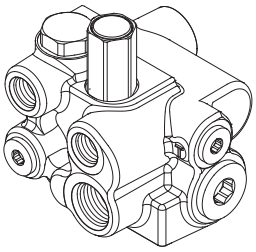

ACCUMULATOR CHARGING VALVE with Relief Valve

Product Explanation, Operating Information, and Service Instructions

ACV-SMO-RV

PRODUCT EXPLANATION

The accumulator charging valve is designed for installation in an open center hydraulic system between the pump and the downstream secondary hydraulic devices.

The accumulator charging valve supplies oil on demand to the accumulator from the open center circuit. Accumulator charging is accomplished at a preset rate (GPM) and is relatively constant within the preset pressure limits.

The flow to the downstream secondary hydraulic devices will be reduced fractionally for a short time when the accumulator is charging. This does not noticeably affect the operation of these components. Full system pressure is available to the downstream secondary hydraulic devices at all times provided oil delivery and pressure from the pump is not impeded.

The accumulator charging valve incorporates a full flow relief valve to limit the maximum pressure in the hydraulic system.

The accumulator charging flow rate, upper and lower accumulator pressure limits and relief valve setting are set at the time of manufacture.

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 for proper repair kit number. Observe Service Instruction procedures on the following pages. See Warnings A, B, C, and D.

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**

Relief valve is preset at the factory. DO NOT READJUST or system damage or failure may occur.

D **⚠ WARNING**

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

NOTE

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

SERVICE INSTRUCTIONS

⚠ WARNING

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

Disassembly

(Refer to Figure 1)

1. Remove plug (7) from housing (15). Remove o-ring (2) from plug (7). **NOTE: Plug is under spring tension.**
2. Remove spring (5) and rod (6) from housing (15).
3. Remove plug (1) from housing (15) and remove o-ring (2) from plug (1).
4. Remove spool (3) from housing (15) through plug (7) end ONLY. Remove seal (4) from spool (3).
5. **Directional spring (27) is attached to screw assembly (26) by means of the small diameter end of spring (27) being snapped in a groove on the nose end of screw assembly (26). See Figure 1a.** Remove nut (24) and remove screw assembly (26)/spring (27) from housing (15). Remove o-ring (25) from screw assembly (26) from nut (24) side of screw assembly. Remove steel ball (28), seat (29), o-ring (9), washer (30), and screen (31) from housing (15).
6. Remove plug (8) from housing (15) and remove o-ring (9) from plug (8).
7. BEFORE moving screw (10), ACCURATELY MEASURE ITS DEPTH from the end of housing and record for reassembly purposes. Remove screw (10) from housing (15).
8. Remove spring (12), retainer (13) and ball (14). Be sure to keep ball (14) separate from ball (20) for reassembling.
9. Remove pin (11) from screw (10) using a drive pin punch. Be careful not to damage threads on screw (10).
10. Remove plug (23) from housing (15). Remove o-ring (9) from plug (23).
11. Remove spring (22), stop (21) and ball (20) from housing (15).
12. Place housing on a bench with plug (23) 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 (15). Insert (18) must come out plug (23) end of housing (15). Be careful not to scratch or mar valve seats on insert (18).
14. Remove spool (19) from insert (18). Remove o-rings (16 & 17) from insert (18).
15. Remove plug (32) from housing (15). Remove o-ring (33) from plug (32).
16. Remove relief valve (34) from housing (15).

⚠ WARNING

Relief valve is preset at the factory. DO NOT READJUST or system damage or failure may occur.

18. Remove o-ring (35), back-up ring (36) and o-ring (37) from relief valve (34).
19. Remove plug (38) from housing (15). Remove o-ring (9) from plug (40).

Assembly

(Refer to Figure 1)

NOTE

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

WASH ALL PARTS WITH CLEAN SOLVENT AND ALLOW TO 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) into housing (15) 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 install in housing (15) from plug (7) side of housing. Note direction of spool (3).
4. Install spring (5) and rod (6) into housing (15).
5. Install new o-ring (2) on plug (7). Install plug (7) in housing (15) and torque 122.0-135.6 N·m (90-100 lb·ft).
6. Install new o-rings (16 & 17) on insert (18) and place insert (18) into housing (15). Note direction of assembly. Seat insert (18) with 12.7 mm (0.50 in) diameter wood dowel.
7. Install spool (19) into insert (18) in housing (15). Note direction of spool, long shoulder end faces end plug (23). See Figure 1b.
8. Install ball (20) on insert (19) in housing (15). Install stop (21) over ball (20) and spring (22) over stop (21).
9. Install new o-ring (9) on plug (23). Carefully install plug (23) in housing (15), centering spring (22). Torque 47.5-54.2 N·m (35-40 lb·ft).
10. Turn housing (15) so plug (1) is vertically upward. Install ball (14) in housing (15). Be sure ball (14) is centered in bottom of hole. Install retainer (13) and spring (12) into housing (15).
11. Insert new pin (11) in screw (10). Be sure pin (11) is aligned properly and is evenly driven into screw (10). Do not damage threads on screw (10).
12. Thread screw (10) into housing (15) TO THE DEPTH RECORDED during disassembly.
13. Install new o-ring (9) on plug (8). Install plug (8) in housing (15) and torque 47.5-54.2 N·m (35-40 lb·ft).
14. **Directional spring (27) is attached to screw assembly (26) by means of the small diameter end of spring (27) being snapped into a groove on the nose end of screw assembly (26). If necessary, reattach the small diameter of spring (27) into the groove on the nose end of screw assembly (26) using a slight twisting motion. See Figure 1a.** Install new o-ring (25) on screw assembly (26) from nut (24) side of screw assembly. Install new screen (31), washer (30), new o-ring (9), seat (29) and steel ball (28) in housing (15). Install screw assembly (26)/spring (27) in housing (15). Torque screw assembly (26) 24.4-29.8 N·m (18-22 lb·ft). Then install nut (24) on screw assembly (26) and torque nut 43.4-51.5 N·m (32-38 lb·ft)
15. Install new o-ring (33) on plug (32). Install plug (32) in housing (15) and torque 67.8-74.6 N·m (50-55 lb·ft).
16. Install new o-ring (35), new back-up ring (36) and new o-ring (37) on relief valve (34). Note location of o-rings and back-up ring.
17. Install relief valve (34) in housing (15) and torque 67.8-74.6 N·m (50-55 lb·ft).

⚠ WARNING

Relief valve is preset at the factory. DO NOT READJUST or system damage or failure may occur.

18. Install new o-ring (9) on plug (38). Install plug (38) in housing (15) and torque 47.5-54.2 N·m (35-40 lb·ft).

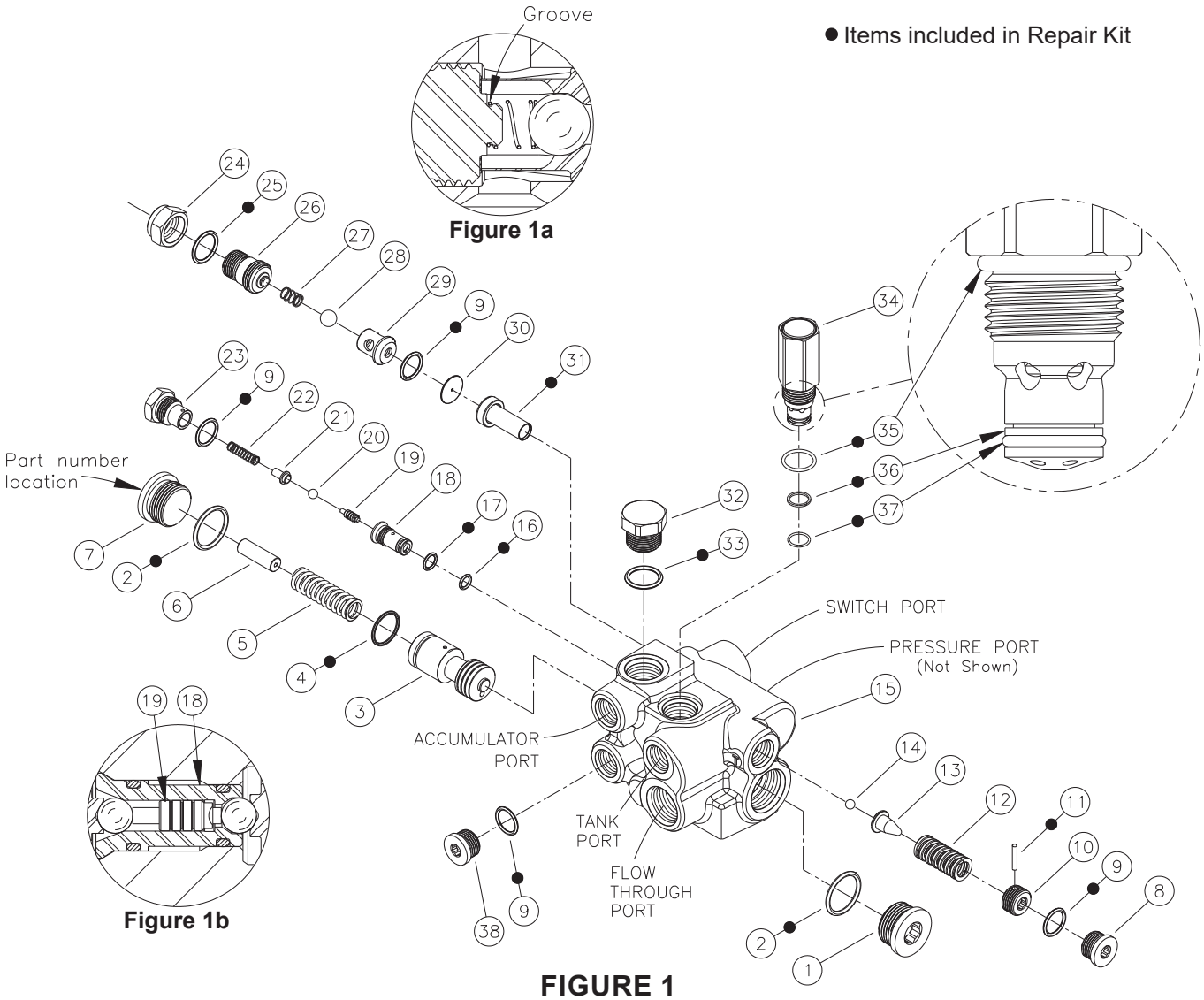

FIGURE 1

TABLE 1 (Specifications)

Part Number	Repair Kit Number	Accumulator High Limit (cut out)		Accumulator Low Limit (cut out)	
		bar	(PSI)	bar	(PSI)
06-463-321	06-400-492	137.9 ± 3.5	(2000 ± 50)	113.8 ± 3.5	(1650 ± 50)
06-463-346	06-400-492	137.9 ± 3.5	(2000 ± 50)	115.3 ± 3.5	(1675 ± 50)
06-463-350	06-400-492	106.9 ± 3.5	(1550 ± 50)	86.2 ± 3.5	(1250 ± 50)

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

Accumulator Charging Valve Adjustment

(Refer to Figure 1)

1. See machine servicing instructions to properly reinstall accumulator charging valve. Tee an accurate pressure gauge on an accumulator line.
2. Start pump and allow approximately one minute for charging to start (pressure in gauge will read accumulator precharge plus). If valve does not begin to charge remove end plug (8) and turn screw (10) in, stopping when gauge shows an increase in pressure. Check the high limit specifications (see TABLE 1) and adjust screw (10) until the high limit setting is met. Reinstall end plug (8). This pressure can be checked correctly only if after each adjustment of screw (10) the accumulator pressure is reduced below the low limit setting and the system recharges the accumulator pressure to its high limit. Repeat process until high pressure setting is accurately adjusted. **NOTE: Be sure to reinstall plug (8) before starting pump.**

⚠ WARNING

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

3. Torque end plug (8) 47.5-54.2 N·m (35-40 lb·ft).

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. Check relief valve setting
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. Check relief valve setting
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. Ball (28) leaking.
2. O-ring (9) next to seat (29) 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 (16) leaking.
2. Seal (4) on spool (3) has been damaged or worn.

ACCUMULATOR CHARGING TIME TOO LONG

1. Dirt in screen (31).
2. Ball (28) partially closed.
3. Seat (29) partially plugged.

ACCUMULATOR FAILS TO START CHARGING

1. Broken spring (12).
2. Broken spring (5).
3. Spool (3) stuck.
4. Dirt in screen (31).

VERY RAPID CYCLING OF CHARGING VALVE

1. Insert (18) worn.

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