

Type 1051 and 1052 Style F and G Size 40, 60, and 70 Rotary Actuators

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Introduction

Scope of Manual

This instruction manual includes installation, adjustment, maintenance, and parts ordering information for the Type 1051 (size 40 and 60) and Type 1052 (Size 40, 60, and 70) pneumatic piston rotary actuator with F and G mounting adaptations (see figure 1).

The G mounting adaptation is for Type 7600 and 9500 valves, and the F mounting adaptation is for all



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Figure 1. Vee-Ball® Valve with Type 1052 Actuator and Type DVC6020 Digital Valve Controller

other eccentric disc or Vee-Ball® valves. Also, this instruction manual provides information for the optional top-mounted handwheel, up and down travel stops, locking mechanism, and pipe-away vent.

Instructions for the control valve, positioner, accessories, and other sizes of actuators are covered in separate instruction manuals.

Top-Mounted handwheels can be applied for infrequent service as a manual handwheel actuator. Also, an adjustable up travel stop can be added to the actuator to limit its stroke in the upward direction, or an adjustable down travel stop can be added to limit actuator stroke in the downward direction.

Do not install, operate, or maintain a Type 1051 or 1052 actuator without first • being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance, and • carefully reading and understanding the contents of this manual. If you have any questions about these instructions, contact your Emerson Process Management™ sales office before proceeding.



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Table 1. Type 1051 and 1052 Actuator Specifications

Operation

Direct Acting: Increasing loading pressure extends the diaphragm rod out of the spring barrel

Service:

Type 1051: For on-off or throttling service with positioner

Type 1052: For on-off or throttling service with or without a positioner

Actuator Sizes

Type 1051: ■ 40 and ■ 60

Type 1052: ■ 40, ■ 60, and ■ 70

Maximum Diaphragm Sizing Pressure⁽¹⁾

Size 40: 4.5 bar (65 psig)

Size 60: 2.8 bar (40 psig)

Size 70: 3.8 bar (55 psig)

Maximum Diaphragm Casing Pressure⁽³⁾

Size 40: 5.2 bar (75 psig)

Size 60: 3.4 bar (50 psig)

Size 70: 4.5 bar (65 psig)

Maximum Valve Shaft Rotation

90 degrees rotation (standard) travel stop, or 60 degrees (optional) travel stop for Type 1051 and 1052 actuators, or 75 degrees (optional) travel stop for Type 1052 actuators

Valve Shaft Diameters, mm (Inches)

Size 40: ■ 12.7 (1/2), ■ 15.9 (5/8), ■ 19.1 (3/4), ■ 22.2 (7/8), ■ 25.4 (1), or ■ 31.8, (1-1/4)

Size 60: ■ 19.1 (3/4), ■ 22.2 (7/8), ■ 25.4 (1), ■ 31.8 (1-1/4), ■ 38.1 (1-1/2), ■ 44.5 (1-3/4), or ■ 50.8 (2)

Size 70: ■ 31.8 (1-1/4), ■ 38.1 (1-1/2), ■ 44.5 (1-3/4), or ■ 50.8 (2)

Stroking Time

Dependent on actuator size, rotation, spring rate, initial spring compression, and supply pressure. If stroking time is critical, consult your Emerson Process Management sales office

Material Temperature Capabilities⁽²⁾

NBR (Nitrile) Diaphragm: -40 to 82°C (-40 to 180°F)

VMQ (Silicone) Diaphragm: -40 to 149°C (-40 to 300°F)

NBR O-Rings: -40 to 82°C (-40 to 180°F), NBR O-rings are used in optional top-mounted handwheel, adjustable down travel stop, and adjustable up travel stop assemblies

Travel Indication

Graduated disc and pointer combination located on actuator end of valve shaft

Pressure Connections

Standard: 1/4 NPT internal thread

Optional: ■ 1/2 or ■ 3/4 NPT internal, and ■ 3/4 NPT internal thread for pipe-away vent

Mounting Positions

See figure 3.

Approximate Weights

See table 2.

Additional Specifications

For casing pressure ranges and for material identification of the parts, see the Parts List

1. Use this value to determine the maximum torque output allowed.

2. The pressure/temperature limits in this manual and any applicable standard or code limitation for valve should not be exceeded.

3. This maximum casing pressure is not to be used for normal operating pressure. Its purpose is to allow for typical regulator supply settings and/or relief valve tolerances.

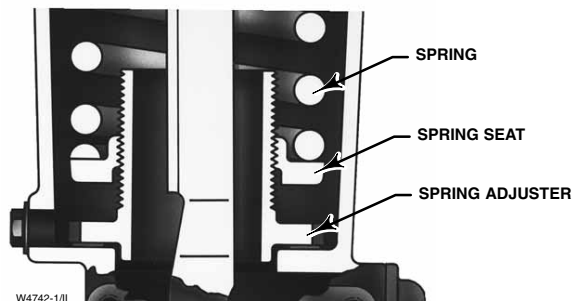


Figure 2. Typical Type 1052 Actuator Adjustable Spring Seat

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

Description

The Type 1051 and 1052 diaphragm rotary actuators are pneumatic spring-return actuators for use with rotary-shaft control valves. The Type 1051 actuator can be used for on-off service, or it can be used for throttling service when equipped with a valve positioner. The Type 1052 actuator can be used for on-off service, or it can be used for throttling service when equipped with or without a valve positioner. The Type 1052 actuator spring is adjustable (see figure 2).

Table 2. Approximate Actuator Weights

SIZE	TYPE 1051		TYPE 1052		TOP-MOUNTED HANDWHEEL	
	Kg	Lb	Kg	Lb	Kg	Lb
40	43	94	45	99	7.3	16
60	89	197	92	203	11	24
70	— — —	— — —	123	272	21	47

Specifications

Specifications are shown in table 1. Specifications for actuator operation, as it originally comes from the factory, are stamped on the nameplate attached to the actuator.

Installation

When an actuator and valve body are shipped together, the actuator is normally mounted on the valve. Follow the valve body instructions when installing the control valve in the pipeline, and then perform the procedures presented in the Loading Connection section. If the actuator is shipped separately or if it is necessary to mount the actuator on the valve, perform the procedures presented in the Actuator Mounting section. And, if the actuator requires a pipe-away vent, or if a retrofit pipe-away kit needs to be installed, refer to the Pipe-Away Vent section.



WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations. Be aware of pinching parts during installation operations.

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.

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Table 3. Recommended Bolting Torques

DESCRIPTION, KEY NUMBER	ACTUATOR SIZE								
	40			60			70		
	Size	N•m	lbf•ft	Size	N•m	lbf•ft	Size	N•m	lbf•ft
Diaphragm Casing, 5	3/8-24	27	20	3/8-24	27	20	3/8-24	27	20
Casing to spring barrel, 7	3/8-16	41	30	3/8-16	41	30	1/2-13	102	75
Diaphragm to rod, 9 (1051)	1/2-13	34	25	3/4-10	102	75	- - -	102	75
Diaphragm to rod, 9 (1052)	1/2-20	34	25	3/4-16	102	75	3/4-16	102	75
Rod end bearing, 16	1/2-20	34	25	5/8-18	61	45	3/4-16	102	75
Turnbuckle to lever, 18	1/2-13	81	60	5/8-11	163	120	3/4-10	271	200
Spring barrel to housing, 21	5/16-18	23	17	7/16-14	68	50	5/8-18	68	50
Housing to yoke, 23	3/8-16	34	25	1/2-13	81	60	1/2-13	81	60
Travel stop to lever, 28	1/2-13	81	60	5/8-11	163	120	3/4-10	271	200
Side of housing, 34 304/4200/PMV	3/8-16	34	25	1/2-13	81	60	1/2-13	81	60
Handwheel top, 54	1/2-20	34	25	5/8-18	34	25	- - -	34	25
Diaphragm head to rod/Adjustable down travel stop, 54 (1051)	1/2-13	27	20	3/4-10	66	49	- - -	69	51
Diaphragm head to rod/Adjustable down travel stop, 54 (1052)	1/2-20	27	20	3/4-16	66	49	3/4-16	69	51
Rod end to turnbuckle, 58	3/4-16-LH	102	75	7/8-14-LH	163	120	7/8-14-LH	163	120
Handwheel to actuator, 141	3/8-16	41	30	3/8-16	41	30	1/2-13	81	60

CAUTION

To avoid parts damage, do not use an operating pressure that exceeds the Maximum Diaphragm Casing Pressure (table 1) or produces a torque greater than the Maximum Allowable Valve Shaft Torque (see Catalog 14). Use pressure-limiting or pressure-relieving devices to prevent the diaphragm casing pressure from exceeding its limit.

To avoid parts damage, do not stroke the actuator while cover (key 33) is off.

Actuator Mounting

Use the following steps to connect a valve and an actuator. Key numbers are shown in figure 8 for Type 1051 actuators and in figure 9 for Type 1052 actuators.



WARNING

To avoid personal injury, perform the steps in the WARNING at the beginning of the Maintenance section to isolate the control valve and actuator.

1. Unscrew cap screws and washers (keys 34 and 63), and remove the cover (key 33).
2. Refer to figure 3 for available mounting styles and positions. When mounting on a Vee-Ball Design V150, V200 or V300 valve, check the valve manual to determine if it is Series B. The actuator is normally positioned vertically with the valve in a horizontal pipeline (see figure 3).

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MOUNTING	ACTION ⁽¹⁾	VALVE SERIES OR DESIGN				VALVE SERIES OR DESIGN		
		BALL/PLUG ROTATION TO CLOSE	V250	V150, V200 & V300	CV500 V500	DISC/BALL ROTATION TO CLOSE	V250	8510B, 8532, 8560 & 9500
Right-Hand	PDTC	CCW	A	A	A	CW	NA	B
	PDTO	CCW	B	B	B	CW	NA	A
Left-Hand	PDTC	CCW	NA	D	D	CW	C	C
	PDTO	CCW	NA	C	C	CW	D	D
Left-Hand (Optional) ⁽²⁾	PDTC	CW	NA	C	NA	NA	NA	NA
	PDTO	CW	NA	D	NA	NA	NA	NA

1. PDTC—Push-down-to-close, and PDTO—Push-down-to-open.
2. A left hand ball will be required for the NPS 3 through 12 Series B and the NPS 14 to 20, with or without attenuator.

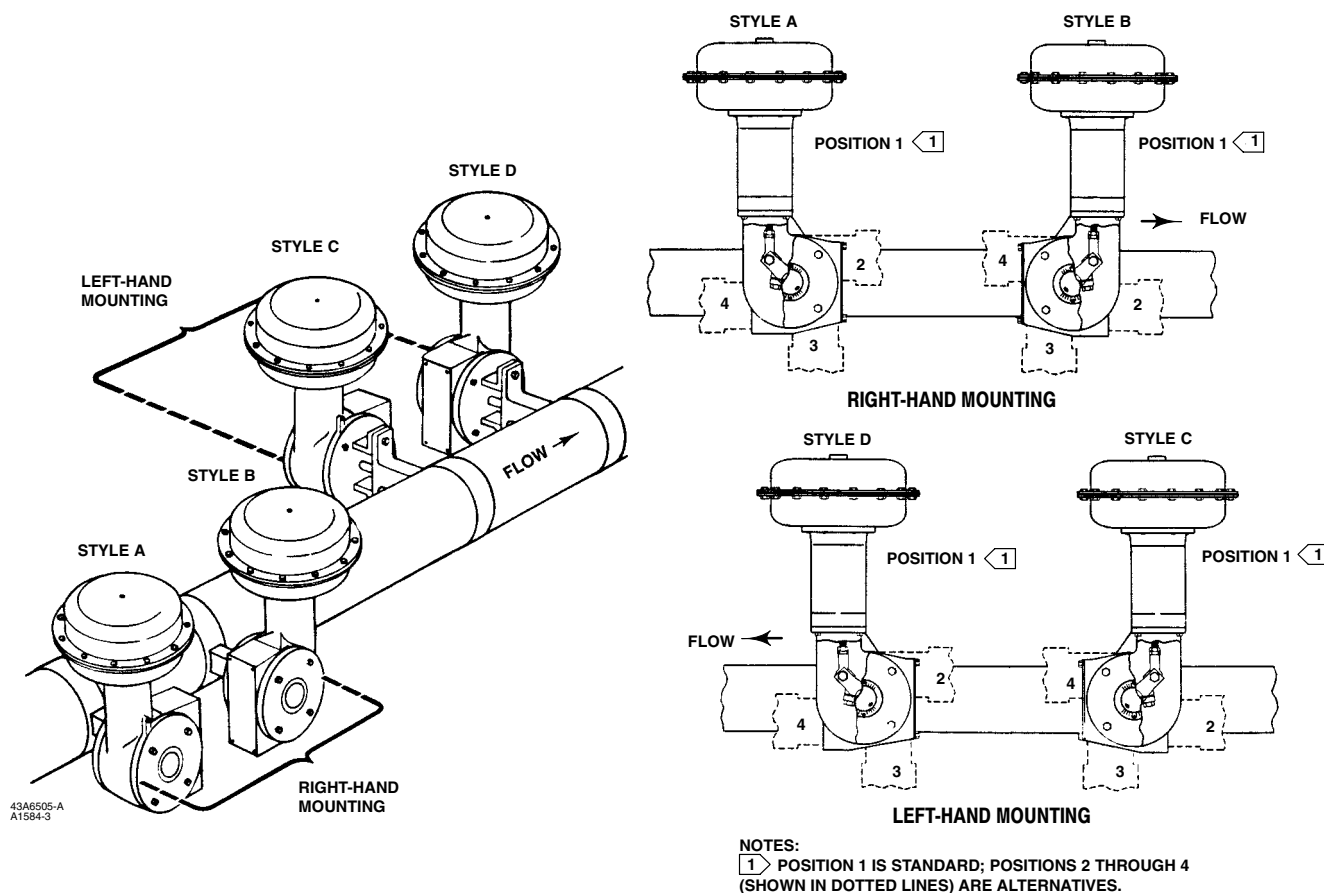


Figure 3. Mounting Styles and Positions for the Type 1051 and 1052 Actuator



WARNING

To avoid personal injury or property damage, the Type 1052 size 70 actuator, due to its weight, must be externally supported if mounted in the horizontal position.

3. When mounting the actuators, make sure that the bushing (key 67) and valve shaft are in-line so that the bushing will slide onto the valve shaft without damage.

4. Mount the actuator on the valve body and secure it with the valve mounting screws. The torque for 1/2 to 1-inch shafts is 88 N•m (65 lbf•ft); for 1-1/4 to

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1-1/2 inch shafts is 136 N•m (100 lbf•ft); for 1-3/4 to 2-inch shafts is 183 N•m (135 lbf•ft).

CAUTION

Exceeding any torque requirement may impair the safe operation of this actuator by causing broken or damaged parts. Refer to table 3 for the bolting torque requirements.

5. Screw the left-hand threaded locknut (key 58) onto the diaphragm rod (key 10) as far as possible.
6. Screw the turnbuckle (key 57) as far as it will go onto the actuator rod.
7. Screw the locknut (key 16) as far as it will go onto the rod end bearing (key 17). Thread this assembly completely into the turnbuckle (key 57).
8. If the lever (key 27) is attached to the rod end bearing, remove the cap screw and hex nut (keys 18 and 19).
9. If the Type 1052 spring adjustment has been changed, complete the Initial Setting portion of the Type 1052 Spring Adjustment section before proceeding.
10. Consult the appropriate valve instruction manual's Installation section for lever/valve shaft orientation marks, and slide the lever into place (see figure 4). Clamp with the cap screw (key 28).
11. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by moving the actuator off its up travel stop with a regulated air source and adjusting the turnbuckle (key 57) slightly.
12. Apply sealant (key 77) or equivalent thread-locking compound to the threads of the cap screw (key 18).
13. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19). Tighten the cap screw to the recommended bolt torque shown in table 3.
14. Note the valve position and direction of rotation. Position the travel indicator (key 37) accordingly.
 - a. If no handwheel actuator is to be used, position the travel indicator (key 37) according to

the valve position just noted. Replace the cover (key 33), and secure with washers and cap screws (keys 34 and 63). If holes in the cover and housing (key 20) do not align, temporarily loosen the cap screws (key 23), and shift the housing slightly.

CAUTION

To avoid parts damage, do not stroke the actuator while the cover (key 33) is off.

- b. If a manual handwheel actuator is to be used, refer to the separate handwheel actuator instruction manual for mounting instructions.

15. Replace the cover (key 33), and secure with cap screws and washers (keys 34 and 63). If the holes in the cover and housing (key 20) do not align, use a regulated air source to move the actuator slightly off the up travel stop. If the hole alignment cannot be obtained in this manner, temporarily loosen the cap screws (key 23), and shift the housing slightly.

CAUTION

To avoid parts damage, do not stroke the actuator while the cover (key 33) is off.

16. Follow the instructions given in the Turnbuckle Adjustment section before proceeding to the Loading Connection section.

Valve Flow Direction

Valve construction can change the flow direction for a control valve assembly. It is important to observe the flow direction in all valve applications **before** installing the valve in the pipeline (see figure 3). Refer to the appropriate valve bulletin or instruction manual.

Note

Observe all warnings and cautions provided in the appropriate valve instruction manual Installation section.

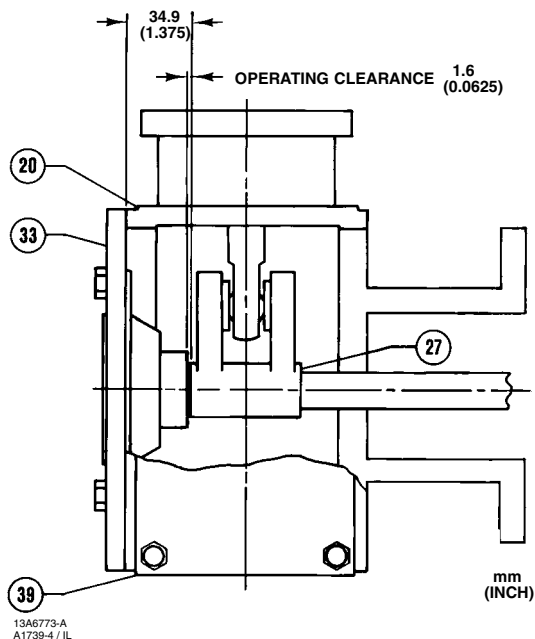


Figure 4. Lever Operating Clearance

Loading Connection

1. Connect the loading pressure piping to the pressure connection in the top of the diaphragm casing.
 - a. **For size 40 through 60 actuators:** Run either 1/4 NPT pipe or 3/8 inch tubing between the 1/4 NPT pressure connection and the instrument.
 - b. **For size 70 actuators:** Run either pipe or tubing between the pressure connection and the instrument. If necessary, remove the 1/4 inch bushing in the pressure connection to increase connection size.
2. Keep the length of pipe or tubing as short as possible to avoid transmission lag in the control signal. If an accessory (such as a volume booster or a valve positioner) is used, be sure that the accessory is properly connected to the actuator. If a valve positioner is part of the assembly, the pressure connection to the actuator will normally be made at the factory.

Table 4. Wrench Size Required for Turnbuckle Adjustment, Inches

ACTUATOR		TURN- BUCKLE (KEY 57)	LOWER LOCKNUT (KEY 16)	UPPER LOCKNUT (KEY 58)
Type	Size			
1051 & 1052	40	1-1/8	3/4	1-1/8
	60	1-5/16	15/16	1-5/16
1052	70	1-5/16	1-1/8	1-5/16

3. When the control valve is completely installed and connected to the instrument, check for correct action (air-to-open or air-to-close) to match the controlling instrument. For successful operation, the actuator stem and valve shaft must move freely in response to the loading pressure change on the diaphragm.

Adjustment

Turnbuckle Adjustment

Correct turnbuckle adjustment ensures that the valve is correctly closed when the actuator is against its travel stops. The turnbuckle adjustment is the only adjustment necessary on the Type 1051 actuator. Key numbers are shown in figure 8 for Type 1051 actuators and in figure 9 for Type 1052 actuators.

For accurate adjustment to the zero-degree valve disc or ball position, remove the valve from the pipeline. Refer to the valve instruction manual for instructions.

A regulated air supply will be required to stroke the actuator. Refer to table 4 for the sizes of the three open-end wrenches required for this procedure.

1. Remove the access plate (key 59). Also remove the machine screws (key 60), if present.

Note

For the most accurate adjustment of the actuator, do not remove the cover (key 33) during this procedure.

2. Loosen the lower locknut (key 16).
3. Make sure the actuator housing (key 20) is clear of any tools or other instruments that could obstruct the actuator stroke path. Pressure the diaphragm casing enough to stroke the actuator down so that the left-hand threaded upper locknut (key 58) is accessible through the access opening. Loosen the locknut.
4. Consult the appropriate valve instruction manual for determining the closed position of the valve. Then use one of the following:

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a. **Push-down-to-close**—Slowly stroke the actuator to the down travel stop. Adjust the turnbuckle (key 57) until the valve is in the closed position. Lock this adjustment with the left-hand threaded locknut (key 58). Stroke the actuator to the mid-travel position, and tighten the locknut (key 16).

b. **Push-down-to-open**—Release all pressure from the diaphragm casing, making sure the diaphragm is against its up travel stop. Be sure that the optional handwheel is adjusted to its topmost position so that the zero position of the actuator and valve can be reached simultaneously. Check the valve position. Stroke the actuator so the turnbuckle (key 57) is accessible through the access opening. Adjust the linkage. Release pressure to the actuator, and check the new adjustment. Continue this procedure until the valve is in the closed position when the actuator is resting on its up travel stop. Stroke the actuator to the mid-travel position, and tighten the locknut (key 16). Stroke the actuator, and tighten the left-hand threaded locknut (key 58).

5. Replace the access plate (key 59).

6. Loosen the self-tapping screws (key 38), adjust the travel indicator (key 37), and re-tighten the self-tapping screws.

Type 1052 Spring Adjustment

Initial Setting

The Type 1052 nameplate specifies an initial spring setting, which is the initial setting adjusted into the actuator spring. Initial setting is the casing pressure at which the diaphragm and diaphragm rod begin to move away from the up travel stop **with the actuator disconnected from the valve**. (With the actuator connected to the valve and pressure applied to the valve, a higher pressure will be required to start actuator travel).

The initial setting was selected (based upon the service conditions specified when the actuator was ordered) so that, when the actuator and valve are in service, the valve will seat properly and full travel will be obtained within a diaphragm casing range of 0 to 1.2, 0 to 2.3, 0 to 2.8, or 0 to 3.8 bar (0 to 18, 0 to

33, 0 to 40, or 0 to 55 psig) depending on specific actuator size and construction.

If the actuator has been disassembled or if the spring adjustment was changed, and it is desired to match the initial setting stated on the nameplate, make sure the rod end bearing (key 17, figure 8 or 9) has been disconnected from the lever (key 27, figure 8 or 9). Adjust the spring so that the diaphragm rod just starts to travel at the spring set pressure specified on the nameplate.

Be sure the rod end bearing does not hit the lever as the diaphragm and diaphragm rod move away from the up travel stop. To adjust the spring, insert a round rod into one of the holes in the lower bearing seat (key 73, figure 9). Hole diameter is 9.5 mm (3/8 inch) for size 40 actuators, 15.9 mm (5/8 inch) for size 60 actuators, and 19.1 mm (3/4 inch) for size 70 actuators. Rotate the bearing seat to move it toward the casing to increase initial setting or away from the casing to decrease initial setting (keys 1 and 2, figure 9).

Stroking Range

The initial spring setting listed on the nameplate has been determined to be the optimum setting, and it is not recommended to make spring adjustments that will cause this value to change or be exceeded. For push-down-to-open valve action, the initial spring setting is the maximum allowable to provide the maximum spring closing force.

CAUTION

Any increase of this setting will over-stress the spring at full travel and may shorten the fatigue life of the spring.

For push-down-to-close valve action, the initial spring set has been determined to be the optimum balance between the air-to-close and the spring-to-open breakout torque.

If the Type 1052 actuator is to be changed from one valve action to another (i.e., push-down-to-close to push-down-to-open), first, refer to the table for key 11 in the Parts List section to determine the proper initial spring setting; then, adjust the unit according to the procedures in the Initial Settings portion of the Type 1052 Spring Adjustment section.

Principle of Operation

The diaphragm rod moves down as loading pressure is increased on top of the diaphragm. As the loading pressure is decreased, the spring forces the diaphragm rod upward.

The spring and diaphragm have been selected to meet the requirements of the application and, in service, the actuator should produce full travel of the valve with the diaphragm pressure as indicated on the nameplate.

Consult the separate positioner instruction manual for actuator principle of operation with positioner.

Maintenance

Actuator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions. Key numbers are shown in figure 8 for Type 1051 actuators and in figure 9 for Type 1052 actuators.



WARNING

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

- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury. Be aware of pinching parts during maintenance operations.
- 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.

CAUTION

To avoid parts damage, do not stroke the actuator while cover (key 33) is off.

Disassembly

The following procedure describes how to completely disassemble the actuator. When inspecting and replacing parts, perform only those steps necessary to accomplish the repair.

Do **not**, under ordinary circumstances, remove the cap screws (keys 7, 8, and 21) at this time.

CAUTION

Cap screw (key 18) must be disengaged from the lever (key 27) before removing the diaphragm casing (key 1). Failure to do so will allow the spring precompression to rotate the valve beyond its fully open or closed position. This could cause damage to the valve components and/or seal.

1. Perform the steps in the **WARNING** at the beginning of the Maintenance section to isolate the control valve and actuator.
2. Remove the tubing or piping from the top of the actuator.
3. Remove the positioner, if used. If necessary, refer to the positioner instruction manual for removal instructions.
4. Unscrew the cap screws and washers (keys 34 and 63), and remove the cover (key 33).

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5. Remove the retaining ring (key 30), and slide the hub (key 29) from the cover. If necessary, remove the travel indicator (key 37) from the hub (key 29).

6. Inspect, and if necessary, replace the cover bushing (key 31). Remove the travel indicator scale (key 35) by removing the self-tapping screws (key 36). Press the bushing out of the cover (key 33).

7. Remove the cap screw and hex nut (keys 18 and 19).

8. Make note of the lever/valve shaft orientation, and then loosen the cap screw (key 28).

CAUTION

When removing the actuator from the valve, do not use a hammer or similar tool to drive the lever (key 27) off the valve shaft. Driving the lever could damage internal valve parts. On some valve types, driving the lever off the shaft could move the valve disc or ball and bearings away from the centered position, causing subsequent damage to valve parts as the valve is operated.

A wheel puller may be used to remove the lever. It is okay to tap the wheel puller screw lightly to loosen the lever, but hitting the screw with excessive force could also damage valve parts or disrupt the centered position of the valve disc and bearings.

9. Rotate the handwheel (if one is used) counterclockwise until the handwheel is not compressing the spring (key 11).



WARNING

To avoid personal injury from pre-compressed spring force suddenly thrusting the upper diaphragm casing (key 1) away from the actuator, relieve Type 1052 spring compression, or carefully remove Type 1051 casing cap screws before proceeding further.

10. To relieve spring compression:

a. *For Type 1051 actuators:*

- Loosen, but do not remove, all casing cap screws and hex nuts (keys 5 and 6). Make sure there is no spring force to the upper diaphragm casing.

- Unscrew and remove the cap screws and hex nuts (keys 5 and 6), and then remove the upper diaphragm casing and the diaphragm (key 3).

b. *For Type 1052 actuators:*

- Insert a round rod into one of the holes in the lower bearing seat (key 73). Use the rod to rotate the lower bearing seat, and move it away from the actuator casings. Continue rotating the lower bearing seat until spring compression is completely removed. Rod hole diameter is 9.5 mm (3/8 inch) for size 40 actuators, 15.9 mm (5/8 inch) for size 60 actuators, and 19.1 mm (3/4 inch) for size 70 actuators.

- Unscrew and remove the cap screws and hex nuts (keys 5 and 6), and then remove the upper diaphragm casing and the diaphragm (key 3).

11. Removing the diaphragm plate (key 4):

a. *For Type 1051 actuators:*

- Pull the diaphragm plate (key 4) and attached parts out of the actuator. The spring (key 11), diaphragm rod (key 10), cap screw (key 9), spring seat (key 13), hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) will be attached to the diaphragm head assembly.

- The diaphragm plate (key 4) may be wedged against the diaphragm rod (key 10), thereby preventing the spring compression from being relieved as the cap screw (key 9) is loosened.



WARNING

Dislodge the diaphragm plate (key 4) from the diaphragm rod (key 10) *before* completely removing the cap screw (key 9). Failure to comply with this requirement could cause personal injury due to the sudden release of spring compression.

- Dislodge the diaphragm plate (key 4) from the diaphragm rod (key 10) by loosening the cap screw (key 9) one full turn and tapping the underside of the diaphragm plate until it follows the cap screw as it is being removed. Failure to check for this condition

before completely removing the cap screw (key 9) could cause personal injury due to the sudden release of spring compression.

- Slowly remove the cap screw (key 9) while making sure that the diaphragm head assembly is following the cap screw disassembly. **Note--Make sure that spring load is zero before the cap screw is completely removed. See the WARNING on the preceding page.** If necessary, separate the remaining parts of the assembly.

b. *For Type 1052 actuators:*

(1.) Remove the rod end bearing (key 17), the hex nut (key 16), turnbuckle (key 57), and the hex nut (key 58) from the diaphragm rod (key 10).

(2.) Pull the diaphragm plate (key 4) and attached parts out of the actuator. Then remove the cap screw (key 9) to separate the diaphragm plate and the diaphragm rod.

(3.) Proceed as appropriate:

- *For Size 40 and 60 actuators:* Remove the actuator spring (key 11) from the actuator. If it is necessary to remove the adjusting screw (key 74) from the spring barrel during this procedure, heat the base of the adjusting screw to 177°C (350°F) long enough for the thread-locking compound (key 77) to lose its holding strength. Then, unscrew the adjusting screw from the spring barrel. If the spring seat and the lower bearing seat (keys 13 and 73) are to be replaced, unscrew the lower bearing seat from the adjusting screw, and then remove the thrust bearing and the bearing races (keys 71 and 72) from the lower bearing seat.

- *For Size 70 actuators:* Remove the actuator spring (key 11) from the actuator. Remove the cap screws (key 21), then remove the spring barrel (key 12) from the actuator housing. If it is necessary to remove the spring adjustment parts, loosen the set screw (key 75), and unscrew the spring adjusting screw (key 74) from the spring barrel (key 12).

12. Unscrew the cap screws (key 23), and remove the actuator housing assembly (key 20).

13. Unbolt the mounting yoke (key 22) from the valve.

14. Check the bushing (key 67) in the mounting yoke. Press out and replace the bushing if necessary.

Assembly

This procedure assumes that the actuator was completely disassembled. If the actuator was not completely disassembled, start these instructions at the appropriate step. This procedure also assumes that the valve is removed from the pipeline for ease in actuator assembly and adjustment.

Key numbers are shown in figure 8 for Type 1051 actuators and in figure 9 for Type 1052 actuators.

1. Installing the spring barrel (key 12):

a. *For Type 1051 actuators:* Place the spring barrel onto the housing (key 2). Secure the spring barrel with cap screws (key 21). Tighten the cap screws to the torque value shown in table 3.

b. *For Type 1052 actuators:* If the spring barrel (key 12) was removed from the housing (key 20), align the spring barrel to the housing as described below to ensure that the offset hole in the base of the spring barrel will be located properly.

- *For Size 40 and 60 actuators:* Note that one of the accessory mounting bosses on the spring barrel is closer to the diaphragm end of the spring barrel. Place the spring barrel onto the housing with the upper boss (the one closer to the diaphragm end) on the same side as the boss located on the housing (see figures 8 and 9). This ensures proper positioning of the offset hole. Secure the spring barrel with cap screws (key 21). On final assembly, tighten the screws to the torque value shown in table 3.

- *For Size 70 actuators:* The spring barrel need not be aligned in any particular position when placing it on the housing.

2. If the bushing (key 67) was removed, press in the new bushing. The end of the bushing should be flush with the bottom of the recess in the mounting yoke (key 22).

3. Slide the mounting yoke over the valve shaft, and secure it to the valve with the valve mounting cap screws.

4. Tighten the valve mounting cap screws to the bolting torque listed in step 6 of the Installation procedures.



WARNING

**Exceeding any torque requirement
may impair the safe operation of the**

1051 & 1052 F & G Actuators

actuator and lead to possible personal injury or property damage.

5. Refer to figure 4 for the desired orientation of the housing (key 20). Secure the housing to the mounting yoke with cap screws (key 23).

6. Coat with lithium grease (key 93) on the cap screw threads (key 9), and the tapered end of the diaphragm rod (key 10).

7. Proceed as appropriate:

a. For Type 1051 actuators (see figure 8)

- Assemble the diaphragm rod, spring seat (key 13), spring (key 11), and diaphragm plate (key 4), and secure with the cap screw (key 9). Tightening the cap screw will compress the spring. Be certain the tapered end of the diaphragm rod is seated in the corresponding hole in the diaphragm plate, that the spring is seated in the spring seat, and that the cap screw is tightened to the torque specified in table 3.

- Install the hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) onto the diaphragm rod.

- Be certain the travel stops (key 8) are located as shown in figure 5.

- Install the diaphragm plate and attached parts into the actuator.

- Be sure the warning nameplate (key 56) is in place. Install the diaphragm (key 3) and the upper diaphragm casing (key 1). Install the cap screws and hex nuts (keys 5 and 6). Tighten the cap screws evenly in a crisscross pattern to compress the spring and secure the upper diaphragm casing. Refer to table 3 for torque values.

b. For Type 1052 actuators (see figure 9):

- *For actuator designs without a set screw (key 75) in the spring barrel (key 12):* if the adjusting screw and attached parts were removed, first clean and then lubricate the upper threads of the adjusting screw (key 74) with lithium grease (key 76) as shown in figure 9. Install the lower bearing seat (key 73), the thrust bearing (key 71), the thrust bearing races (key 72), and the spring seat (key 13) onto the adjusting screw.

- First, clean and then coat the lower end of the adjusting screw with sealant (key 77) or equivalent

thread-locking compound as shown in figure 9, and install the entire assembly into the spring barrel (key 12). Let the adjusting screw stand undisturbed for at least two hours after installation to allow the thread-locking compound to cure.

CAUTION

Apply lubricant to the upper threads and thread-locking compound to the lower threads of the adjusting screw. Do not overlap the coat of lubricant with the coat of thread-locking compound since this will adversely affect the performance quality of both substances.

- *For actuator designs with a set screw (key 75),* if the adjusting screw (key 74) and attached parts were removed, lubricate the threads of the adjusting screw with lithium grease (key 76). Install the lower bearing seat (key 73), the thrust bearing (key 71), the thrust bearing races (key 72), and the spring seat (key 13) onto the adjusting screw. Install this assembly into the spring barrel (key 12). Secure the adjusting screw with the set screw (key 75).

8. Coat the tapered end of the diaphragm rod (key 10) and the threads of the cap screw (key 9) with lithium grease (key 76). Bolt the diaphragm plate to the diaphragm rod.

9. Be certain the travel stops (key 8) are located as shown in figure 5.

10. Install the spring (key 11) into the spring barrel. Install the diaphragm plate and diaphragm rod into the actuator. Attach the hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) to the diaphragm rod.

11. Installing the diaphragm:

- Install the diaphragm (key 3) and place the upper diaphragm casing (key 1) onto the lower diaphragm casing (key 2). If necessary, rotate the lower bearing seat (key 73) so that the upper diaphragm casing travel stop will not contact the diaphragm when the casing cap screws and nuts (key 5 and 6) are tightened.

- Secure the upper diaphragm casing with the cap screws and hex nuts (keys 5 and 6). Be sure the warning nameplate is in place on the casing. Tighten the nuts on the cap screws to the torque value shown in table 3.

12. **For Type 1052 actuators,** complete the Initial Setting portion of the 1052 Spring Adjustment section before proceeding.

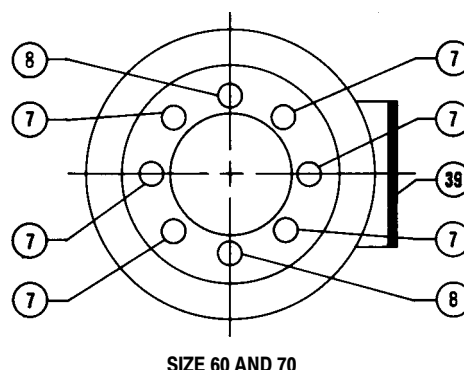
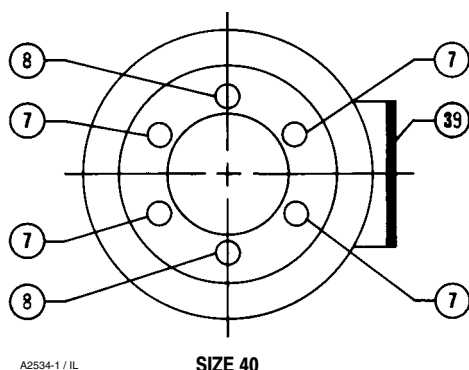


Figure 5. Travel Stop Orientation

13. Refer to the appropriate valve instruction manual for lever/valve shaft orientation marks, and slide the lever (key 27) into place; see figure 4 for correct lever operating clearance. Clamp with the cap screw (key 28, figure 9).

14. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by carefully stroking the actuator off its up travel stop with a regulated air source.

15. Apply sealant (key 77) or equivalent thread-locking compound to the threads of the cap screw (key 18).

16. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19). Tighten the nut on the cap screw (see table 3).

17. Coat the bearing surfaces of the hub (key 29), and cover (key 33) with lithium grease (key 76). Install the bushing (key 31) and hub into the cover. Secure with the retaining ring (key 30).

18. Install the travel indicator scale (key 35), and secure it with the self-tapping screws (key 36). Then install the travel indicator (key 37), and secure it with the self-tapping screws (key 38).

19. Note the valve disc or ball position, and direction of rotation. Position the travel indicator (key 37) accordingly.

20. Replace the cover (key 33), and secure with cap screws and washers (keys 34 and 63). If the holes in the cover and housing (key 20) do not align, use a regulated air source to move the actuator slightly off the up travel stop. If hole alignment cannot be obtained in this manner, temporarily loosen cap screws (key 23), and shift the housing slightly.

CAUTION

To avoid parts damage, do not stroke the actuator while cover (key 33) is off.

21. If a valve positioner is to be used, consult the separate valve positioner instruction manual for proper positioner installation.

22. Follow the instructions in the Turnbuckle Adjustment section.

Changing Actuator Mounting

The actuator is normally positioned vertically in a horizontal pipeline. However, four mounting styles and four positions for each style are possible (see figure 3).

Note

Due to its weight, the Type 1052, size 70 actuator must be externally supported if mounted in the horizontal position.

Correct lever/valve shaft positioning is important to ensure proper valve action. Consult the appropriate valve instruction manual.

Style A is right-hand mounted, while style D is left-hand mounted. In all other ways, the styles A and D are identical.

Style B is right-hand mounted, while style C is left-hand mounted. In all other ways, the styles B and C are identical.

Use the following procedure along with figures 8 and 9, for key number references, to convert from

styles A and D to styles B and C or vice versa or to change the mounting position.



WARNING

To avoid personal injury, perform the steps in the WARNING at the beginning of the Maintenance section to isolate the control valve and actuator.

1. Remove the tubing or piping from the top of the actuator.
2. Remove the cover (key 33) by unscrewing and removing the cap screws and washers (keys 34 and 63).
3. Unscrew cap screw (key 18). Loosen cap screw (key 28).

CAUTION

When removing the actuator from the valve body, do not use a hammer or similar tool to drive the lever (key 27) or actuator off the valve shaft. Driving the lever or actuator could damage internal valve parts. On some valve types, driving the lever (key 27) could move the valve disc and bearings away from the centered position causing subsequent damage to valve parts.

A wheel puller may be used to remove the lever. It is okay to tap the wheel puller screw lightly to loosen the lever, but hitting the screw with excessive force could also damage valve parts or disrupt the centered position of the valve disc and bearings.

4. If changing styles,
 - Unscrew cap screws (key 23), and remove the actuator housing (key 20) from the mounting yoke (key 22).
 - Rotate the housing 180 degrees, maintaining the appropriate position (1, 2, 3, or 4), and place the actuator onto the mounting yoke (key 22).
5. If changing positions, unscrew cap screws (key 23), and rotate the actuator housing to the desired position.

6. Secure actuator housing (key 20) to the mounting yoke (key 22) with cap screws (key 23). Consult table 3 for appropriate bolt torques.

7. Consult the appropriate valve instruction manual for lever/valve shaft orientation marks, and slide the lever (key 27) into place; see figure 4 for correct lever operating clearance. Clamp with the cap screw (key 28).

8. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by stroking the actuator off its up travel stop with a regulated air source.

9. Apply sealant (key 77) or equivalent thread-locking compound to the threads of the cap screw (key 18).

10. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19). Tighten cap screw to the recommended bolt torque shown in table 3. This connection can be aided by stroking the actuator from its up travel stop with a regulated air source.

11. Note the valve position and direction of rotation. Position the travel indicator (key 37) accordingly. Replace the cover (key 33), and secure it with cap screws and washers (keys 34 and 63).

- If the holes in the cover and housing (key 20) do **not** align, use a regulated air source to move the actuator slightly off the up travel stop.

- If hole alignment **cannot** be obtained in this manner, temporarily loosen cap screws (key 23) and shift the housing slightly.

CAUTION

To avoid parts damage, do not stroke the actuator while cover (key 33) is off.

12. Follow the instructions given in the Turnbuckle Adjustment section.

Top-Mounted Handwheels and Adjustable Travel Stops

Principle of Operation for Handwheels

Note

If repeated or daily manual operation is expected or desired, the unit should

be equipped with a manual handwheel actuator. Refer to the separate manual handwheel actuator instruction manual for mounting instructions.

Top-Mounted Handwheel Assembly is attached to a special upper diaphragm casing (key 1, figures 8 and 9) with cap screws (key 141, figure 10). A hex nut (key 137, figure 11) locks the handwheel in position. Turning the handwheel (key 51, figure 10) clockwise into the upper diaphragm casing forces the pusher (key 135, figure 10) against the diaphragm and diaphragm plate (keys 3 and 4, figures 8 and 9) to compress the spring (key 11, figures 8 and 9) and move the diaphragm rod downward.

Turning the handwheel counterclockwise allows the actuator spring to move the diaphragm rod upward.

- If the valve is push-down-to-close, full opening can be restricted by positioning the handwheel at the desired position.
- If the valve is push-down-to-open, full closing of the valve can be restricted by use of the handwheel.

Adjustable Up Travel Stop (figure 11) limits the actuator stroke in the upward direction. To make adjustments, first relieve actuator loading pressure before removing the closing cap (key 187) as it is a pressure retaining part. Remove the closing cap (key 187). Also, for size 70 actuators, the hex nut (key 137) must be loosened. Then turn the stem (key 133) clockwise into the diaphragm case to move the actuator stem downward or counterclockwise to allow the spring to move the actuator stem upward.

- If the valve has push-down-to-close action, full opening can be restricted by the position of the adjustable travel stop. Or,
- If the valve has push-down-to-open action, full closing can be restricted by the position of the adjustable travel stop.

For size 70, tighten the hex nut and replace the closing cap after adjustment.

Adjustable Down Travel Stop (figure 12) limits the actuator stroke in the downward direction. To make adjustments, first relieve actuator loading pressure before removing the closing cap (key 187) as it is a pressure retaining part. Remove the closing cap (key 187). Loosen the hex jam nut (key 189) and either turn the hex nut (key 63 for size 40 and 70 actuators; or key 54 for size 60 actuators) down on the stem (key 133) to limit travel, or up on the stem

to allow more travel. Lock the jam nut against the hex nut, and replace the closing cap after the adjustment has been made.

Handwheel Maintenance and Adjustable Travel Stop

If loading pressure seems to be leaking from either the handwheel or adjustable up stop, the O-rings (key 138 and 139, figures 10 and 11) may need replacement. If the adjustable down stop leaks, the O-ring (key 139, figure 12) may need replacement or possibly the closing cap (key 187, figure 11) is not tight. To tighten the closing cap, apply a good grade of thread sealant to the closing cap threads.

For ease of operation, the stem threads (key 133, figures 10, 11, and 12) may need an occasional application of lithium grease (key 241). A grease fitting (key 169, figures 10 and 11) is provided for this purpose in the size 70. The size 70 may also need to have the thrust bearing (key 175, figures 10 and 11) packed with lithium grease (key 241). Travel stops for the smaller casings can be lubricated between the stem and pusher (key 135, figures 10 and 11) with lithium grease (key 241).

The following disassembly procedures are separated where appropriate between the top-mounted handwheel and adjustable up travel stop assemblies (figures 10 and 11) and the adjustable down travel stop assembly (figure 12).



WARNING

To avoid personal injury, perform the steps in the WARNING at the beginning of the Maintenance section to isolate the control valve and actuator.

1. Remove the tubing or pipe from the handwheel body (key 142, figures 10, 11, and 12).



WARNING

To avoid personal injury from the pre-compressed spring force thrusting the upper diaphragm casing (key 1, figures 8 and 9) away from the actuator, either relieve Type 1052 spring compression, or carefully remove Type 1051 casing cap screws by following the instructions that are referenced in the steps below before removing the casing.

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2. Relieve all actuator spring compression by following the procedures presented in the Disassembly portion of the Maintenance section. Then, rotate either the handwheel (key 51, figure 10) or the travel stop stem (key 133, figures 11 and 12) counterclockwise until the handwheel or travel stop assembly is no longer compressing the spring.

CAUTION

For Type 1051 actuators with eccentric disc valves and push-down-to-open action, the cap screw (key 18, figure 8) should be disengaged from the lever (key 27, figure 9) before removing the diaphragm casing (key 1, figure 8) as specified in the following steps. Failure to do so will allow the spring precompression to rotate the valve beyond its closed position. This could cause damage to the valve seal, seat, or other valve components.

3. Proceed as appropriate:

For Adjustable Up Travel Stops:

- a. Remove the upper diaphragm casing (key 1, figures 8 and 9) by following steps 1, 3, 7, 9, 10, and 11 of the Disassembly portion of the Maintenance section.
- b. Remove the cap screws (key 141, figures 10 and 11), and separate the assembly from the upper casing.
- c. Loosen the locknut (key 137, figure 10), or remove the closing cap (key 187, figure 11).
- d. Turn the stem (key 133, figures 10 and 11) clockwise out of the valve body. On handwheel assemblies, the cotter pin and hex nut (keys 247 and 54, figure 10) will have to be removed so that the handwheel (key 51, figure 10) and locknut can be taken off the stem first.
- e. Remove and inspect the O-rings (keys 138 and 139, figures 10 and 11); replace them if necessary.
- f. To complete disassembly:

For sizes 40 and 60: Drive out the groove pin (key 140, figures 10 and 11), and slide the pusher (key 135, figures 10 and 11) off the stem.

For size 70: The pusher unit is held to the stem by a retaining screw (key 174, figures 10, 11 or 12). Removing the retaining screw and pusher exposes the thrust bearing (key 175, figures 10 and 11) for inspection.

For Adjustable Down Travel Stops:

Key numbers are shown in figure 12 unless otherwise noted. For ease of operation, the stem (key 133) threads may need an occasional application of lubricant.

- a. Remove the closing cap (key 187), and unscrew the jam nut and hex nut (keys 189 and 63 for size 40 and 70 actuators; or keys 189 and 43 for size 60 actuators) off the stem (key 133).
- b. Remove the upper diaphragm casing (key 1, figures 8 and 9) and travel stop body (key 142) by following steps 1, 3, 7, 9, 10, and 11 of the Disassembly portion of the Actuator Maintenance section.
- c. Unscrew cap screws (key 141), and remove the body from the diaphragm case.
- d. Check the condition of the O-ring (key 139), and replace it if necessary.
- e. Loosen the hex nut (key 54), and then unscrew the travel stop stem (key 133) out of the actuator stem. The lower diaphragm plate (key 82) can now be removed and the rest of the actuator disassembled.

4. Reassemble by reversing the order of the disassembly steps, being sure to apply lubricant as previously mentioned and as shown by the lubrication boxes (key 241) in figures 10 and 11. For size 70 handwheels or up travel stop assemblies, coat the threads of the retaining screws (key 174, figures 10 and 11) with sealant (key 242) or equivalent thread-locking compound.

5. Readjust the spring to obtain the appropriate travel stop restriction by following the steps in the Top Mounted Handwheel Assembly section, and then return the unit to operation.

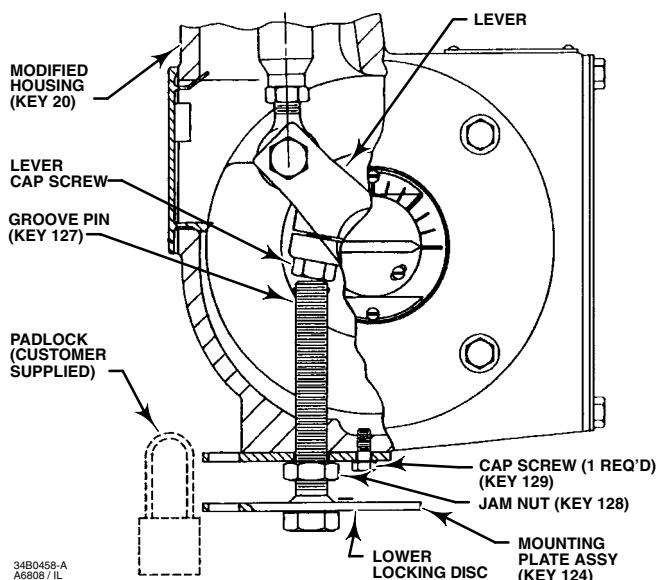


Figure 6. Actuator Locking Mechanism

Locking Mechanism

Refer to figure 6 when installing, operating, and locking the mechanism. Key numbers are shown in figure 6 unless otherwise noted.

Installing the Locking Mechanism



WARNING

To avoid personal injury, perform the steps in the WARNING at the beginning of the Maintenance section to isolate the control valve and actuator.

1. To add the locking mechanism to an existing actuator, contact your Emerson Process Management sales office to purchase the required parts. The required parts are the locking mechanism and a modified actuator housing.
2. To remove the old housing, use the Disassembly procedures in the Maintenance section.
3. Attach the mounting plate (key 123) to the modified housing (key 20) as shown in figure 6.

Attach it with the cap screw (key 129). Make sure the hole in the center of the mounting plate lines up with the large tapped hole in the housing.

4. Make sure the jam nut (key 128) is threaded onto the threaded bolt before threading it into the housing.

5. After the bolt is threaded into the housing, install the groove pin (key 127) into the end of the bolt. (Note: The groove pin will prevent the threaded bolt from being totally unthreaded from the actuator housing.)

6. Make sure that the bolt is not threaded in so far that it will interfere with reassembly of the actuator.

7. Reassemble actuator using the Assembly procedure in the Maintenance section.

8. Make sure the actuator diaphragm rod is retracted fully. This will be the locked position of the valve. For a push-down-to-close valve and actuator, the valve will be fully open when locked. For a push-down-to-open valve and actuator, the valve will be fully closed when locked.

9. Screw the threaded bolt into the housing until it contacts the head on the lever cap screw (see figure 6).

10. Insert the padlock (customer supplied) to connect the mounting plate (key 123) with the lower locking disc on the mounting plate assembly (key 124). You might have to back off the lower locking disc a slight amount to line up the holes for the padlock.

CAUTION

In the larger sized actuators, the layers of the mounting plate assembly may be far enough apart that you will need to purchase a padlock with a longer loop. Do not attempt to force the layers closer to fit a small looped padlock, as property damage may result.

11. Tighten the jam nut (key 128) against the mounting plate.

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Operating the Locking Mechanism

To Unlock the Actuator

1. Remove the padlock. Loosen the jam nut (key 128), and unscrew the threaded bolt until it is stopped by the groove pin (key 127) in the threaded bolt.

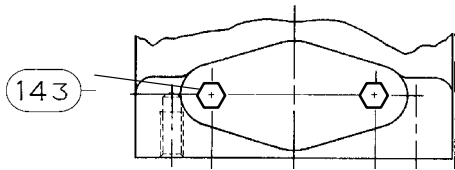
CAUTION

For normal operation of the actuator, the threaded bolt must be unscrewed far enough so that the actuator lever will not contact the bolt, which could lead to property damage.

2. If you are going to leave the bolt threaded into the housing, lock it by tightening the jam nut (key 128) against the mounting plate so that it cannot be screwed into the housing and interfere with normal actuator operation.

To Lock the Actuator

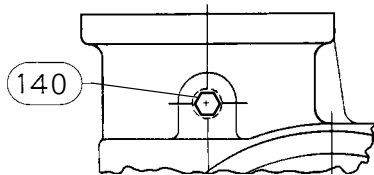
1. Make sure the actuator diaphragm rod is retracted fully. This will be the locked position of the valve. For a push-down-to-close valve and actuator, the valve will be fully open when locked. For a push-down-to-open valve and actuator, the valve will be fully closed when locked.
2. Make sure the jam nut (key 128) is loose. Screw the threaded bolt into the housing until it contacts the head on the lever cap screw (see figure 6).
3. Rotate the threaded bolt until one of the holes in the lower locking disc (which is welded to the bolt) is in line with the hole in the mounting plate (key 123). Tighten the jam nut against the mounting plate.
4. Lock the plate and disc together with a padlock. (The padlock is customer supplied.)



32A9325-F / IL

NOTE:
IF ACCESSORIES ARE NOT INSTALLED ON THE MOUNTING BOSS, INSTALL CAP SCREWS (KEY 143) TO PLUG OPENINGS. A MOUNTING BOSS IS LOCATED ON BOTH SIDES OF THE SPRING BARREL.

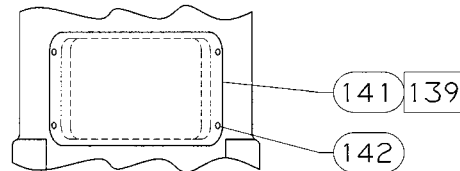
ACCESSORIES MOUNTING BOSS



40B3945-B / IL

NOTE:
INSTALL THE HEX HEAD PLUG (KEY 140) INTO THE VENT OPENING LOCATED IN THE ACTUATOR HOUSING.

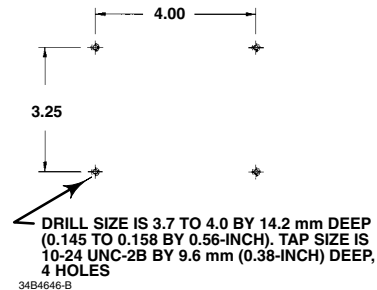
HOUSING VENT PLUG LOCATION



34B4646-B / IL

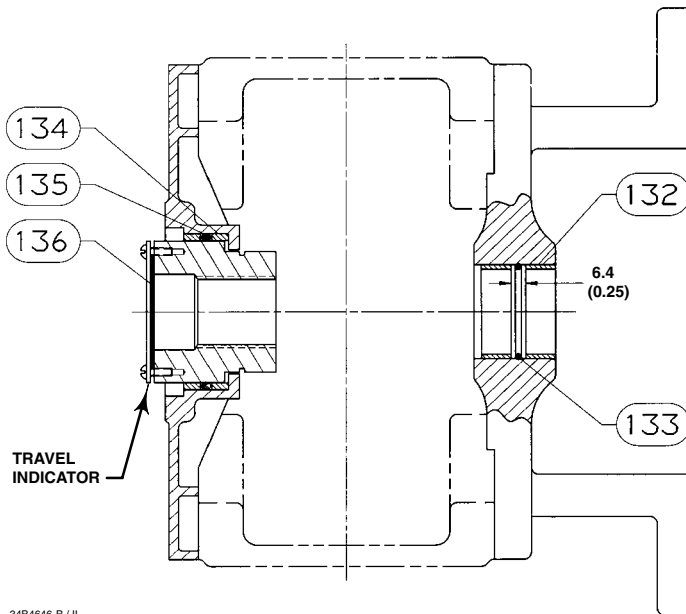
NOTE:
FOR FIELD CONVERSION OF TYPE 1052 ACTUATORS, ATTACH COVER (KEY 141) OVER THE SPRING BARREL ADJUSTMENT OPENING WITH SELF-TAPPING SCREWS (KEY 142). USE KEY 141 AS A DRILLING TEMPLATE. USE DRILL SIZE 2.6 mm (A #37 DRILL) (0.104-INCH) BY 9.6 mm (0.38-INCH) DEEP.
☐ APPLY SEALANT

**TYPE 1052 SPRING BARREL
ACCESS COVER**



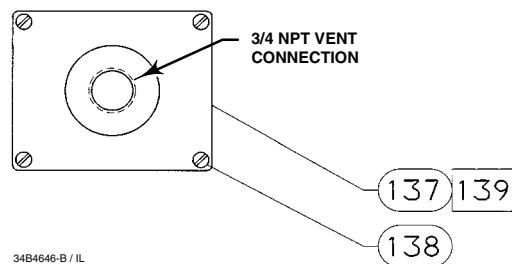
34B4646-B

**DRILLING AND TAPPING PATTERN
ACCESS PLATE ASSEMBLY**



34B4646-B / IL

MOUNTING YOKE AND COVER ASSEMBLY



34B4646-B / IL

NOTE:
FOR FIELD CONVERSION, DRILL AND TAP HOLE PATTERN IF HOUSING HAS A NON-METALLIC ACCESS PLATE. USE KEY 137 AS A DRILLING TEMPLATE IF DESIRED. OR, USE THE DIMENSIONS PROVIDED IN THIS FIGURE FOR DRILLING AND TAPPING.
☐ APPLY SEALANT

ACCESS PLATE ASSEMBLY

mm
(INCH)

Figure 7. Pipe Away Vent Assembly

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Pipe-Away Vent



WARNING

If a flammable or hazardous gas is being used as a supply medium, personal injury, or property damage could result from fire or explosion of accumulated gas. A remote vent pipe cannot be relied upon to vent all gases from the installed location. Provide adequate ventilation for the actuator/positioner assembly. Comply with local and regional codes, and keep the vent pipeline as short as possible with few bends.

Some applications require venting of gas from the rotary actuator housing. The 3610 Series positioners vent into the actuator housing, and from there, the gas has numerous avenues of escape.

Note

This modification is NOT intended to be a leak-proof or pressure-tight design. It is intended to aid in containing the gas that vents from the positioner and allow for connection of piping to carry it away.

Take care that an adequate vent pipe size is used. This is particularly important with the larger size actuators that have fast stroking speed requirements. In these situations, large quantities of gas can be vented very quickly through the positioner, and adequate pipe-away capability must be obtained. Keep the vent piping as short as possible with few bends.

Refer to the Disassembly and Assembly steps in the Maintenance section to gain access to the following parts. Key numbers are shown in figure 7 unless otherwise noted.

Bushings—Remove the mounting yoke bushing (key 67), and the end plate cover bushing (key 31, figures 8 and 9). Replace them with the pipe-away vent parts, as shown in figure 7. The mounting yoke bushing (key 132) is a two-piece bushing with an O-ring (key 133). The end plate cover completes the assembly with a two-piece bushing (key 134) with an O-ring (key 135).

Travel Indicator—A gasket (key 136) is placed under the travel indicator plate. Remove the indicator plate (key 37, figures 8 and 9), install the gasket (key 136) as shown in figure 7.

Access Plate Assembly—A modified metal access plate assembly (key 137) is provided with a 3/4 NPT vent connection as shown in figure 7. If the actuator had a plastic access plate, it will be necessary to drill and tap the actuator housing to install the machine screws (key 138) as shown in figure 7. Use the drilling and tapping pattern shown in figure 7, or use the holes in the access plate as a template to mark holes.

When finished with all maintenance procedures requiring the access plate assembly (key 137) to be removed, use the sealant (key 139) provided with the kit to seal the plate in place.

Housing Vent Plug—A vent is provided in the housing design. To plug this opening, the pipe-away vent kit provides a hex pipe plug (key 140) for this opening, as shown in figure 7. Install the hex plug (key 140) into this opening and tighten it.

Accessories Mounting Boss—If accessories are not installed on the mounting boss, install cap screws (key 143) to plug openings. The location to install the cap screws (key 143) is shown in figure 7. A mounting boss is located on both sides of the spring barrel (key 12, figures 8 and 9).

Type 1052 Spring Barrel Access Cover—For field conversion of Type 1052 actuators, attach the cover (key 141) over the spring barrel adjustment opening with self-tapping screws (key 142). Use key 141 as a drilling template. Drill size is 2.6 mm (A #37 drill) (0.104-inches) by 9.6 mm (0.38-inches) deep.

Parts Ordering

When corresponding with your Emerson Process Management sales office about this equipment, refer to the serial number found on the actuator nameplate (key 41, figures 8 and 10). Also, specify the complete 11-character part number from the following parts list when ordering replacement parts. The Size 70 actuator is available only in Type 1052 actuators.



WARNING

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

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

Parts Kits

Top-Mounted Handwheel Retrofit Kits

Kit provides parts to add a top-mounted handwheel. Kit Number 1 includes the handwheel assembly only. Kit Number 2 includes Kit Number 1 and a new upper case (key 1) that is required to mount the handwheel assembly.

Kit Number 1

Key	Description	Part Number
	Size 40	38A1213X032
	Size 60	38A1213X062
	Size 70 Type 1052 only	CV8010X0052

Kit Number 2

Key	Description	Part Number
	Size 40	38A1213X072
	Size 60,	38A1213X022
	Size 70 Type 1052 only	CV8010X0062

Pipe-Away Vent Retrofit Kit

Vent-away kits include: access plate, two-piece bushing, two O-rings, gasket, and the application of a sealant (sealant supplied with retrofit kit). For Type 1052, an additional cover plate and screws are required for the spring adjustment access.

See figure 7.

Pipe-Away Vent Retrofit Kit Numbers

SHAFT DIAMETER		TYPE 1051 SIZE	KIT PART NUMBER	TYPE 1052 SIZE	KIT PART NUMBER
mm	Inches				
12.7	1/2	40	34B4646X022	40	34B4646X162
15.9	5/8	40	34B4646X032	40	34B4646X182
19.1	3/4	40	34B4646X042	40	34B4646X202
		60	34B4646X052	60	34B4646X212
22.2	7/8	40	34B4646X062	40	34B4646X222
		60	34B4646X072	60	34B4646X232
25.4	1	40	34B4646X082	40	34B4646X242
		60	34B4646X092	60	34B4646X252
31.8	1-1/4	40	34B4646X102	40	34B4646X262
		60	34B4646X112	60	34B4646X272
38.1	1-1/2	60	34B4646X122	70	34B4646X282
				60	34B4646X292
44.5	1-3/4	60	34B4646X132	70	34B4646X302
				60	34B4646X312
50.8	2	60	34B4646X142	70	34B4646X322
				60	34B4646X332
				70	34B4647X342

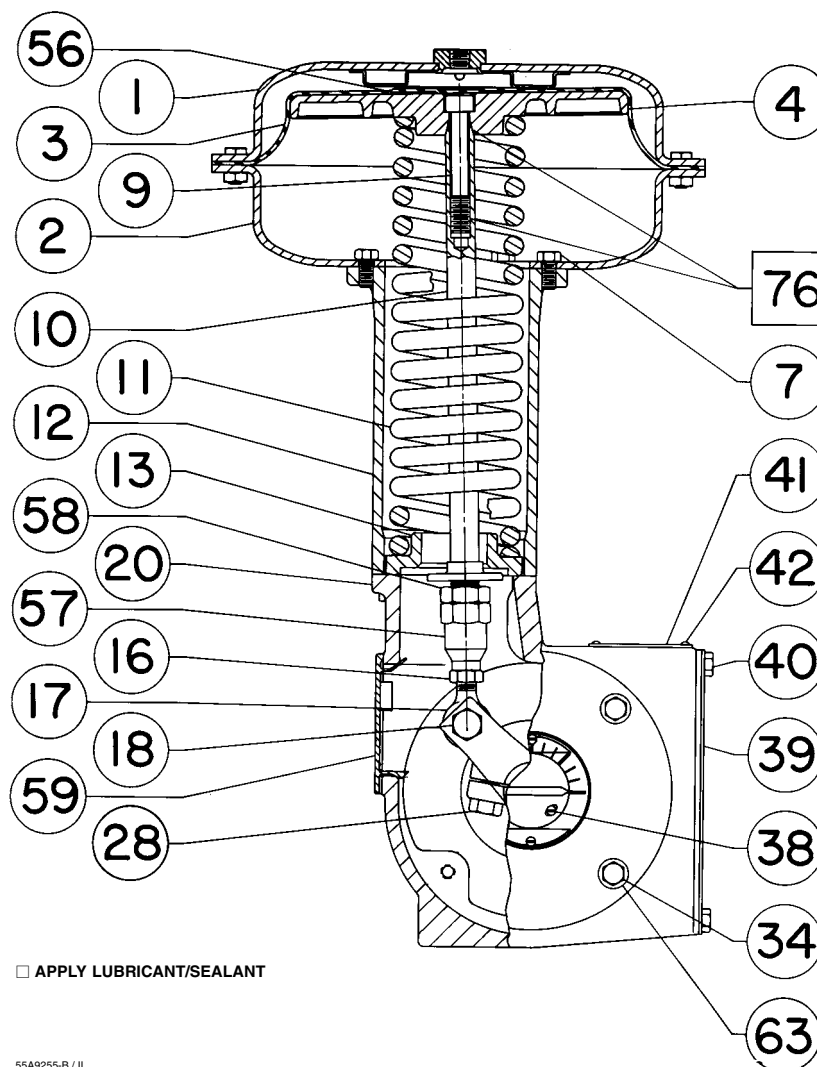


Figure 8. Typical Type 1051 Actuator Assembly

Parts List

Common Parts (Figures 8 and 9)

Note

Part numbers shown are for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.

Key	Description	Part Number	Key	Description	Part Number
1	Casing, upper		3*	Diaphragm, molded (continued)	
2	Diaphragm Casing, lower (steel zn pl)			Size 60	2E859702202
3*	Diaphragm, molded (NBR/nylon)			Size 70	2N126902202
	Standard			w/adj down stop	
	w/handwheel, or w/adj up stop			Size 40	2E669902202
Size 40		2E670002202		Size 60	2E859802202
				Size 70	2N130902202
				VMQ/polyester	
				Standard	
				w/handwheel, or w/adj up stop	
				Size 40	2E6700X0012
				Size 60	2E8597X0032
				Size 70	2N1269X0012
			4	Diaphragm Head	

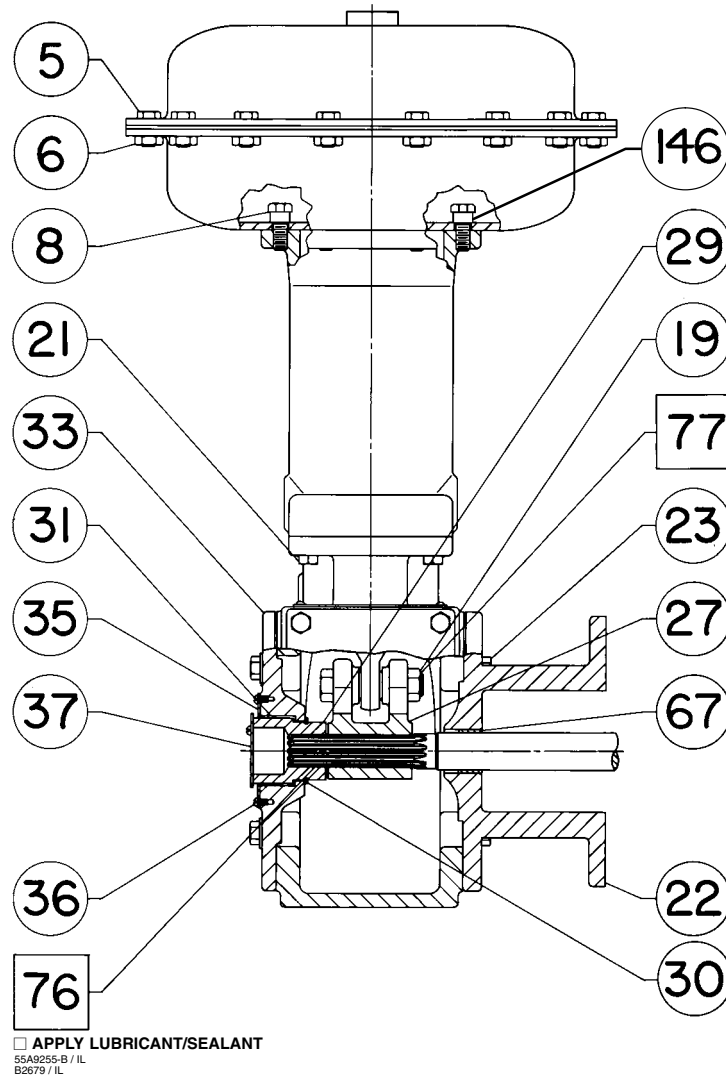


Figure 8. Typical Type 1051 Actuator Assembly (Continued)

Key	Description	Part Number	Key	Description	Part Number
5	Screw, Cap, Hex Hd, Size 40 (12 req'd) Size 60 (16 req'd) Size 70 (24 req'd)		16	Nut, Hex	
6	Nut, Hex Size 40 (16 req'd) Size 60 (24 req'd) Size 70 (28 req'd)		17	Bearing Rod End	
7	Screw, Cap, Hex Hd Size 40 (4 req'd) Size 60 (6 req'd) Size 70 (10 req'd)		18	Screw, Cap, Hex Hd	
8	Stop, Travel (2 req'd)		19	Nut, Hex, Jam	
9	Screw, Cap, Hex Socket		20	Housing	
10	Diaphragm Rod		20	Modified Housing	
11	Spring	See following table	21	Screw, Cap, Hex Hd (4 req'd)	
12	Spring Barrel		22	Yoke, Mounting	
13	Spring Seat	See following table	23	Screw, Cap, Hex Hd (4 req'd)	
			27	Lever	
			28	Screw, Cap, Hex Hd	
			29	Hub	
			30	Ring, Retaining, Ext	
			31*	Bushing Size 40 Sizes 60 & 70	12A9373X012 12A9374X012
			33	Cover	

1051 & 1052 F & G Actuators

Key	Description	Part Number	Key	Description	Part Number
34	Screw, Cap, Hex Hd w/o switches, w/Type 304, Type 4200, w/BZE6-2RN or DTE6-2RN SW, w/micro switch w/90 deg, or w/ Type 3710 positioner (4 req'd) w/NAMCO or LSA/LSX switches, w/1 or 2 GO switches, w/ LSA/LSX sw, or w/NAMCO or LSA/LSX switch (2 req'd)		140*	Pin, Groove Carbon Steel-Plated Size 40 S31600 (316 SST) Size 60	1F118028992 1B627035072
35	Scale, Indicator		141	Screw, Cap, Hex Hd Size 40 (6 req'd) Size 60 (8 req'd) Size 70 (12 req'd)	
36	Screw, Self Tapping (2 req'd)		142	Body	
37	Travel Indicator		164	Body Extension	
38	Self-Tapping Screw (2 req'd)		169	Grease Fitting	
38	Machine Screw (2 req'd)		171	Washer, plain	
39	Plate, Cover		174	Retaining Screw	
40	Screw, Cap, Hex Hd (4 req'd)		175	Bearing, Thrust	
41	Nameplate		176	Bearing Race, Thrust, Type 1052 Size 70 only (2 req'd)	
42	Screw, Drive (4 req'd)		241	Lithium grease lubricant	
56	Warning Label		242	Thread locking sealant	
57	Turnbuckle		244	Anti-seize lubricant	
58	Nut, Hex, Jam		246	Spacer	
59	Plate, Access		247	Pin, Cotter	
63	Washer, Plain Size 40 (4 req'd) Size 60 & 70 (2 req'd)		Adjustable Up Travel Stop (Figure 11)		
67*	Bushing	See following table	133	Stem	
71	Bearing, Thrust		135	Plate, Pusher	
72	Bearing Race (2 req'd)		137	Nut, travel stop	
73	Bearing Seat		138*	O-Ring, (NBR) Size 40 Size 60 Size 70	1D237506992 1B885506992 1C415706992
74	Screw, Adjusting		139*	O-Ring, (NBR) Size 40 Size 60 Size 70	1D267306992 1D547106992 1D269106992
76	Lithium grease lubricant		140*	Pin, Groove carbon steel-plated Size 40 S31600 (316 SST) Size 60	1F118028992 1B627035072
77	Thread locking sealant		141	Screw, Cap, Hex Hd Size 40 (6 req'd) Size 60 (8 req'd) Size 70 (12 req'd)	
78	Screw, Cap 9.5 & 12.7 mm (3/8 & 1/2 inch) Shafts (2 req'd) 15.9 thru 50.4 mm (5/8 thru 2-inch) Shafts (4 req'd)		142	Body	
82	Diaphragm Head, lower		164	Body Extension	
83	Plug, Protective		169	Grease Fitting	
- - -	Pipe Bushing (not shown)		171	Spacer	
144	Warning Nameplate		174	Retaining Screw	
146	Spacer		175	Bearing, Thrust	
Top-Mounted Handwheel (Figure 10)			176	Bearing Race, Thrust, Type 1052 Size 70 only (2 req'd)	
51	Handwheel		187	Travel Stop Cap	
54	Nut, Hex, Slotted		241	Lithium grease lubricant	
133	Stem		242	Thread locking sealant	
135	Plate, Pusher				
137	Nut, Hex, Jam				
138*	O-Ring, (NBR) Size 40 Size 60 Size 70	1D237506992 1B885506992 1C415706992			
139*	O-ring, (NBR) Size 40 Size 60 Size 70	1D267306992 1D547106992 1D269106992			

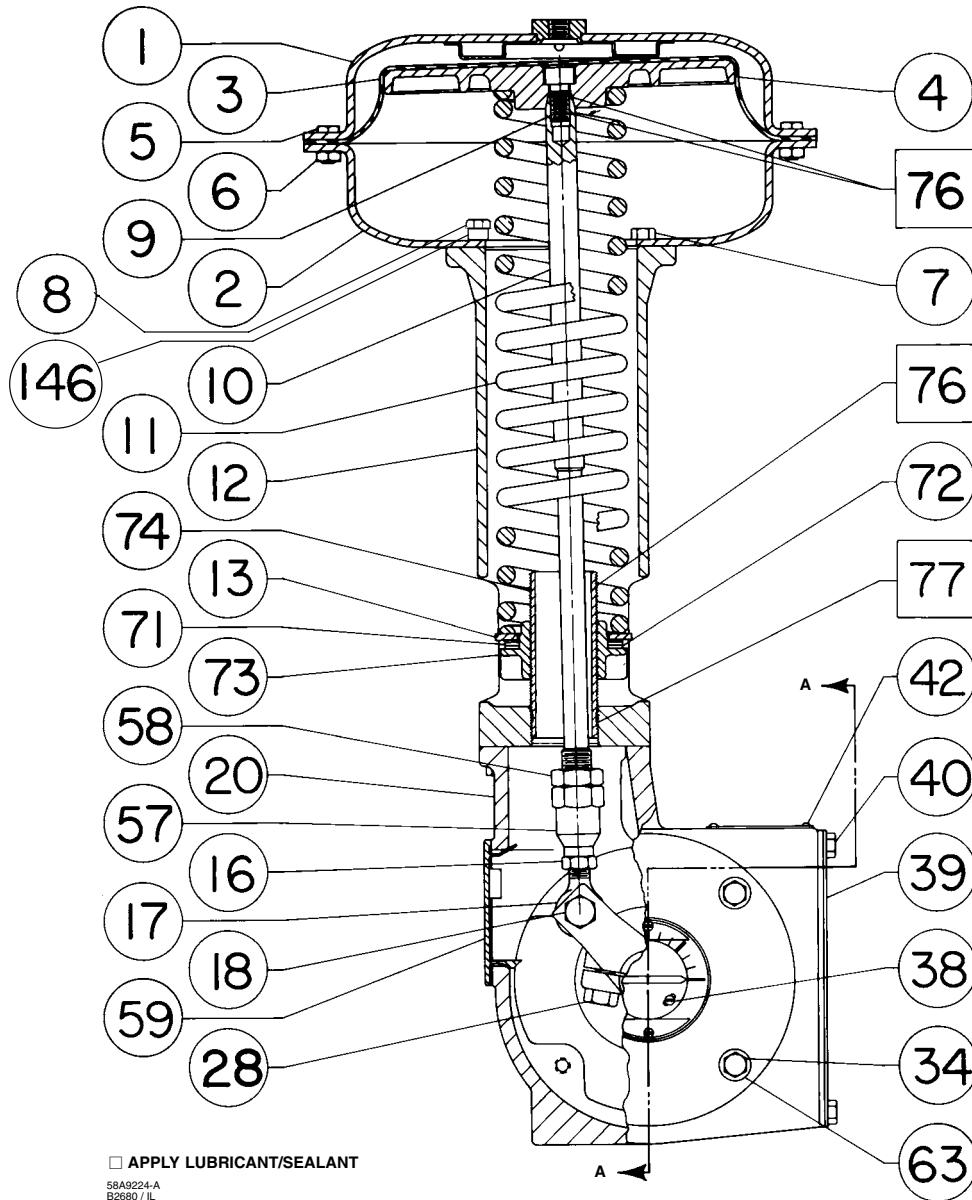


Figure 9. Typical Type 1052 Assembly

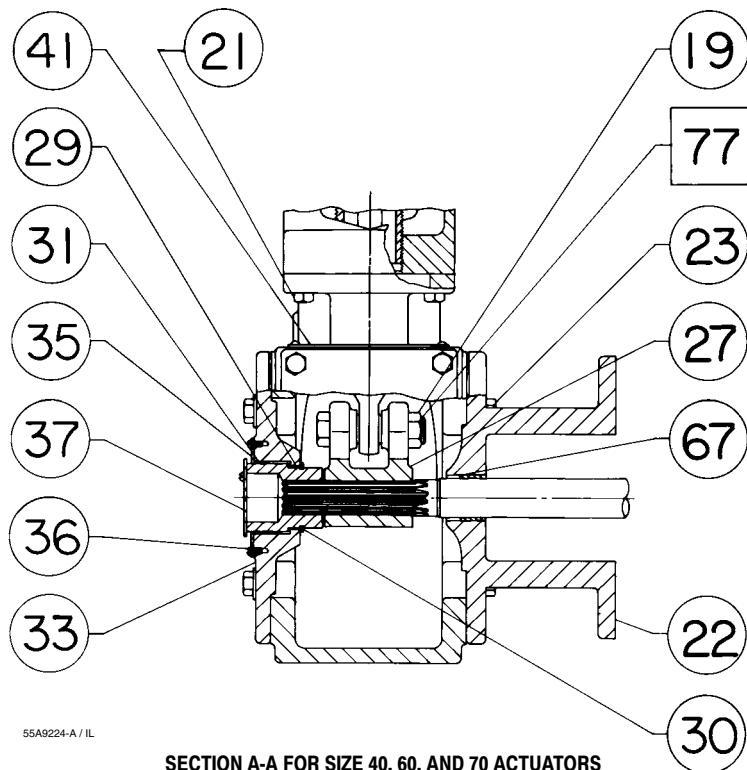
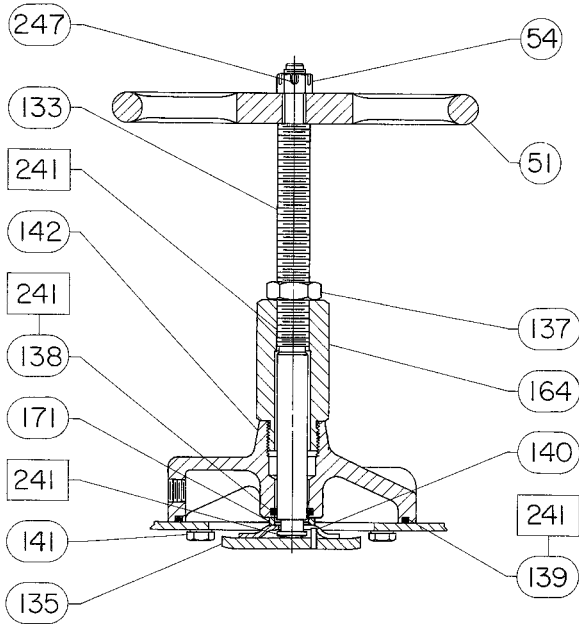


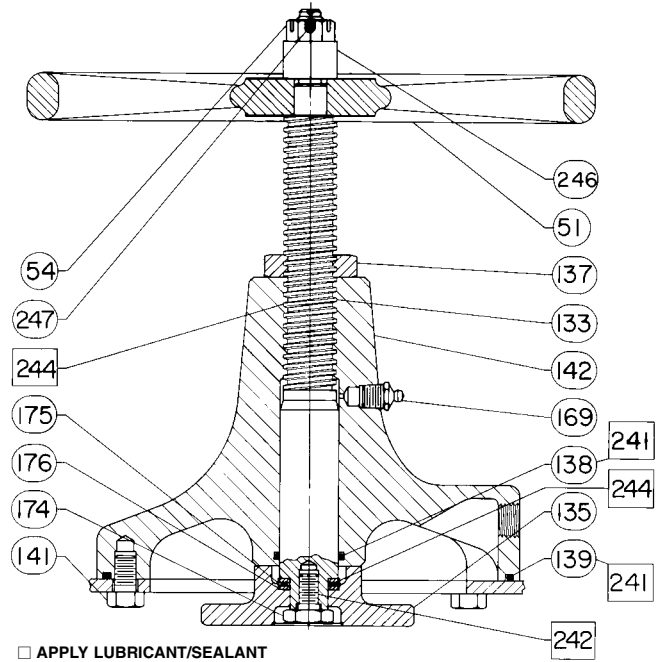
Figure 9. Typical Type 1052 Assembly (continued)



☐ APPLY LUBRICANT

38A1213-B / IL

**TOP-MOUNTED HANDWHEEL ASSEMBLY FOR
SIZE 40 AND 60 ACTUATORS**



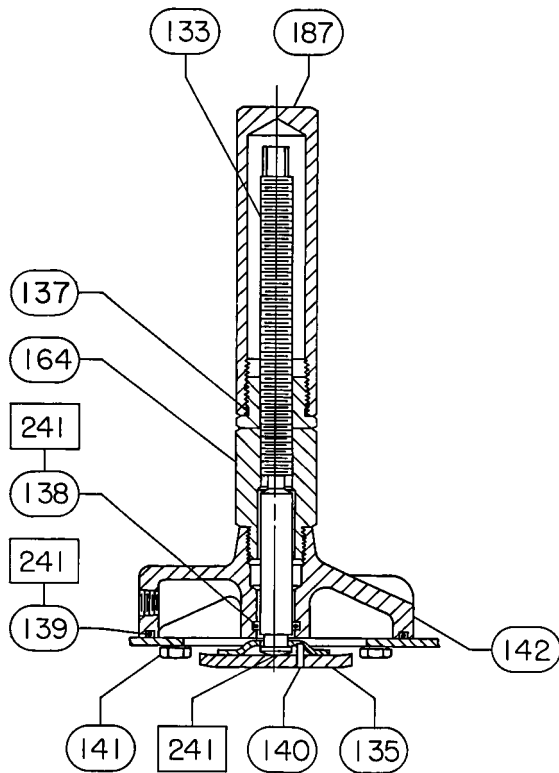
☐ APPLY LUBRICANT/SEALANT

CV8010-G / IL

**TOP-MOUNTED HANDWHEEL ASSEMBLY FOR
SIZE 70 ACTUATOR**

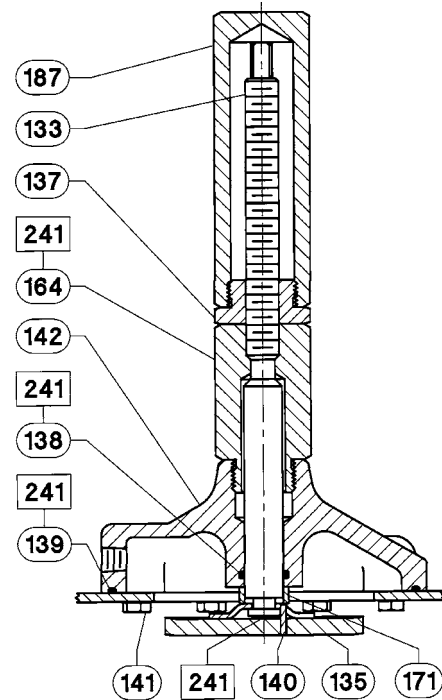
Figure 10. Handwheel Assemblies

1051 & 1052 F & G Actuators



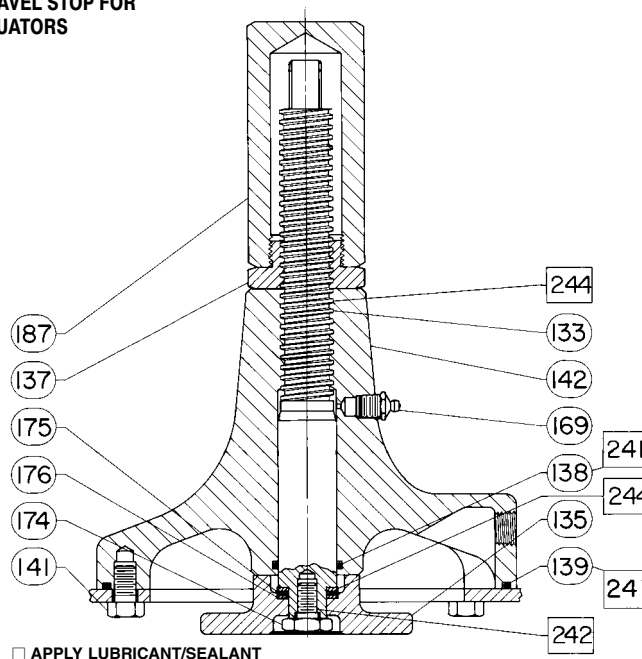
28A1207-B / IL

**ADJUSTABLE UP TRAVEL STOP FOR
SIZE 40 ACTUATORS**



28A1214-A / IL

**ADJUSTABLE UP TRAVEL STOP FOR
SIZE 60 ACTUATORS**



CV8057-E / IL

**ADJUSTABLE UP TRAVEL STOP FOR SIZE 70
TYPE 1052 ACTUATORS**

Figure 11. Adjustable Up Travel Stops

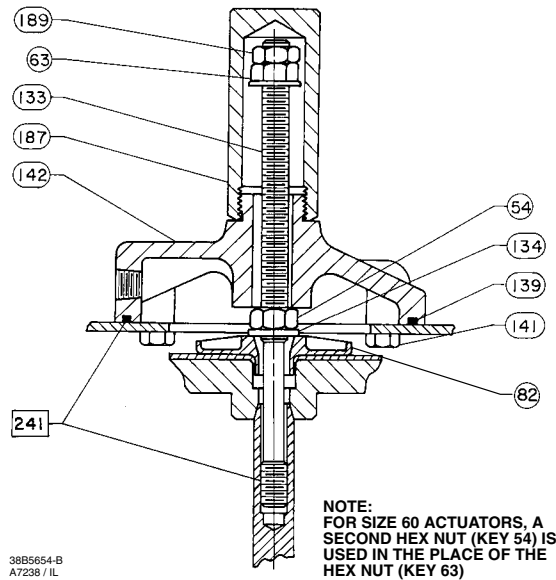


Figure 12. Adjustable Down Travel Stop

Adjustable Down Travel Stop (Figure 12)

Key	Description	Part Number
54	Nut, Hex Size 40 (1 req'd) Size 60 & 70 (2 req'd)	
63	Flange Nut	
133	Travel Stop Stem	
134	Washer (plain carbon steel)	
139*	O-Ring (NBR) Size 40 Size 60 Size 70	1D267306992 1D547106992 1D269106992
141	Screw, Cap, Hex Hd (steel zn pl) Size 40 (6 req'd) Size 60 (8 req'd) Size 70 (12 req'd)	
142	Travel Stop Body	
187	Travel Stop Cap	
189	Nut, Hex, Jam Size 40 & 60 (1 req'd) Size 70 (2 req'd)	
241	Lithium grease lubricant	

Locking Assembly (Figure 6) (Size 40, 60, and 70 Actuators)

123	Mounting Plate
124	Mounting Plate Assembly
127	Groove Pin
128	Jam Nut

129 Cap Screw

Pipe-Away Vent (Figure 7)

Key	Description	Part Number
-----	-------------	-------------

Complete retrofit kits are listed at the beginning of the parts list. Use this listing for individual replacement parts

132*	Lined Bushing (steel/PTFE) yoke side 12.7 mm (1/2 inch) dia. shaft (2 req'd) 15.9 mm (5/8 inch) dia. shaft (2 req'd) 19.1 mm (3/4 inch) dia. shaft (2 req'd) 22.2 mm (7/8 inch) dia. shaft (2 req'd) 25.4 mm (1-inch) dia. shaft (2 req'd) 31.8 mm (1-1/4 inch) dia. shaft (2 req'd) 38.1 mm (1-1/2 inch) dia. shaft (2 req'd) 44.5 mm (1-3/4 inch) dia. shaft (2 req'd) 50.8 mm (2-inch) dia. shaft (2 req'd)	1U902599402 14B4642X012 F1918348112 14B4631X012 14B4632X012 14B4633X012 14B4634X012 14B4635X012 G1668548112
133*	O-Ring (NBR) 12.7 mm (1/2 inch) dia. shaft 15.9 mm (5/8 inch) dia. shaft 19.1 mm (3/4 inch) dia. shaft 22.2 mm (7/8 inch) dia. shaft 25.4 mm (1-inch) dia. shaft 31.8 mm (1-1/4 inch) dia. shaft 38.1 mm (1-1/2 inch) dia. shaft 44.5 mm (1-3/4 inch) dia. shaft 50.8 mm (2-inch) dia. shaft	1J4888X0052 11A8741X052 1F4636X0032 10A3805X012 10A8217X042 14A6981X012 1F1153X0012 1P1676X0012 10A3800X012
134*	Bushing (steel/PTFE) hub side Size 40 12.7 to 22.2 mm (1/2 to 7/8 inch) dia. shaft (2 req'd) Size 40 25.4 to 31.8 mm (1- to 1-1/4 inch) dia. shaft (2 req'd) Size 60 19.1 to 50.8 mm (3/4 to 2-inch) dia. shaft (2 req'd)	14B3503X012 14B3503X012 14B4310X012
135*	O-Ring, hub side Size 40 12.7 to 22.2 mm (1/2 to 7/8 inch) dia. shaft Size 40 25.4 to 31.8 mm (1- to 1-1/4 inch) dia. shaft Size 60 19.1 to 50.8 mm (3/4 to 2-inch) dia. shaft	1K594906562 1K594906562 1U2504X0042
136	Travel Indicator Gasket	
137	Access Plate assembly	
138	Machine screw (4 req'd)	
139	Blue RTV or equivalent	
140	Plug	
141	Spring Barrel Cover, Type 1052 only (2 req'd)	
142	Self-tapping Screw Size 40 (4 req'd) Size 60 (5 req'd) Size 70 (8 req'd)	
143	Cap Screw Size 40 & 70 (4 req'd) Size 60 (2 req'd)	

1051 & 1052 F & G Actuators

Key 11. Spring⁽¹⁾ for Type 1051 Actuator Only (Steel)

Key 13. Spring Seat⁽¹⁾ for Type 1051 Actuator Only (Steel)

CASING PRESSURE		ACTUATOR SIZE	KEY 11 SPRING PART NUMBER	KEY 13 SPRING SEAT PART NO.
Bar	Psig			
0 to 1.2	0 to 18	40	1L217427042	12A9447X012
		60	1K162727082 1N937327082 1N937327082	12A9450X012 12A9448X012 12A9449X012
		60	1K162727082 1N937327082 1N937327082	12A9448X012 12A9449X012 12A9448X012 12A9449X012
0 to 2.3	0 to 33	40	1L217327042 1P637127082	12A9446X012 12A9447X012
		60	1K162827082 1K162827082 1N937327082 1N937327082	12A9448X012 12A9449X012 12A9448X012 12A9449X012
		60	1K162827082 1K162829082	12A9446X012 12A9448X012 12A9449X012
0 to 2.8	0 to 40	40	1L217327042	12A9446X012
0 to 3.8	0 to 55	40	1L217327042	12A9446X012
0.2 to 1.0	3 to 15	60	1K162727082	12A9450X012
0.2 to 2.1	3 to 30	40	1L217327042 1P637127082	12A9446X012 12A9447X012
		60	1K162827082 1N937327082	12A9449X012 12A9449X012
		60	1N937327082	12A9449X012

1. For more detailed ordering information concerning spring selection to obtain the torque required by the valve, consult your Emerson Process Management sales office.

Key 11. Spring⁽¹⁾ for Type 1052 Actuators Only (Steel)

CASING PRESSURE		ACTUATOR SIZE	INITIAL SPRING COMPRESSION				KEY 11 SPRING PART NUMBER
			Push-down-to-open		Push-down-to-close		
Bar	Psig		Bar	Psig	Bar	Psig	
0 to 1.2	0 to 18	40	0.2	3.0	0.2	3.0	1L217427042
			0.3	4.3	0.2	3.0	1P637127082
	0 to 18	60	0.3	3.7	0.2	3.0	1K162727082
			0.2	3.5	0.2	3.0	1N937327082
0 to 2.3	0 to 33	40	0.3	4.3	0.3	4.3	1P637127082
			0.4	6.0	0.2	3.0	1L217327042
			0.3	4.4	0.2	3.0	1N844027082
	0 to 33	60	0.2	3.5	0.2	3.5	1N937327082
			0.5	7.0	0.2	3.0	1K162827082
			0.5	6.8	0.2	3.0	1P270227042
	0 to 33	70	0.7	10.1	0.2	3.0	1R676027082
			0 to 2.8	0 to 40	40	0.3	4.4
0.4	6.0	0.2				3.0	1L217327042
0 to 40	60	0.5		6.8	0.2	3.0	1P270227042
		0.5		7.0	0.2	3.1	1K162827082
0 to 40	70	0.7	10.1	0.2	3.3	1R676027082	
		0 to 3.8	0 to 55	40	0.3	4.4	0.2
0.7	10.1				0.7	10.1	1R676027082
0.2 to 1.0	3 to 15	40	— — —	— — —	0.2	3.0	1L217427042
	3 to 15	60	0.3	3.7	0.2	3.0	1K162727082
0.2 to 2.1	3 to 30	40	0.3	4.3	0.3	4.3	1P637127082
			0.4	6.0	0.2	3.0	1L217327042
			— — —	— — —	0.2	3.0	1N844027082
	3 to 30	60	0.2	3.5	0.2	3.5	1N937327082
			0.5	7.0	0.2	3.0	1K162827082
			— — —	— — —	0.2	3.0	1P270227042
	3 to 30	70	0.7	10.1	0.2	3.0	1R676027082
1. For more detailed ordering information concerning spring selection to obtain the torque required by the valve, consult your Emerson Process Management sales office.							

1. For more detailed ordering information concerning spring selection to obtain the torque required by the valve, consult your Emerson Process Management sales office.

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Keys 22 and 67*. Mounting Yoke Assembly

VALVE DESIGN	ACTUATOR SIZE	VALVE SHAFT DIAMETER	VALVE SHAFT DIAMETER	KEY 22 YOKE CAST IRON ⁽¹⁾		KEY 67 BUSHING, PTFE
		mm	Inches			
CV500, V150, V200, V250, V300, 8510, 8532, and 8560	40	12.7	1/2	12A9799X0A2	---	1U902599402
		15.9	5/8	12A9799X0B2	---	12A9555X012
		19.1	3/4	12A9799X0C2	---	12A9556X012
	40	22.2	7/8	12A9799X0E2	---	12A9557X012
		25.4	1	12A9799X0G2	---	12A9775X012
		31.8	1-1/4	12A9799X112	---	12A9558X012
	60	19.1	3/4	12A9799X0D2	---	12A9556X012
		22.2	7/8	12A9799X0F2	---	12A9557X012
		25.4	1	12A9799X0H2	---	12A9775X012
	60 and 70	31.8	1-1/4	12A9799X0J2	---	12A9558X012
		38.1	1-1/2	12A9799X0K2	---	12A9559X012
		44.5	1-3/4	12A9799X0L2	---	10A3848X012
		50.8	2	12A9799X0M2	---	12A9715X012
9500 for G Mounting	40	12.7	1/2	---	32A9755X012	1U902599402
		15.9	5/8	---	32A9742X012	12A9555X012
		19.1	3/4	---	32A9743X012	12A9556X012
	40	25.4	1	---	32A9757X012	12A9575X012
		31.8	1-1/4	---	32A9746X012	12A9558X012
	60	19.1	3/4	---	32A9750X012	12A9556X012
		25.4	1	---	32A9778X012	12A9775X012
	60 and 70	31.8	1-1/4	---	32A9753X012	12A9558X012
		38.1	1-1/2	---	32A9754X012	12A9559X012
		44.5	1-3/4	---	35A9704X012	12A9560X012
		50.8	2	---	35A9705X012	12A9561X012

1. The yokes in this column are available as yoke-bushing assemblies. However, the bushings are available as replacement parts.

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Form 5062

May 2008

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