

# Instruction Manual

## CVS Type 1051 Rotary Actuator Sizes 30 - 60

All CVS Controls actuators are to be installed and maintained in accordance with instructions supplied by CVS Controls.

This manual includes information on installing, maintaining and adjusting the CVS Type 1051 Actuator, sizes 30 to 60. Part numbers for the entire assembly is also included. For information on other equipment used with these actuators, consult the appropriate manuals.

### Introduction

The CVS Type 1051 Diaphragm Rotary Actuator is a pneumatic spring-return actuator designed for use with rotary-shaft control valves. This is a direct-acting actuator, and an increase in the loading pressure extends the diaphragm rod out of the spring barrel. The CVS Type 1051 Actuator is suitable for on-off service, or for throttling service when used with a valve positioner.

The stroking time is dependent on the actuator size, rotation, spring rate, initial spring compression and supply pressure. If the stroking time is critical for your application, consult CVS Controls Ltd. for proper settings.

The travel indicator is a combination graduated disk and pointer located on the actuator end of the valve shaft. Fixed travel stops are an available option.

Refer to Table 1 for additional specifications for the CVS Type 1051 Actuator. Additional information specific to the actuator as shipped from the factory are stamped on the nameplate (Figure 2) installed on the actuator.



Figure 1: CVS Type 1051 Actuator

### Installation

When the actuator and the valve are shipped together from CVS Controls Ltd., the actuator is usually mounted onto the valve. Refer to the valve body instruction when installing the valve into the pipeline, and then follow the instructions in the Loading Connections portion of this manual.

If the actuator has been shipped separately, or if it is necessary to mount the actuator onto the valve, refer to procedures in the Actuator Mounting portion of this manual.

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**Table 1: CVS Type 1051 Actuator Specifications**

<b>Operating Principle</b>		Direct Acting
<b>Actuator Sizes</b>		30, 40, 60
<b>Maximum Diaphragm Casing Pressure</b>	<b>Size 30</b>	80 psig (5.5 bar)
	<b>Size 40</b>	65 psig (4.5 bar)
	<b>Size 60</b>	40 psig (2.8 bar)
<b>Maximum Valve Shaft Rotation</b>		90 degrees with optional fixed stops
<b>Acceptable Valve Shaft Diameters In. (mm)</b>	<b>Size 30</b>	1/2" (12.7 mm), 5/8" (15.9 mm), 3/4" (19.1 mm)
	<b>Size 40</b>	1/2" (12.7 mm), 5/8" (15.9 mm), 3/4" (19.1 mm), 7/8" (22.2 mm), 1" (25.4 mm), 1-1/4" (31.8 mm)
	<b>Size 60</b>	3/4" (19.1 mm), 7/8" (22.2 mm), 1" (25.4 mm), 1-1/4" (31.8 mm), 1-1/2" (38.1 mm), 1-3/4" (44.5 mm) or 2" (50.8 mm)
<b>Material Temperature Capabilities</b>	<b>Nitrile Diaphragm</b>	-40 to 180°F (-40 to 82°C)
<b>Pressure Connections</b>		1/4" NPT Female
<b>Mounting Positions</b>		See Figures 3 and 4
<b>Approximate Weights</b>		See Table 2
<b>Additional Specifications</b>		Refer to the Parts List for casing pressure ranges and material identification

**Installation cont'd**

**Warning: Exceeding the diaphragm casing limits can cause pressure-retaining parts to burst and may cause personal injury or property damage. Do not exceed the limits outlined in Table 1. Use pressure-limiting or pressure-relieving devices to prevent the diaphragm casing pressure from exceeding these limits.**

**Actuator Mounting**

Follow these instructions when connecting a valve body and an actuator that have been ordered separately. Refer to Figures 7 and 8 for Key Numbers.

1. Remove cap screws and washers (Keys 8 and 9), and then remove cover (Key 41).
2. Refer to Figures 3 and 4 for mounting styles and positions. Normally the actuator is positioned vertically with the valve in a horizontal pipeline.
3. Slide the mounting yoke (Figure 8, Key 35) over the valve shaft and use the valve mounting cap screws to secure it to the valve.
4. For other valve types refer to the instruction manual for that valve body and use bolting torques for these cap screws.

**Caution: Refer to Table 3 for proper actuator bolt torque requirements. Exceeding the torque requirement may impair the safe operation of the actuator.**

5. Screw the left-hand threaded locknut (Key 18) onto the diaphragm rod (Key 22) as far as possible.
6. Screw the turnbuckle (Key 16) as far as it will go onto the actuator rod.
7. Screw the locknut (Key 14) onto the rod end bearing (Key 13) and thread this assembly fully into the turnbuckle (Key 16).
8. If the lever is attached to the rod end bearing, remove the cap screw and hex nut (Keys 12 and 31)
9. Refer to the proper valve body instruction manual for lever/valve shaft orientation marks and slide the lever into place. (See Figure 5) Clamp with the cap screw (Key 10).
10. Turn the lever (Key 33) to align with the rod end bearing (Key 13). To facilitate this connection move the actuator off its up travel stop with a regulated air source and slightly adjust the turnbuckle (Key 16).

**Table 2: Approximate Actuator Weights**

Size	Cast Iron Construction <sup>1</sup>		Aluminum Construction <sup>2</sup>	
	Lb	Kg	Lb	Kg
30	65	29	55	25
40	94	43	86	39
60	197	89	175	79

1. Cast iron spring barrel and housing  
 2. Sizes 30, 40 and 60: aluminum spring barrel, housing and housing cover.

## Installation cont'd

11. Apply thread locking compound to the threads of the cap screw (Key 12).
12. Connect the lever (Key 33), and rod end bearing (Key 13) with the cap screw and hex nut (Keys 12 and 31).

**Note: Refer to Table 3 for the recommended bolt torque and tighten the cap screw as indicated.**

13. Note the valve position and direction of rotation and position the travel indicator (Key 38) accordingly.
14. Position the travel indicator (Key 38) according to the valve position noted in #13. Replace the cover (Key 41), securing with washers (Key 9) and cap screws (Key 8). If the holes in the cover and housing (Key 17) do not align properly, temporarily loosen the cap screws (Key 32) and shift the housing slightly. Do not stroke the actuator while the cover has been removed.
15. Refer to the instructions in the Adjustment section of this manual and properly adjust the actuator turnbuckle before proceeding to the Loading Connection portion of installation.

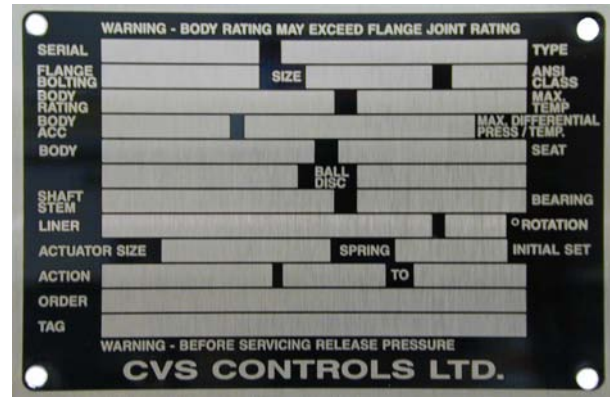


Figure 2: Nameplate on CVS 1051 Actuator

Table 3: Recommended Bolting Torques

Key #	Actuator Size					
	30		40		60	
	Ft-Lb	N·m	Ft-Lb	N·m	Ft-Lb	N·m
44	15	20	15	20	15	20
2 & 43	30	41	30	41	30	41
24	25	34	25	34	75	102
14	10	14	25	34	45	61
12	16	22	60	81	120	163
42	7	9	7	9	16	22
32	25	34	25	34	60	81
10	25	34	60	81	120	163
8	25	34	25	34	60	81
5	7	9	7	9	7	9
18	35	47	75	102	120	163

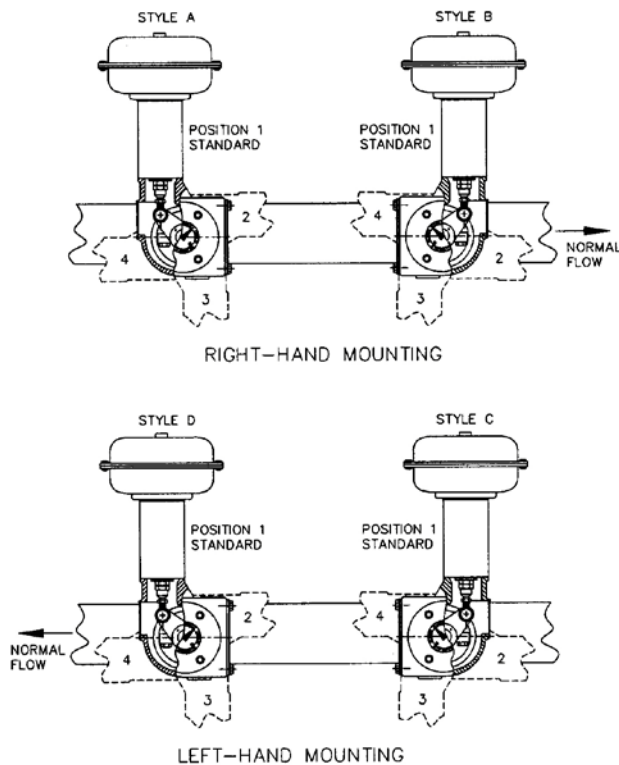


Figure 3: Mounting Styles and Positions for CVS Type 1051 Actuator

Mounting	Action <sup>1</sup>	CVS Design V100 Valve
Right-Hand	PDTC	A
	PDTO	B
Left-Hand	PDTC	C
	PDTO	D

1. PDTC: Push-Down-To-Close; PDTO: Push-Down-To-Open

## Loading Connection

1. Connect the loading pressure piping to the pressure connection in the top of the diaphragm casing. Run either 1/4-inch pipe or 3/8-inch tubing between the 1/4-inch pressure connection and the instrument.
2. Keep the length of pipe or tubing as short as possible to avoid transmission lag in the control signal. Should a volume booster or valve positioner be used, ensure that it is properly connected to the factory. If a valve positioner is part of the assembly, the connection will likely be made at the CVS Controls factory.
3. When the control valve has been completely installed and connected, check for correct action (air-to-open or air-to-close) according to the controlling instrument. Ensure proper operation by checking that the actuator stem and valve shaft are moving freely in response to the loading pressure change on the diaphragm.

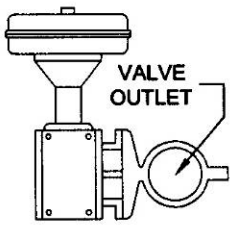
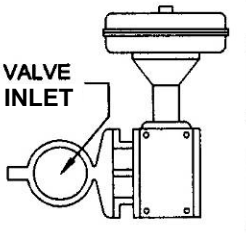
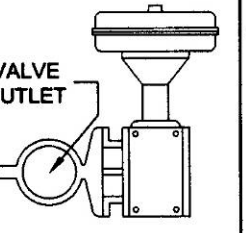
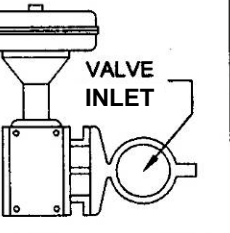
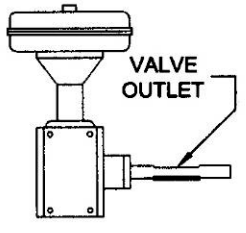
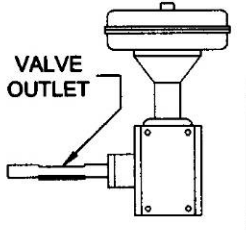
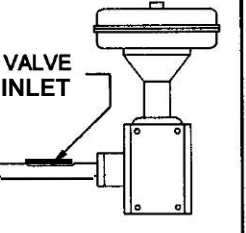
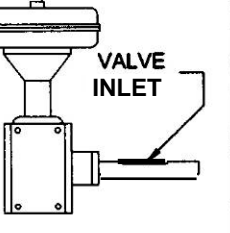
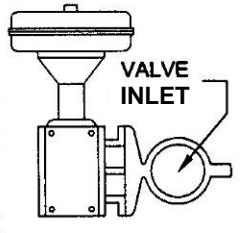
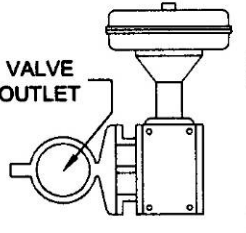
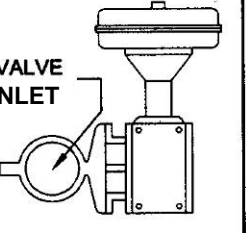
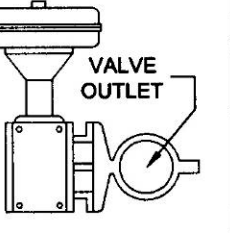
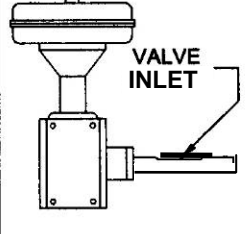
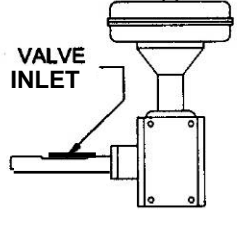
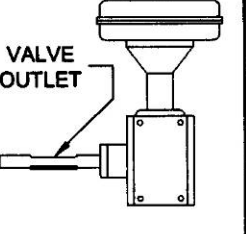
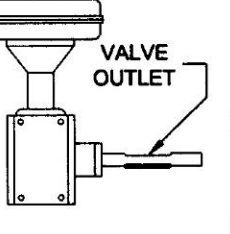
MOUNTING POSITION	RIGHT-HAND MOUNTING		LEFT-HAND MOUNTING	
	STYLE A	STYLE B	STYLE C	STYLE D
	CVS V100=PDTC	CVS V100=PDTO	CVS V100=PDTC	CVS V100=PDTO
1				
2				
3				
4				

Figure 4: CVS Type 1051 Actuator-Valve Mounting

## Turnbuckle Adjustment

**Warning:** The sudden release of process fluid can cause personal injury or property damage. Prior to starting adjustment procedures:

- Isolate the valve from the process,
- Release the process pressure, and
- Vent the actuator loading pressure.

Correct turnbuckle adjustment ensures the valve is correctly closed when the actuator is against its travel stops. Refer to Figure 7 for Key Numbers.

For accurate adjustment to the zero-degree valve ball position, remove the valve from the pipeline. Refer to instructions in the appropriate valve body instruction manual.

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

**Note:** To achieve the most accurate adjustment of the actuator, do not remove the cover during this procedure (Key 41).

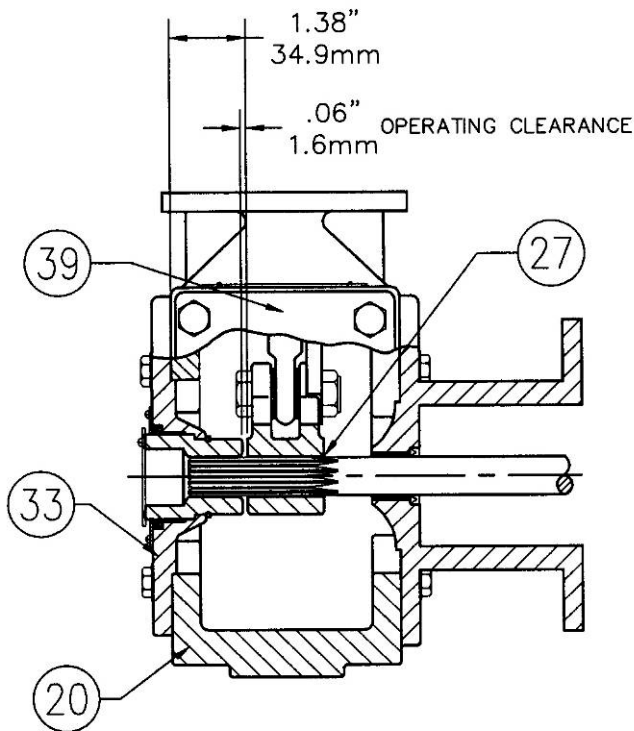


Figure 5: Lever Operating Clearance

1. Remove the access plate (Key 11) and machine screws (Key 29) if included.
2. Loosen the lower locknut (Key 14).
3. Ensure that there are no tools or instruments within the actuator housing and blocking the stroke path. Add pressure to the diaphragm casing to stroke the actuator down and provide access to the left-hand threaded upper locknut (Key 18). Loosen the locknut.
4. Use one of the following according to the service required by the actuator:
  - a. **Push-Down-To-Close:** Slowly stroke the actuator to the down travel stop. Determine the closed position of the valve according to the appropriate valve body manual. Adjust the turnbuckle until the valve is in the closed position and lock this adjustment with the left-hand threaded locknut (Key 18). Stroke the actuator to the mid-travel position and tighten the locknut (Key 16).
  - b. **Push-Down-To-Open:** Determine the closed position of the valve according to the appropriate valve body manual. Release all pressure from the diaphragm casing and ensure that the diaphragm is against its up travel stop. Check the valve position and stroke the actuator so the turnbuckle (Key 16) 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. Tighten the locknut (Key 14), stroke the actuator and tighten the left-hand threaded locknut (Key 18).
5. Replace the access plate (Key 11).
6. Loosen the self-tapping screws (Key 7), adjust the travel indicator (Key 38) and retighten the self-tapping screws.

Table 4: Wrench Sizes Required for Turnbuckle Adjustment, In

Actuator Size	Turnbuckle (Key 16)	Lower Locknut (Key 14)	Upper Locknut (Key 18)
30	15/16	1/2	7/8
40	1-1/8	3/4	1-1/8
60	1-5/16	15/16	1-5/16

## Principle of Operation

As the loading pressure is increased on top of the diaphragm the diaphragm rod moves down. As the loading pressure is decreased, the diaphragm rod is forced upward by the spring.

The spring and diaphragm have been selected to fulfill the requirements of the application. When in service the actuator should produce full travel of the valve with the diaphragm pressure as indicated on the nameplate (Figure 2)

For principle of operation of the actuator with a valve positioner, refer to the separate positioner manual.

## Maintenance

Actuator parts are subject to wear and tear which requires inspection and replacement as necessary according to the severity of service conditions. The following instructions outline adjustment, disassembly and reassembly of parts. Refer to Figures 7 & 8 for Key Numbers.

**Warning: The sudden release of process fluid can cause personal injury or property damage. Prior to starting adjustment procedures:**

- Isolate the valve from the process,
- Release the process pressure, and
- Vent the actuator loading pressure.

## Disassembly

The CVS Type 1051 Actuator can be completely disassembled by following these procedures. When inspecting or repairing the actuator, perform only those steps necessary. Under normal conditions, the cap screws (Keys 2, 42 and 43) should not be removed.

**Note: Cap screw (Key 12) must be disengaged from the lever (Key 33) prior to removing the diaphragm casing (Key 26). Failure to do so will allow the spring compression to rotate the valve beyond its fully open or closed position. This could cause damage to the valve seal.**

1. Bypass the control valve, relieve all loading pressure and remove the tubing or piping from the top of the actuator.
2. If the control valve assembly includes a valve positioner, remove it from the assembly.
3. Remove the cap screws and washers (Keys 8 and 9) as well as the cover (Key 41).

4. Remove the retaining ring and then the hub (Keys 36 and 30) from the cover.
5. Inspect the bushing (Key 40). If replacement is necessary, remove the travel indicator scale (Key 39) by first unscrewing the self-tapping screws (Key 37).
6. Remove the cap screw and hex nut (Keys 12 and 31).
7. Note the orientation of the lever/valve shaft, and then loosen the cap screw (Key 10).

**Note: Avoid using a hammer to drive the lever (Key 33) off of the valve shaft. On some valve types this could cause the valve ball and bearings to move from their centered position, causing damage to valve parts during operation.**

**If using a tool is necessary, use a wheel puller to remove the lever. Tapping the wheel puller screw lightly to loosen the lever is permissible, but hitting the screw with excessive force could also cause damage to valve parts or disrupt the positioning of the valve ball and bearings.**

**Warning: Before proceeding further, remove the cap screws and relieve the spring compression. Failure to do so may cause personal injury if the compressed spring force suddenly thrusts the upper diaphragm casing away from the actuator.**

8. Loosen but do not remove the casing cap screws (Key 45). Ensure that all spring force in the upper diaphragm casing has been relieved. Unscrew and remove the cap screws and hex nuts (Keys 45 and 44) then remove the upper diaphragm casing and the diaphragm (Key 25).
9. Refer to the warning on the CVS Controls nameplate (Key 27) located on the diaphragm plate (Key 1).
10. Remove the diaphragm plate (Key 1) and the attached parts from the actuator. The following parts will be attached to the diaphragm head: spring (Key 21), diaphragm rod (Key 22), cap screw (Key 24), spring seat (Key 19), hex nut (Key 18), turnbuckle (Key 16), hex nut (Key 14) and rod end bearing (Key 13).

## Disassembly, cont'd

**Warning:** The diaphragm plate (Key 1) may be lodged against the diaphragm rod (Key 22), preventing the spring compression from being relieved as the cap screw (Key 24) is being loosened. If this is the case, loosen the cap screw (Key 24) one full turn, and then tap the underside of the diaphragm head until it follows the cap screw disassembly. Failure to check for and rectify this situation prior to removing the cap screw (Key 24) could cause a sudden release of spring compression as the cap screw is disengaged. This sudden release could result in personal injury or property damage.

11. Slowly remove the cap screw (Key 24) while ensuring that the diaphragm head is following the cap screw disassembly. The spring load will be zero before the cap screw is completely removed. The remaining parts of the assembly can then be separated.
12. Unscrew the cap screws (Key 32) and remove the actuator housing assembly (Key 17).
13. Unbolt the mounting yoke (Key 35) from the valve body.
14. Push out the bushing (Key 34) from the mounting yoke and examine for wear. Replace if necessary.

## Assembly

These instructions assume that the actuator was completely disassembled. If the actuator was only partially assembled, start the instructions at the appropriate step. Refer to Figures 7 & 8 for Key Numbers.

1. If the bushing (Key 34) was replaced, press in the new bushing and ensure the end of the bushing is flush with the bottom of the recess in the mounting yoke (Key 35).
2. Slide the mounting yoke (Key 35) over the valve shaft and secure it to the valve using the valve mounting cap screws. Refer to Table 3 and to the appropriate valve manual for bolting torques on these cap screws.

**Note:** Exceeding the torque requirement may result in unsafe operation of the actuator. Refer to Table 3 for recommended bolting torques.

3. Consult Figures 3 and 4 for the desired housing orientation. Secure the housing to the yoke using cap screws (Key 32).

4. Coat the thread of the cap screw (Key 24) as well as the tapered end of the diaphragm rod (Key 22) with an appropriate lubricant.
5. Assemble the following parts: diaphragm rod (Key 22), spring seat (Key 19), spring (Key 21) and diaphragm plate (Key 1), then secure with the cap screw (Key 24). Tightening the cap screw will compress the spring. Ensure that 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.
6. Install the hex nut (Key 18), turnbuckle (Key 16), hex nut (Key 14) and rod end bearing (Key 13) onto the diaphragm rod.
7. Ensure the travel stops (Key 43) are located as shown in Figure 6.
8. Install the diaphragm plate and attached parts into the actuator.

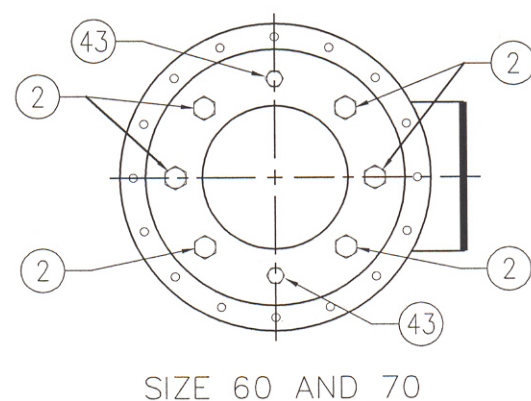
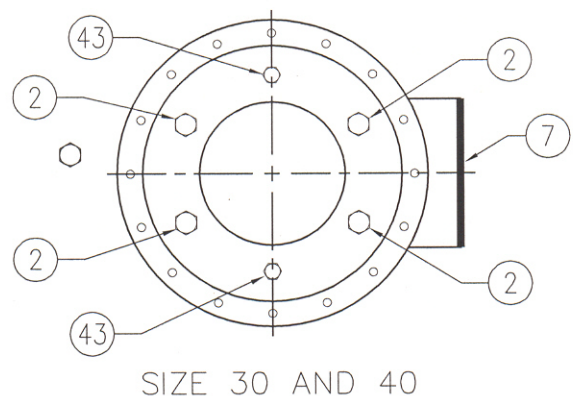


Figure 6: Travel Stop Orientation



## Disassembly, cont'd

9. Ensure that the warning nameplate (Key 27) is in place and install the diaphragm (Key 25) and the upper diaphragm casing (Key 26).
10. Install the cap screws and hex nuts (Keys 45 and 44). Tighten cap screws evenly using a crisscross pattern to compress the spring, and then secure the upper diaphragm casing.
11. Refer to the appropriate valve body instruction manual for lever/valve shaft orientation marks, and slide the lever (Key 33) into place. See Figure 5 for correct lever operating clearance. Clamp with the cap screw (Key 10).
12. Rotate the lever (Key 33) until it aligns with the rod end bearing (Key 13). This connection can be assisted by stroking the actuator off its up travel stop using a regulated air source.
13. Apply a thread-locking compound to the threads of the cap screw (Key 12).
14. Connect the lever (Key 33) and the rod end bearing (Key 13) with the cap screw and hex nuts (Keys 12 and 31). Tighten the cap screw to the torque as recommended in Table 3).
15. If a valve positioner is being used with the assembly, consult the appropriate manual for positioner installation.
16. Coat the bearing surfaces of the hub (Key 30) and the cover (Key 41) with a suitable lubricant. Install the bushing (Key 40) and hub into the cover and secure with the retaining ring (Key 36).
17. Install the travel indicator scale (Key 39) and secure with self-tapping screws (Key 37).
18. Make note of the valve position and direction of rotation and position the travel indicator (Key 38) accordingly.
19. Replace the cover (Key 41) and secure with cap screws and washers (Keys 8 and 9). If the holes in the cover and housing (Key 17) do not align, use a regulated air source to move the actuator slightly off its up travel stop. If this does not result in proper alignment, temporarily loosen the cap screws (Key 32) and shift the housing slightly. Do not stroke the actuator while the cover is off.
20. Refer to the Adjustment section of this manual for correct actuator turnbuckle adjustment.

## Changing Actuator Mounting

Generally the actuator is positioned vertically in a horizontal pipeline, however there are four possible mounting styles and for possible positions for each style. Refer to Figures 3 and 4.

Correct lever/valve shaft positioning is important in ensuring proper valve action. Refer to the appropriate valve body instruction manual.

**Warning: The sudden release of process fluid can cause personal injury or property damage. Prior to starting adjustment procedures:**

- Isolate the valve from the process,
- Release the process pressure, and
- Vent the actuator loading pressure.

Style A is right-hand mounted and Style D is left-hand mounted. In all other ways Styles A and D are identical.

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

Refer to the following procedure to convert from Styles A and D to Styles B and C or vice versa, or to change the mounting position. Key numbers refer to Figures 7 & 8.

1. Remove the cover (Key 41) by unscrewing and removing the cap screws and washers (Keys 8 and 9).
2. Unscrew cap screw (Key 12) and loosen cap screw (Key 10).

**Warning: Do not use a hammer to drive the lever off the drive shaft. This could cause damage to internal valve parts. On some valves, driving the lever could move the valve ball and bearings away from the centered position, resulting in damage to valve parts as the valve is operated.**

**If using a tool to remove the lever is necessary, use a wheel puller. Tapping the wheel puller screw lightly to loosen the lever is permissible, but excessive force could also result in damage to valve parts and disruption of the centered position of the valve disk and bearings.**

3. If changing styles,
  - a. Remove the cap screws (Key 32) and the actuator housing (Key 17) from the mounting yoke (Key 35).
  - b. Rotate the housing 180 degrees while maintaining the appropriate position (1, 2, 3 or 4) and place the actuator onto the mounting yoke (Key 35).
4. If changing positions, remove cap screws (Key 32) and rotate the actuator housing to the desired position.



## Changing Actuator Mounting cont'd.

**Note: Consult Table 3 for appropriate bolt torques.**

5. Secure the actuator housing (Key 17) to the mounting yoke (Key 35) with cap screws (Key 32).
6. Refer to the appropriate valve body instruction manual for lever/valve shaft orientation marks and slide the lever into place. Consult Figure 5 for lever operating clearance. Clamp with the cap screw (Key 10).
7. Rotate the lever (Key 33) to align with the rod end bearing (Key 13). This connection can be aided by stroking the actuator slightly off its up travel stop with a regulated air source.
8. Apply thread locking compound to the threads of the cap screw (Key 12).
9. Connect the lever (Key 33) and the rod end bearing (Key 13) using the cap screw and hex nuts (Keys 12 and 31). This connection can be aided by stroking the actuator slightly off its up travel stop with a regulated air source.

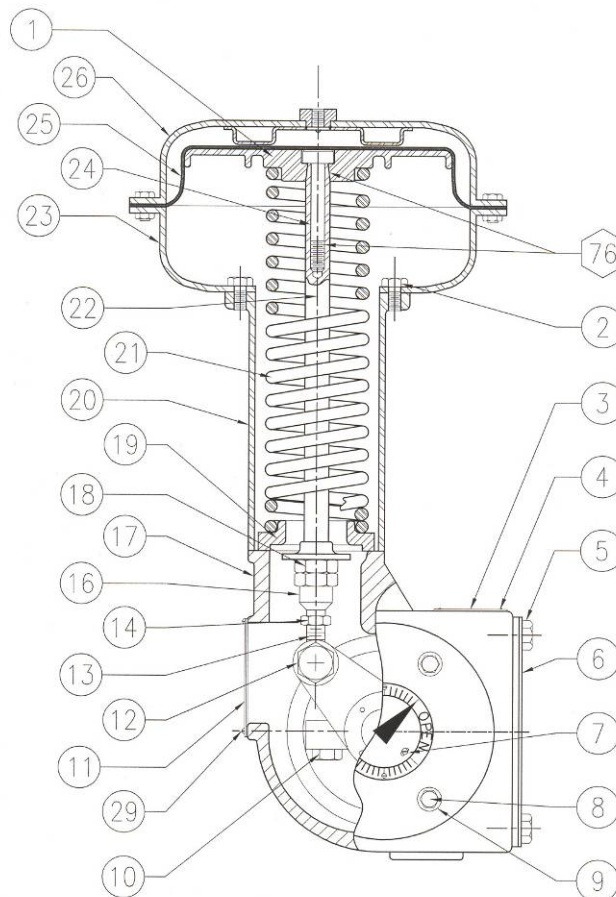
**Note: Tighten cap screw (Key 12) to the recommended bolt torque shown in Table 3.**

10. Position the travel indicator (Key 38) according to the valve position and direction of rotation.
11. Replace the cover (Key 41) and secure it with cap screws and washers (Keys 8 and 9). If the holes in the cover and housing (Key 17) do not align, use a regulated air source to move the actuator slightly off its up travel stop. If this does not result in proper alignment, temporarily loosen the cap screws (Key 32) and shift the housing slightly. Do not stroke the actuator while the cover is off.
12. Refer to the Adjustment section of this manual for correct actuator turnbuckle adjustment.

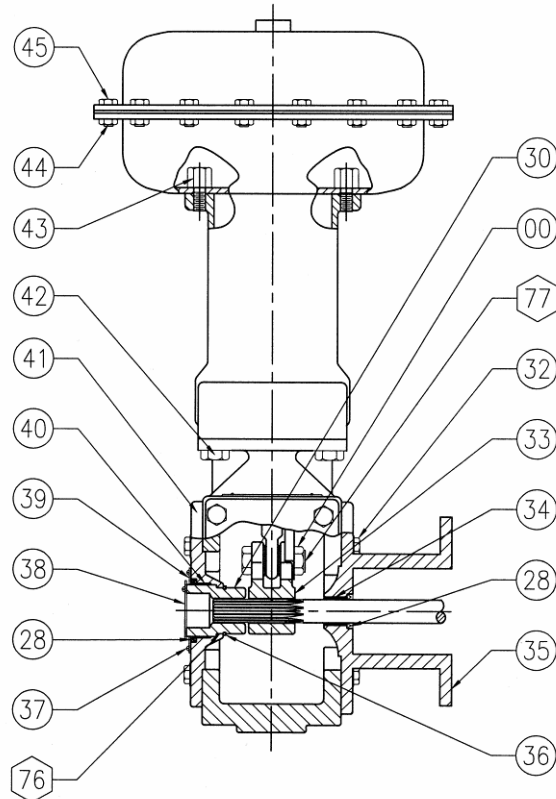
## Parts Ordering

The serial number for your CVS Type 1051 Rotary Actuator is located on the nameplate (Figure 2 and Key 3, Figure 7). Please refer to your serial number when corresponding with your CVS Controls representative. When ordering replacement parts, please refer to the following parts list.

**Figure 7: Typical CVS Type 1051 Actuator Assembly**



**Figure 8: Typical CVS Type 1051 Actuator Assembly cont'd**



## CVS Type 1051 Rotary Actuator Parts List

Key No.	Description	Part Number	Key No.	Description	Part Number		
1	Diaphragm Plate, cast iron	Size 30	CVS2F649319042	12	Cap Screw, pl steel	Size 30	CVS1A553424052
		Size 40	CVS2V939919042			Size 40	CVS1A361524052
		Size 60	CVS20A1336X012			Size 60	CVS12A9519X012
2	Cap Screw, pl steel	Size 30 & 40 (4 req'd)	CVS1A368424052	13	Rod End Bearing, steel/TFE	Size 30	CVS1R580299012
		Size 60 (6 req'd)				Size 40	CVS1E561699012
3	Nameplate, stainless steel	CVS16A3188X012	Size 60			CVS1R440899012	
4	Drive Screw, stainless steel (4 req'd)	CVS1A368228982	14	Hex Nut, zn pl steel	Size 30	CVS1A946324122	
5	Cap Screw, pl steel (4 req'd) (Not required with positioner)	CVS1C275224052			Size 40	CVS1E353724122	
6	Cover Plate, steel (Not required with positioner)	CVS22A9359X012			Size 60	CVS1A354024122	
7	Cap Screw, pl steel (2 req'd)	CVS1B561528982	16	Turnbuckle, zn pl steel	Size 30	CVS12A9623X012	
8	Cap Screw, zn pl steel	Size 30 & 40			Size 40	CVS22A9625X012	
		Size 60			Size 60	CVS22A9624X012	
9	Washer, zn pl steel	Size 30 & 40	CVS1H723125072	17	Housing, aluminum	Size 30	CVS46A0463X022
		Size 60				Size 40	CVS42A9306X062
10	Cap Screw, pl steel	Size 30	CVS1A353124052			Size 60	CVS42A9309X062
		Size 40	CVS1A340924052	Size 30	CVS48A5247X012		
		Size 60	CVS12A9405X012	Size 40	CVS48A5245X012		
11	Access Plate, steel (For aluminum constructions only)	CVS12A9638X012	18	Hex Nut, zn pl steel	Size 60	CVS48A5246X012	
					Size 30	Size 30	CVS12A9666X012
	Access Plate, polyester (For aluminum constructions only)	CVS38A4712X012			Size 40	Size 40	CVS12A9629X012
19	Spring Seat, steel	See Following Table	Size 60	Size 60	CVS1R438924122		

## CVS Type 1051 Rotary Actuator Parts List

Key No.	Description	Part Number	Key No.	Description	Part Number				
20	Spring Barrel, aluminum	Size 40	CVS32A9325X012	35	Mounting Yoke	See Following Table			
		Size 60	CVS42A9327X012	36	Retaining Ring, zn pl steel	Size 30 & 40	CVS12A9409X012		
	Spring Barrel, cast iron	Size 40	CVS32A9325X022			Size 60	CVS12A9455X012		
		Size 60	CVS42A9327X022	37	Self Tapping Screw, steel (2 req'd)	CVS1B561528982			
21	Spring	See Following Table	38	Travel Indicator, SST	Size 30 & 40	CVS28A8534X012			
22	Diaphragm Rod, pl steel	Size 30			CVS12A9652X042	Size 60	CVS28A8495X012		
		Size 40			CVS12A9652X022	39	Travel Indicator Scale, SST	Size 30 & 40	CVS28A8533X012
		Size 60	CVS12A9462X032	Size 60	CVS28A8492X012				
23	Lower Diaphragm Casing, zn pl steel	Size 30	CVS2E792225062	40	Bushing, fiberglass	Size 30 & 40	CVS12A9373X012		
		Size 40	CVS2E806325062			Size 60	CVS12A9374X012		
		Size 60	CVS2E847425062			41	Cover, aluminum	Size 30 & 40	CVS32A9533X012
24	Cap Screw, steel	Size 30	CVS12A9459X012	Size 60	CVS32A9532X012				
		Size 40	CVS12A9460X012	Cover, cast iron	Size 30 & 40			CVS32A9311X012	
		Size 60	CVS12A9461X012		Size 60	CVS32A9313X012			
25	Diaphragm, Nitrile	Size 30	CVS2E791902202	42	Cap Screw, pl steel (4 req'd)	Size 40	CVS1A352624052		
		Size 40	CVS2E670002202			Size 60	CVS1A418624052		
		Size 60	CVS2E859702202			43	Travel Stop, steel, Size 30	Size 30	CVS15A8382X012
26	Upper Diaphragm Casing, zn pl steel	Size 30	CVS2J713828992	Travel Stop, steel, Size 40	CVS1H591724092				
		Size 40	CVS2L441828992	Travel Stop, steel, Size 60	CVS16A4120X012				
		Size 60	CVS30A0055X012	44	Hex Nut, zn pl steel	Size 30 (12 req'd)	CVS1A346524122		
27	Warning Nameplate (not shown)	CVS12A9530X012				Size 40 (16 req'd)			
		29	Machine Screw, pl steel, 4 req'd (Aluminum constructions only, not shown)			CVS1A340828992		Size 60 (24 req'd)	
				28	Seal, steel & synthetic rubber	Size 30 & 40	CVS12A9451X012	45	Cap Screw, pl steel
Size 60	CVS12A9452X012					Size 40 (16 req'd)			
Size 60 (24 req'd)	CVS12A9452X012	Size 60 (24 req'd)							
30	Hub	See Following Table	46	Travel Indicator, SST (not shown)	CVS12A9693X012				
31	Hex Nut, pl steel	Size 30	CVS1A352724122	47	Machine Screw, pl steel (not shown)	CVS1C899028982			
		Size 40	CVS1A341224122						
		Size 60	CVS1A343324122						
32	Cap Screw, pl steel (4 req'd)	Size 30 & 40	CVS1A336924052	48	Travel Indicator Disc, steel (not shown)	CVS22A9699X012			
		Size 60	CVS1A340924052						
33	Lever, ductile iron	See Following Table	76	Lubricant	(Not Supplied)				
34	Bushing	See Following Table	77	Sealant	(Not Supplied)				

### Key 19 Spring Seat Key 21 Spring

Casing Pressure <sup>1</sup> (PSIG)	Torque Output (In.-Lb)				Casing Pressure <sup>1</sup> (BAR)	Torque Output (N•m)				Key 19 Spring Seat (steel)	Key 21 Spring (steel)
	90° Rotation		60° Rotation			90° Rotation		60° Rotation			
	Up <sup>2</sup>	Down <sup>2</sup>	Up <sup>2</sup>	Down <sup>2</sup>		Up <sup>2</sup>	Down <sup>2</sup>	Up <sup>2</sup>	Down <sup>2</sup>		
<b>Actuator Size 30</b>											
0-18	180	210	180	480	0-1.2	20	24	20	54	CVS12A9445X012	CVS1K509827032
	---	---	250	180		---	---	28	20	CVS12A9445X012	CVS1N751527032
0-33	180	560	180	1530	0-2.3	20	63	20	173	CVS12A9445X012	CVS1K509827032
	250	700	250	1220		28	79	28	138	CVS12A9445X012	CVS1N751527032
<b>Actuator Size 40</b>											
0-18	---	---	650	570	0-1.2	---	---	73	64	CVS12A9447X012	CVS1P637127082
	440	600	440	1320		50	68	50	149	CVS12A9447X012	CVS1L217427042
0-33	630	1800	630	3180	0-2.3	71	203	71	359	CVS12A9447X012	CVS1P637127082
	830	560	830	1880		94	63	94	212	CVS12A9446X012	CVS1L217327042
<b>Actuator Size 60</b>											
0-18	1580	1330	1580	3220	0-1.2	179	150	179	364	CVS12A9450X012	CVS1K162727082
	1310	2830	1310	6810		148	320	148	769	CVS12A9448X012	CVS1K162827082
0-33	1580	3960	1580	4320	0-2.3	179	447	179	488	CVS12A9450X012	CVS1K162727082
	2330	2030	2330	5490		263	229	263	620	CVS12A9449X012	CVS1K162827082
	0-40	2330	4380	2330		8780	263	495	263	992	CVS12A9449X012

1. Positioner supply pressure should be 10 percent higher than actuator casing pressure
2. Up: diaphragm rod fully retracted; Down: diaphragm rod fully extended

**Key 34 Bushing, TFE**  
**Key 35 Yoke-Bushing Assembly<sup>1</sup>**

Actuator Size	Valve Shaft Diameter		Key 34 Bushing, TFE	Key 35 Yoke-Bushing Assembly Cast Iron & TFE
	In	mm		
30	1/2	12.7	CVS1U902599402	CVS12A9779X0A2
40	3/4	19.1	CVS12A9556X012	CVS12A9799X0C2
	7/8	22.2	CVS12A9557X012	CVS12A9799X0E2
60	1	25.4	CVS12A9775X012	CVS12A9799X0H2
	1-1/4	31.8	CVS12A9558X012	CVS12A9799X0J2
	1-1/2	38.1	CVS12A9559X012	CVS12A9799X0K2

1. Yokes are available only as yoke-bushing assemblies. Bushing is available separately as a replacement part.

**Key 30 Hub, Aluminum or 416 sst**

Actuator Size	Valve Shaft Diameter		Key 30 Hub
	In	mm	
30	1/2	12.7	CVS22A9496X012
40	3/4	19.1	CVS22A9497X012
	7/8	22.2	CVS22A9486X012
60	1	25.4	CVS22A9420X012
	1-1/4	31.8	CVS22A9500X012
	1-1/2	38.1	CVS22A9501X012

**Key 33 Lever, Ductile Iron**

Actuator Size	Valve Shaft Diameter		Key 33 Lever
	In	mm	
30	1/2	12.7	CVS32A9579X012
40	3/4	19.1	CVS32A9569X012
	7/8	22.2	CVS32A9570X012
60	1	25.4	CVS32A9590X012
	1-1/4	31.8	CVS32A9591X012
	1-1/2	38.1	CVS32A9592X012

**CVS Type 1051 Actuator Sizes**

V100 Valve Body Size	Valve Stem Connection		CVS Type 1051 Actuator Size
	In	mm	
2"	1/2	12.7	30
3"	3/4	19.1	40
4"	7/8	22.2	
6"	1	25.4	60
8"	1-1/4	31.8	
10"	1-1/4	31.8	
12"	1-1/2	38.1	