

MUELLER® BUTTERFLY VALVE
MDT ACTUATOR MAINTENANCE

Annual Maintenance Instructions

MDT Actuators for above ground service:

1. Verify that the actuator is bolted securely to the valve. If movement is detected, remove actuator cover and tighten mounting bolts.
2. If operation is difficult or gear box is noisy, remove actuator cover to inspect gearing and lubricant. Clean actuator and replace grease if it is separated or worn away.
Recommended lubricant: CATO-MYSTIK JT-6 Grease.
3. Check pointer on top of actuator to see if it properly indicates valve position.

MDT Actuators for buried service:

1. No scheduled maintenance is required.
2. Recommended lubricant: Precision LC828 Lithium Complex Grease.

Troubleshooting

1. Do not assume the MDT actuator requires adjustment if the valve is leaking. If the valve is leaking, cycle it to try to flush possible debris from the seating area. If the actuator requires adjustment, the stops are located inside the actuator housing.
2. If a new valve is leaking past the stem packing, cycle the valve. The packing is self-adjusting and the leak should stop after several open/close cycles.

Rev. 2/04

MUELLER® BUTTERFLY VALVE
CHANGING MDT-2S ACTUATOR ROTATION

Notes:

1. MDT-2S requires 32 turns for full rotation.
2. No additional parts are required to change actuator rotation in the field.
3. Refer to Drawing GA-11493MS for parts illustration.

Changing Actuator Rotation:

1. Place valve in the full open position with line pressure shut off and zero differential pressure across the valve.
2. Remove 4 cap screws (16) and actuator cover (15) and gasket (19).
3. Remove and save grease from gear box (discard grease if new grease to be added when reassembling).
4. Turn shaft (13) so that the 2 groove pins (14) can be driven out without jamming into the bottom corner of the actuator housing.
5. Using a smaller diameter drift punch than the pins themselves, drive out the groove pins (14) out of the stop collars/bearings (8) in the opposite direction from which they were installed (pins are slightly recessed on the side the punch should be used on). Note: Drive the pins out at an angle to the bottom of the actuator housing.
6. Remove the shaft (13) by unscrewing it using the 2" op nut.
7. Remove the lever (12), turn it over and place it back on the valve shaft Note: do not change the orientation of the slider nut (9) to the shaft (13).
8. To reassemble, reverse steps 1 through 6. When reinstalling the 4 cap screws (16) apply Loctite to them and torque to 10 ft-lbs.

MUELLER® BUTTERFLY VALVE
CHANGING MDT-3S ACTUATOR ROTATION

Notes:

1. MDT-3S requires 30 turns for full rotation.
2. No additional parts are required to change actuator rotation in the field.
3. Refer to Drawing GA-11499MS for parts illustration.

Changing Actuator Rotation:

1. Place valve in the full open position with line pressure shut off and zero differential pressure across the valve.
2. Remove the 4 cap screws (15), actuator cover (14) and gasket (24).
3. Remove and save the grease from the gear box (discard grease if new grease to be added when reassembling).
4. Remove the thrust collar drive pin (19). Use a correctly sized drift punch and a minimum 2# hammer. The pin is tapered and must be driven out the opposite direction than it was installed. Find the recessed side of the pin and drive it out from that side. The pin is very tight and takes some effort to remove. Once the pin starts to move, drive it out at an angle to the bottom of the housing so it does not become trapped against the housing.
5. Unscrew the shaft (23) out of the top of the actuator.
6. Remove the link lever assembly (7,9 etc).
7. Rotate the links (9) 180° and place the link lever assembly (7, 9 etc) back on to the valve shaft. Note: Turn the thick or long side of the slider nut (20) towards the thrust collar (18).
8. To reassemble, reverse steps 5 through 1. When reinstalling the 4 cap screws (15), apply Loctite to them and torque to 10 ft-lbs.

Note: The Eccentric bearings (13) are used to adjust the close position of the valve. As these bearings are preset correctly at the factory, field adjustment should never be required. When attempting to stop a leaking valve in the field, these bearings should be adjusted only as a last resort. If required, refer to Disassembly/Assembly Instructions for the MDT-3S.

MUELLER® BUTTERFLY VALVE
CHANGING MDT-4S ACTUATOR ROTATION

Notes:

1. MDT-4S requires 40 turns for full rotation.
2. A new screw shaft and slider nut with opposite hand threads will be required to accomplish change of rotation.
3. Refer to Drawings GA-11499MS for parts illustration.

Changing Actuator Rotation:

1. Place valve in the full open position with line pressure shut off and zero differential pressure across the valve.
2. Remove the 4 cap screws (15), actuator cover (14) and gasket (24).
3. Remove and save the grease from the gear box (discard grease if new grease to be added when reassembling).
4. Remove the stop collar drive pin (19). Use a correctly sized drift punch and a minimum 2# hammer. The pin is tapered and must be driven out the opposite direction than it was installed. Find the recessed side of the pin and drive it out from that side. The pin is very tight and takes some effort to remove. Once the pin starts to move, drive it out at an angle to the bottom of the housing so it does not become trapped against the housing.
5. Unscrew the screw shaft (23) out of the top of the actuator.
6. Remove the retaining ring (11) and link assembly (9).
7. Remove the slider nut (20).
8. Replace the screw shaft (23) and slider nut (20) with a set having opposite hand threads.
9. To reassemble, reverse steps 6 through 1. When reinstalling the 4 cap screws (15), apply Loctite to them and torque to 10 ft-lbs.

Note: The Eccentric bearings (13) are used to adjust the close position of the valve. As these bearings are preset correctly at the factory, field adjustment should never be required. When attempting to stop a leaking valve in the field, these bearings should be adjusted only as a last resort. If required, refer to Disassembly/Assembly Instructions for the MDT-4S.

MUELLER® BUTTERFLY VALVE
DISASSEMBLY/ASSEMBLY INSTRUCTIONS
MDT-2S ACTUATOR FOR BURIED SERVICE

Notes:

1. MDT-2S requires 32 turns for full rotation.
2. Refer to Drawings GA-11493MS for parts illustration.

Disassembly:

1. Place valve in the fully closed position with line pressure shut off and zero differential pressure across the valve.
2. Remove 4 cap screws (16). Lift off housing cover (15) and gasket (19).
3. Remove grease from housing.
4. Turn screw shaft (13) so that the groove pins (14) align in such a way that they can be driven out without jamming in the bottom of the housing (1) and lock up the screw shaft (13). Using a slightly smaller diameter drift punch, drive out groove pins (14) from screw shaft bearings (8) and screw shaft (13).
5. Remove screw shaft (13) from housing (1) by turning the 2" op. nut (22) counter-clockwise and threading out. Remove screw shaft bearings (8) and shim washers (7).
6. Remove lever (12) and slider nut (9) with its slider blocks (11), and slide tubes (10). Remove valve shaft key.
7. Remove housing mounting screws (6) and housing (1).
8. Remove insert (3) with its O-rings (4,5). Note: These items may come off when the housing is removed.
9. Remove O-ring (20) from housing.
10. Inspect all parts and determine if replacement parts are required. Order replacement parts through your Mueller Representative or Butterfly Valve Customer Service at
Henry Pratt Company
401 S. Highland Avenue, Aurora, IL 60506-5563
Attention: Parts Manager
Phone: (630) 844-4000 extension 4029
Fax: (630) 844-4191
E-mail: bfvparts@muellervalves.com

Assembly:

1. Before assembly, make sure that the valve trunnion and shaft are clean and free of rust or any foreign material.
2. Set valve disc in the closed position to be within 1/16" of true closed position at disc edge 90° from shaft centerline.
3. Install expansion plug (2) in housing (1) using 2 1-1/4" diameter by 1" long round bars (not furnished). Press plug (2) into housing (1) bore near the outside face of the

- housing.
4. Apply approved grease to O-ring (4) and place in groove on O.D. of housing insert (3).
 5. Apply approved grease to O-ring (5) and place in groove on I.D. of housing insert (3). Slide housing insert into operator housing (1).
 6. Apply RTV 732 to valve top trunnion around circumference of mounting holes.
 7. Align operator housing (1) in proper mounting position and lower over valve shaft being careful not to damage the O-rings (4,5). Apply Loctite to mounting cap screws (6) prior to insertion and bolt down housing (torque to 23 ft-lbs).
 8. Position lever (12) on valve shaft.
 9. Partially engage groove pins (14) in holes in screw shaft (13) and shaft bearings (8) into proper location so that the pins are against the bottom of the slots in the bearings. Measure the distance over shaft bearings (8) faces (outside to outside). Measure the face-to-face inside the housing (1). The shims (7) are to make up this difference.
 10. Remove screw shaft (13), groove pins (14) and bearings (8).
 11. Assemble half of the shims (7) needed on each bearing (8) and install in housing (1).
 12. Assemble slide tubes (10) onto slider block (11) and position in track in the bottom of the housing (1) and in lever (12).
 13. Install screw shaft (13) (threaded end) through the end of the housing (1), through front screw shaft bearing (8), through slider block (11) and into rear screw shaft bearing (8).
 14. Install groove pins (14) in screw shaft (13) and screw shaft bearings (8).
 15. Turn screw shaft (13) until slider block (11) is against the shaft bearing (8) at the closed end and the keyways between the valve shaft and lever (12) are aligned. If the keyways do not line up, then the shims (7) will have to be relocated.
 16. Insert key into keyway.
 17. * Assemble operating nut (22) and lock in place with spring pin (21). Upset spring pin (21) in nut (22) to provide water tight fit.
 18. Fill housing with approved grease.
 19. Pack the housing cover (15) slider block track with approved grease.
 20. Align the gasket (19) and install cover (15).
 21. Apply Loctite to the 4 cap screws (16) and install. Torque down to 10 ft-lbs.
 22. Run operator back and forth several times to check for binding and proper operation.

*Note: Skip Step 17 if the original screw shaft/nut assembly is reused or if these parts are purchased preassembled.

MUELLER® BUTTERFLY VALVE
DISASSEMBLY/ASSEMBLY INSTRUCTIONS
MDT-3S ACTUATOR FOR BURIED SERVICE

Notes:

1. MDT-3S requires 30 turns for full rotation.
2. Refer to Drawings GA-11499MS.

Disassembly:

1. Place valve in the fully closed position with line pressure shut off and zero differential pressure across the valve.
2. Remove 4 cap screws (15). Lift off housing cover (14) and gasket (24).
3. Remove grease from housing (1) assembly.
4. Turn screw shaft (23) so that the drive pins (19) align in such a way that they can be driven out without jamming in the bottom corner of the housing (1) and lock up the screw shaft. Using a slightly smaller diameter drift punch and minimum 2# hammer, drive out the pins from the inner thrust collar (18), outer flange bearing (28) and screw shaft (23).
5. Remove the screw shaft (23) from the housing (1) assembly by turning it in the direction that results in the screw shaft threading out.
6. Remove lever (7), link assemblies (9) and slider nut (20) along with set screws (10), retainer rings (11), slide tubes (12) and eccentric bearings (13) as an assembly.
7. Remove housing mounting screws (6) and housing assembly (1).
8. Remove insert (3) with its O-rings (4,5). Note: These items may come off when the housing is removed.
9. Remove shim (16), thrust washer (17), and flange bearing (28) from the housing.
10. Remove retainer rings (11) from lever (7) and lift off link assemblies (9) with slider tubes (12) and slider nut (20).
11. Remove set screws (10) and eccentric bearings (13) from link assemblies (9).
12. Inspect all parts and determine if replacement parts are required. Order replacement parts through your Mueller Representative or Butterfly Valve Customer Service at

Henry Pratt Company
401 S. Highland Avenue, Aurora, IL 60506-5563
Attention: Parts Manager
Phone: (630) 844-4000 extension 4029
Fax: (630) 844-4191
E-mail: bfvparts@muellervalves.com

Assembly:

Note: in the following instructions, the use of directional words such as lower, upward, etc. assume the back of the housing is in a horizontal position, and the valve stem is pointing upward. Actual position of these items may differ.

1. Before assembly, make sure that the valve trunnion and shaft are clean and free of rust or any foreign material.
2. Set valve disc in the closed position to be within $\pm 1/16$ " of true closed position at disc edge 90° from shaft centerline.
3. Apply approved grease to O-ring (4) and place in groove on O.D. of the housing insert (3).
4. Apply grease to O-ring (5) and place groove on ID. of housing insert (3). Slide insert (3) into operator housing (1).
5. Apply RTV 732 to valve top trunnion around circumference of mounting holes.
6. Align operator housing (1) in proper mounting position and lower over valve shaft being careful not to damage the O-ring (5). Apply Loctite to mounting cap screws (6) prior to insertion and bolt down housing (torque to 55 ft-lbs).
7. Place eccentric bearing (13) in link (9). Insert set screw (10) in link but do not tighten yet. Insert slider tube (12) in track in housing. Place lower link (9) on lever (7) lower arm with eccentric bearing shoulder upward. Assemble retaining ring (11) to lower lever arm.
8. Position lever on valve shaft.
9. Align slider tube (12) under link (9) with the link and lever forming a 90° angle and insert slider nut (20) through eccentric bearing (13) and into slider tube (12).
10. Check disc position per Step 2.
11. Position internal thrust washer (17) and thrust collar (18) in place against the housing (1). Push the slider nut against them and hold in place. Adjust the eccentric bearing until the key can be partially inserted into the lever (7) and tighten the set screw (10) to securely lock the eccentric bearing into place. The set screw must contact the O.D. of the eccentric bearing in one of the notches (not on a high spot).
12. Remove the slider nut (20), key and lever/link assembly from the operator.
13. Alignment of eccentric bearing/link assemblies:
 - a. Leaving the lower link on the lever and facing up, insert the second link (9), **without eccentric bearing (13)**, on top of the lower link (both links on the same side of the lever arm) so that both link outlines are parallel.
 - b. Inset the slider nut (20) up through the eccentric bearing (13) in the lower link and up through the eccentric bearing bore in the upper link (9).
 - c. Assemble the second eccentric bearing (13) with its flange upward and to the side away from the upper link (9), with its I.D. over the slider nut (20), and its OD. in the link bore - without moving the links out of parallel with each other. Insert the set screw (10) making sure that it contacts the O.D. of the eccentric bearing (13) in one of the notches (not on a high spot) and tighten.
14. Lift the top link/eccentric bearing assembly off of the lever and slider nut. The link/eccentric bearing assemblies are now in proper alignment.
15. Carefully remove the set screws (10) without moving the eccentric bearings, apply Loctite to threads, reassemble and tighten. Do this to both links, **but do not move eccentric bearings**.
16. Assemble the lever (7), slider nut (20), and the two properly aligned links (9) making sure the proper orientation is maintained (upper and lower links). Lock assembly together with the retaining rings (11).
17. Place over the operator end of the screw shaft (23) the op nut (26) and thrust washer

- (17) and secure the op nut (26) with the pin (27).
18. Slide the screw shaft (23) through the housing (1) bearing and place the second thrust washer (17) and thrust collar (18) over the end of the screw shaft. Continue to slide the screw shaft into the housing until it is stopped by the op nut/thrust washer.
 19. Move the internal thrust washer (17) and thrust collar (18) into place and partially insert the drive pin (19), use a feeler gauge to measure between the thrust collar (18) and housing (1) to determine the required amount of shim (16).
 20. Remove the partially inserted drive pin (19) and pull out the screw shaft. Remove the thrust washer (17). Slide the required amount of shim onto the screw shaft (23) and replace the thrust washer (17).
 21. Replace complete lever/link assembly back over the valve shaft in the proper orientation, and with slider nut (20) inserted into the slide tube (12) in housing track.
 22. Insert threaded end of shaft (23) through bearing until threads begin to show on the inside of the housing. Replace the interior thrust washer (17) and thrust collar (18) on the screw shaft. Now thread screw shaft (23) through slider nut (20) and continue threading until the screw shaft is aligned with the flange bearing (28).
 23. Secure the interior thrust collar (18) and flange bearing (28) with drive pins (19).
 24. Turn actuator until lever/link assembly is in full toggle position. If disc is still in the full closed position ($\pm 1/16$ "), the keyways should align. Apply Loctite to key and insert into the lever and valve shaft connection,
 25. Coat all moving surfaces and track with approved grease and fill the housing with grease.
 26. Pack the housing cover slider tube track with approved grease.
 27. Place the second slider tube (12) onto top of slider nut (20).
 28. Align the cover gasket (24) on top of housing (1).
 29. Lower housing cover (14) into place being careful to get the upper slide tube (12) into the track in the housing cover.
 30. Apply Loctite and torque down the 5 hex head cap screw (15) cover bolts to 10 ft-lbs.
 31. Run the actuator back and forth 2 times to check for binding.

MUELLER® BUTTERFLY VALVE
DISASSEMBLY/ASSEMBLY INSTRUCTIONS
MDT-4S ACTUATOR FOR BURIED SERVICE

Notes:

1. MDT-4S requires 40 turns for full rotation.
2. Refer to Drawings GA-11499MS for part illustration.

Disassembly:

1. Place valve in the fully closed position with line pressure shut off and zero differential pressure across the valve.
2. Remove 4 cap screws (15). Lift off housing cover (14) and gasket (24).
3. Remove grease from housing (1) assembly.
4. Turn screw shaft (23) so that the drive pin (19) aligns in such a way that it can be driven out without jamming in the bottom corner of the housing (1) and lock up the screw shaft. Using a slightly smaller diameter drift punch and minimum 2# hammer, drive out the pin from the inner thrust collar (18) and screw shaft (23).
5. Remove the screw shaft (23) from the housing (1) assembly by turning it in the direction that results in the screw shaft threading out.
6. Remove lever (7), link assemblies (9) and slider nut (20) along with set screws (10), retainer rings (11), slide tubes (12) and eccentric bearings (13) as an assembly.
7. Remove housing mounting screws (6) and housing assembly (1).
8. Remove insert (3) with its O-rings (4,5). Note: These items may come off when the housing is removed.
9. Remove shim (16) and thrust washer (17) from the housing.
10. Remove retainer rings (11) from lever (7) and lift off link assemblies (9) with slider tubes (12) and slider nut (20).
11. Remove set screws (10) and eccentric bearings (13) from link assemblies (9).
12. Inspect all parts and determine if replacement parts are required. Order replacement parts through your Mueller Representative or Butterfly Valve Customer Service at:

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Assembly:

Note: in the following instructions, the use of directional words such as lower, upward, etc. assume the back of the housing is in a horizontal position, and the valve stem is pointing upward. Actual position of these items may differ.

1. Before assembly, make sure that the valve trunnion and shaft are clean and free of rust or any foreign material.
2. Set valve disc in the closed position to be within $\pm 1/16$ " of true closed position at disc edge 90° from shaft centerline.
3. Apply approved grease to O-ring (4) and place in groove on O.D. of the housing insert (3).
4. Apply grease to O-ring (5) and place groove on ID. of housing insert (3). Slide insert (3) into operator housing (1).
5. Apply RTV 732 to valve top trunnion around circumference of mounting holes.
6. Align operator housing (1) in proper mounting position and lower over valve shaft being careful not to damage the O-ring (5). Apply Loctite to mounting cap screws (6) prior to insertion and bolt down housing (torque to 55 ft-lbs).
7. Place eccentric bearing (13) in link (9). Insert set screw (10) in link but do not tighten yet. Insert slider tube (12) in track in housing. Place lower link (9) on lever (7) lower arm with eccentric bearing shoulder upward. Assemble retaining ring (11) to lower lever arm.
8. Position lever on valve shaft.
9. Align slider tube (12) under link (9) with the link and lever forming a 90° angle and insert slider nut (20) through eccentric bearing (13) and into slider tube (12).
10. Check disc position per Step 2.
11. Position internal thrust washer (17) and thrust collar (18) in place against the housing (1). Push the slider nut against them and hold in place. Adjust the eccentric bearing until the key can be partially inserted into the lever (7) and tighten the set screw (10) to securely lock the eccentric bearing into place. The set screw must contact the O.D. of the eccentric bearing in one of the notches (not on a high spot).
12. Remove the slider nut (20), key and lever/link assembly from the operator.
13. Alignment of eccentric bearing/link assemblies:
 - a. Leaving the lower link on the lever and facing up, insert the second link (9), without eccentric bearing (13), on top of the lower link (both links on the same side of the lever arm) so that both link outlines are parallel.
 - b. Inset the slider nut (20) up through the eccentric bearing (13) in the lower link and up through the eccentric bearing bore in the upper link (9).
 - c. Assemble the second eccentric bearing (13) with its flange upward and to the side away from the upper link (9), with its I.D. over the slider nut (20), and its OD. in the link bore - without moving the links out of parallel with each other. Insert the set screw (10) making sure that it contacts the O.D. of the eccentric bearing (13) in one of the notches (not on a high spot) and tighten.
14. Lift the top link/eccentric bearing assembly off of the lever and slider nut. The link/eccentric bearing assemblies are now in proper alignment.
15. Carefully remove the set screws (10) without moving the eccentric bearings, apply Loctite to threads, reassemble and tighten. Do this to both links, but do not move eccentric bearings.

16. Assemble the lever (7), slider nut (20), and the two properly aligned links (9) making sure the proper orientation is maintained (upper and lower links). Lock assembly together with the retaining rings (11).
17. Place over the operator end of the screw shaft (23) the op nut (26) and thrust washer (17) and secure the op nut (26) with the pin (27).
18. Slide the screw shaft (23) through the housing (1) bearing and place the second thrust washer (17) and thrust collar (18) over the end of the screw shaft. Continue to slide the screw shaft into the housing until it is stopped by the op nut/thrust washer.
19. Move the internal thrust washer (17) and thrust collar (18) into place and partially insert the drive pin (19), use a feeler gauge to measure between the thrust collar (18) and housing (1) to determine the required amount of shim (16).
20. Remove the partially inserted drive pin (19) and pull out the screw shaft. Remove the thrust washer (17). Slide the required amount of shim onto the screw shaft (23) and replace the thrust washer (17).
21. Replace complete lever/link assembly back over the valve shaft in the proper orientation, and with slider nut (20) inserted into the slide tube (12) in housing track.
22. Insert threaded end of shaft (23) through bearing until threads begin to show on the inside of the housing. Replace the interior thrust washer (17) and thrust collar (18) on the screw shaft. Now thread screw shaft (23) through slider nut (20) and continue threading until the screw shaft is aligned with the bottom bearing (21).
23. Secure the interior thrust collar (18) with drive pin (19).
24. Turn actuator until lever/link assembly is in full toggle position. If disc is still in the full closed position ($\pm 1/16$ "), the keyways should align. Apply Loctite to key and insert into the lever and valve shaft connection,
25. Coat all moving surfaces and track with approved grease and fill the housing with grease.
26. Pack the housing cover slider tube track with approved grease.
27. Place the second slider tube (12) onto top of slider nut (20).
28. Align the cover gasket (24) on top of housing (1).
29. Lower housing cover (14) into place being careful to get the upper slide tube (12) into the track in the housing cover.
30. Apply Loctite and torque down the 5 hex head cap screw (15) cover bolts to 10 ft-lbs.
31. Run the actuator back and forth 2 times to check for binding.