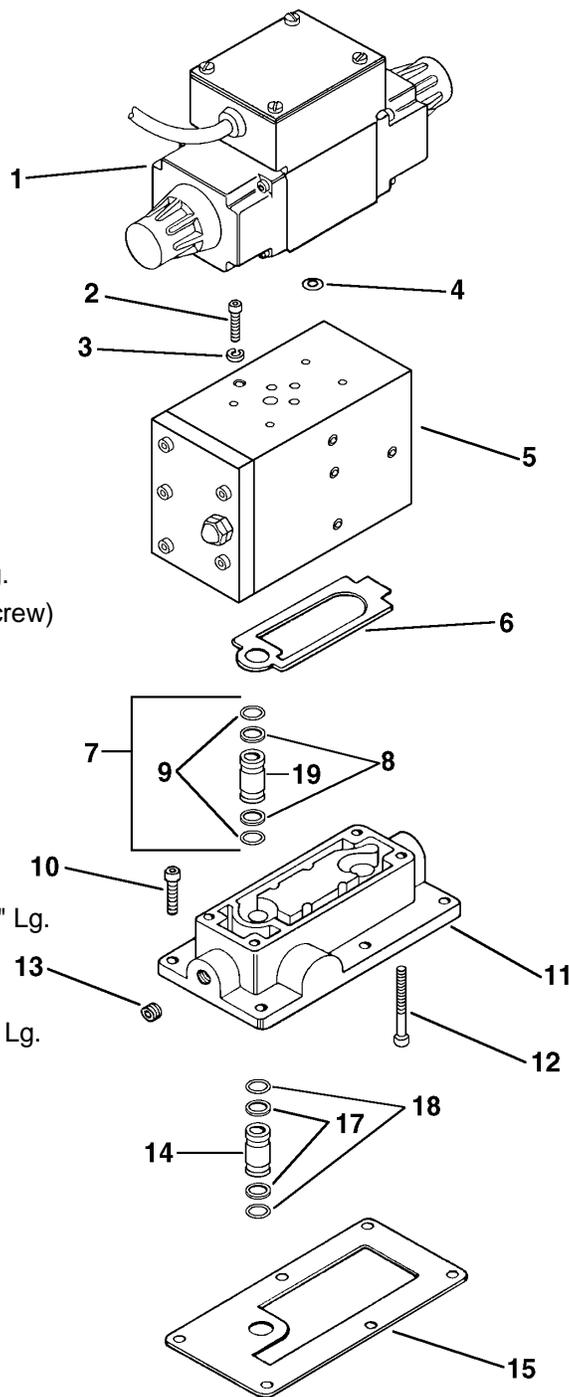


L-2236
 Rev. O
 04/97
 PC5240

For date codes beginning with "D"

**Figure 1 - Valve Assembly
 Parts List**

Item No.	Part Number	Qty.	Description
1	DA1269900SR	1	Solenoid Ass'y.
2	Std. Hardware	4	Cap Screw #10-32 x 2" Lg.
3	Std. Hardware	4	Lock Washer (for a #10 screw)
4	★	4	O-Ring
5	CL99950W	1	Valve Block Ass'y.
6	★	1	Gasket
7	DA973950SR	1	Valve to Adapter Connector Ass'y.
8	★	2	Back-up Washer
9	★	2	O-Ring
10	Std. Hardware	6	Cap Screw $\frac{5}{16}$ - 18 x 1 $\frac{1}{4}$ " Lg.
11	F132038	1	Manifold (BVS4)
11	F130038	1	Manifold (BVR4)
12	Std. Hardware	4	Cap Screw $\frac{1}{4}$ - 20 x 1 $\frac{3}{4}$ " Lg.
13	Std. Hardware	1	Plug $\frac{1}{8}$ " N.P.T.F. (BVS4)
13	Std. Hardware	2	Plug $\frac{3}{8}$ " N.P.T.F. (BVR4)
14	BSS5899D	1	Connector
15	★	1	Gasket
17	★	2	Back-up Washer
18	★	4	O-Ring
19	DA973950SR	1	Connector (incl. item 8,9)
—	BSS57330SR	1	Remote Pendant

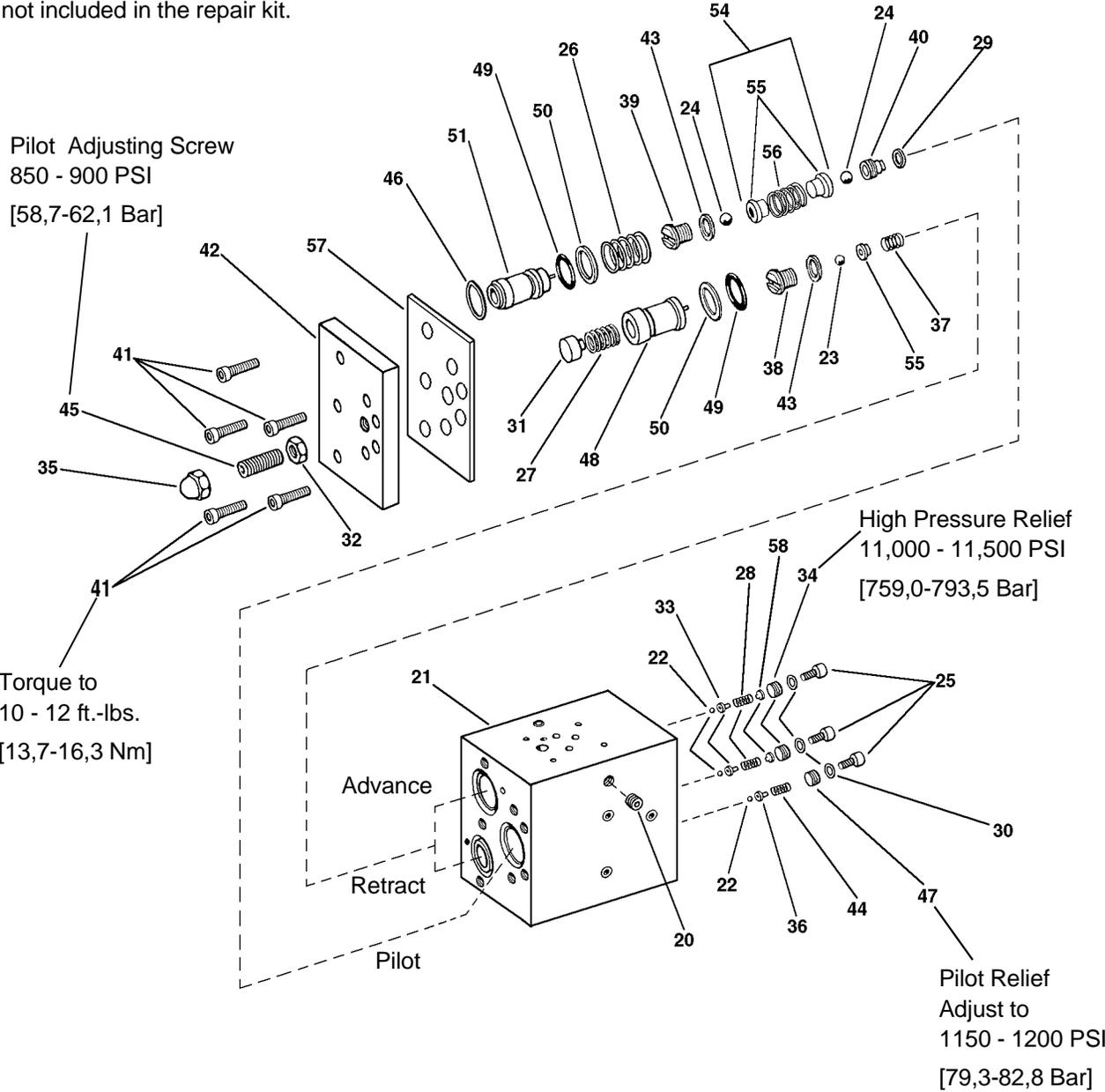


★Indicates items included in and available only as part of
 Repair Kit VS4-24K1.

INSTALL ALL KIT COMPONENTS TO INSURE OPTIMUM PERFORMANCE OF THE REPAIRED PUMP.

IMPORTANT: When installing new Spring, Item 27, compress to 750 PSI [51,8 Bar] (1680 lbs of force) on a 10 Ton ENERPAC press prior to assembly.

NOTE: Item #58 is required only for initial assembly at the factory. They will not be needed for rebuilding and may be discarded during service. They are not included in the repair kit.



Torque settings for ball seats:

Lower seat, item 40, to 25 ft-lbs [33,9 Nm].

Upper seats, items 38 & 39, to 37 ft-lbs. [50,2 Nm]

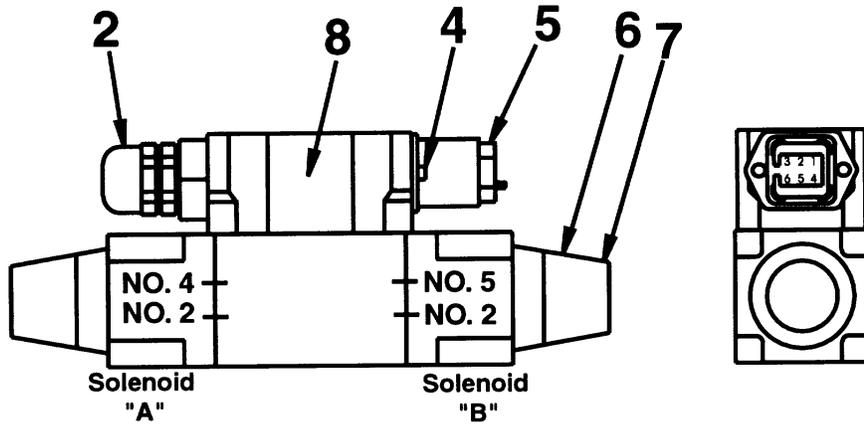
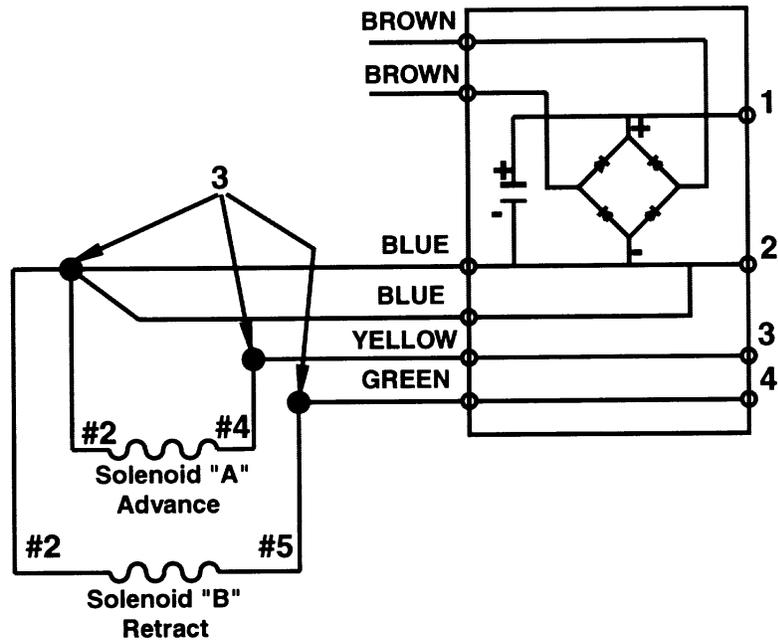
Figure 2

Figure 2 - Valve Block Assembly

Parts List

Item No.	Part Number	Qty.	Description
20	★	5	Plug 1/16"-27 NPTF
21	CL938950W	1	Valve Block Ass'y.
22	★	3	1/8" Ball
23	★	1	1/4" Ball
24	★	4	1 1/32" Ball
25	B1342028	3	Screw
26	★	2	Spring
27	★	1	Spring
28	★	2	Spring
29	★	2	Gasket
30	★	3	Gasket
31	CH43950W	1	Spacer
32	F378123	1	Nut
33	★	2	Ball Guide
34	K877028	2	Adjusting Screw
35	Standard Hardware	1	Acorn Nut 3/8" - 24 UNF
36	★	1	Ball Guide
37	★	1	Spring
38	★	1	Seat
39	★	2	Seat
40	★	2	Seat
41	Standard Hardware	7	Cap Screw 1/4" - 20 UNC x 7/8" Lg.
42	M502098	1	Cover
43	★	3	Gasket
44	★	1	Spring
45	Y158028	1	Adjusting Screw
46	★	2	Seal Ring
47	Y948028	1	Adjusting Screw
48	DA983950SR	1	Piston Ass'y.
49	★	3	O-Ring
50	★	3	Back-up Washer
51	DA982950SR	2	Piston Ass'y.
54	CL104950W	2	Spring & Spacer Ass'y.
55	L843186	5	Spacer
56	★	2	Spring
57	★	1	Gasket
58	CF634006	2	Slug

★Indicates items included in and available only as part of Repair Kit VS4-24K1.



**Figure 3 - Solenoid Assembly
BVS4/BVR4 Parts List**

Item No.	Part Number	Qty.	Description
2	DA1522095	1	Strain Relief
3	BL20187	3	Connector
4	DA4041028	2	Self-Tapping Screw
5	CV663900	1	Rectifier Assembly
6	DA6372720	2	24 Volt Coil
7	DA6373021	2	Coil Nut
8	DA3793001	1	Terminal Box
9	DA3792900	--	Solenoid Assembly (Includes items 6, 7, and 8)

TROUBLESHOOTING AND REPAIR OF BVS4/BVR4 ELECTRIC VALVES

In diagnosing malfunctioning valves, certain symptoms may be common not only to valves, but often to hydraulic equipment in general. Before repairing the valve, mount a VM-2 on the pump and verify that the problem is not with the pump.

Troubleshooting

1. Check electrical operation of valve. Make certain pushbutton control station is in correct working order. Check spool valve for "clicking" sound which indicates operating solenoids.
2. In making observations, it is assumed that pilot pressure has been correctly set, or can be adjusted, and that valve has been checked for external oil leakage.
3. Inability to obtain any pressure may be the result of blown connector seals, jammed relief components, or sticking solenoids.
4. Pressure leaks which are consistent and increase proportionately with increasing pressure ranges are usually the result of leaking gaskets or threaded surfaces.
5. Ball seat leakage is often erratic and intermittent.
6. Become familiar with and use valve schematics.
7. Valve should operate identically in both directions. If valve fails to operate in one direction, check directional circuit involved.
8. If valve malfunction is identical in both directions, check pilot circuit.
9. If valve operates to 1,200-1,500 PSI [82,8-103,5 Bar] in both directions, it usually indicates excessive pilot pressure, with valve bypassing through pilot relief.
10. If pilot setting cannot be adjusted down, it indicates a severe leak in pilot ball seat.
11. If Valve fails to build to maximum pressure in both directions, pilot pressure may be too low. This can also be caused by inability to maintain sufficient pilot pressure as a result of excessive leakage through the spool valve, also through badly leaking pilot relief ball seat in valve block.
12. If valve builds pressure simultaneously in both directions, this may be the result of a broken pin in the directional piston.
13. If valve fails to change direction immediately, this may be due to worn spacers or bad spring between balls of directional circuits.

Disassembly

1. Remove solenoid assembly (see Figure 3) by removing cover and four screws that hold solenoid assembly to valve block. NOTE: Do not disassemble solenoid assembly.
2. Remove the adaptor block (Figure 1, item 11) by removing the four screws (item 12), the connector assembly (item 8) and gasket (item 6) from the valve block.
3. Disassemble valve block (see Figure 2) by removing the acorn nut (item 35), lock nut (item 32), adjusting screw (item 45), seven screws (item 41), cover (item 42) and gasket (item 57). Remove the spacer (item 31), spring (item 27), piston assembly (item 48), seat (item 38), gasket (item 43), ball (item 23), spacer (item 55) and spring (item 37). The pilot piston section of valve is now disassembled.
4. Disassemble the advance and retract piston sections by removing the cover seals (item 46), (2) pistons (item 51), the springs (item 26), upper seats (item 39), gaskets (item 43), balls (item 24), spring and spacer assemblies (item 39), balls (item 24), lower seats (item 40) and gaskets (item 29). NOTE: Discard used copper gaskets and replace with new items supplied with repair kit.
5. Disassemble the pilot relief section by removing the screw (item 25), gasket (item 30), adjusting screw (item 47), spring (item 44), ball guide (item 36) and ball (item 22).
6. Disassemble the high pressure relief sections for both advance and retract by removing the (2) screws (item 25), gaskets (item 30), adjusting screws (item 34), slugs (discard), springs (item 28), ball guides (item 33) and balls (item 22).
7. It is not necessary to remove the pipe plugs (item 20) from the valve body.
8. Body is now ready to be cleaned, inspected for damage and reassembled.

Reassembly: When assembling, use new parts supplied in repair kit.

1. Clean valve block and inspect all components. Check for worn or damaged ball seats, broken or weak springs. Inspect relief ball seats in valve block.
2. Carefully reseal small balls in reliefs, and replace guides, springs, and adjusting screws. Use care when turning adjusting screws so as not to distort or displace springs. Pilot relief spring can be forced into cross hole by bottoming screw. Do not install gaskets (item 30) or screws (item 25) at this time as adjustments to reliefs will be made during testing of the valve.
3. Assemble advance and retract piston sections by installing gaskets (item 29) and lower seats (item 40). Torque lower seats to 25-30 ft-lbs. [33,9-40,7 Nm]. Install balls (item 24), spring and spacer assemblies (item 54), balls (item 24), gaskets (item 43) and upper seats (item 39). Torque upper seats to 37 ft-lbs. [50,2 Nm]. NOTE: If new seats are used, they must be seated by placing the ball on the seat and pressing to 200 PSI [13,8 Bar] on a 10 ton press.
 - A. Attach couplers to both ports. Connect each port to hand pump and 15,000 PSI [1035,0 Bar] gauge. Adjust each high pressure relief to 11,500-12,000 PSI [793,5-828,0 Bar]. Valve should hold pressure at 10,000 PSI [700 Bar] without leakage. Both seats in directional circuits will be checked in this operation.
4. Install new O-Rings and back-up washers on all three pistons.
5. Install springs (item 26) and piston assemblies (item 51) into advance and retract sections of valve body. Install cover seals (item 46) between piston and cover plate.
6. Assemble pilot piston section by installing spring (item 37), spacer (item 55), ball (item 23), gasket (item 43) and seat (item 38). Torque seat to 37 ft-lbs. [50.2 Nm]. Install pilot piston assembly (item 48), spring (item 27) and spacer (item 31).
7. Use seven cap screws (item 41) to bolt cover (item 42) and gasket (item 57). Insert adjusting screw (item 45) and locknut (item 32). Do not install acorn nut (item 35) at this time as adjustments will be made during testing.
8. Install solenoid assembly (see Figure 3) using four cap screws and cover to valve body.
9. Valve is now ready to be adjusted and tested.

Adjustments

1. Mount valve on a remote block and connect to a 700 cu. in./min. [11,473 cu.cm/min.] output test pump. Insert 2,000 PSI [138,0 Bar] gauge in 1/16" NPT port on block nearest cover plate (may be on either side of block).
2. Connect pushbutton station to the valve.
3. With adjusting screw turned in, adjust pilot relief setting from port end of block to 1,150-1,200 PSI [79,3-82,8 Bar].
4. Adjust pilot setting to 850-900 PSI [58,7-62,1 Bar]. (Adjustment screw is located under acorn nut.)
5. Connect the ADV port to advance port on a double acting cylinder and a 15,000 PSI [1035,0 Bar] gauge.
6. Connect the RET port to retract port on a double acting cylinder and a 15,000 PSI [1035,0 Bar] gauge.
7. Run the cylinder back and forth under no pressure to eliminate air.
8. Valve should build to maximum pressure in both advance and retract directions.
9. Valve should hold pressure in both advance and retract directions. At 10,000 PSI [700 Bar] there should be less than a 300 PSI [20,7 Bar] drop in 15 seconds. When the valve is in hold, there should be no cylinder creep.
10. Remove remote block and reassemble to original block and onto pump.

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