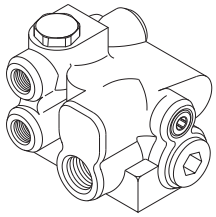

DUAL ACCUMULATOR CHARGING VALVE

Product Explanation, Operating Information, and Service Instructions

ACV-DMO

PRODUCT EXPLANATION

The accumulator charging valve is designed for installation in an open center hydraulic system. The accumulator charging valve supplies oil on demand to the accumulators from the open center circuit. Accumulator charging is accomplished at a preset rate (GPM) and is relatively constant within the preset pressure limits.

Flow to downstream hydraulic secondary devices will be reduced fractionally while the accumulators are charging. This does not noticeably affect operation of these components. Full system pressure is available to the downstream hydraulic devices at all times provided oil delivery and pressure from the pump is not impeded.

The accumulator charging valve does not limit pressure in the accumulators that is from system load downstream of the flow through port. Over pressure protection is to be located between the pump and accumulator charging valve.

OPERATING INFORMATION

End user must provide proper maintenance of valve, should it become inoperable, by replacing the valve or servicing it with the proper repair kit. See TABLE 1 on page 3 for the proper repair kit number. Observe Service Instruction procedures on following pages. See Warnings A, B, and C below.

IMPORTANT INFORMATION

A **⚠ WARNING**

Due to allowable operating temperature of accumulator charging valve avoid contact or burn injury may occur.

B **⚠ WARNING**

Be sure system energy is relieved from accumulator charging valve before removing from machine. See machine operating instructions for procedures to relieve system energy.

C **⚠ WARNING**

Do not exceed the high limit pressure setting indicated in TABLE 1 or system damage or failure may occur.

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NOTE

Locate the model number on the accumulator charging valve and compare it to the model number in TABLE 1. Be sure you have the proper service instructions.

SERVICE INSTRUCTIONS

⚠ WARNING

Be sure system energy is relieved from accumulator charging valve before removing from machine. See machine servicing instructions for procedures to relieve system energy and to remove charging valve from machine.

Disassembly

(Refer to Figure 1)

1. Remove plug (7) from housing (13). Remove o-ring (2) from plug (7). **NOTE: Plug (7) is under spring tension.**
2. Remove spring (5) and rod (6) from housing (13).
3. Remove plug (1) from housing (13) and remove o-ring (2) from plug (1).
4. Remove spool (3) from housing (13) through plug (7) end ONLY. Remove seal (4) from spool (3).
5. **Earlier Models:** Loosen nut (33) and remove screw assembly (32) from housing (13). Remove o-ring (31) from screw assembly (32). Remove spring (30), poppet (29), seat (28), o-ring (23), and washer (27) from housing (13).
   Later Models: Some later models use a directional spring (30). Directional spring (30) is attached to screw assembly (32) by means of the small diameter end of spring (30) being snapped into a groove on the nose end of screw assembly (32). See Figure 1b. Remove nut (33) from screw assembly (32) and remove screw assembly (32) from housing (13). Remove o-ring (31) from screw assembly (32) from nut (33) side of screw assembly. Remove shim (43), spring (30), steel ball (29), seat (28), o-ring (23), and orifice (27) from housing (13).
6. Remove filter/screen (26) and washer (25) from housing (13).
7. BEFORE moving screw (8), ACCURATELY MEASURE ITS DEPTH from the end of housing (13) and record for reassembly purposes. Remove screw (8) from housing (13).
8. Remove spring (10), retainer (11), and ball (12). Be sure to keep ball (12) separate from ball (20) for reassembling.
9. Remove pin (9) from screw (8) using a drive pin punch. **NOTE: Be careful not to damage threads.**
10. Remove plug (24) from housing (13). Remove o-ring (23) from plug (24).
11. Remove spring (22), stop (21), and ball (20), from housing (13).
12. Place housing (13) on a bench with plug (24) end down. Spool (19) may or may not fall out at this point.
13. Using a 6.35-7.87 mm (0.25-0.31 in) diameter wood or plastic dowel, carefully remove insert (18) and spool (19) from housing (13). Insert (18) must come out plug (24) end of housing (13). Be careful not to scratch or mar valve seats on insert (18).
14. Remove spool (19) from insert (18). Remove o-rings (15 & 17) and back-up rings (14 & 16) from insert (18). **NOTE: Not all models use back-up rings (14 & 16).**
15. Remove plug (42) from housing (13). Remove o-ring (41) from plug (42).
16. Remove spring (40), poppet (39), sleeve (37), poppet (35), and spring (34) from housing (13). **NOTE: Be careful not to scratch or mar housing or sleeve bore. Poppets (35 & 39) are steel in model numbers 06-463-248 and 06-463-250. Reinstall these steel poppets during reassembly.**
17. Remove o-rings (36 & 38) from sleeve (37).

NOTE

Observe torque specifications as indicated in assembly procedures or system damage or failure may occur.

Assembly

(Refer to Figure 1)

WASH ALL PARTS WITH CLEAN SOLVENT AND DRY. LUBRICATE ALL RUBBER PARTS WITH CLEAN SYSTEM FLUID PRIOR TO ASSEMBLY. BE SURE ENTIRE ASSEMBLY PROCEDURE IS DONE WITH CONTAMINATION FREE METHODS.

1. Install new o-ring (2) on plug (1). Install plug (1) in housing (13) and torque 122.0-135.6 N·m (90-100 lb·ft).
2. Install new seal (4) on spool (3). Be sure seal (4) does not twist in groove.
3. Lubricate spool (3) with clean system fluid and properly install into housing (13) as shown in Figure 1.
4. Install spring (5) and rod (6) into housing (13).
5. Install new o-ring (2) on plug (7). Install plug (7) into housing (13) and torque 122.0-135.6 N·m (90-100 lb·ft).
6. Install new o-rings (15 & 17) and new back-up rings (14 & 16) on insert (18) and install insert (18) into housing (13). Note direction of assembly. Seat insert (18) with a 12.7 mm (0.50 in) diameter wood or plastic dowel. **NOTE: Not all models use back-up rings (14 & 16).**
7. Install spool (19) into insert (18) in housing (13). Note direction of spool (19), long shoulder end faces end plug (24). See Figure 1a.
8. Install ball (20) on insert (19) in housing (13). Install stop (21) over ball (20), and spring (22) over stop (21).
9. Install new o-ring (23) on plug (24). Carefully install plug (24) into housing (13), centering spring (22). Torque plug (24) 47.5-54.2 N·m (35-40 lb·ft).
10. Turn housing (13) so plug (1) is vertically upward. Install ball (12) in housing (13). Be sure ball (12) is centered in bottom of hole in housing (13). Place retainer (11) and spring (10) into housing (13).
11. Insert new pin (9) in screw (8). Be sure pin (9) is aligned properly and is evenly driven into screw (8). **NOTE: Be careful not to damage threads.**
12. Thread screw (8) into housing (13) to the depth recorded during disassembly.
13. Install washer (25) and new filter/screen (26) in housing (13).
15. **Earlier Models:** Install new o-ring (31) on screw assembly (32). Install washer (27), new o-ring (23), seat (28), poppet (29), spring (30), and screw assembly (32) into housing (13). Torque screw assembly (32) 24.4-29.8 N·m (18-22 lb·ft). Then torque nut (33) 43.4-51.5 N·m (32-38 lb·ft).
    Later Models: Some later models use a directional spring (30). Directional spring (30) is attached to screw assembly (32) by means of the small diameter end of spring (30) being snapped into a groove on the nose end of screw assembly (32). If necessary, reattach the small diameter of spring (30) into the groove on the nose end of screw assembly (32) using a slight twisting motion. See Figure 1b. Install new o-ring (31) on screw assembly (32) from nut (33) side of screw assembly. Install orifice (27), new o-ring (23), seat (28), steel ball (29), and spring (30) in housing (13). Fully lubricate shim (43) with clean system fluid and install in housing (13) on end of seat (28). Install screw assembly (32) in housing (13). Torque screw assembly (32) 24.4-29.8 N·m (18-22 lb·ft). Then install nut (33) on screw assembly (32) and torque nut 43.4-51.5 N·m (32-38 lb·ft).
16. Install new o-rings (36 & 38) on sleeve (37).
17. Install spring (34), new poppet (35), sleeve (37), new poppet (39), and spring (40) into housing (13). **NOTE: Poppets (35 & 39) are steel in model numbers 06-463-248 and 06-463-250. Reinstall these steel poppets during reassembly.**
18. Install new o-ring (41) on plug (42). Install plug (42) in housing (13) and torque 67.8-81.3 N·m (50-60 lb·ft).

VALVE ADJUSTMENT

(Refer to Table 1)

1. See machine servicing instructions to properly reinstall accumulator charging valve. Tee an accurate pressure gauge on an the accumulator line.
2. Start the pump and allow approximately one minute for charging to start (pressure in gauge will read accumulator precharge plus). If the valve does not begin to charge turn screw (8) in, stopping when gauge shows an increase in pressure. Check the high limit specifications and adjust screw (8) until the high limit setting is met. This pressure can be checked correctly only if after each adjustment of screw (8) the accumulator pressure is reduced below the low limit setting and the system recharges the accumulator pressure to its high limit.

NOTE

It may be necessary to reconnect the tank port line after each adjustment to prevent oil leakage from this port.

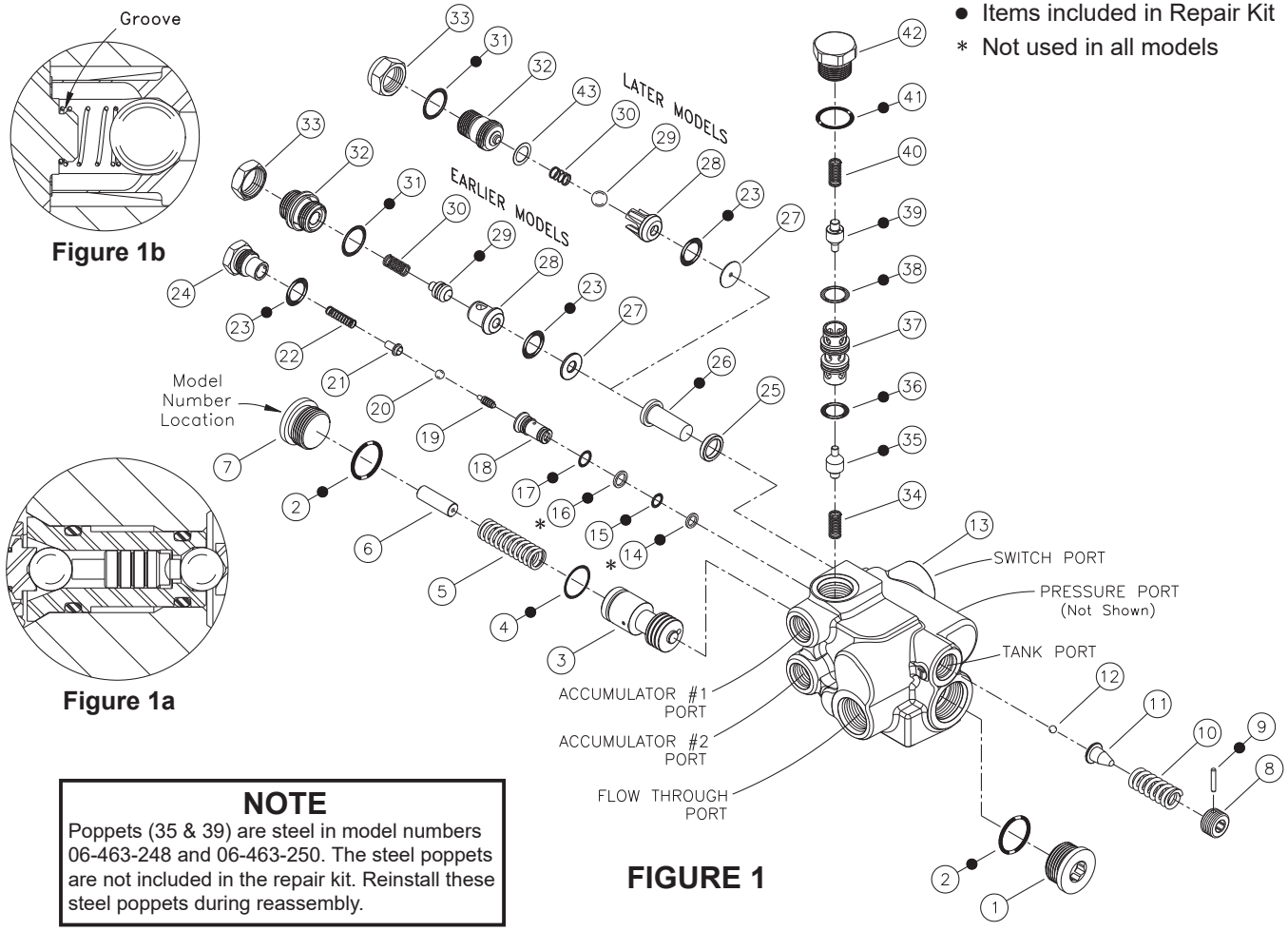

FIGURE 1

NOTE

Poppets (35 & 39) are steel in model numbers 06-463-248 and 06-463-250. The steel poppets are not included in the repair kit. Reinstall these steel poppets during reassembly.

TABLE 1 (Specifications)

Model Number	Repair Kit Number	Nominal High Limit (cut out)		Nominal Low Limit (cut in)	
		bar	(PSI)	bar	(PSI)
06-463-200	06-400-112	158.6 ± 3.5	(2300 ± 50)	127.6 ± 3.5	(1850 ± 50)
06-463-202	06-400-112	189.6 ± 3.5	(2750 ± 50)	155.1 ± 3.5	(2250 ± 50)
06-463-204	06-400-112	137.9 ± 3.5	(2000 ± 50)	113.8 ± 3.5	(1650 ± 50)
06-463-206	06-400-112	124.1 ± 3.5	(1800 ± 50)	86.2 ± 3.5	(1250 ± 50)
06-463-208	06-400-112	144.8 ± 3.5	(2100 ± 50)	117.2 ± 3.5	(1700 ± 50)
06-463-210	06-400-112	127.6 ± 3.5	(1850 ± 50)	103.4 ± 3.5	(1500 ± 50)
06-463-212	06-400-112	103.4 ± 3.5	(1500 ± 50)	86.2 ± 3.5	(1250 ± 50)
06-463-214	06-400-112	82.7 ± 3.5	(1200 ± 50)	63.8 ± 3.5	(925 ± 50)
06-463-216	06-400-112	113.8 ± 3.5	(1650 ± 50)	93.1 ± 3.5	(1350 ± 50)
06-463-218	06-400-112	124.1 ± 3.5	(1800 ± 50)	94.8 ± 3.5	(1375 ± 50)
06-463-220	06-400-180	165.5 ± 3.5	(2400 ± 50)	137.9 ± 3.5	(2000 ± 50)
06-463-222	06-400-112	179.3 ± 3.5	(2600 ± 50)	148.2 ± 3.5	(2150 ± 50)
06-463-224	06-400-194	165.5 ± 3.5	(2400 ± 50)	137.9 ± 3.5	(2000 ± 50)
06-463-226	06-400-112	103.4 ± 3.5	(1500 ± 50)	86.2 ± 3.5	(1250 ± 50)
06-463-228	06-400-112	179.3 ± 3.5	(2600 ± 50)	144.8 ± 3.5	(2100 ± 50)
06-463-230	06-400-112	137.9 ± 3.5	(2000 ± 50)	113.8 ± 3.5	(1650 ± 50)
06-463-234	06-400-112	165.5 ± 3.5	(2400 ± 50)	137.9 ± 3.5	(2000 ± 50)
06-463-238	06-400-112	151.7 ± 3.5	(2200 ± 50)	124.1 ± 3.5	(1800 ± 50)
06-463-244	06-400-112	189.6 ± 3.5	(2750 ± 50)	155.1 ± 3.5	(2250 ± 50)
06-463-246	06-400-112	179.3 ± 3.5	(2600 ± 50)	144.8 ± 3.5	(2100 ± 50)
06-463-248	06-400-447	137.9 ± 3.5	(2000 ± 50)	113.8 ± 3.5	(1650 ± 50)
06-463-250	06-400-448	179.3 ± 3.5	(2600 ± 50)	148.2 ± 3.5	(2150 ± 50)
06-463-252	06-400-485	60.3 ± 3.5	(875 ± 50)	44.8 ± 3.5	(650 ± 50)
06-463-254	06-400-485	70.7 ± 2.6	(1025 ± 38)	55.2 ± 2.6	(800 ± 38)

NOTE: If your product number is not listed, contact ZF Off-Highway Solutions Minnesota Inc. for information.

SERVICE CHECKS FOR HYDRAULIC SYSTEMS

ACCUMULATOR CHARGING CYCLE REPEATS FREQUENTLY WHEN ACCUMULATOR IS NOT NORMALLY BEING DISCHARGED IN SERVICE

1. Leaking accumulator lines or fittings
1. Check lines and fittings for leaks and correct
2. Incorrect setting of accumulator gas charge
2. Check accumulator gas charge
3. Line to accumulator plugged
3. Replace line
4. Inoperative charging valve
4. Replace charging valve

ACCUMULATOR STARTS TO CHARGE BUT DOES NOT REACH HIGH LIMIT

1. No oil or low oil level in tank
1. Check oil level
2. Pump worn or inoperative and not delivering full flow or pressure
2. Check pump
3. Inoperative system relief valve (valve leaking or has low setting so full flow and pressure are not available)
3. Check relief valve
4. Inoperative charging valve
4. Replace charging valve

ACCUMULATOR CHARGING TIME TOO LONG

1. No oil or low oil level in tank
1. Check oil level
2. Relief valve setting too low
2. Check valve setting
3. Pump worn or inoperative and not delivering full flow or pressure
3. Check pump
4. Inoperative charging valve
4. Replace charging valve

ACCUMULATOR FAILS TO START CHARGING

1. No oil or low oil level in tank
1. Check oil level
2. Worn or inoperative pump
2. Check pump pressure and flow
3. Inoperative relief valve
3. Replace relief valve
4. Air in accumulator line
4. Bleed accumulator line
5. Inoperative charging valve
5. Replace charging valve

VERY RAPID CYCLING OF CHARGING VALVE

1. Incorrect setting of accumulator gas charge
1. Check accumulator gas charge
2. Inoperative charging valve
2. Replace charging valve

LACK OF ADEQUATE FLOW THROUGH VALVE

1. Inoperative pump
1. Check pump pressure and delivery
2. Inoperative relief valve
2. Replace relief valve
3. Blocked lines
3. Replace lines
4. Inoperative charging valve
4. Replace charging valve

SERVICE DIAGNOSIS

(Refer to Figure 1)

ACCUMULATOR CHARGING CYCLE REPEATS FREQUENTLY WHEN ACCUMULATOR IS NOT NORMALLY BEING DISCHARGED IN SERVICE

1. Poppet or ball (29) leaking.
2. O-ring (23) next to seat (28) leaking.
3. O-ring (17) leaking.
4. Ball (20) leaking.
5. Inoperative seat on insert (18).

ACCUMULATOR STARTS TO CHARGE BUT DOES NOT REACH HIGH LIMIT

1. O-ring (15) leaking.
2. Seal (4) on spool (3) is damaged or worn.

ACCUMULATOR CHARGING TIME TOO LONG

1. Dirt in filter (26).
2. Poppet (35 or 39) stuck, partially closed.
3. Seat (28) or orifice (27) partially plugged.
4. Poppet or ball (29) stuck.

ACCUMULATOR FAILS TO START CHARGING

1. Broken spring (10).
2. Broken spring (5).
3. Seal (4) inoperative.
4. Spool (3) stuck.
5. Dirt in filter (26).

VERY RAPID CYCLING OF CHARGING VALVE

1. Insert (18) worn.
2. Poppets (35 or 39) stuck, partially closed.

ACCUMULATOR PRESSURES ARE NOT ISOLATED FROM ONE ANOTHER

1. O-rings (36 or 38) leaking.
2. Inoperative poppets (35 or 39).