Fisher™ 3025 Diaphragm Actuator Sizes 1 and 2

Contents

Figure 1. Fisher 3025 Actuator

X1861_03

Introduction

Scope of Manual

This instruction manual provides information on installation, adjustment, maintenance, and parts ordering for the Fisher 3025 actuators in sizes 1 and 2. Refer to separate instruction manuals for information about the valve positioner and other accessories used with these actuators.

Do not install, operate, or maintain a 3025 actuator without being fully trained and qualified in valve,actuator, and accessory installation, operation, and maintenance. **To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings.** If you have any questions about these instructions, contact your Emerson sales office before proceeding.

Table 1. Specifications

SPECIFICATION		ACTUATOR SIZE	
		1	2
Nominal Effective Area	cm^2	1860	3710
	$Inch^2$	288	575
Yoke Boss Diameter		3-9/16	- - -
		5	5
		5H	5H
Acceptable Valve Stem Connection		3/4-16UNF	- - -
		1-14UNS	1-14UNS
		1 1/4-12UNF	1 1/4-12UNF
Maximum Travel	mm	203.2	139.7
	inch	8	5.5
Maximum Diaphragm Casing Pressure(1)	bar	4	
	Psig	58	
Temperature Capabilities	°C	-30 to 82°C	
	°F	-22 to 180°F	
Pressure Connections (internal)		1/2 NPT	
		3/4 NPT	
		1 NPT	
Approximate Actuator Weights	kg	210 to 360	370 to 480
	lb	465 to 795	815 to 1,060
Approximate Side Handwheel Weights	kg	100	70
	lb	220	150
Maximum Allowable Output Thrust(1)	N	52,910	87,750
	lbs	11,895	19,725

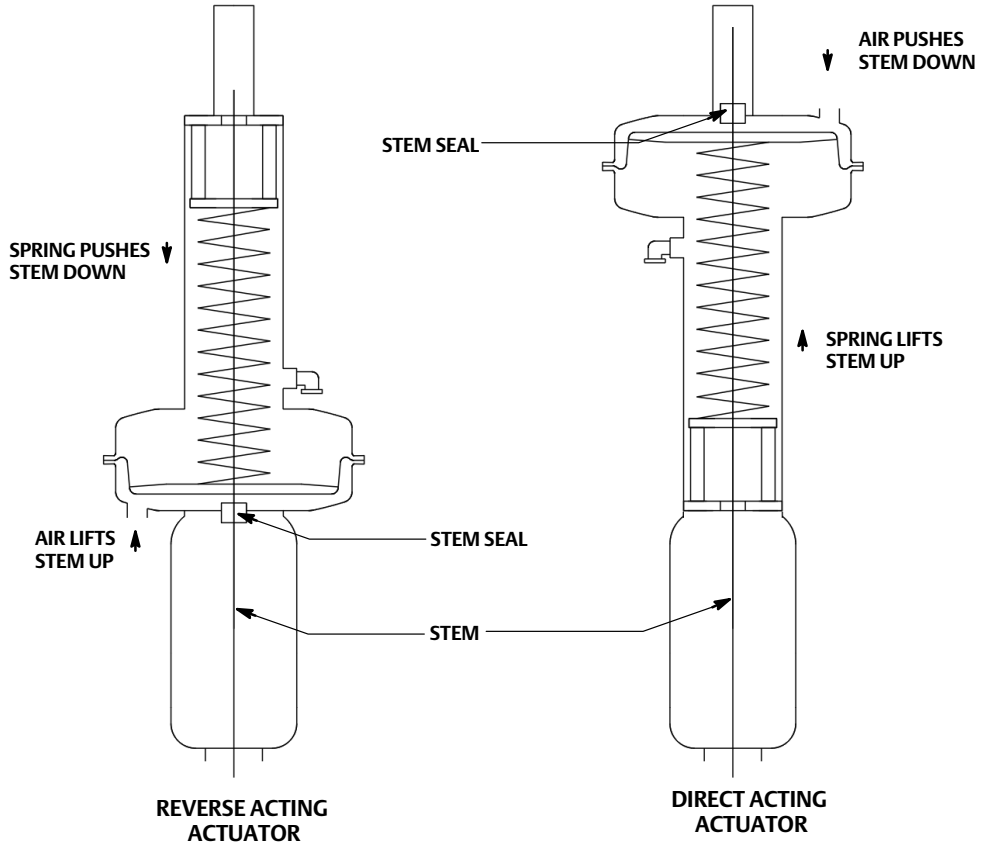
1. Normal operating diaphragm pressure must not exceed maximum diaphragm casing pressure and must not produce a force on the actuator stem greater than the maximum allowable output thrust or the maximum allowable valve stem load. Contact your Emerson sales office with questions concerning maximum allowable valve stem load.

Description

The Fisher 3025 spring-opposed diaphragm actuators position the valve plug in the valve body in response to varying controller or valve positioner pneumatic output signals applied to the actuator diaphragm. They can be specified either direct or reverse acting. The 3025 size 1 actuator offers 203.2 mm (8 in) maximum travel. The 3025 size 2 actuator provides 139.7 mm (5.5 in) maximum travel.

The 3025 actuator can be equipped with a side-mounted handwheel assembly. It is usually used as an auxiliary manual actuator. Casing-mounted adjustable up and down travel stops are also available on this actuator.

Figure 2. Schematic of Fisher 3025 Actuator in Reverse and Direct Acting



Specifications

Refer to table 1 for Specifications of the 3025 actuator. See the actuator nameplate for specific information about your actuator.

Educational Services

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Installation

⚠ WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

Key number locations are shown in figures 5 through 15, unless otherwise noted. Also, refer to figure 4 for location of parts.

NOTICE

To avoid parts damage, do not use an operating pressure that exceeds the Maximum Diaphragm Casing Pressure of 4 bar (58 psi) or produces a force on the actuator stem greater than the Maximum Allowable Valve Stem Load.

- Valve/Actuator Assembly: If the actuator and valve are shipped together as a control valve assembly, it has been adjusted at the factory, and may be installed in the pipeline. After installing the valve in the pipeline, refer to the Loading Connection procedures.
- Actuator Mounting: If the actuator is shipped separately or the actuator has been removed from the valve, it is necessary to mount the actuator on the valve before placing the valve in the pipeline. Refer to the following actuator mounting procedures before placing the valve in service.
- Positioner: If a positioner is installed, or is to be installed on the actuator, refer to the positioner instruction manual for installation. During the adjustment procedures, it will be necessary to provide a temporary loading pressure to the actuator diaphragm.

Lifting Actuator Assembly

⚠ WARNING

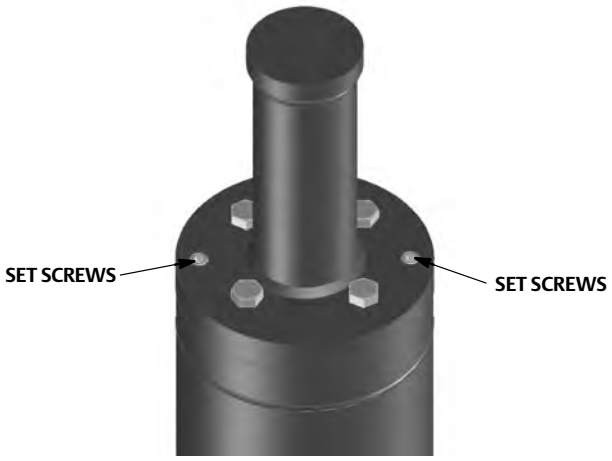
To avoid personal injury or equipment damage, use proper lifting and rigging practices while lifting the actuator assembly. For all mounting procedures use an adequately sized lifting and rigging equipment to handle the actuator and any attached accessories. Use caution during lifting and handling to prevent slippage, swinging, faulty equipment connections, or sudden shock loads.

To avoid personal injury or equipment damage, do not lift or support a complete valve and actuator assembly or any attached piping using the two threaded holes provided on the actuator. The threaded holes are provided for lifting of the actuator and accessories only.

NOTICE

Care must be taken when lifting the actuator assembly to ensure all accessories and tubing are not damaged in the process. Accessories and tubing may need to be removed prior to lifting to prevent damage and properly reinstalled before use.

Figure 3. Threaded Holes for Hoist Rings



The two threaded holes (M16x2 for Size 1 actuator or M20x2.5 for Size 2 actuator) located on the actuator protective cap can be used to install hoist rings and lift the actuator assembly with appropriate lifting and rigging equipment. The actuator assembly weight is provided in table 1. Consult the appropriate actuator accessory instruction manuals for the weight of each additional component.

Mounting the Actuator on the Valve

NOTICE

If the valve stem is allowed to remain in the up position (towards the actuator) during mounting, it can interfere with the actuator mounting, possibly damage valve stem threads or bend the valve stem. Be sure the valve stem is pushed down (into the valve body), away from the actuator while mounting.

⚠ WARNING

When moving the actuator stem with loading pressure applied, exercise caution to keep hands and tools out of the actuator stem travel path. If the loading pressure is accidentally disconnected, personal injury and property damage may result if something is caught between the actuator stem and other control valve parts.

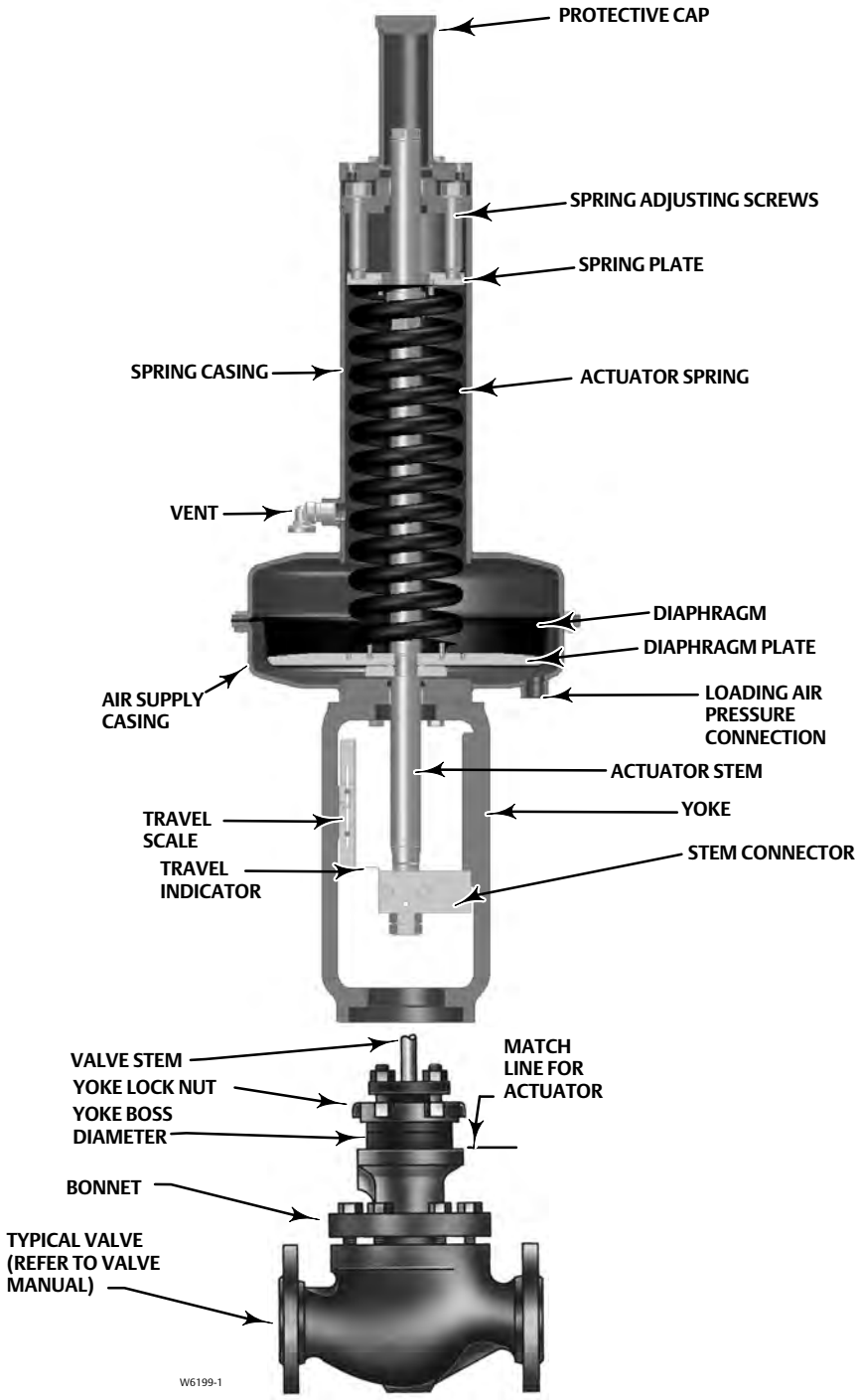
Provide a temporary method of applying diaphragm loading pressure to the diaphragm to extend the actuator stem during bench set spring adjustments.

1. Provide a vise or some other method of supporting the valve and the weight of the actuator during assembly. For direct or reverse acting valves, push the valve stem down away from the actuator while mounting the actuator.
2. Screw the stem locknuts all the way onto the valve stem.
3. Lift or hoist the actuator onto the valve bonnet:

a. For size 3-9/16 yoke boss, slowly lower the actuator down onto the valve. As the yoke passes over the end of the valve stem, place the yoke locknut over the valve stem. Continue to lower the actuator while guiding the valve stem into the opening in the end of the actuator stem. Once the actuator is in place, screw the yoke locknut onto the valve bonnet and tighten the locknut.

b. For 5 and 5H yoke boss, slowly lower the actuator down onto the valve while guiding the valve stem into the opening in the end of the actuator stem. Once the actuator is in place, insert the cap screws and tighten the hex nuts, securing the actuator to the bonnet.

Figure 4. Actuator Mounting Components for 3025 Actuator



Installing the Stem Connector Assembly

When installing the stem connector assembly (key 26), the actuator and valve stem threads should engage the threads of the stem connector by the distance equal to the diameter of the stem.

⚠ WARNING

Install the stem connector securely before a positioner is mounted to the actuator and pressurized, using only a regulator-controlled air supply, not the positioner, to move the actuator stem.

To avoid personal injury or property damage, keep hands and tools out of the actuator stem travel path while applying loading pressure to move the actuator stem in the following steps.

NOTICE

To avoid damaging the seating surfaces, do not rotate the valve plug while it is seated. Exercise care while installing the stem connector assembly to avoid damage to the valve plug stem and valve stem threads.

Note

Replacement stem connectors are an assembly of two stem connector halves, cap screws, and a spacer between the connector halves. Remove the spacer and discard, if present, before clamping the actuator and valve stems together. Use only a mated pair of stem connectors.

1. If the actuator is equipped with a side-mounted handwheel, be sure that it is in the neutral position. If the actuator is equipped with casing-mounted travel stops, be sure that they do not limit the actuator travel.
2. If necessary, push the valve stem down so that it is touching the seat ring on direct-acting valves. For reverse acting valves, push the stem down to the open position.
3. If necessary, screw the valve stem locknuts down, away from the connector location.
4. Perform one of the following procedures (a or b as appropriate):

   a. For direct acting actuator, increase slowly the diaphragm pressure until the actuator stem (key 6) moves down the specified travel.

   b. For reverse acting actuator, set the diaphragm loading pressure to approximately 0.5 bar (7 psi) over the upper bench set pressure. Then release slowly the diaphragm pressure until the actuator stem (key 6) moves down the specified travel.

5. Place the stem connector half with the upper threaded hole fully engaged onto the actuator stem and align the actuator stem and valve stem with threads from both stems mated root-to-crest with the stem connector. A slight change to loading pressure may be necessary to align the threads. If the actuator is a size 2 equipped with a side-mounted handwheel, ensure that the anti-rotation plate (key 151) is pointed towards the neutral indicator (key 108) and that the holes in the anti-rotation plate are aligned with the tapped holes on the top of the stem connector half.
6. Install the other half of the stem connector and insert the cap screws and tighten them while ensuring even spacing between the stem connector halves on all sides. If installing a positioner, also attach the feedback bracket at the same time.
7. Screw the valve stem locknuts up against the stem connector. If the actuator is a size 2 equipped with a side-mounted handwheel, install the 4 cap screws (key 131) of the anti-rotation plate and tighten them. Verify that the pointer of the anti-rotation plate (key 151) is aligned with the neutral indicator (key 108).
8. Slowly stroke the actuator and verify full rated travel is achieved.

9. Be sure that the valve is in the closed position. Loosen the screws on the travel indicator scale (key 29) and align it with the travel indicator (key 30).
10. If the actuator is a size 2 equipped with a side-mounted handwheel, rotate the handwheel full travel to ensure that the travel of the side-mounted handwheel matches the rated valve travel on the nameplate. If travel is not correct, refer to the assembly procedures in the Side-Mounted-Handwheel Assembly for Size 2 Actuator Maintenance section to adjust the handwheel travel.
11. Stroke the actuator full travel to ensure that the travel matches the rated valve travel on the nameplate. If valve travel is not correct, repeat the stem connector procedure.

Loading Connection

The loading pressure connections are made at the factory if the valve, actuator, and positioner come as a unit. Keep the length of tubing or piping as short as possible to avoid transmission lag in the control signal. If a volume booster, valve positioner or other accessory is used, be sure that it is properly connected to the actuator. Refer to the positioner instruction manual or other manuals as necessary.

For actuators shipped separately or whenever the actuator pressure connections are installed, use the following steps:

1. Connect the loading pressure piping to the NPT internal connection in the diaphragm casing.
2. Cycle the actuator several times to be sure that the valve stem travel is correct when the correct pressure ranges are applied to the diaphragm.

⚠ WARNING

If valve stem travel appears to be incorrect, refer to the Stem Connector Assembly procedures at the beginning of this section. To avoid personal injury or product damage, do not place the valve into service if it is not reacting correctly to diaphragm loading pressure changes.

Maintenance

Actuator parts are subject to normal wear and must be inspected and replaced when necessary. The frequency of inspection and replacement depends on the severity of service conditions.

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.**
- **Vent the power actuator loading pressure and relieve any actuator spring precompression.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

The maintenance instructions are divided into several sections: Actuator Maintenance, Side-Mounted Handwheel Assembly for Size 1 Actuator, Side-Mounted Handwheel Assembly for Size 2 Actuator, and Casing-Mounted Travel Stops.

Actuator Maintenance

This procedure describes how the actuator can be completely disassembled and assembled. When inspection or repairs are required, disassemble only those parts necessary to accomplish the job; then, start the assembly at the appropriate step.

Key numbers refer to figures 5 through 10. Figures 5 and 6 show the Size 1 actuator for travel up to and including 139.7mm (5.5 inch), figures 7 and 8 show the Size 1 actuator for travel above 139.7mm (5.5 in) and up to 203.2mm (8 inch), figures 9 and 10 show the Size 2 actuator.

It may be necessary to apply a temporary loading pressure to the actuator during the disassembly.

Actuator Disassembly

Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve. Also shut off all pressure lines to the power actuator, release all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.

1. If equipped, remove the tubing or piping from the connection in the diaphragm casing(s).
2. If equipped with adjustable travel stops, refer to the disassembly procedures in the Casing-Mounted Travel Stops Maintenance section to remove travel stop parts
3. For reverse acting actuator only: slightly pressurize the actuator diaphragm until movement of the actuator stem is detected and the spring force applied to the stem connector is relieved.

⚠ WARNING

To avoid personal injury due to the sudden uncontrolled movement of parts, do not loosen the stem connector cap screws when the stem connector has spring force applied to it.

4. Separate the stem connector by loosening the stem locknuts (keys 27 and 28) and unscrewing the two stem connector cap screws. For reverse acting actuator only: slowly exhaust the diaphragm pressure.
5. If necessary, separate the actuator from the valve body by removing the yoke locknut or the bolts.
6. For direct acting actuator only: it will be necessary to separate the actuator from the yoke (key 1) or from the side-mounted handwheel if equipped. If equipped with side-mounted handwheel, refer to the disassembly procedures in the Side-Mounted-Handwheel Maintenance section to separate the actuator from the side-mounted handwheel. For actuator without side-mounted-handwheel, remove the cap screws (key 24) of the yoke and lift off the actuator.
7. Remove the cap screws (key 24) of the protective cap (key 5) and lift off the protective cap.

⚠ WARNING

To avoid personal injury from the pre-compressed spring force thrusting the diaphragm casing away from the actuator, relieve the spring compression (step 8 below).

8. Relieve the spring compression by unscrewing alternately and slowly the 4 spring adjusting screws (key 16).

NOTICE

Be careful when pulling the threads of the actuator stem through the casings to avoid damaging the bushing (key 20) and O-ring (key 19).

9. Remove the cap screws and nuts (keys 22 and 23) of the spring casing (key 3) and lift off the spring casing.
10. Remove the spring plate (key 15) and actuator spring(s) (keys 13 and 14).
11. For size 2 actuator only: remove the cap screws and nuts (keys 22 and 23) of the air supply casing (key 2) and pull off the air supply casing. Unscrew the actuator stem pieces to separate the 2 diaphragm plates (key 8).
12. Lift off the stems and diaphragm plate assembly.
13. Unscrew the actuator stem pieces. Inspect diaphragm (key 17) and O-ring (key 18) and replace if necessary.
14. Inspect bushings (key 20), O-ring (key 19) and replace if necessary.

Table 2. Actuator Assembly Recommended Torque Values

DESCRIPTION, KEY NUMBER	ACTUATOR SIZE	THREAD SIZE, INCH	TORQUE	
			N • m	Lbf • ft
Actuator stems, keys 6, 9, 10, 12	1 and 2	1-1/2-12	300	221
Yoke and protective cap, key 24	1	M16x2	195	144
	2	M20x2.5	380	280
Diaphragm casing, keys 22 and 23(1)	1 and 2	M10x1.5	32	24
Spring adjusting screws, key 16	1 and 2	M30x3.5	185	136
Valve stem connector cap screws, key 26(2)	1 and 2	1/2-13	92	68
Handwheel to casing, key 125	1	M16x2	195	144
	2	M20x2.5	380	280
Handwheel housing, keys 126 and 127	1	M16x2	150	111
Handwheel stem connector, key 124	2	1/2-13	92	68

1. Observe tightening patterns and procedure described in the appropriate Actuator Assembly section.
2. Torque values when lithium grease is used on the threads.

Actuator Assembly

Refer to table 2 as appropriate.

1. If removed, coat the bushings (key 20) with lithium grease (key 50) and slide them into the casings.
2. Coat the O-ring(s) (key 19) with lithium grease (key 50) and place into the air supply casing (key 2) and for size 2 actuator into the middle casing (key 4).
3. Ensure that the pins (key 21) are installed in the diaphragm plate (key 8) and spring plate (key 15).
4. Install the travel stop (key 11) on the actuator upper stem end (key 12) for reverse acting actuator or on the actuator lower stem end (key 6) for direct acting actuator, apply thread lock (key 52) to the threads and tighten this assembly into the stop stem (key 10) to 300 N • m (221 lbf • ft).
5. Perform one of the following procedures (a or b as appropriate):

   a. For size 1 actuator: assemble the actuator lower stem end (key 6) for reverse acting actuator or the actuator upper stem end (key 12) for direct acting actuator, the thrust plate (key 7), the o-ring (key 18), the diaphragm (key 17), the diaphragm plate (key 8). Apply thread lock (key 52) to the actuator stem threads and install the stop stem assembly (keys 10, 11 and 6 or 12) and tighten to 300 N • m (221 lbf • ft). If equipped with a side-mounted handwheel, the pin hole in the lower actuator stem (key 6) shall be aligned with the middle of 2 bolt holes of the

diaphragm and it might be necessary for a good alignment to fully tighten the stem and diaphragm plate stem assembly only when the actuator is installed on the side-mounted handwheel with the pin (key 146) inserted through the sleeve and actuator stem. Then place the stem and diaphragm plate assembly in the air supply casing (key 2). Align the holes of the diaphragm with the holes of the casing and if equipped with side-mounted handwheel align the hole in the lower actuator stem (key 6) with the hole in the sleeve (key 101).

b. For size 2 actuator: first assemble the parts located in the air supply casing (key 2): assemble the actuator lower stem (key 6) for reverse acting actuator or the actuator upper stem end (key 12) for direct acting actuator, the thrust plate (key 7), the O-ring (key 18), the diaphragm (key 17), the diaphragm plate without pin (key 8). Apply thread lock (key 52) to the actuator stem threads and tighten the middle stem (key 9) to 300 N • m (221 lbf • ft). Install this assembly in the air supply casing (key 2). Place the middle casing (key 4) with the bushing (key 20) towards the air supply casing (key 2) and with the vent (key 25) connection diametrically opposed to the air connection of the air supply casing (key 2). Install the cap screws and nuts (keys 22 and 23) and tighten slightly. Lift up the stem and diaphragm plate assembly and install the second thrust plate (key 7), O-ring (key 18), diaphragm (key 17) and diaphragm plate (key 8). Align the holes of the diaphragm with the holes of the casing. Apply thread lock (key 52) to the thread of the middle stem (key 9) and install the stop stem assembly (keys 10, 11 and 6 or 12) and tighten to 300 N • m (221 lbf • ft).

NOTICE

Be careful when pulling the threads of the actuator stem through the casings to avoid damaging the bushing (key 20) and O-ring (key 19).

6. Install the actuator spring(s) (keys 13 and 14).
7. Apply anti-seize lubricant (key 51) into the 4 bores of the spring plate (key 15) and install the spring plate with the bores aligned with the air connection of the air supply casing (key 2).
8. Place the spring casing (key 3) with the vent connection diametrically opposed to the air connection of the air supply casing (key 2). Ensure that the 4 tapped holes of the spring casing flange are aligned with the 4 bores on the spring plate (key 15).
9. Install the cap screws and nuts (keys 22 and 23). Tighten the diaphragm casing cap screws and nuts in the following manner. For the size 2 actuator tighten the cap screws and nuts of the 2 diaphragm casing joints.
10. The first 4 bolts tightened should be diametrically opposed and 90 degrees apart. Tighten these 4 bolts to 16 N • m (12 lbf • ft).
11. Tighten the remaining bolts in a clockwise, criss-cross pattern to 16 N • m (12 lbf • ft).
12. Repeat this procedure by tightening 4 bolts, diametrically opposed and 90 degrees apart, to a torque of 32 N • m (24 lbf • ft).
13. Tighten the remaining bolts in a clockwise, criss-cross pattern to 32 N • m (24 lbf • ft).
14. After the last bolt is tightened to 32 N • m (24 lbf • ft), all of the bolts should be tightened again to 32 N • m (24 lbf • ft) in a circular pattern around the bolt circle.
15. Once completed, no more tightening is recommended.
16. Coat the threads of the spring adjusting screws (key 16) with anti-seize lubricant (key 51). Be sure that the 4 bores into the spring plate are aligned with the threaded holes of the spring casing. Then install and screw alternately and slowly the 4 cap screws to compress the spring(s). Tighten to the appropriate torque shown in table 2.
17. Place the protective cap (key 5) onto the casing, insert the cap screws (key 24) and tighten to the appropriate torque as shown in table 2.
18. If equipped with a side-mounted handwheel, refer to the assembly procedures in the Side-Mounted Handwheel Maintenance section.
19. Lift the actuator and place it on the yoke (key 1), insert the cap screws (key 24) and tighten to the appropriate torque as shown in table 2.

20. Install the vent(s) (key 25) on the casing(s).
21. If equipped with adjustable travel stops, refer to the assembly procedures in the Casing-Mounted Travel Stops Maintenance section.
22. Mount the actuator onto the valve in accordance with the procedures in the Installation section.

Side-Mounted Handwheel for Size 1 Actuator

A side-mounted handwheel (figure 11) is normally used as a manual actuator. The handwheel can be mounted in either of two position orientations so that, regardless of valve plug action, counter-clockwise rotation always opens the valve.

Instructions are given below for complete disassembly and assembly of the side-mounted handwheel assembly. Perform the disassembly only as far as necessary to accomplish the required maintenance; then, begin the assembly at the appropriate step.

Key numbers are shown in figure 11.

Disassembly for Size 1 Side-Mounted Handwheel

1. Complete steps 1 through 5 of the disassembly portion of the Actuator Maintenance section.
2. Unscrew the pointer (key 149) from the sleeve (key 101). Remove the cap screws (key 24) of the yoke and lift off the actuator and handwheel assembly.
3. Unscrew the 6 cap screws (key 127). Remove the gear case and handwheel assembly.
4. If necessary, remove the handwheel housing (key 102) by unscrewing the 4 cap screws (key 125).
5. Turn the handwheel so that the sleeve (key 101) extends out of the bottom of the worm gear (key 112). Do not lose the key (key 111).
6. Loosen the set screws (key 128) of the retaining flange (key 1120). Unscrew the 2 cap screws (key 126) and remove the retaining flange. Lift out the retainer (key 115), the thrust bearings (key 113) and the worm gear (key 112).
7. The worm shaft (key 116) and associated parts can be removed in order to replace or lubricate them. First, loosen the set screw (key 148), unscrew the handwheel cap (key 122) and remove the handwheel (key 121). Do not lose the small ball or spring (keys 142 and 143).
8. Loosen the two set screws (key 129) and unscrew the two worm retainers (keys 119 and 120). The ball bearings (key 117) will come out with the retainers. Remove the worm shaft (key 116).

Assembly for Size 1 Side-Mounted Handwheel

1. Pack the ball bearings (key 117) with lithium grease (key 50) and insert one ball bearing in the back worm retainer (key 120).
2. Thread the back worm retainer and ball bearing (keys 50 and 120) into the gear case (109). Align the set screw slot in the worm retainer with the set screw hole in the gear case, insert the set screw (key 129) and tighten.
3. Coat the worm shaft (key 116) threads with lithium grease lubricant (key 50) and slide the shaft into the gear case (key 109) so that the end of the shaft fits snugly in the back worm retainer.
4. Insert the bearing in the front worm retainer (key 119) and thread the retainer and ball bearing into the gear case. Align the set screw slot in the retainer with the set screw hole in the gear case, insert the set screw (key 129) and tighten.
5. Put the spring and ball (keys 142 and 143) in the handwheel (key 121). Slide the handwheel onto the worm shaft (key 116). Thread the handwheel cap (key 122) onto the worm shaft, insert the set screw (key 148) in the cap and tighten.
6. Pack the 2 thrust bearings (key 113) with lithium grease (key 50). Install one thrust bearing; then install the worm gear (key 112), followed by the second thrust bearing and the bearing retainer (key 115).

7. Coat the key (key 111) with lithium grease (key 50) and install it on the retaining flange (key 110).
8. Insert the set screws (key 128) in the retaining flange (key 110). Install the 2 cap screws (key 126) and tighten to the appropriate torque as shown in table 2. Adjust the set screws (key 128) to eliminate free play in the bearings. Note over-tightening the set screws will make handwheel operation difficult.
9. Coat the sleeve (key 101) threads and slot with lithium grease (key 50), slide the sleeve into the retaining flange with the slot aligned with the key (key 11), turn the handwheel and feed the sleeve through the worm gear. Continue turning the handwheel until the threads of the sleeve are fully engaged in the gear case.
10. If removed, install the handwheel housing (key 102) on the actuator, insert the cap screws (key 125) and tighten to the appropriate torque as shown in table 2.
11. Install the gear case and handwheel assembly on the handwheel housing (key 102), insert the cap screws (key 127) and tighten to the appropriate torque as shown in table 2.
12. Place the handwheel and actuator assembly on the yoke, insert the cap screws (key 125) and tighten to the appropriate torque as shown in table 2.
13. Install the pointer (key 149) onto the sleeve (key 101). Turn the handwheel until the pointer is around 20mm below the yoke upper flange. In this location the sleeve will not interfere with the stem connector during the stroking of the actuator. Align the neutral position indicator (key 108) with the pointer.
14. Mount the actuator and handwheel assembly in accordance with the procedures in the Installation section.
15. Mount the actuator on the valve following the procedures in the Installation section.

Side-Mounted Handwheel for Size 2 Actuator

A side-mounted handwheel (figure 12) is normally used as a manual actuator. The power screws (keys 103 and 105) and stem nut (key 104) can be mounted in either of two position orientations so that, regardless of valve plug action, counter-clockwise rotation always opens the valve.

NOTICE

Automatic operation is possible only when the side-mounted handwheel is in the neutral position.

To avoid damage to actuator parts, release all pressure from the casings before using the side-mounted handwheel.

Travel stop, if any installed on the actuator, will not limit the travel when the side-mounted handwheel is operated.

Instructions are given below for complete disassembly and assembly. Perform the disassembly only as far as necessary to accomplish the required maintenance; then begin the assembly at the appropriate step.

It may be necessary to apply a temporary loading pressure to the actuator during the disassembly. Key numbers are shown in figure 12.

Disassembly for Side 2 Side-Mounted Handwheel

1. Complete steps 1 through 5 of the disassembly portion of the Actuator Maintenance section.
2. Unscrew the protective cover cap screws (key 134), remove the washers (key 133) and the protective covers (key 107).
3. Unscrew the locknuts (key 132) of the neutral indicator (key 108). Unscrew the cap screws (key 131) of the anti-rotation plate (key 150). Separate the stem connector (key 124) by unscrewing the two stem connector cap screws.
4. If necessary, separate the actuator from the handwheel assembly by removing the cap screws (key 125) and lift off the actuator.

5. Turn clockwise the handwheel to unscrew the upper power screw (key 103 or 105).
6. Remove the lower power screw (key 103 or 105) and stem nut (key 104).
7. If necessary, separate the actuator yoke (key 1) from the handwheel assembly by removing the cap screws (key 24).
8. Remove the handwheel and drive shaft assembly (keys 121 and 109) by unscrewing the cap screws (key 137).
9. If required, the drive shaft assembly can be broken down by removing the nut (key 140), the washer (key 139), the rotation indicator (key 155), the handwheel (key 121), and the worm shaft (key 116) and the bearings and bushings (keys 117 and 118). If required, remove the cap screws and nuts (keys 135 and 136) of the anti-rotator clamped on the drive shaft housing, the anti-rotator (key 153), the spacer (154) and the two clamps (key 152).
10. Remove the worm gear (key 112), the key (key 111), the bearing (key 113) and if required remove the bushing (key 114) from the handwheel yoke (key 106).

Assembly for Size 2 Side-Mounted Handwheel

1. If the drive shaft assembly was separated, coat the bushings (key 118) with lithium grease (key 50) and slide them into the gear case (key 109). Coat the bearings (key 117) and the worm shaft (key 116) with lithium grease (key 50). Place the bearing, insert the worm shaft into the gear case (key 109) and place the second bearing. Install the handwheel (key 121), the rotation indicator (key 155), the washer (key 139) and tighten the nut (key 140). Place the two clamps (key 152), the spacer and the anti-rotator (keys 153 and 154), insert the cap screws and nuts (keys 135 and 136) and tighten.
2. If bushing (key 114) was removed, coat it with lithium grease (key 50) and slide it into the handwheel yoke (key 106).
3. Coat the bearing (key 113), the key (key 111) and the worm gear (key 112) with lithium grease (key 50). Install the key in the worm gear. Place the bearing and slide the worm gear in the handwheel yoke (key 106).
4. If used, apply thread lock (key 52) to the threads of the screw(s) (key 156) and tighten into the power screw(s) (key 103 and/or 105). Coat the threads of the power screws (keys 103 and 105) with lithium grease (key 50). Slide the anti-rotation plate (key 151) onto the lower power screw. Screw the lower power screw into the stem nut (key 104) until the threads of the power screw are fully engaged. Slide the assembly into the worm gear (key 112) with the slot aligned with the key (key 111). Slide the anti-rotation plate (key 150) onto the upper power screw and screw the upper power screw into the stem nut (key 104) until the threads of the power screw are fully engaged.
5. If the actuator yoke (key 1) was removed, slide the neutral indicator (key 108) in the actuator yoke, install the handwheel yoke (key 106) on the actuator yoke, insert the cap screws (key 24) and tighten to the appropriate torque as shown in table 2.
6. If the actuator was separated from the handwheel yoke (key 106), lift the actuator and place it on the handwheel yoke, insert the cap screws (key 125) and tighten to the appropriate torque as shown in table 2 .
7. Place the stem connector (key 124) half with the threaded hole fully engaged onto the actuator stem (key 6) and onto the upper power screw (key 103 or 105). Ensure that the anti-rotation plate (key 150) is pointed towards the neutral indicator (key 108) and ensure that the holes in the anti-rotation plate are aligned with the tapped holes on the bottom of the stem connector half.
8. Install the other half of the stem connector and insert the cap screws and tighten them while ensuring even spacing between the stem connector halves on all sides. Install the 4 cap screws (key 131) of the anti-rotation plate and tighten them. Install a nut (key 132) on the neutral indicator (key 106), slide the indicator in the hole of the anti-rotation plate and place the 2 other nuts (key 132).
9. Place the handwheel and drive shaft assembly. Insert the cap screws (keys 137 and 138) and adjust the cap screws (key 138) to eliminate free play between the worm shaft and worm gear. Tighten the cap screws (key 137).

Note

To prevent rotation of the lower power screw during the travel adjustment, before turning the handwheel, assemble the valve stem connector around the lower power screw end the anti-rotating lug on the yoke.

10. Ensure that the 2 power screws have the same threads engagement in the stem nut (key 104), then preventing the rotation of the lower power screw (key 103 or 105) turn the handwheel (key 121) until the 2 power screws are in contact.
11. Perform one of the following procedures (a or b as appropriate):

    a. **For direct acting actuator,** slightly rotate the handwheel in the opposite direction to have a small gap between the 2 power screws.

    b. **For reverse acting actuator,** rotate the handwheel in the opposite direction until the lower power screw move down the specified travel and mark the position of the lower power screw. Set the diaphragm loading pressure to approximately 0.5 bar over the upper bench set pressure, release slowly the diaphragm pressure until the actuator stem moves down the specified travel, then rotate the handwheel until the position mark is reached.

12. Align the pointer of the neutral indicator (key 108) with the anti-rotation plate (key 151). Place the protective covers (key 107), the washers (key 133) and tighten the cap screws (key 134).
13. Mount the actuator and handwheel assembly in accordance with the procedures in the Installation section.

Casing-Mounted Adjustable Travel Stops

Casing-mounted adjustable travel stops (shown in figures 13 through 15) are available to limit travel in the down direction (extending the actuator stem) or in the up direction (retracting the actuator stem). The travel stop in figure 13 is a down travel stop, the travel stop in figure 14 is an up and down travel stop, and the travel stop in figure 15 is an up travel stop.

Use the nut (key 206, figures 13 and 14), screw (key 203, figure 14) or cap screw (key 202, figure 15) to set the point at which the travel stop limits travel. Be sure to tighten the locknuts and replace the cap (key 201) after setting the travel stop.

Instructions are given below for disassembly and assembly. Perform the disassembly only as far as necessary to accomplish the required maintenance; then, begin the reassembly at the appropriate step.

It may be necessary to apply a temporary loading pressure to the actuator during the disassembly.

Key numbers are shown in figures 13 through 15.

1. Bypass the control valve, reduce loading pressure to atmospheric, and remove the tubing or piping from the connection in the diaphragm casing(s).
2. Remove the cap (key 201). For reverse acting actuator, ensure that the travel stop in the down direction is not causing any spring compression. For direct acting actuator, ensure that the travel stop in the up direction is not causing any spring compression. If travel stop is causing spring compression, slightly pressurize the actuator diaphragm until movement of the actuator stem is detected and the spring force applied to the travel stop is relieved.
3. For down travel stop (figure 13) and up and down travel stop (figure 14), unscrew the hex nuts (key 205 and 206). For up and down travel stop (figure 14), loosen the locknut (key 204) and unscrew the screw (key 203). For up travel stop (figure 15), loosen the locknut (key 204) and unscrew the cap screw (key 202).
4. Remove the cap screws (key 24) of the protective cap (key 5) and lift off the protective cap.
5. Reassemble parts in the reverse order of removal.
6. Re-adjust the travel stop(s).

Parts Ordering

Each actuator has a serial number stamped on the nameplate. Always mention this number when corresponding with your Emerson sales office regarding technical information or replacement parts.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Parts List

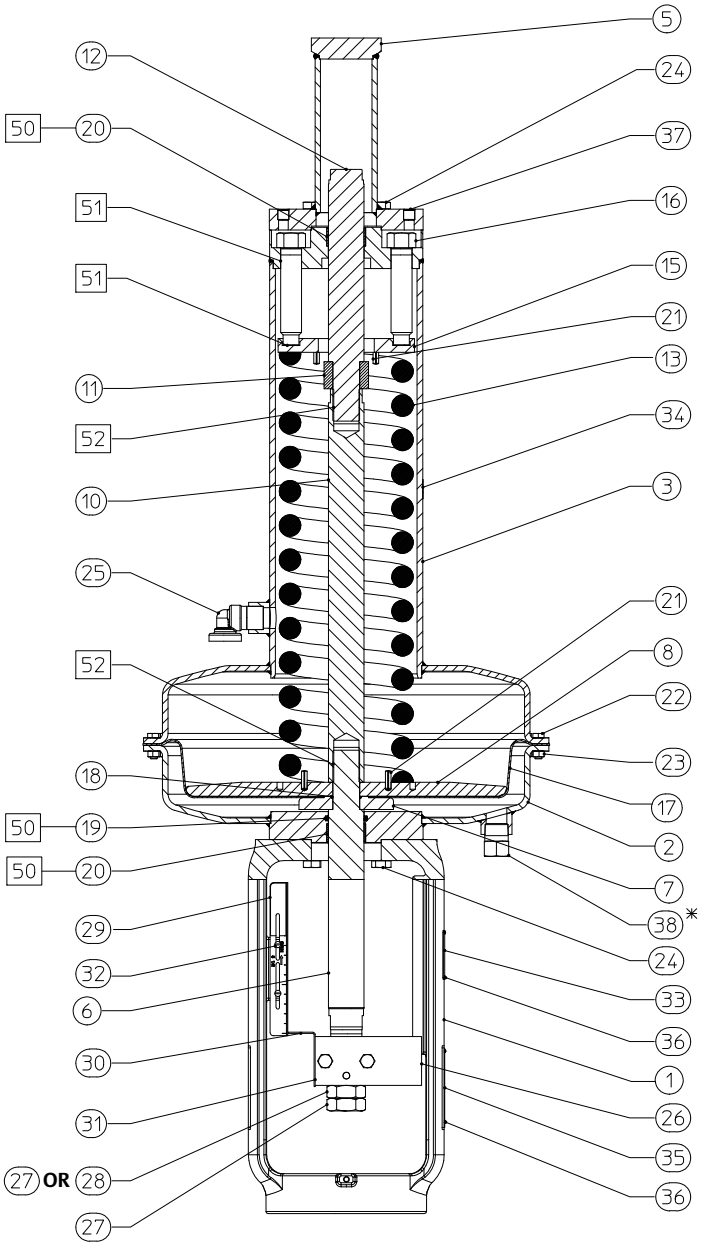
Note
Contact your Emerson sales office for part numbers.

Actuator Assembly (figures 5, 6, 7, 8, 9, and 10)

Key	Description
1	Yoke
2	Casing Air Supply
3	Casing Spring
4	Middle Casing
5	Protective Cap
6	Lower Stem
7	Thrust Plate
8	Diaphragm Plate
9	Middle Stem
10	Stop Stem
11	Travel Stop
12	Upper Stem
13	Spring
14	Spring
15	Spring Plate
16	Hex Hd Screw Cap
17*	Diaphragm
18*	O-ring
19*	O-ring
20*	Bushing
21	Pin
22	Hex Hd Screw Cap
23	Hex Nut
24	Hex Hd Screw Cap
25	Vent
26	Stem Connector
27	Jam Hex Nut
28	Hex Nut
29	Travel Scale Indicator
30	Travel Indicator
31	Flat Hd Machine Screw
32	Round Hd Machine Screw
33	Warning Tag
34	Warning Label
35	Nameplate
36	Drive Screw
37	Hex Socket Screw Set
38	Reducing Bushing
50	Lubricant
51	Anti-Seize Lubricant
52	Thread Lock

*Recommended spare parts

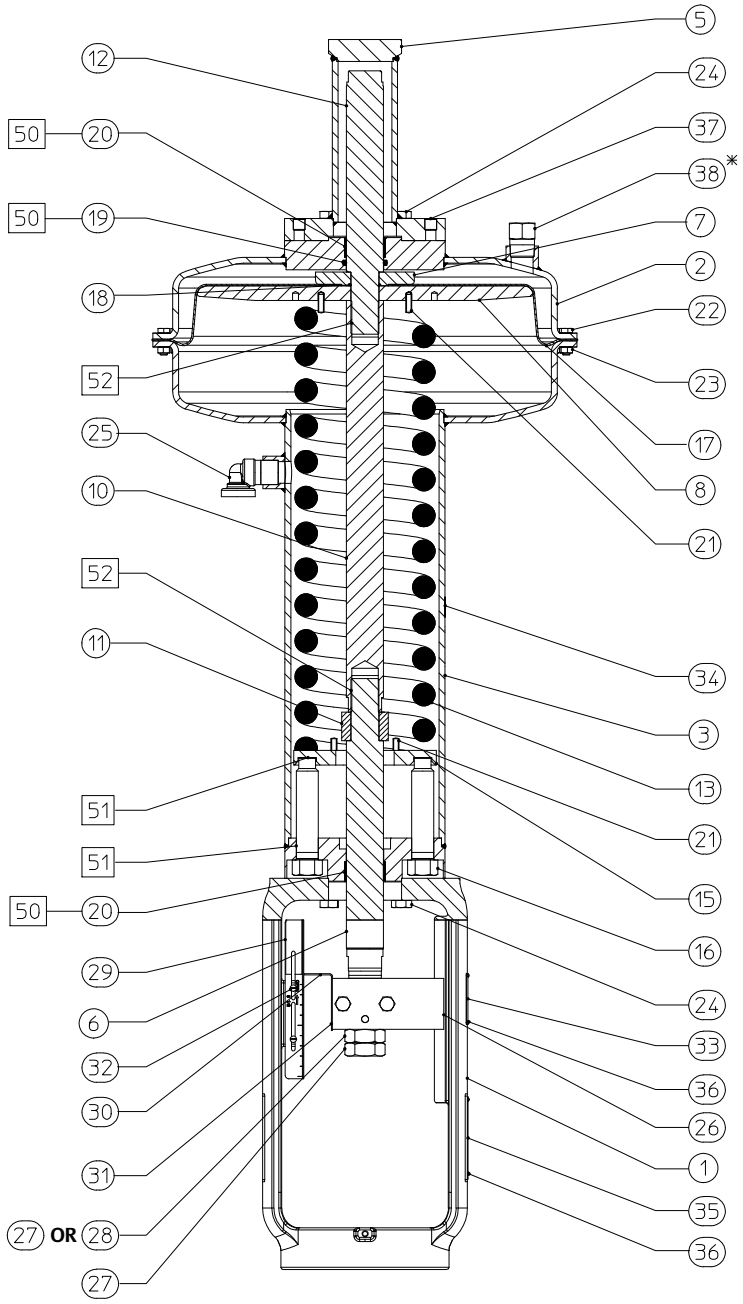
Figure 5. Fisher 3025 Actuator Size 1
(Travels Up to 139.7 mm (5.5 in) Reverse Acting)



☐ APPLY LUB
* IF USED

GF10442

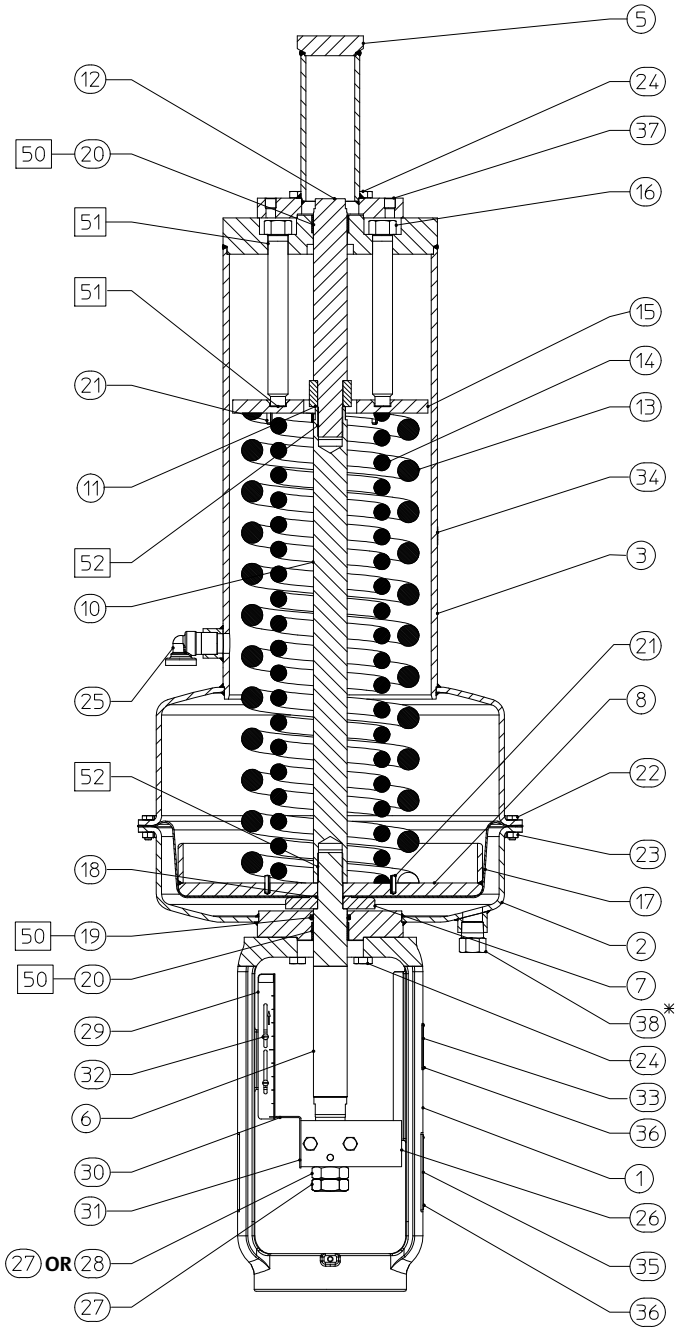
Figure 6. Fisher 3025 Actuator Size 1
(Travels Up to 139.7 mm (5.5 in) Direct Acting)



☐ APPLY LUB
* IF USED

GF17491

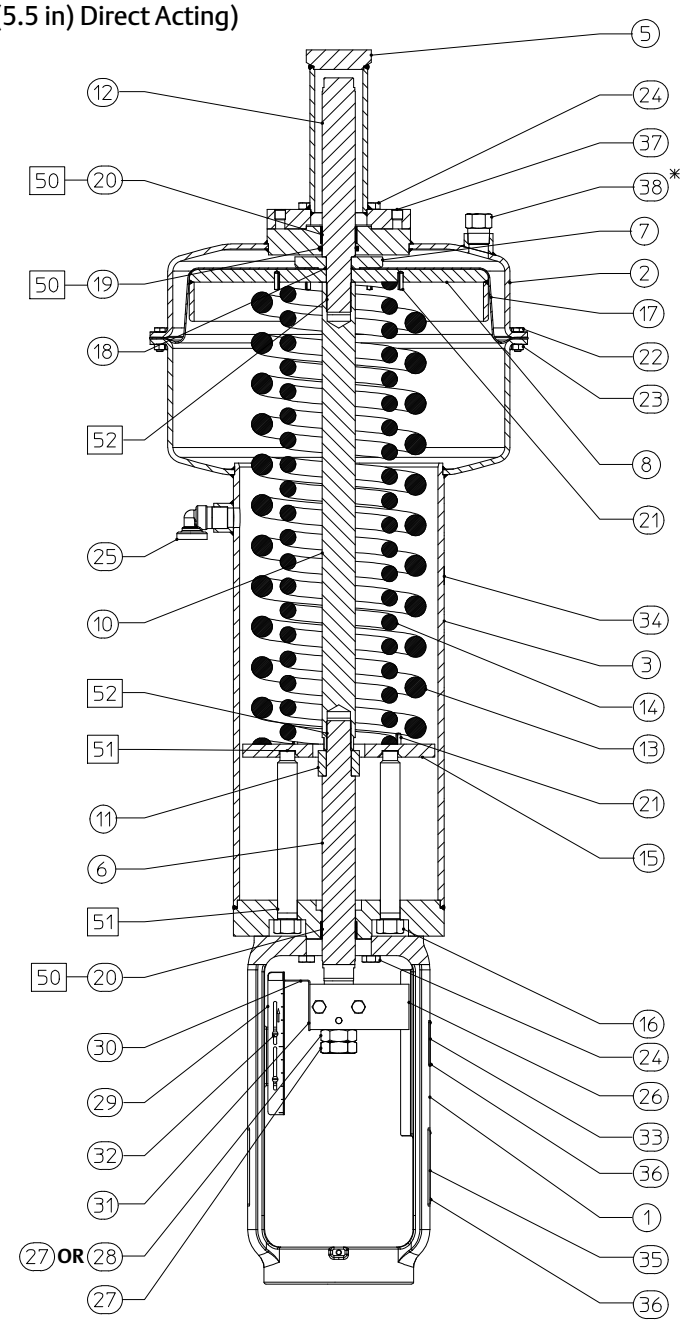
Figure 7. Fisher 3025 Actuator Size 1
(Travels Above 139.7 mm (5.5 in) Reverse Acting)



☐ **APPLY LUB**
∗ IF USED

GF15018

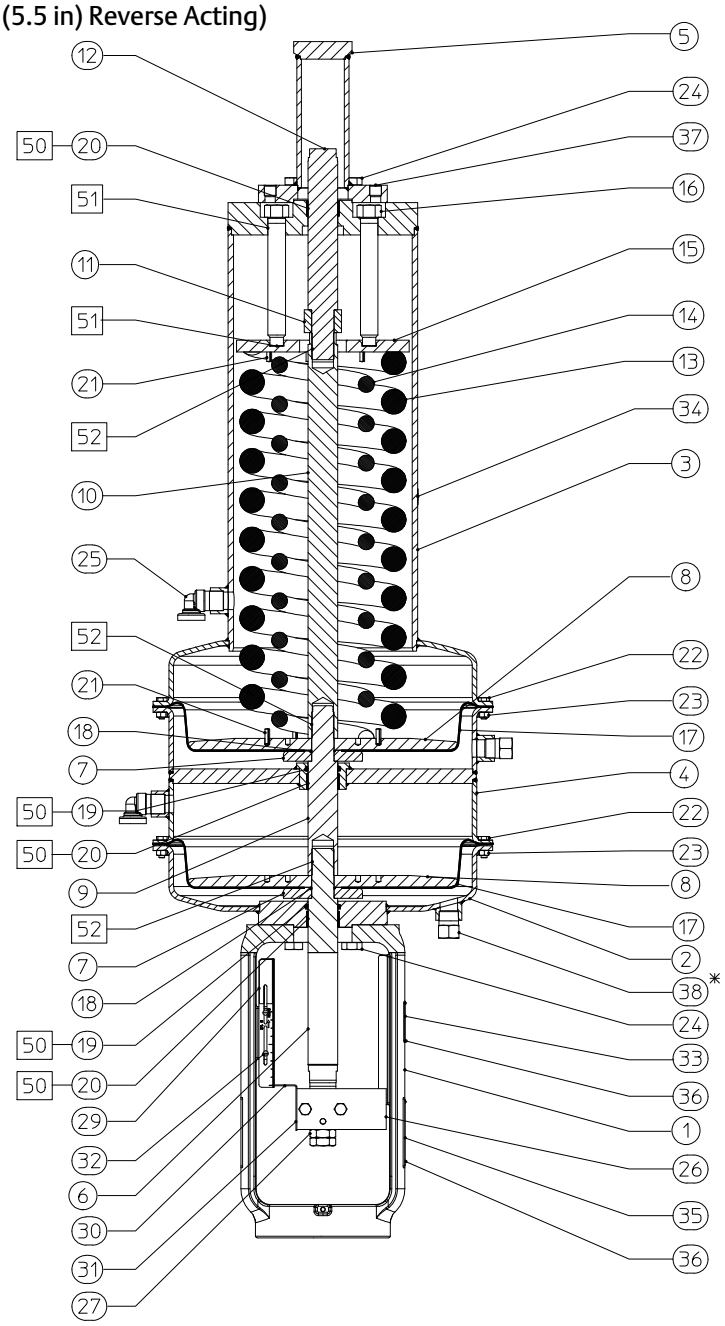
Figure 8. Fisher 3025 Actuator Size 1
(Travels Above 139.7 mm (5.5 in) Direct Acting)



☐ **APPLY LUB**
* IF USED

GF17501

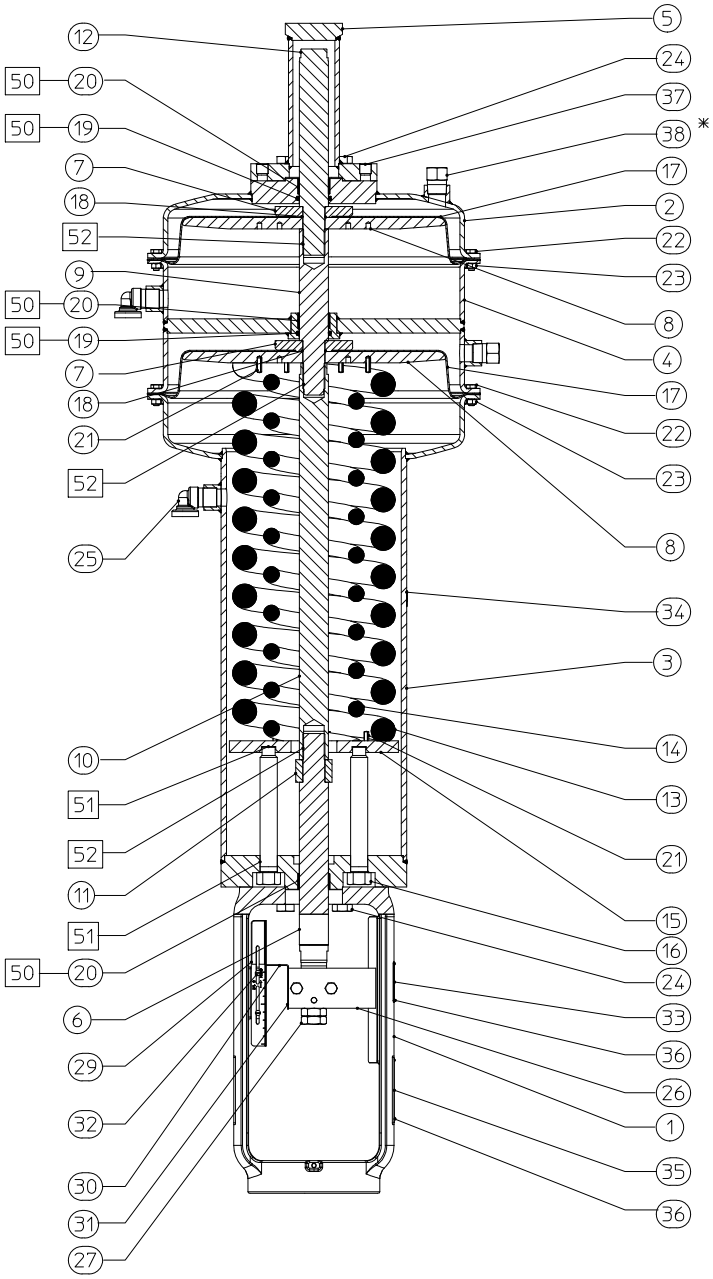
Figure 9. Fisher 3025 Actuator Size 2
(Travels Up to 139.7 mm (5.5 in) Reverse Acting)



☐ **APPLY LUB**
∗ IF USED

GF11920

Figure 10. Fisher 3025 Actuator Size 2
(Travels Up to 139.7 mm (5.5 in) Direct Acting)



☐ **APPLY LUB**
∗ IF USED

GF17492

Side-Mounted Handwheel (figures 11 and 12)

Key	Description
101	Sleeve
102	Handwheel Housing
103	Power Screw, LH
104	Stem Nut
105	Power Screw, RH
106	Handwheel Yoke
107	Cover
108	Handjack Indicator
109	Gear Case
110	Flange
111	Key
112	Worm Gear
113	Bearing
114	Bushing
115	Retainer
116	Worm Shaft
117	Bearing
118	Bushing
119	Front Worm Retainer
120	Back Worm Retainer
121	Handwheel
122	Handwheel Cap
123	Handgrip
124	Stem Connector
125	Hex Hd Screw Cap
126	Hex Socket Screw Cap
127	Hex Socket Screw Cap
128	Hex Socket Set Screw
129	Slotted Set Screw
130	Shoulder Screw
131	Hex Hd Screw Cap
132	Hex Nut
133	Plain Washer
134	Hex Hd Screw Cap
135	Hex Hd Screw Cap
136	Hex Nut
137	Hex Hd Screw Cap
138	Hex Hd Screw Cap
139	Plain Washer
140	Hex Nut
141	Lub Fitting
142	Spring
143	Ball
144	Split Ring
145	Chain
146	Lock Pin
147	Drive Screw
148	Slotted Screw Set
149	Pointer
150	Anti-rotation Plate
151	Anti-rotation Plate
152	Clamp
153	Anti-rotator
154	Spacer
155	Rotation Indicator
156	Screw
50	Lubricant

Figure 11. Side-Mounted Handwheel for Size 1 Actuator

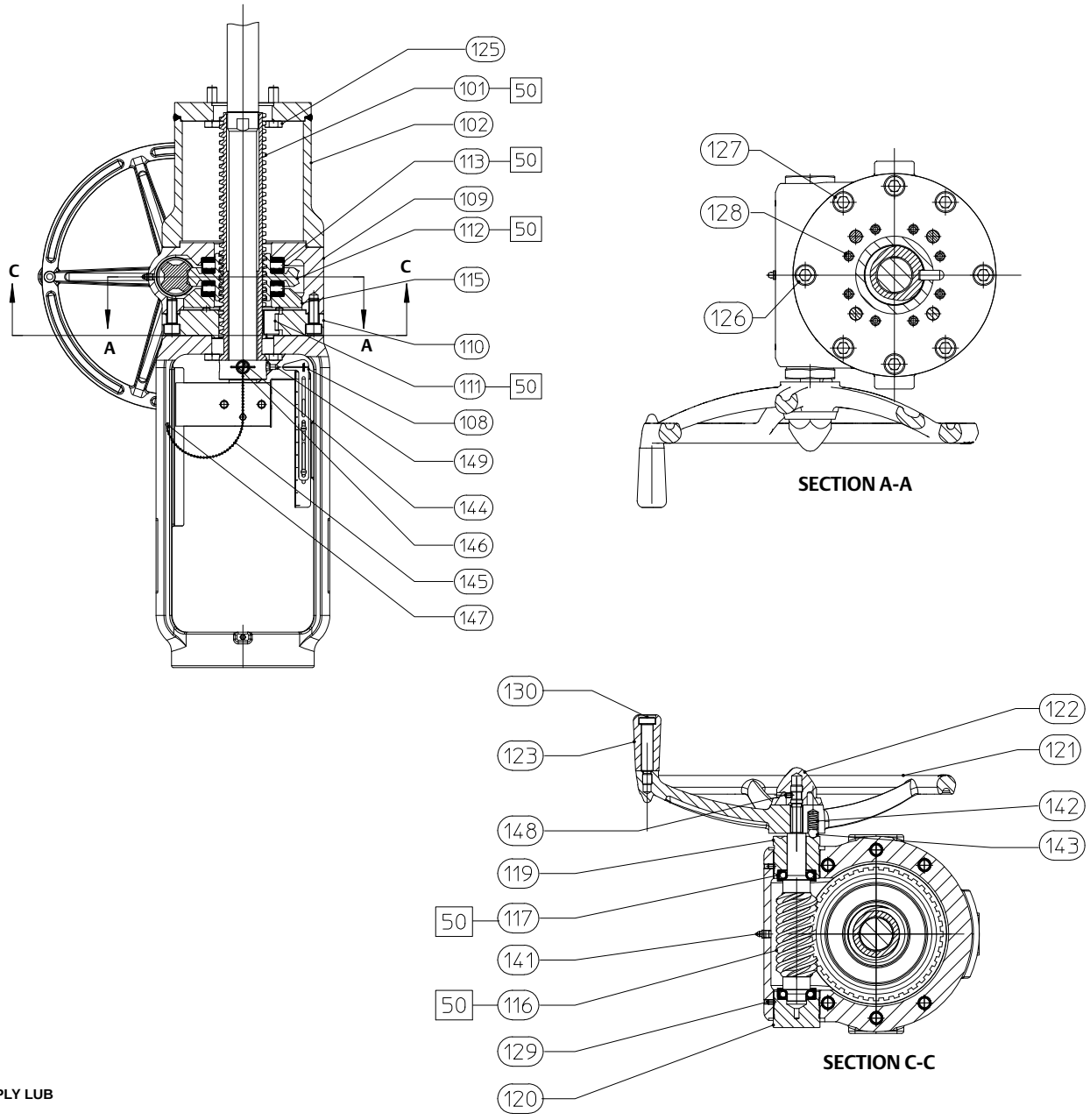
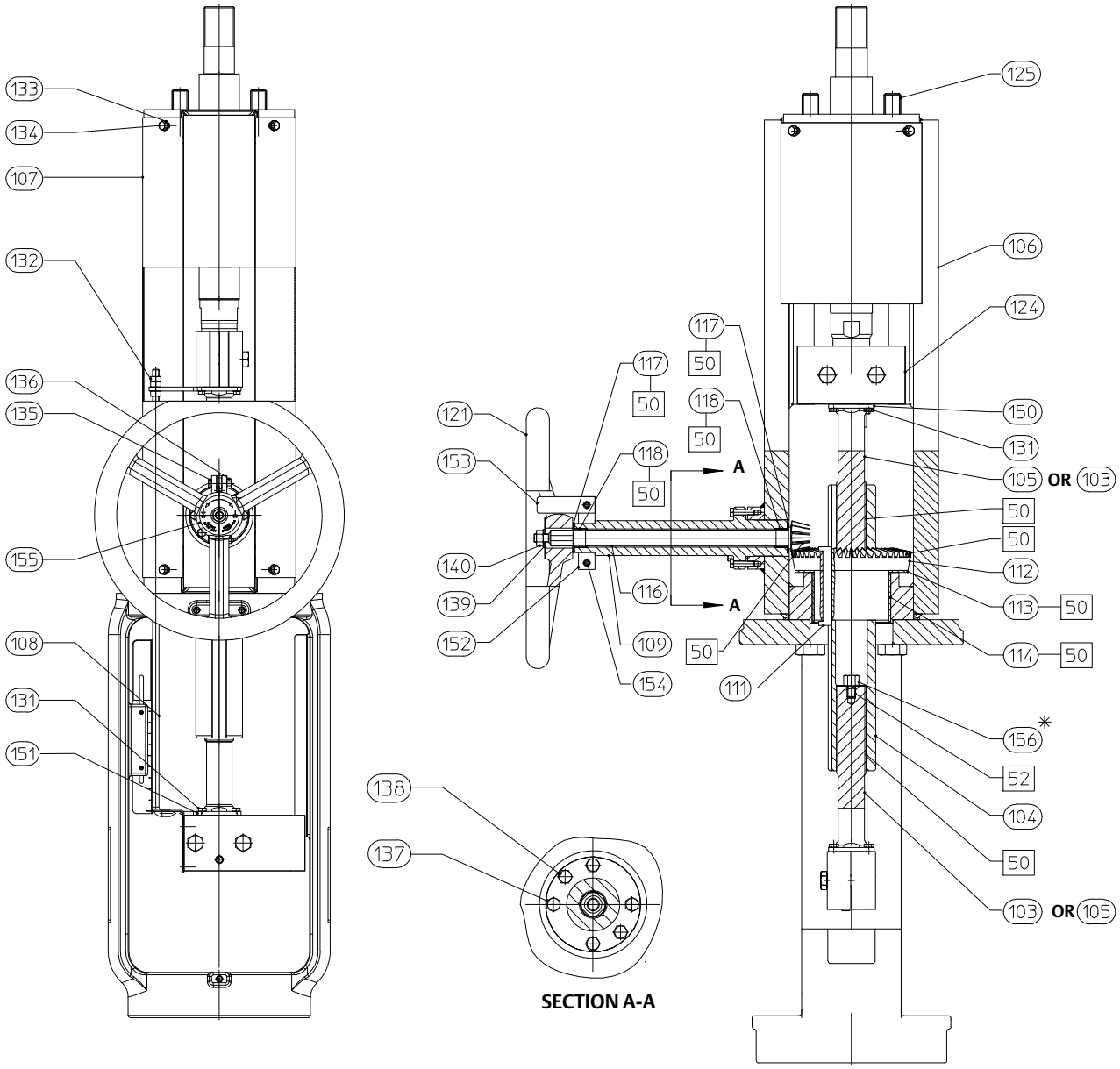


Figure 12. Side-Mounted Handwheel for Size 2 Actuator



☐ **APPLY LUB**
* **IF USED**
Gf16920

Casing-Mounted Travel Stops (figures 13, 14, and 15)

Key	Description
201	Protective Cap
202	Hex Hd Cap Screw
203	Adjusting Screw
204	Jam Hex Nut
205	Hex Nut
206	Jam Hex Nut

Figure 13. Style 10 Down Travel Stop (Casing-Mounted)

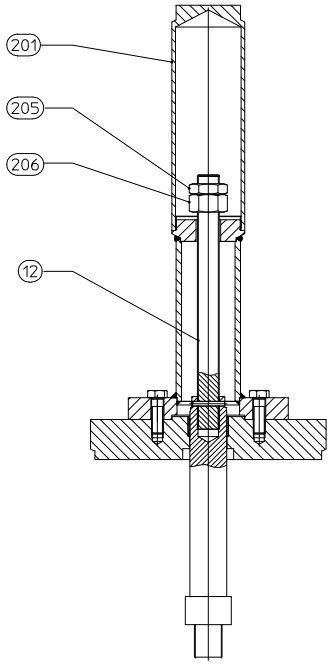


Figure 14. Style 11 Up and Down Travel Stop (Casing-Mounted)

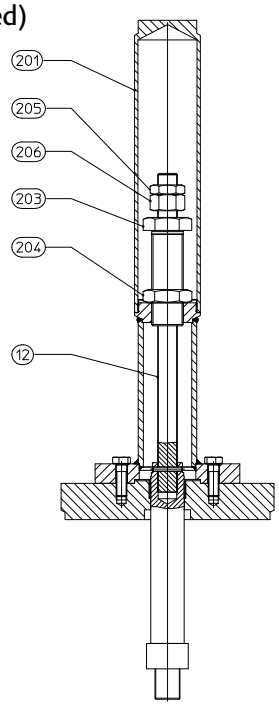
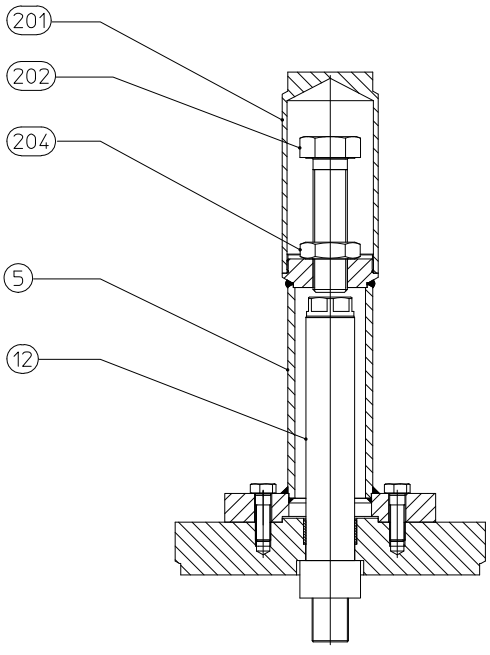


Figure 15. Style 12 Up Travel Stop (Casing-Mounted)



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