rotating the shaft in the direction shown by the rotation arrow.

15. The pump is now ready to test. Refer to front of this manual for start-up procedure.





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