SINGLE MODULATING VALVE (464 Series)

Service Instructions

TABLE 1 (Specifications)

Model Number	Repair Kit Number	Brake Pressure Setting		Model Number	Repair Kit Number	Brake Pressure Setting	
		bar	(PSI)			bar	(PSI)
03-464-100	06-400-137	206.8 ± 3.5	(300 ± 50)	06-464-118	06-400-108	55.2 ± 3.5	(800 ± 50)
03-464-102	06-400-108	103.4 ± 3.5	(1500 ± 50)	06-464-120	06-400-108	69.0 ± 3.5	(1000 ± 50)
03-464-180	06-400-108	69.0 ± 3.5	(100 ± 50)	06-464-130	06-400-108	82.7 ± 3.5	(1200 ± 50)
06-464-100	06-400-108	82.7 ± 3.5	(1200 ± 50)	06-464-132	06-400-108	37.9 ± 3.5	(550 ± 50)
06-464-102	06-400-108	62.1 ± 3.5	(900 ± 50)	06-464-134	06-400-108	37.9 ± 3.5	(550 ± 50)
06-464-104	06-400-108	144.8 ± 3.5	(2100 ± 50)	06-464-136	06-400-108	37.9 ± 3.5	(550 ± 50)
06-464-106	06-400-108	103.4 ± 3.5	(1500 ± 50)	06-464-904	06-400-108	75.8 ± 3.5	(1100 ± 50)
06-464-108	06-400-108	137.9 ± 3.5	(2000 ± 50)	06-464-951	06-400-108	103.4 ± 3.5	(1500 ± 50)
06-464-110	06-400-108	37.9 ± 3.5	(550 ± 50)	06-464-952	06-400-108	37.9 ± 3.5	(550 ± 50)
06-464-112	06-400-108	65.5 ± 1.7	(950 ± 25)	06-464-960	06-400-108	103.4 ± 3.5	(1500 ± 50)
06-464-114	06-400-108	55.2 ± 3.5	(800 ± 50)	20-100-948	06-400-108	137.9 ± 3.5	(2000 ± 50)
06-464-116	06-400-108	158.6 ± 5.2	(2300 ± 75)				

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

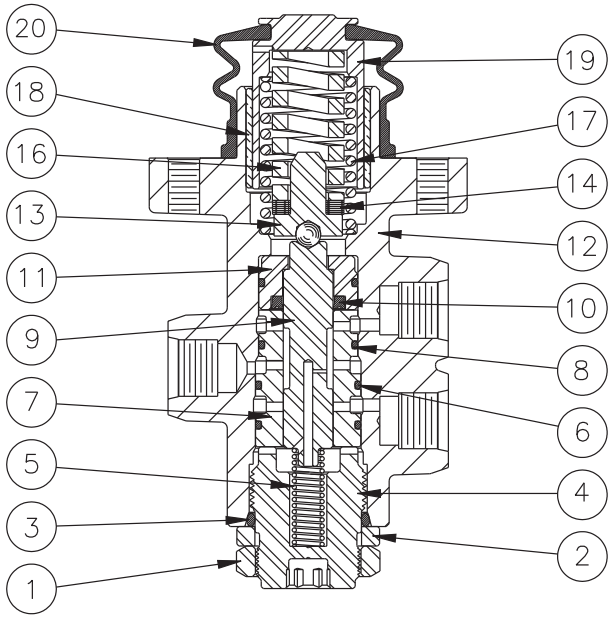

FIGURE 1

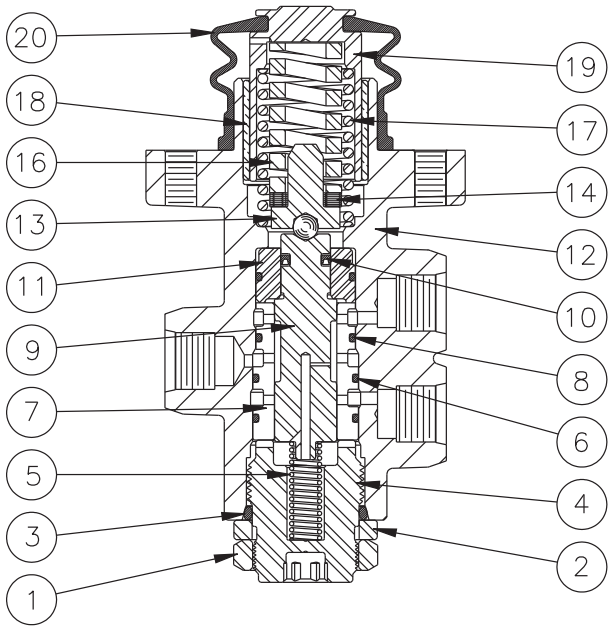

FIGURE 2

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Form No. 81-464-001 Revised 2017-12-21

www.mico.com

Models: 03-464-100
03-464-102
06-464-100
06-464-104
06-464-106
06-464-108
06-464-116
06-464-130
06-464-904
20-100-948

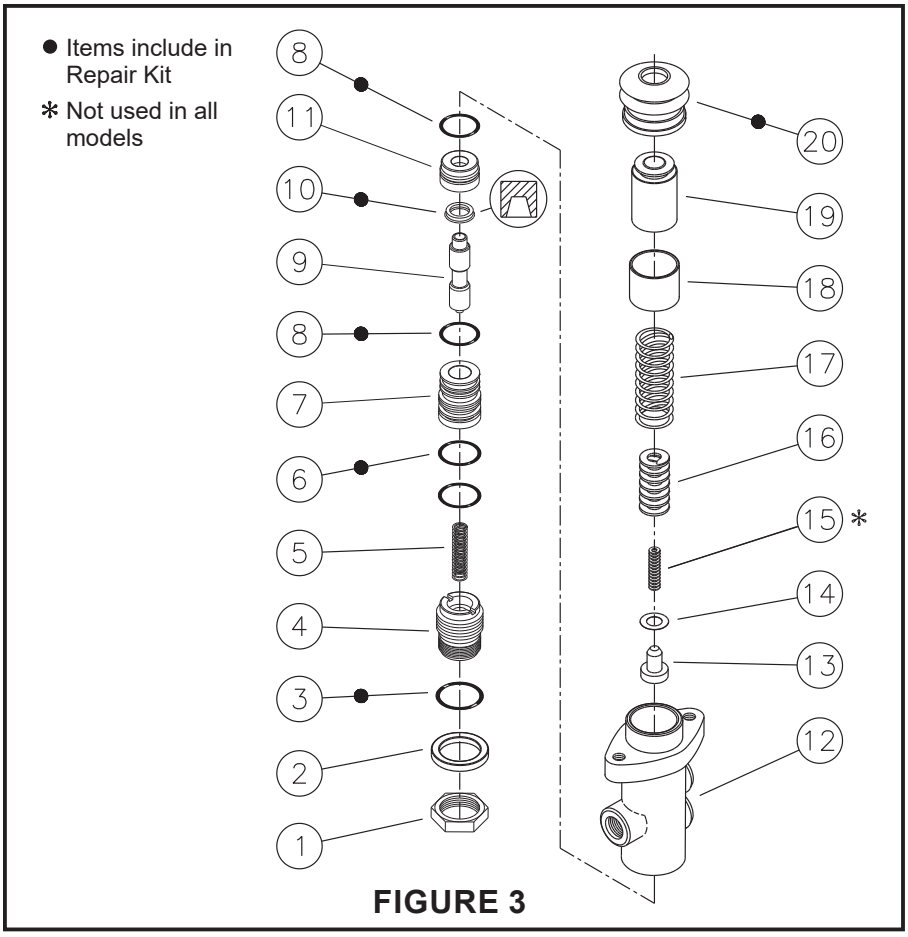

FIGURE 3

DISASSEMBLY
(Refer to Figures 1 and 3)

NOTE
Spool (9) and sleeve (7) are manufactured as a matched set. Do not intermix spool (9) or sleeve (7) with other parts.

1. Remove boot (20) from piston (19).
2. Remove piston (19), springs (15, 16, & 17) and shim(s) (14) from housing (12). **NOTE: Some models also use a 6.35 mm (0.25 in) spacer with shim(s). Note the number of shim(s) being removed from housing (12).**
3. Bearing (18) need not be removed from housing (12). **NOTE: Excessive wear on both bearing (18) and piston (19) may make replacement necessary.**
4. Remove retainer assembly (13) from housing (12). **NOTE: Ball is pressed into retainer (13).**
5. Loosen nut (1) and remove end plug (4) from housing (12). Remove spring (5), nut (1), washer (2), and o-ring (3) from end plug (4).
6. Using a wooden dowel remove spacer (11), sleeve (7), and spool (9) assembly from housing (12). **NOTE: Be careful not to scratch or mar sleeve (7) or housing bore.**
7. Separate spacer (11), spool (9), and sleeve (7). **NOTE: Excessive wear on either spool (9) or sleeve (7) may make replacement necessary.**
8. Remove o-ring (8) and cup (10) from spacer (11).
9. Remove o-ring (8) and two o-rings (6) from sleeve (7). **NOTE: Be careful not to damage the bore or grooves on sleeve (7).**

ASSEMBLY
(Refer to Figures 1 and 3)

LUBRICATE ALL RUBBER COMPONENTS FROM REPAIR KIT, SPOOL (9), AND SLEEVE (7) WITH CLEAN TYPE FLUID USED IN THE SYSTEM.

1. Clean all parts thoroughly before assembling.
2. Install new cup (10) in spacer (11) and new o-ring (8) on spacer (11). Note direction of cup (10).
3. Insert spacer (11) into housing (12) through end plug (4) side of housing. Note direction of spacer (11).
4. Install two new o-rings (6) on large diameter end of sleeve (7) and one new o-ring (8) on smaller diameter end of sleeve (7).
5. Carefully insert spool (9) into sleeve (7). Note direction of spool (9).
6. Carefully install sleeve (7) and spool (9) assembly into housing (12) using a wooden dowel. Note direction of assembly.
7. Install spring (5) into housing (12).
8. Install end plug (4) in housing (12) and torque 10.9-20.3 N·m (96-180 lb·in) to seat spacer (11) and sleeve (7). Then loosen end plug (4) 1/4 turn and torque 1.1-6.8 N·m (10-60 lb·in).
9. Install new o-ring (3), washer (2), and and nut (1) on end plug (4). Hold end plug (4) with a hex key wrench and torque nut 67.8-81.4 N·m (50-60 lb·ft).
10. Install retainer assembly (13) in housing (12). **NOTE: Depress retainer (13) until it bottoms on spacer (11). Spool (9) and retainer (13) should return when released. If the spool and retainer do not return when released, the bore of sleeve (7) may be damaged.**
11. Install shim(s) (14), springs (15, 16 & 17), and piston (19) in housing (12). **NOTE: Some models also use a 6.35 mm (0.25 in) spacer with shim(s). Be sure to install the same number of shim(s) and spacer as were removed during disassembly.**
12. Install new boot (20) on housing (12).

NOTE
After service, the valve must develop the pressure indicated in the specifications, TABLE 1. Shim(s) (14) are used to obtain the correct pressure setting. Contact ZF Off-Highway Solutions Minnesota Inc. if the brake pressure setting not able to be obtained.

Models: 03-464-180
06-464-102
06-464-110
06-464-112
06-464-114
06-464-118
06-464-120
06-464-132
06-464-134
06-464-136
06-464-951
06-464-952
06-464-960

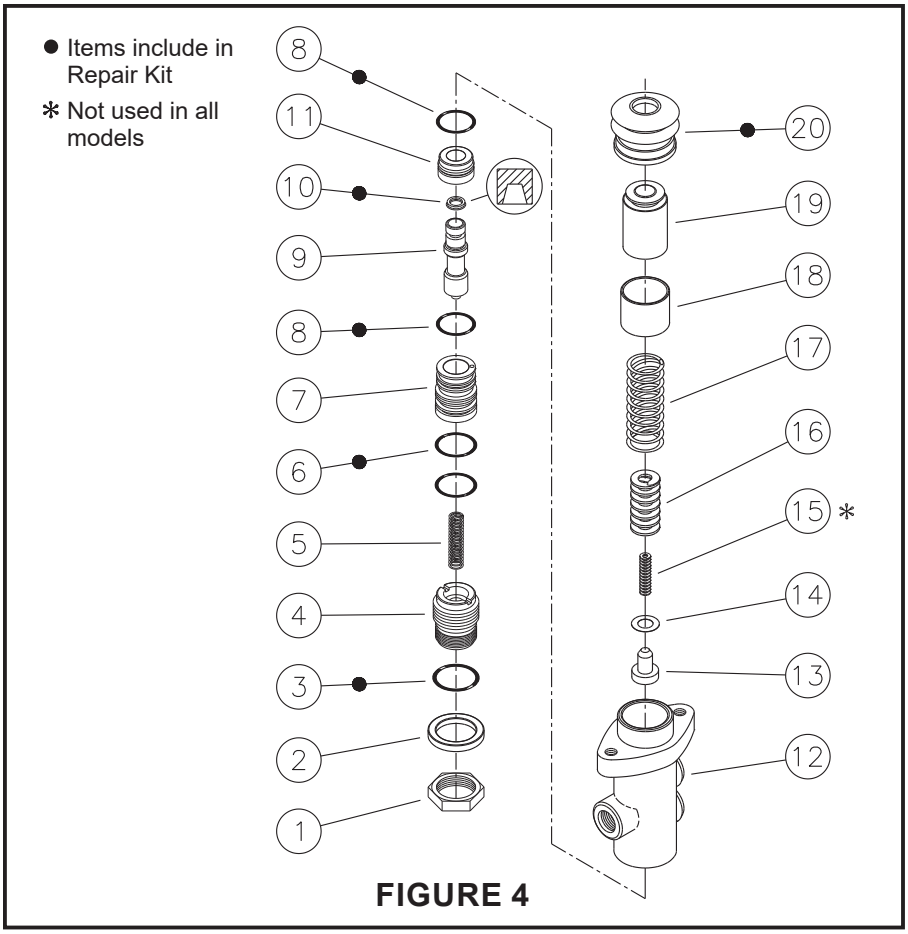

FIGURE 4

DISASSEMBLY
(Refer to Figures 2 and 4)

NOTE
Spool (9) and sleeve (7) are manufactured as a matched set. Do not intermix spool (9) or sleeve (7) with other parts.

1. Remove boot (20) from piston (19).
2. Remove piston (19), springs (15, 16, & 17) and shim(s) (14) from housing (12). **NOTE: Some models also use a 6.35 mm (0.25 in) spacer with shim(s). Note the number of shim(s) being removed from housing (12).**
3. Bearing (18) need not be removed from housing (12). **NOTE: Excessive wear on both bearing (18) and piston (19) may make replacement necessary.**
4. Remove retainer assembly (13) from housing (12). **NOTE: Ball is pressed into retainer (13).**
5. Loosen nut (1) and remove end plug (4) from housing (12). Remove spring (5), nut (1), washer (2), and o-ring (3) from end plug (4).
6. Using a wooden dowel remove spacer (11), sleeve (7), and spool (9) assembly from housing (12). **NOTE: Be careful not to scratch or mar sleeve (7) or housing bore.**
7. Separate spacer (11), spool (9), and sleeve (7). **NOTE: Excessive wear on either spool (9) or sleeve (7) may make replacement necessary.**
8. Remove o-ring (8) from spacer (11).
9. Remove cup (10) from spool (9).
10. Remove o-ring (8) and two o-rings (6) from sleeve (7). **NOTE: Be careful not to damage the bore or grooves on sleeve (7).**

ASSEMBLY
(Refer to Figures 1 and 3)

LUBRICATE ALL RUBBER COMPONENTS FROM REPAIR KIT, SPOOL (9), AND SLEEVE (7) WITH CLEAN TYPE FLUID USED IN THE SYSTEM.

1. Clean all parts thoroughly before assembling.
2. Install new o-ring (8) on spacer (11).
3. Insert spacer (11) into housing (12) through end plug (4) side of housing. Note direction of spacer (11).
4. Install two new o-rings (6) on large diameter end of sleeve (7) and one new o-ring (8) on smaller diameter end of sleeve (7).
5. Install new cup (10) on spool (9). Note direction of cup (10).
6. Carefully insert spool (9) into sleeve (7). Note direction of spool (9).
7. Carefully install sleeve (7) and spool (9) assembly into housing (12) using a wooden dowel. Note direction of assembly.
8. Install spring (5) into housing (12).
9. Install end plug (4) in housing (12) and torque 10.9-20.3 N·m (96-180 lb·in) to seat spacer (11) and sleeve (7). Then loosen end plug (4) 1/4 turn and torque 1.1-6.8 N·m (10-60 lb·in).
10. Install new o-ring (3), washer (2), and and nut (1) on end plug (4). Hold end plug (4) with a hex key wrench and torque nut 67.8-81.4 N·m (50-60 lb·ft).
11. Install retainer assembly (13) in housing (12). **NOTE: Depress retainer (13) until it bottoms on spacer (11). Spool (9) and retainer (13) should return when released. If the spool and retainer do not return when released, the bore of sleeve (7) may be damaged.**
12. Install shim(s) (14), springs (15, 16 & 17), and piston (19) in housing (12). **NOTE: Some models also use a 6.35 mm (0.25 in) spacer with shim(s). Be sure to install the same number of shim(s) and spacer as were removed during disassembly.**
13. Install new boot (20) on housing (12).

NOTE
After service, the valve must develop the pressure indicated in the specifications, TABLE 1. Shim(s) (14) are used to obtain the correct pressure setting. Contact ZF Off-Highway Solutions Minnesota Inc. if the brake pressure setting not able to be obtained.

BLEEDING

Brakelines should be bled very carefully as soon as the valve is installed in the machine. Air in the system will not allow the brakes to release properly and may severely damage them.

1. Start engine and allow accumulator to reach full charge. Shut down engine, then slowly apply and release brakes, waiting one minute between applications until brakes will not apply. Repeat this step three times.
2. Operate engine to maintain accumulator pressure within working limits throughout the bleeding procedure.
3. Open bleeder screw at wheel closest to brake valve and apply brakes cautiously until all air is bled out of line. Then close bleeder screw. Repeat this step at each wheel, moving to the next closest wheel from the brake valve each time, as follows:
   a. Left front
   b. Right front
   c. Right rear
   d. Left rear
4. Release brake pressure for at least one (1) minute.
5. Apply brakes, holding pedal down 10 seconds; then release pressure for one (1) minute. Repeat this step two more times.
6. Repeat step 3.
7. Check for system leaks and be sure of proper brake operation.

SERVICE CHECKS FOR 464 SERIES SINGLE PEDAL VALVES

BRAKES SLOW TO APPLY

1. No or improper gas charge in accumulator
1. **Check gas charge**
2. Brakes not properly adjusted
2. **Adjust brakes**
3. Inoperative brakes
3. **Check brakes**
4. Hydraulic lines or fittings leaking
4. **Check for leaks and repair**
5. Inoperative automatic adjuster (Goodrich Hi-torque Brakes only)
5. **Check adjuster operation**
6. Damaged hydraulic brake lines
6. **Check lines for dents that restrict flow of oil**

BRAKES WILL NOT RELEASE

1. Pedal angle out of adjustment
1. **Check for proper pedal angle**
2. Inoperative brakes
2. **Check brakes**
3. Inoperative automatic adjusters
3. **Check operation of adjusters**
4. Inoperative brake valve
4. **Replace brake valve**

INSUFFICIENT BRAKES

1. No oil or low oil level in tank
1. **Check oil level in tank**
2. Brakes not properly adjusted
2. **Check brake adjustment**
3. Oil or grease on brake lining
3. **Clean or install new linings**
4. Brake line damaged
4. **Check lines and replace**
5. Inoperative automatic adjusters
5. **Check operation of adjusters**
6. No or improper gas charge in accumulator
6. **Check gas charge**
7. Inoperative brakes
7. **Check brakes**
8. Brake valve inoperative
8. **Replace valve**

EXCESSIVE BRAKING

1. Inoperative brakes
1. **Check brakes**
2. Inoperative brake valve
2. **Replace brake valve**

BRAKES WILL NOT RELEASE COMPLETELY

1. Brakes not properly adjusted
1. **Adjust brakes**
2. Inoperative brakes
2. **Check brakes**
3. Pedal angle out of adjustment
3. **Adjust pedal angle**
4. Inoperative wheel cylinders
4. **Replace wheel cylinders**
5. Inoperative automatic adjuster
5. **Check operation of adjusters**
6. Air in brakes (when automatic adjusters used Goodrich Hi-torque Brakes only)
6. **Bleed brakes**
7. Inoperative brake valve
7. **Replace brake valve**
8. Back pressure on return line too high
8. **Remove restriction**

NO BRAKES

1. No oil in hydraulic system
1. **Check oil level in tank**
2. Broken or damaged brake line
2. **Check lines for breaks or damaged condition**
3. Brakes not properly adjusted
3. **Adjust brakes**
4. Inoperative system relief valve
4. **Check pressure in pressure line to valve**
5. Worn pump
5. **Check pressure in pressure line to valve**
6. Inoperative automatic adjuster
6. **Check brake line pressure**
7. Inoperative or worn brakes
7. **Check brakes**
8. Inoperative brake valve
8. **Replace brake valve**

PEDAL KICKBACK WHEN BRAKES ARE APPLIED

1. Air in brakes
1. **Bleed brakes**

SERVICE DIAGNOSIS

(Refer to Figures 3 and 4)

BRAKES WILL NOT RELEASE COMPLETELY

1. Piston (19) sticking
2. Pedal angle out of adjustment
3. Spring (5) broken

BRAKE WILL NOT RELEASE

1. Binding spool (9)
2. Damaged sleeve (7)
3. Piston (19) binding

NO BRAKES

1. Piston (19) binding
2. Broken spring (16)

EXCESSIVE BRAKING

1. Too many shims (14) installed in valve

EXCESSIVE ACCUMULATOR LEAKAGE WHEN BRAKES ARE APPLIED

1. Damaged spool (9)
2. Damaged sleeve (7)
3. O-rings (6) leaking
4. O-rings (8) leaking

EXCESSIVE ACCUMULATOR LEAKAGE WHEN BRAKES ARE NOT BEING USED

1. Damaged spool (9)
2. Damaged sleeve (7)
3. O-rings (6) leaking
4. Spring (5) broken

INSUFFICIENT BRAKES

1. Broken pressure regulating spring (16)
2. Boot cut, allowing dirt to accumulate under piston (19) flange