



# INSTRUCTIONS

BULLETIN 947914-A

## TWO-WAY PUMP SUCTION AND RETURN VALVES

### (THREE-WAY PLUNGER TYPE)

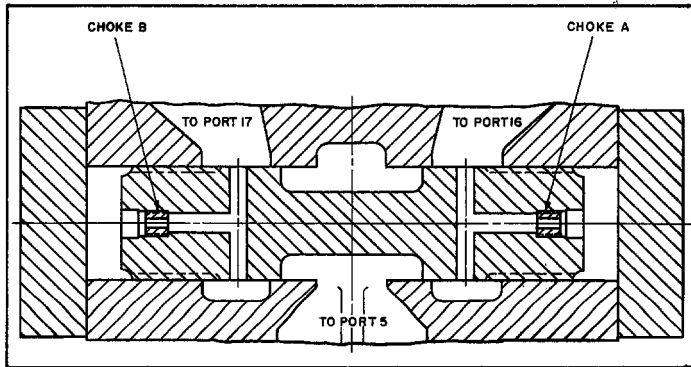
### FOR OILGEAR TYPE "D" UNITS

#### I. CONSTRUCTION

The two-way pump suction and return valve, bolted on the bottom of the pump case, consists of a back pressure relief valve (214), a suction check valve (209), a three-way plunger (201) all enclosed in a body (200). There are two styles of valves... "plain" and "cushioned."

#### II. PRINCIPLE OF OPERATION

The back pressure relief valve (214) (BPRV) prevents excessive supercharge or return pressure on the suction side of the pump. The suction check valve (209) retains the supercharge fluid in the suction valve and pump, yet allows pump to draw fluid from the reservoir if the supercharge volume is insufficient. The three-way plunger (201) automatically connects ports 17 and "B" to suction when delivery is at port "A." The plunger also connects ports 16 and "A" to suction when delivery is at port "B." Fluid delivered by the radial piston pump is directed thru coring the case to port 16 or 17, then thru drilled passages in the plunger to an area behind the plunger, shifting it toward the suction side blocking the pressure side of pump unit to supercharge.

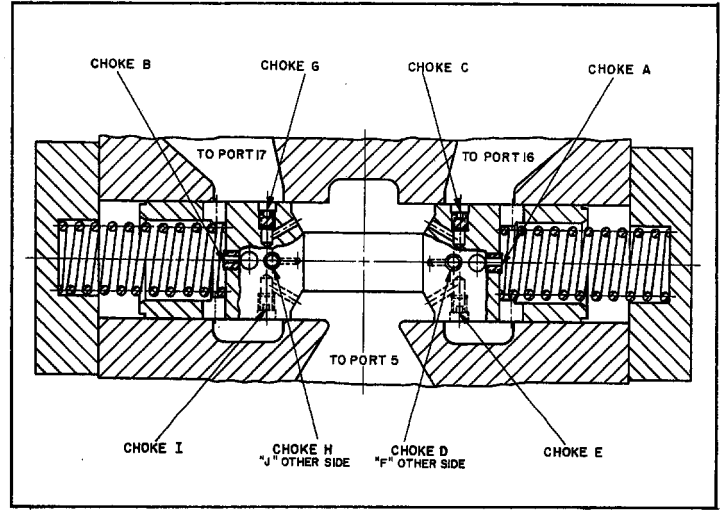


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Figure 1. Cross Section of "Plain" plunger.

"Plain" plungers have provisions for inserting choke plugs when necessitated by application. These chokes effect a dashpot action on the plunger.

"Cushioned" type plungers contain provisions for orifices in addition to the chokes. These orifices cushion operation, reducing shocks which occur during deceleration and quick reversal of flow on some applications. The plunger will bypass pump delivery at neutral thru the orifices until the delivery exceeds a predetermined volume. Springs on plunger end help push plunger out of dashpots when delivery direction is reversed.



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Figure 2. Cross Section of "Cushioned" plunger.

Orifices, choke sizes and arrangements are based on applications. Sizes and arrangements for other applications can be obtained from The Oilgear Company.

"Special" suction and return valves. Some one-way pumps are equipped with modified two-way pump suction and return valves in which the three-way plunger is held in one position by a spacer. Some modified "Plain" two-way pump suction and return valves, used on non-differential systems, have springs to center the three-way plunger when the control is in neutral position. Some modified two-way pump suction and return valves are furnished with spacers incorporating an orifice check adapter at port 16 or port 17 to resist gravity drop of large press rams.

#### III. SPECIFICATIONS

Back pressure relief valves are normally set at 60 psi.

A. Approximate pressure variation for each 1/16" shim.

B. Maximum total thickness of all shims permitted.

Pump Size	A	B
2	8	5/8
4	8	5/8
8	8	9/16
12	8	9/16
20	4	1/4
35	4	7/16
60	4	1/8
100	4	1/8
150	4	1/8

IX. PARTS LIST

Part No.	Description	Part No.	Description
200.	Body, Valve	212.	Flange, Suction Pipe
200A.	Screw, Socket Head Cap	212A.	Screw, Socket Head Cap
200B.	Stud, Lock Nut and	213.	Seal, O'ring
201.	Plunger, Valve w/chokes & orifices	214.	Plunger, Relief Valve
202.	Seal, O'ring	215.	Spring, Relief Valve
203.	Gasket, Spacer	216.	Shims, R. V. Spring
204.	Spacer, Seal	*217.	Seal, Gasket
205.	Gasket, Flange	218.	Cap, Relief Valve
206.	Cap, Spool End	218A.	Screw, Socket Head Cap
207.	Seal, O'ring	219.	Spring, Plunger
208.	Guide, C. V. Disc	220.	Spring, Check Valve
209.	Disc, Check Valve	221.	Retainer, Seal
210.	Seat, Check Valve	222.	Seal, O'ring
211.	Gasket, Flange		

\*Some size 12 suction valves furnished with O'ring for part (217).

NOTE: When ordering replacement parts, be sure to include pump serial number, data sheet (DS) number, and part number. When ordering chokes or orifices, refer to figures 1 and 2.

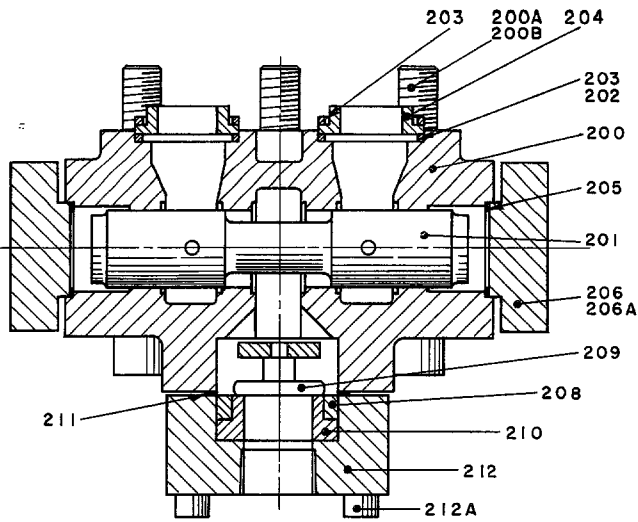
Specify type of hydraulic fluid used when ordering O'rings, gaskets or seals.

O'RING SIZES

Cross Section x O.D. Duro + 5

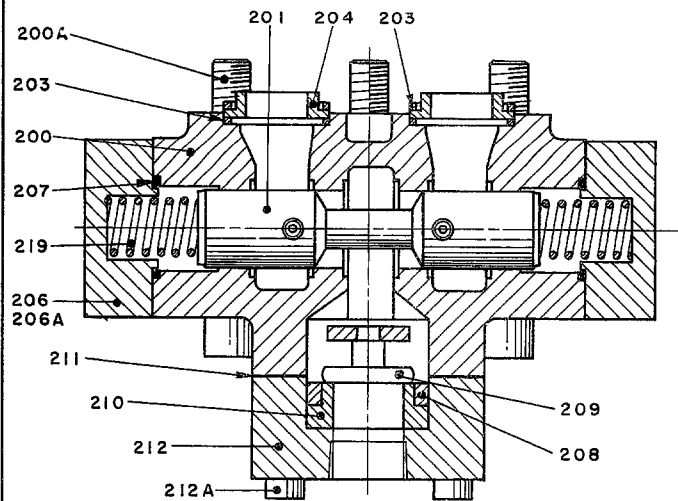
Part No.	Size Units									
	2, 4, & 8		12		20		35		60, 100 & 150	
202.	-	-	-	-	-	-	3/16 x 2-7/8	90	3/16 x 3-5/8	90
207.	-	-	1/8 x 1-5/8	90	1/8 x 2	90	1/8 x 3	90	1/8 x 3	90
213.	-	-	-	-	-	-	3/16 x 3-5/8	90	3/16 x 4-3/8	90
217.	-	-	1/8 x 1-1/4	90	-	-	-	-	-	-
222.	-	-	-	-	-	-	3/16 x 3-7/8	90	1/8 x 4-5/8	90

**PLAIN**

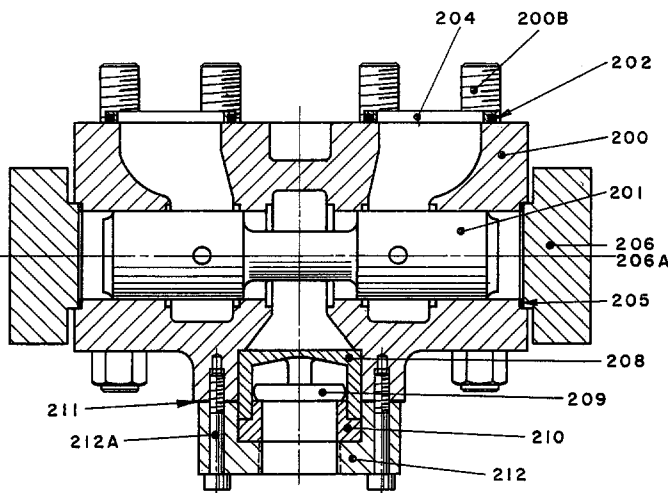


**SIZE 2 THRU 35**

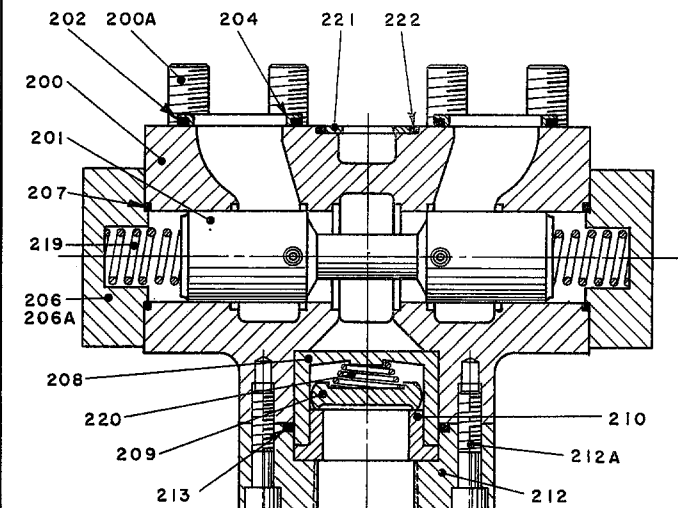
**CUSHIONED**



**SIZE 12 THRU 20**

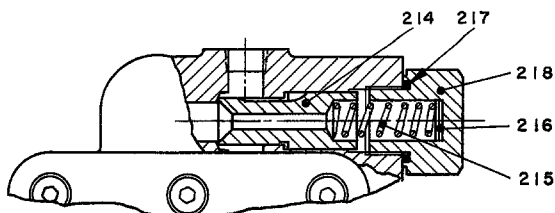


**SIZE 60 THRU 150**

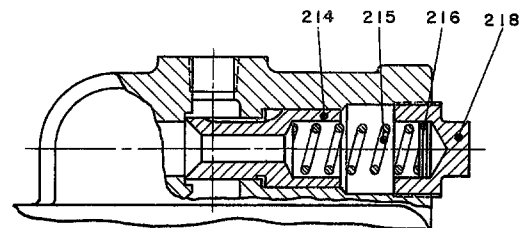


**SIZE 35 THRU 150**

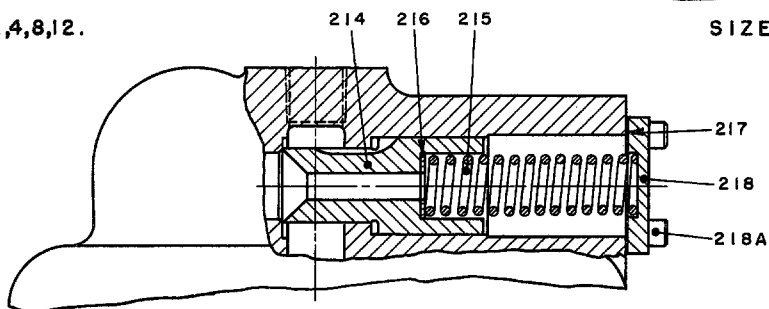
**BACK PRESSURE RELIEF VALVES**



**SIZE 2,4,8,12.**



**SIZE 20.**



**SIZE 35,60,100,150.**

Figure 3. Parts Drawing, Oilgear Three-Way Plunger Type Suction Valve . DS-947914 (503809).

#### IV. MALFUNCTIONS AND CAUSES

Excessive noise in pump is often caused by air entering the system at the suction valve gasket, port 5 suction pipe or by cavitation due to restricted passages. Low back pressure is usually caused by a sticky B.P.R.V. plunger (214) or a faulty suction check valve (209). Insufficient pump volume or pressure may be caused by excessive leakage past the three-way plunger. If pump will raise pressure on one port only, the three-way plunger may be sticking on that port side.

#### V. TESTING

To check for a sticking three-way plunger, block ports "A" and "B" and insert a high pressure gage in each flange, or in ports 18 and 19. Slowly increase the pump delivery at port "A" and then at port "B". If pressure can be raised at one port only, the plunger may be stuck.

To check the back pressure relief valve setting insert a low pressure gage in port 12 and run the pump with control at neutral. If port 12 is being used, disconnect piping at port 12 and install a tee fitting. Connect piping to two legs of the tee and a low pressure gage in the other. Gage reading indicates back pressure.

To adjust back pressure, remove inspection cover on side of reservoir (it may be necessary to drain some fluid first). If reservoir does not have an inspection cover, it will be necessary to disconnect the pump from the circuit and drive motor and raise the pump to adjust the B.P.R.V. Remove pipe plug (cap or cover) over B.P.R.V. and add shims to increase pressure and remove shims to decrease pressure. See III A and B.

#### VI. DISASSEMBLY

Tag all O-rings, gaskets, seals and shims so they will be returned to their original positions.

Suction Check Valve. Remove suction flange (212). The check valve cage, (208) has a 0.002" press fit in suction flange. Complete disassembly of flange and cage is usually not necessary for inspection and cleaning.

Three-Way Plunger. Remove plunger flanges (plunger caps) (206), gaskets and springs (219) when used. Plunger (201) is free to be removed.

Back Pressure Relief Valve. Remove pipe plug (cap or cover) (218). The shims (216), spring (215) and plunger (214) are free to be removed. Plunger is tapped so a threaded rod can be inserted to withdraw the plunger.

#### VII. INSPECTION

Suction Check Valve. Check for dirt on the check valve seat (210) or disk (209) and examine surfaces for scratches or grooves. Check for cracked seat.

Three-Way Plunger. Check surface of plunger and bore in valve body for wear. Normal clearance is approximately 0.001 inch. Plunger should shift back and forth freely. If necessary, polish or lap plunger. Examine choke plugs and orifices for dirt or sediment.

Back Pressure Relief Valve. Check valve plunger seat for scoring or foreign matter. Clean foreign matter from V-slot in plunger. Polish or lap sticky plunger. Clearance between plunger and valve body should be approximately 0.001 at both diameters. Be sure hole through plunger is not blocked. Anneal all copper gaskets when used.

#### VIII. ASSEMBLY

Clean all parts thoroughly. If B.P.R.V. or suction valve plungers were lapped, make certain that all compound has been removed. Insert B.P.R.V. plunger (214), spring (215), shims (216) and pipe plug.\* Insert suction check valve seat (210) and disk (209) and press cage (208) into the suction flange (212). Mount the suction flange assembly with gasket on valve body. Draw bolts up evenly and very tightly, insert three-way plunger (201), and springs (219), if used. Be sure radial hole in plunger, that connects area behind plunger to port 16 or 17, is pointed up to facilitate bleeding of air from dashpot area. Bolt flange gaskets and flanges (206) to valve body. Bolt entire suction and return valve assembly with seals or gaskets, spacers and spacer gaskets in place on bottom of pump. Draw suction valve mounting bolts up evenly and very tightly as all seals here must be air tight. Install suction and exhaust pipes. Use pipe compounds sparingly or Teflon tape and only on male threads. Suction pipe in port 5 must be turned in very tightly to prevent the pump from sucking air. Connect piping to port 22 and remount pump on reservoir.

\*If a flange type B.P.R.V. cover is used, insert hollow shims or washers between plunger and spring and secure cover screws with soft iron locking wire.