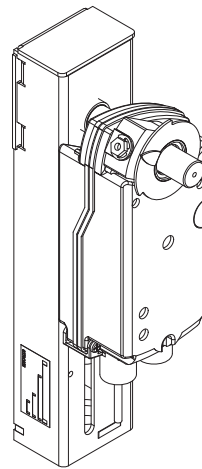


### Application

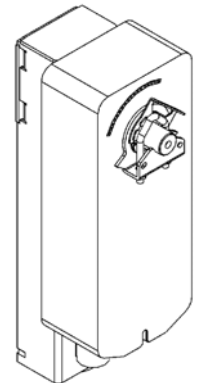
The Mx4x-6xxx-220/-230 and Mx4x-7xxx-220/-230 series actuator/linkage assemblies are mounted onto globe valves to control the flow of hot water, chilled water, and steam. These assemblies are used with 2-1/2" to 6" VB-82x3 series 2-way and VB-8303 series 3-way globe valves, 2-1/2" through 6" VB-931x series 3-way mixing globe valves, 65 mm and 80 mm VB-9xx5 2-way metric globe valves, and discontinued 2-1/2" to 6" VB-92xx series 2-way globe valves.

### Features

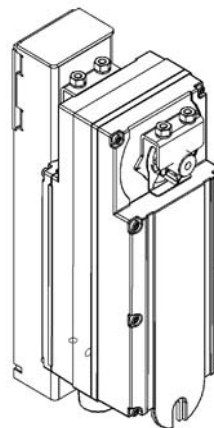
- Used with 2-way and 3-way globe valves in modulating or two-position service
- Provides spring return and non-spring return actuator control
- Flexible actuator mounting orientation
- Maintenance-free construction
- Quick and simple installation
- Heavy-duty steel rack and pinion construction and sheet metal housing
- NEMA Type 2 (IP 54) and NEMA Type 4 (IP 56) ratings available



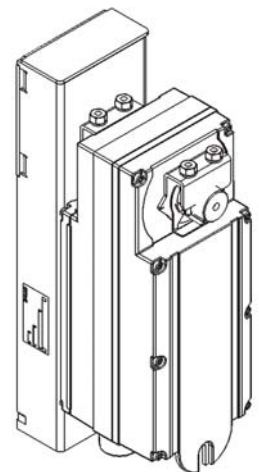
Mx41-6153-220



Mx41-707x-220  
Mx41-715x-220  
Mx41-715x-230



Mx40-717x-220  
Mx40-717x-230



Mx41-634x-230

## Applicable Literature

F-Number	Description	Audience	Purpose
F-26642	MA40-704x, MA4x-707x, MA4x-715x Schneider Electric DuraDrive Series Spring Return Two-Position Actuators General Instructions	<ul style="list-style-type: none"> <li>- Sales Personnel</li> <li>- Application Engineers</li> <li>- Installers</li> <li>- Service Personnel</li> <li>- Start-up Technicians</li> </ul>	<p>Describes the actuator's features, specifications, and possible applications. Provides step-by-step mounting instructions.</p>
F-26742	MA40-717x Schneider Electric Dura Drive Series Actuators Spring Return Direct Coupled Actuator General Instructions		
F-26644	MF4x-7xx3 Schneider Electric DuraDrive Series Spring Return Floating Actuator General Instructions		
F-26645	MS4x-7xx3 Schneider Electric DuraDrive Series Spring Return Proportional Actuator General Instructions		
F-27215	MF41-6153/MS41-6153 Series Non-Spring Return Rotary Electronic Damper Actuators General Instructions		
F-26744	MF41-6343 Schneider Electric DuraDrive Series Non-Spring Return Direct Coupled Actuator General Instructions		
F-26745	MS41-634x Schneider Electric DuraDrive Series Non-Spring Return Direct Coupled Actuator General Instructions		
F-26748	MS40-717x Schneider Electric DuraDrive Series Spring Return Direct Coupled Actuator General Instructions		
F-26749	MF40-7173 Schneider Electric DuraDrive Series Spring Return Direct Coupled Actuator General Instructions		
F-26752	Vx-7xxx and Vx-9xxx Series Linked Globe Valve Assemblies and Mx4x-7xxx and Mx4x-6xxx Series Actuator/Linkage Assemblies with Schneider Electric DuraDrive Actuators, Selection Guide		
F-27199	Vx-8xxx Series Valve Selection Guide	<ul style="list-style-type: none"> <li>- Sales Personnel</li> <li>- Application Engineers</li> <li>- Installers</li> <li>- Service Personnel</li> <li>- Start-up Technicians</li> </ul> <p>Provides features, specifications, mounting dimensions, and other criteria useful to the selection of Vx-8xx3 series linked globe valve assemblies and actuator/linkage assemblies with Schneider Electric DuraDrive.</p>	
F-27253	AV-608 Linkage Adapter Kit General Instructions	<ul style="list-style-type: none"> <li>- Sales Personnel</li> <li>- Application Engineers</li> <li>- Installers</li> <li>- Service Personnel</li> <li>- Start-up Technicians</li> </ul> <p>Provides step-by-step instructions for mounting Mx4x-xxxx-22x series actuators onto discontinued 1-1/2" and 2" VB-9xxx series valves.</p>	
F-26080	EN-205 Water System Guidelines	<ul style="list-style-type: none"> <li>- Application Engineers</li> <li>- Installers</li> <li>- Service Personnel</li> <li>- Start-up Technicians</li> </ul> <p>Provides treatment guidelines for water and steam systems.</p>	

## SPECIFICATIONS

**Table-1 Model Chart — Mx41-707x-22x and Mx41-715x-2xx Spring-Return Actuators with Linkage.**

Part Numbers	Power Input								Approximate Timing in Seconds @ 70 °F (21 °C) with No Load		Manual Override
	Voltage 50/60 Hz	Running				Holding					
		50 Hz		60 Hz		DC Amps	50 Hz	60 Hz			
		VA	Watts	VA	Watts		Watts	Watts	Powered	Spring Return	
<b>Spring Return Actuators with Linkage</b>											
MA41-7073-220	24 Vac ± 20% 22-30 Vdc	4.8	3.2	4.8	3.2	0.13	0.8	0.8	<80	<40	Yes
MA41-7070-220	120 Vac ± 10%	10.7	4.2	5.6	3.6	—	2.0	1.2			
MA41-7071-220	230 Vac ± 10%	17.0	5.1	8.0	4.0	—	2.7	1.4			
MF41-7073-220	24 Vac ± 20% 22-30 Vdc	6.2	4.8	6.2	4.8	0.18	2.8	2.8	<195	<30	
MS41-7073-220	24 Vac ± 20% 22-30 Vdc	5.8	4.6	5.8	4.6	0.17	2.3	2.3			
MA41-7150-220	120 Vac ± 10%	11.7	8.8	10.0	8.4	—	3.6	5.0	<190	<30	
MA41-7150-230											
MA41-7151-220	230 Vac ± 10%	15.5	9.5	10.6	8.5	—	4.6	3.3			
MA41-7151-230											
MA41-7153-220	24 Vac ± 20% 22-30 Vdc	9.8	7.5	9.7	7.5	0.29	2.8	2.8			
MA41-7153-230											
MF41-7153-220	24 Vac ± 20% 22-30 Vdc	9.8	7.7	9.7	7.7	0.30	3.3	3.3			
MF41-7153-230											
MS41-7153-220	24 Vac ± 20% 22-30 Vdc	9.8	7.4	9.7	7.4	0.28	2.9	2.9			
MS41-7153-230											

**Table-2 Model Chart — Mx40-717x-2xx Spring-Return Actuators with Linkage.**

Part Numbers	Power Input				Approximate Timing in Seconds @ 70 °F (21 °C) with No Load		Manual Override
	Voltage 50/60 Hz	Watts	VA		Powered	Spring Return	
			Running	Holding			
MA40-7173-220 MA40-7173-230	24 Vac ± 20%	5.4	9.6	4.1	<145	<75	No
MA40-7170-220 MA40-7170-230	120 Vac ± 10%	7.2	11.4	9.4			
MA40-7171-220 MA40-7171-230	240 Vac ± 10%	7.4	11.8	9.5			
MF40-7173-220 MF40-7173-230	24 Vac ± 20%	5.5	10.0	4.3			
MS40-7173-220 MS40-7173-230	24 Vac ± 20%	7.1	9.4	5.4			
MS40-7170-220 MS40-7170-230	120 Vac ± 10%	7.1	11.1	9.1			
MS40-7171-220 MS40-7171-230	240 Vac ± 10%	7.2	11.8	10.1			

**Table-3 Model Chart — Mx41-6xxx-2x0 Non-Spring Return Actuators with Linkage.**

Part Numbers	Power Input				Approximate Timing in Seconds @ 70 °F (21 °C) with No Load	Manual Override
	Voltage 50/60 Hz	Watts	VA			
			Running	Holding		
MF41-6153-220 <sup>a</sup>	24 Vac +20%, -15% <sup>a</sup>	3.0	3.0	—	125 (60 Hz)	Yes
MS41-6153-220 <sup>a</sup>	24 Vac +20%, -15% <sup>a</sup>	4.0	5.0	1.2	150 (50 Hz)	
MF41-6343-230	24 Vac ± 20%	3.8	7.1	3.6	<145	
MS41-6343-230	24 Vac ± 20%	4.8	7.1	5.0		
MS41-6340-230	120 Vac ± 10%	5.0	9.6	8.8		
MS41-6341-230	240 Vac ± 10%	5.1	10.1	9.2		

<sup>a</sup> Minimum voltage at 85 to 130 °F ambient: 24 Vac, +20%, -5% (MF models), 24 Vac, +20%, -10% (MS models).

**Table-4 Actuator/Linkage Compatibility Table.**

Actuator	Linkage <sup>a</sup>	Actuator/Linkage Assembly	Valve Body Series and Size									
			VB-92xx <sup>b</sup> , VB-931x <sup>b</sup>		VB-82x3, VB-8303, VB-92xx <sup>b</sup> , VB-931x			VB-82x3, VB-8303		VB-92xx <sup>b</sup> , VB-931x		
			1-1/2" <sup>c</sup>	2" <sup>c</sup>	2-1/2"	3"	4"	5"	6"	5"	6"	
Mx41-6153	AV-607	Mx41-6153-220	X	X	X	X	X	—	—	—	—	
Mx41-707x		Mx41-707x-220	X	X	X	X	X	—	—	—	—	
Mx41-715x		Mx41-715x-220	X	X	X	X	X	X	—	—	—	
Mx40-717x		Mx40-717x-220	X	X	X	X	X	X	—	—	—	
Mx41-634x	AV-609	Mx41-634x-230	—	—	—	—	—	—	X	X	X	
Mx41-715x		Mx41-715x-230	—	—	—	—	—	—	X	—	—	
Mx40-717x		Mx40-717x-230	—	—	—	—	—	—	X	—	—	

<sup>a</sup> Provided with actuator in -2xx assemblies.

<sup>b</sup> Discontinued model.

<sup>c</sup> Requires AV-608 Linkage Adapter Kit in addition to actuator and AV-607 linkage.

### Close-Off Pressure and Maximum Operating Pressure Differential

For all valve assemblies, be sure to check that the anticipated maximum pressure drop across the valve in the closed position will not exceed the close-off pressure rating and that the pressure differential across the valve in the open position will not exceed the maximum operating pressure differential rating.

For VB-9xxx valve applications, consult the Vx-7xxx & Vx-9xxx Selection Guide, F-26752.

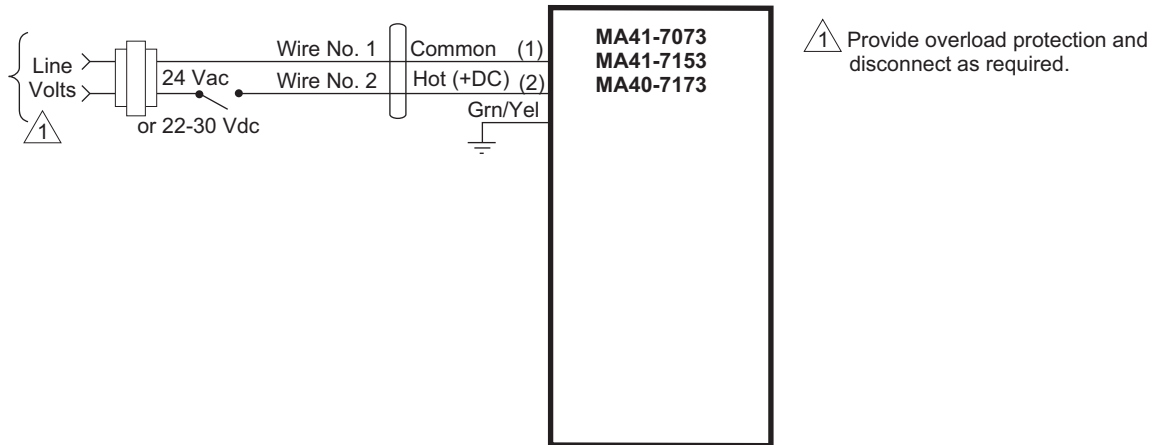
For VB-8xx3 valve applications, consult the Vx-8xxx Selection Guide, F-27199.

### ACCESSORIES

AM-756 Metric conduit adaptor M20 x 1.5 to 1/2" NPT (two per package).  
 AV-608 Linkage Adapter Kit for discontinued 1-1/2" and 2" VB-9xxx.

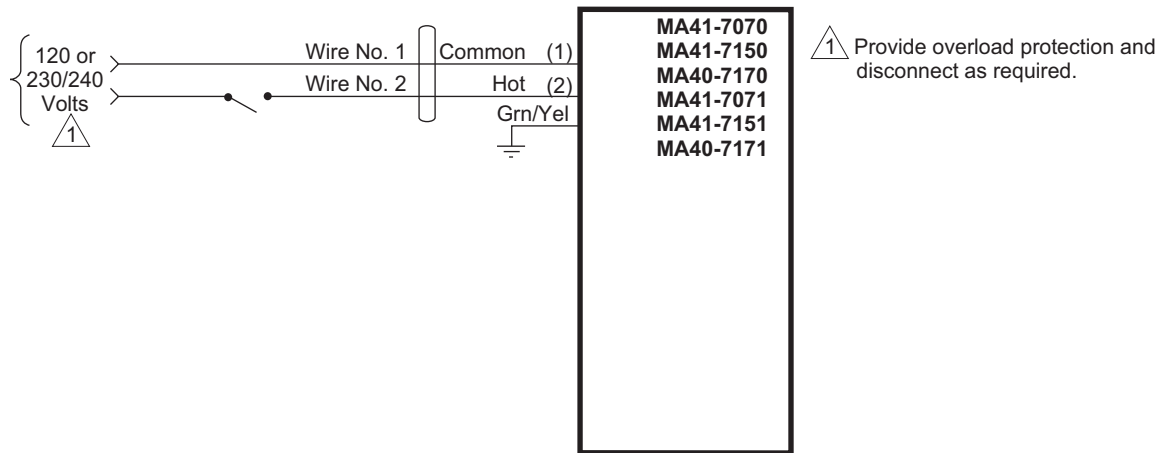
## TYPICAL APPLICATION (wiring diagrams)

Figure-1 through Figure-8 illustrate typical wiring diagrams for actuators. See Table-1 and Table-3 for model selection. Consult the actuator's General Instructions for detailed, actuator-specific wiring diagrams. See "Applicable Literature" on page 2.



Model	Wire 1	Wire 2
MA41-7073 MA41-7153	L2 Black	L1 Red
MA40-7173	24G Blk/Blu	24H Black

Figure-1 Typical Wiring Diagram for 24 Vac MA4x-7xx3 Series Two-Position Actuators.



Model	Wire 1	Wire 2
MA41-7070 MA41-7150 MA40-7170	L2 White	L1 Black

Model	Wire 1	Wire 2
MA41-7071 MA41-7151 MA40-7171	L2 Blue	L1 Brown

Figure-2 Typical Wiring Diagram for 120 Vac MA4x-7xx0, and 230/240 Vac MA4x-7xx1 Two Position Actuators.

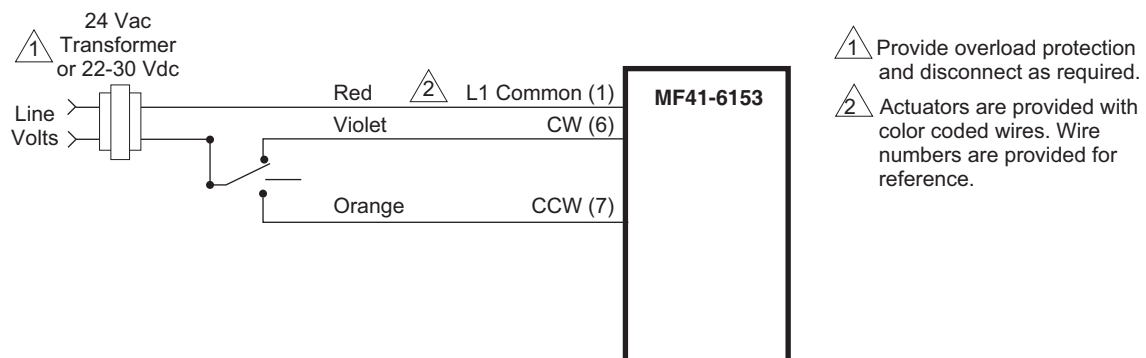


Figure-3 Typical Wiring Diagram for MF41-6153 Floating Actuator.

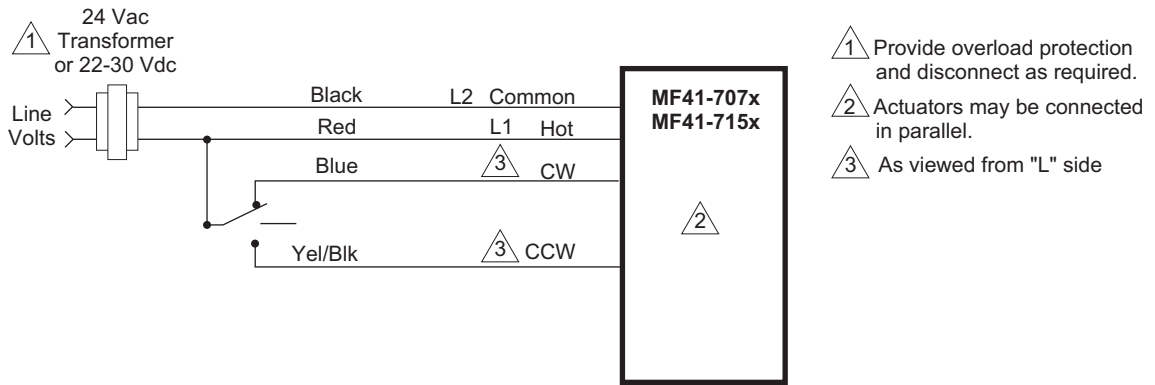


Figure-4 Typical Wiring Diagram for MF41-707x Series and MF41-715x Series Floating Actuators.

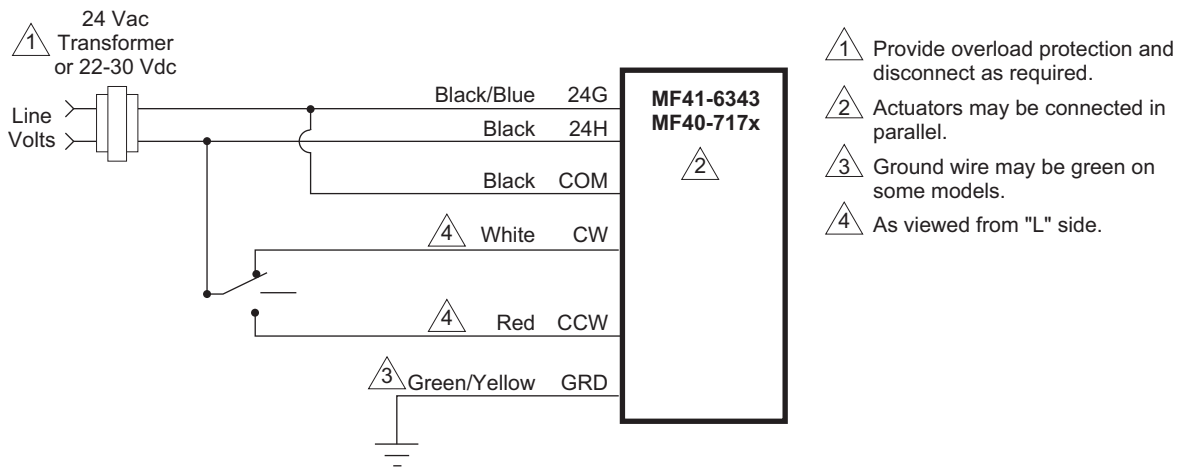


Figure-5 Typical Wiring Diagram for MF41-6343 Series and MF40-717x Series Floating Actuators.

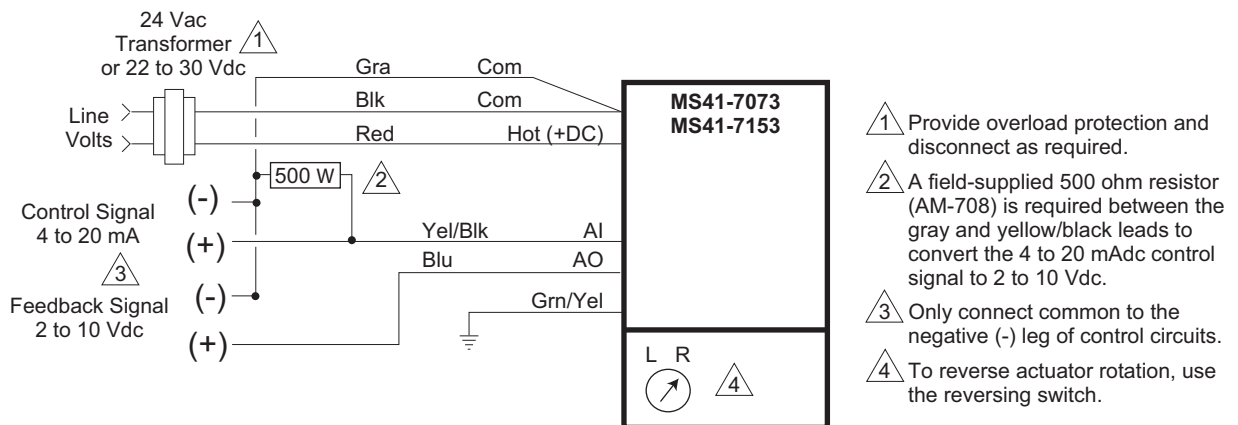
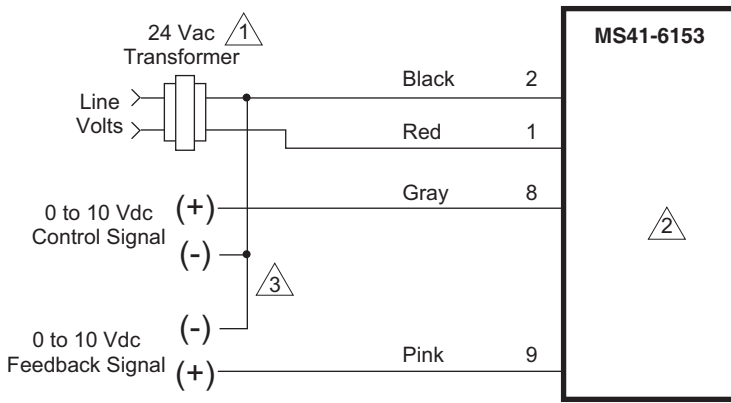
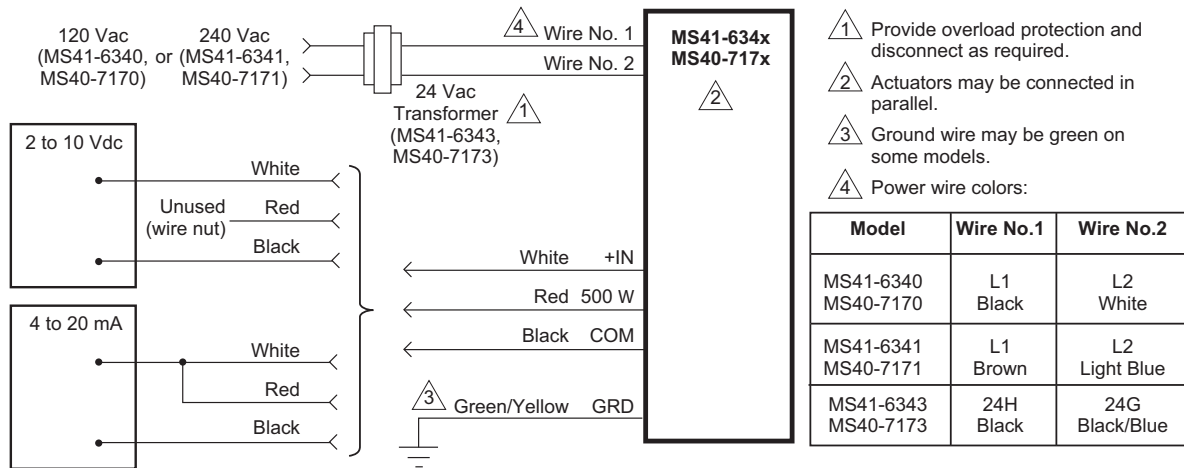


Figure-6 Typical Wiring Diagram for MS41-707x Series and MS41-715x Series Proportional Actuators.



- 1 Provide overload protection and disconnect as required.
- 2 Set the actuator rotation, using the DIP switch. Switch is factory-set for CW rotation on increasing signal.
- 3 For reliable performance, use separate commons for 24 Vac, 0 to 10 Vdc control signal, and 0 to 10 Vdc feedback signal.

Figure-7 Typical Wiring Diagram for MS41-6153 Proportional Actuators.



- 1 Provide overload protection and disconnect as required.
- 2 Actuators may be connected in parallel.
- 3 Ground wire may be green on some models.
- 4 Power wire colors:

Figure-8 Typical Wiring Diagram for MS41-634x and MS40-717x Series Proportional Actuators.



## INSTALLATION

### Inspection

Inspect package for damage. If damaged, notify carrier immediately. If undamaged, open the package and inspect for obvious damage. Return damaged products.

### Requirements

- Training: Installer must be a qualified, experienced technician.
- Tools (not provided):
  - Appropriate wrenches for stem extensions, packing nuts, and bracket nuts
  - 10 mm socket wrench (for shaft clamp nuts on Mx40-717x, Mx41-707x, Mx41-715x)
  - 1/2" nut driver and 1/2" open end wrench (for all except Mx41-634x, Mx40-717x)
  - Measuring scale graduated in 1/32" increments
  - Torque wrench, range to include 90 to 120 lb-in. (7.5 to 10 lb-ft, 10 to 14 N-m)
  - Pipe wrenches, two
  - 11/16" open-end wrench for jam nuts, two
  - Vise grip or pliers
  - Appropriate power supply (see the applicable actuator General Instructions sheet for power requirements)



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#### **Warning:**

- Disconnect power from the actuator before installation to prevent personal injury and damage.
  - Make all connections in accordance with the job wiring diagram and in accordance with national and local electrical codes. *Use copper conductors only.*
- 

### General Installation

Schneider Electric globe valve rack and pinion linkages are provided as complete assemblies. The following pages contain instructions for installing the AV-607 and AV-609 linkages.

### Mounting

Allow at least 5" (127 mm) above the actuator/linkage assembly for removal and reattachment of the actuator to the installed valve.

### Mounting Actuator and Linkage to Valve Body

#### **Process Overview**

This mounting procedure consists of two sections:

- **Section A. Mounting Linkage to Valve**
  - A1. VB-9xxx (2-way and 3-way) valves and appropriate actuator types (see Table-1), follow the instructions in this section to assemble the linkage to the valve
  - A2. VB-8xx3 (2-way and 3-way) valves and appropriate actuator types (see Table-1), follow the instructions in this section to assemble the linkage to the valve
- **Section B. Actuator Mounting and Setup**

In this section, choose the subsection that is appropriate for the specific actuator type and valve type, to mount the actuator and adjust the linkage:

- B1. Spring Return Actuators with Manual Override 2-Way Valves and 3-Way Valves (Normal Position — Valve Stem Up)
- B2. Spring Return Actuators with Manual Override 2-Way Valves and 3-Way Valves (Normal Position — Valve Stem Down)
- B3. Non-Spring Return Actuator with Manual Override VB-8213 and VB-921x 2-Way Valves (Valve Stem Up, Open) VB-8223 and VB-922x 2-Way Valves (Valve Stem Up, Closed) VB-8303 and VB-931x 3-Way Valves (Valve Stem Up, Port A Closed)
- B4. Spring Return Actuators without Manual Override VB-8223, VB-922x 2-Way Valves (Normal Position — Valve Stem Up, Closed) VB-8303, VB-931x 3-Way Valves (Normal Position — Valve Stem Up, Port A Closed)
- B5. Spring-Return Actuators without Manual Override VB-8213, VB-921x 2-Way Valves (Normal Position — Valve Stem Down, Closed) VB-8303, VB-931x 3-Way Valves (Normal Position — Valve Stem Down, Port B Closed)

The linkage is assembled to the valve according to Section A. Refer to Table-5, below, to determine the remainder of the assembly path for a specific actuator and valve.

**Table-5 Procedure for Mounting Actuator and Linkage to Valve Body.**

Actuator Type	Valve Type	Section B				
		Subsection B1	Subsection B2	Subsection B3	Subsection B4	Subsection B5
Spring Return Actuators with Manual Override Mx41-707x Mx41-715x	2-Way and 3-Way, Normal Position Valve Stem Up	X				
	2-Way and 3-Way, Normal Position Valve Stem Down		X			
Non-Spring Return Actuators with Manual Override Mx41-6153 Mx41-634x	2-Way and 3-Way, Normal Position Valve Stem Up			X		
	2-Way and 3-Way, Normal Position Valve Stem Down			X		
Spring Return Actuators without Manual Override Mx40-717x	2-Way and 3-Way, Normal Position Valve Stem Up <sup>a</sup>				X	
	2-Way and 3-Way, Normal Position Valve Stem Down <sup>a</sup>					X

<sup>a</sup> Power is required to position the actuator during assembly.

## Section A. Mounting Linkage to Valve

### A1. Mounting Linkage to Valve — VB-9xxx and Appropriate<sup>1</sup> Actuator Models

1. Assemble the linkage to the valve, according to Figure-9.

**Note:** If necessary for ease of assembly, remove the actuator from the linkage.

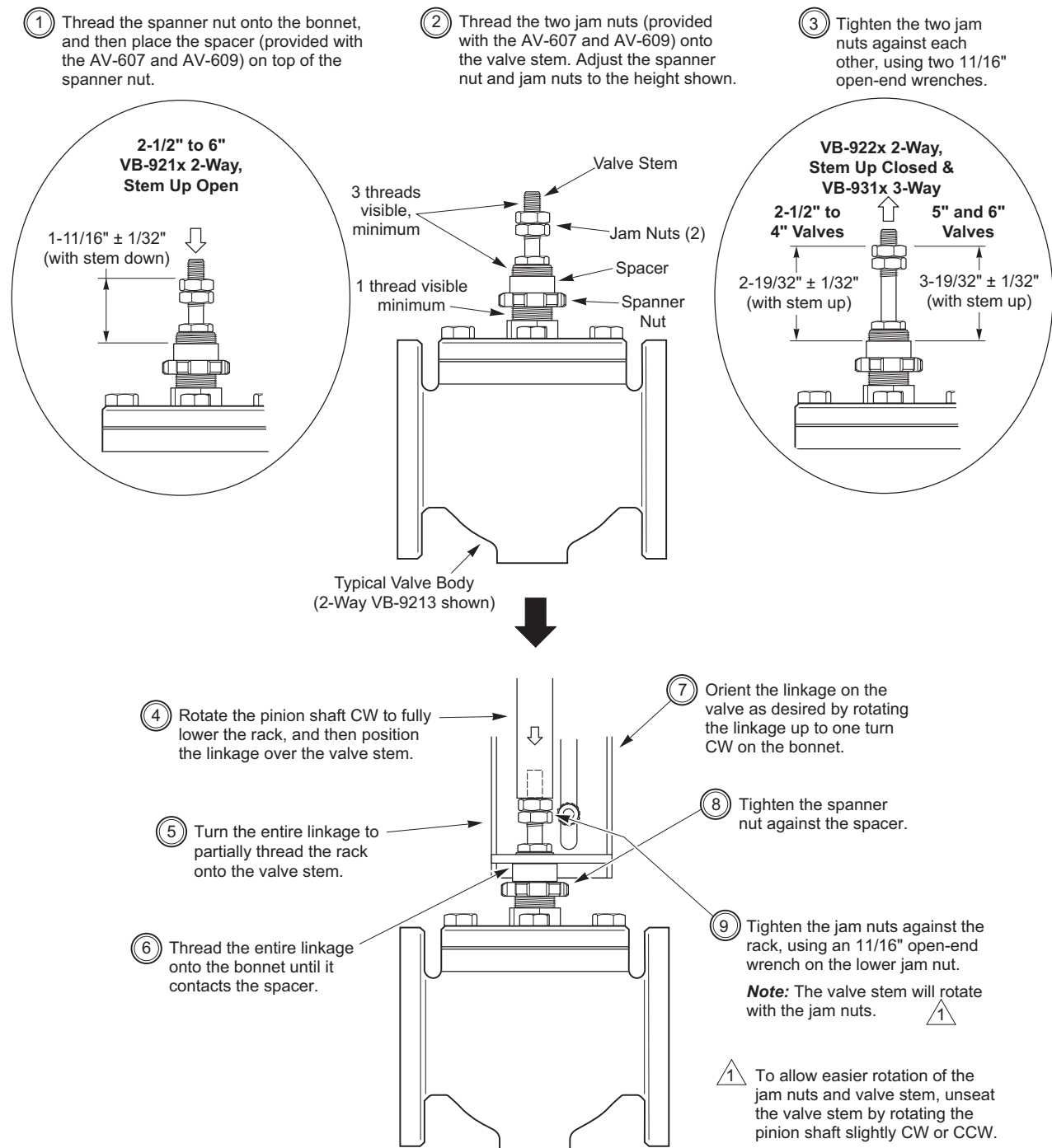


Figure-9 Assembling Linkage to Valve.

2. Continue the assembly process according to the following section, "Section B. Actuator Mounting and Setup."

<sup>1</sup>. See Table-4

## A2. Mounting Linkage to Valve — VB-8xx3 and Appropriate<sup>1</sup> Actuator Models

1. Assemble the linkage to the valve, according to Figure-10.

**Note:** If necessary for ease of assembly, remove the actuator from the linkage.

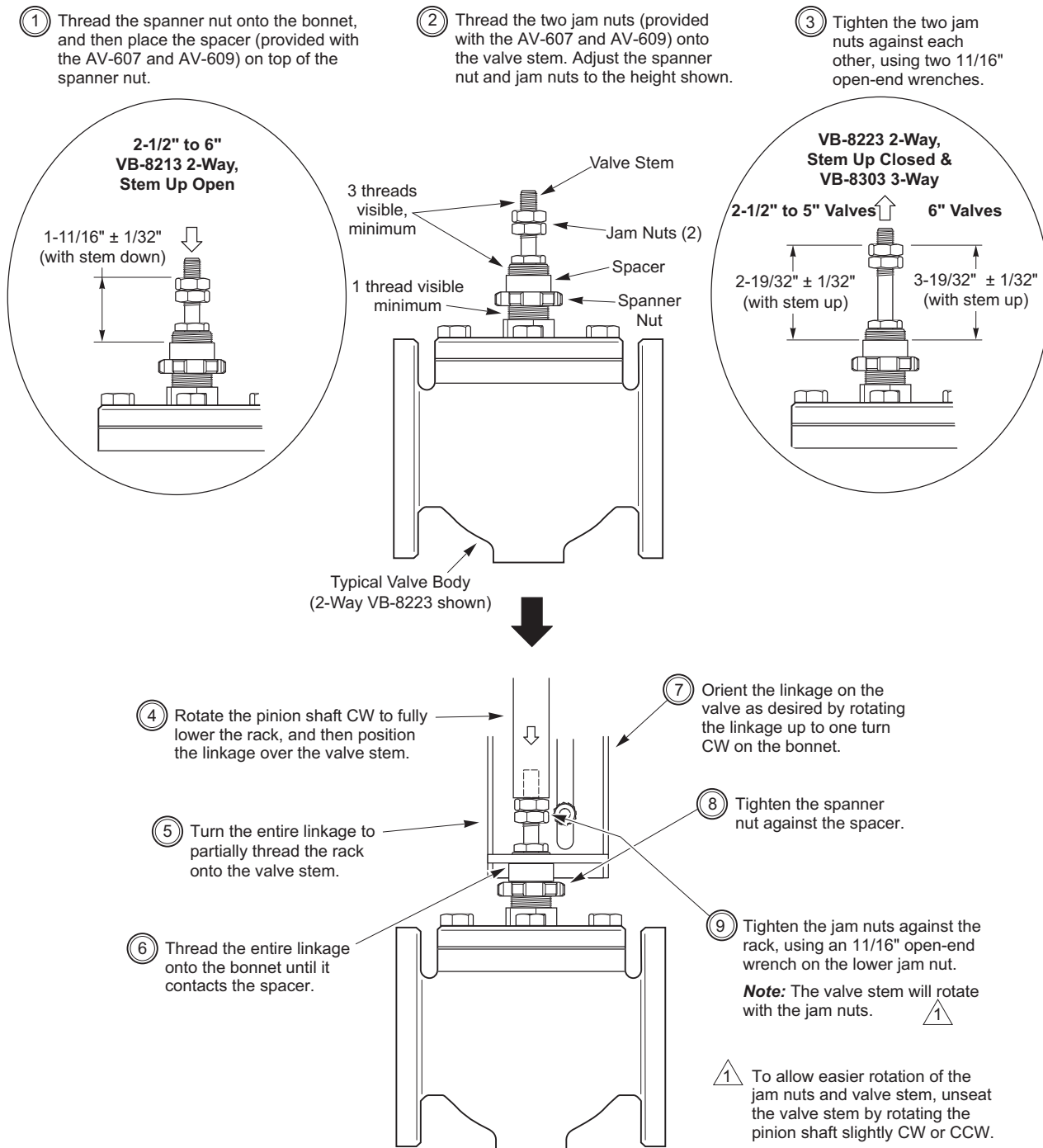


Figure-10 Assembling Linkage to Valve.

2. Continue the assembly process according to the following section, "Section B. Actuator Mounting and Setup."

<sup>1</sup> See Table-4

## Section B. Actuator Mounting and Setup

To mount the actuator and set up the assembly, refer to the subsection that applies to the specific actuator type and valve type.

### B1. Spring Return Actuators with Manual Override

#### 2-Way Valves and 3-Way Valves (Normal Position — Valve Stem Up)

#### Mx41-707x (VB-9xxx only) and Mx41-715x (AV-607 and AV-609)

- a. Install the actuator onto the linkage and valve, and set up the assembly, according to Figure-11.

**Note:** When setting the L/R selector for "direct acting" or "reverse acting," refer to the applicable table in "Setting Actuator/Valve Action" on page 18.

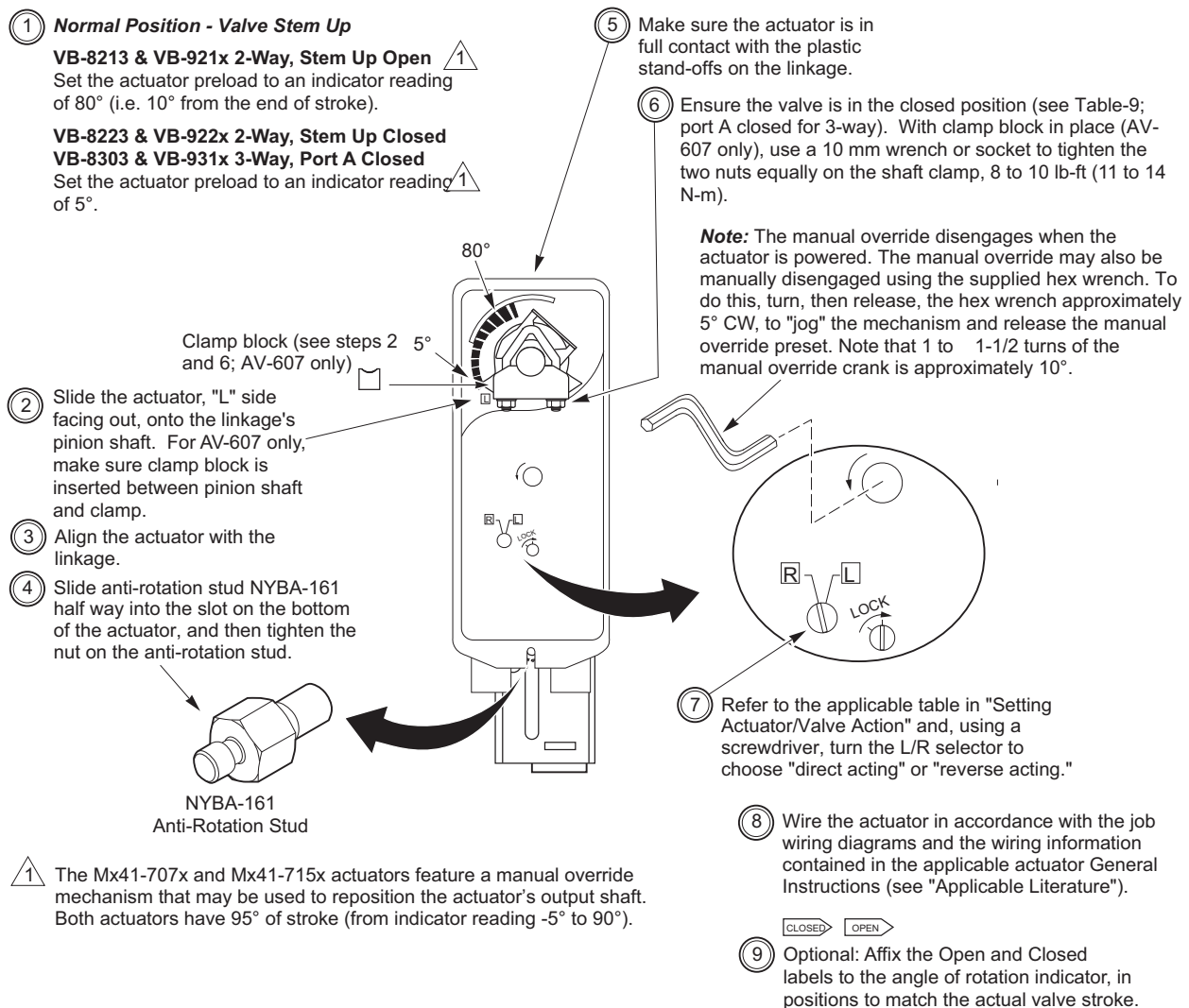


Figure-11 Mounting Mx41-707x or Mx41-715x and Setting Up Actuator/Linkage/Valve Assembly.

- b. Power the actuator and check the system's operation for heating or cooling output, in response to the control signal. See "Setting Actuator/Valve Action" on page 18.
- c. Refer to the appropriate actuator General Instructions sheet for additional actuator wiring and application information (see "Applicable Literature" on page 2). For valve body installation and application information, refer to the appropriate valve body General Instructions sheet.

**B2. Spring Return Actuators with Manual Override**  
**2-Way Valves and 3-Way Valves (Normal Position — Valve Stem Down)**

**Mx41-707x (VB-9xxx only with AV-607) and Mx41-715x (AV-607 and AV-609)**

- a. Install the actuator onto the linkage and valve, and set up the assembly, according to Figure-12.

**Note:** When setting the L/R selector for "direct acting" or "reverse acting," refer to the applicable table in "Setting Actuator/Valve Action" on page 18.

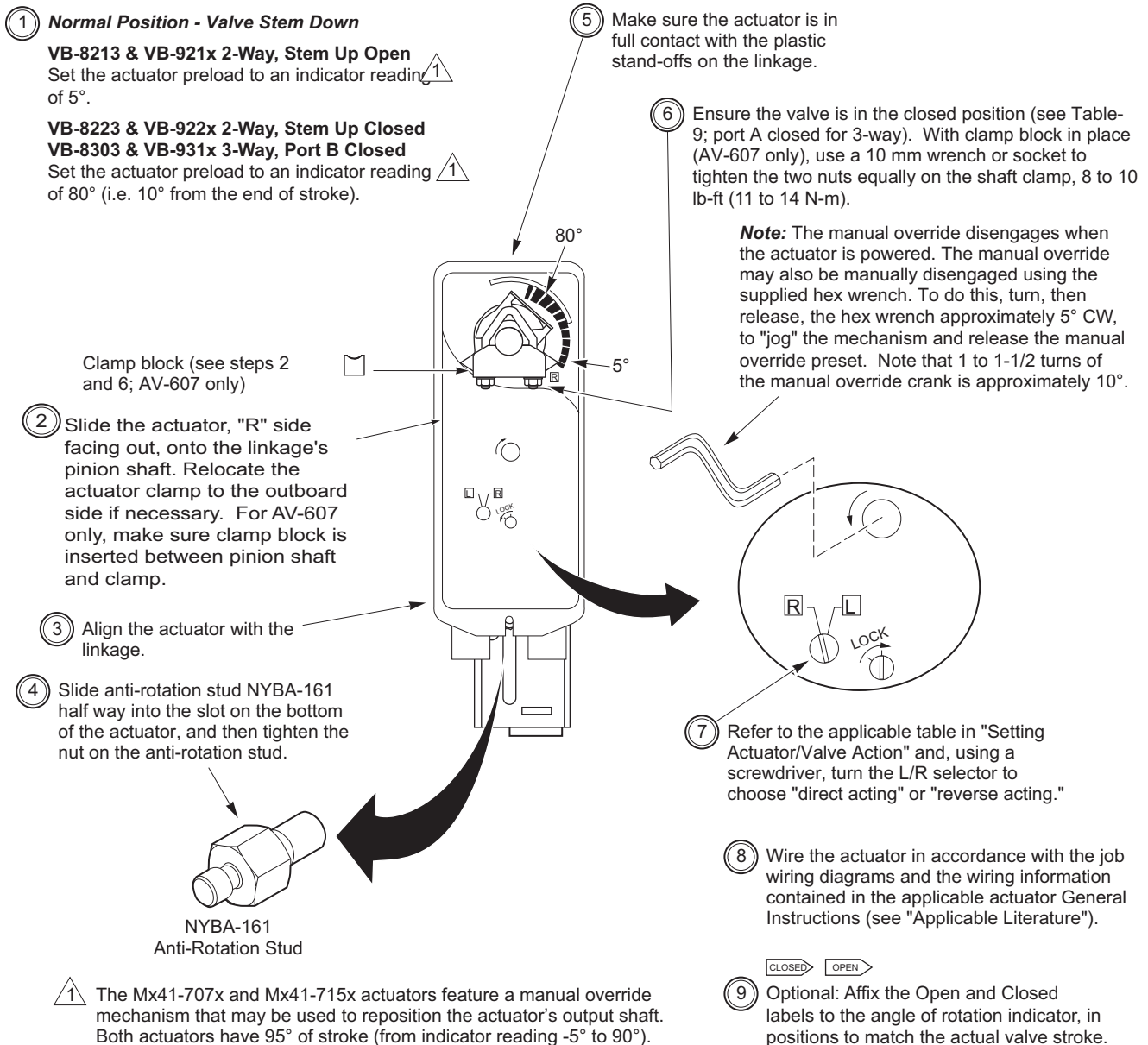


Figure-12 Mounting Mx41-707x or Mx41-715x and Setting Up Actuator/Linkage/Valve Assembly.

- b. Power the actuator and check the system's operation for heating or cooling output, in response to the control signal. See "Setting Actuator/Valve Action" on page 18.
- c. Refer to the appropriate actuator General Instructions sheet for additional actuator wiring and application information (see "Applicable Literature" on page 2). For valve body installation and application information, refer to the appropriate valve body General Instructions sheet.

**B3. Non-Spring Return Actuator with Manual Override**  
**VB-8213 and VB-921x 2-Way Valves (Valve Stem Up, Open)**  
**VB-8223 and VB-922x 2-Way Valves (Valve Stem Up, Closed)**  
**VB-8303 and VB-931x 3-Way Valves (Valve Stem Up, Port A Closed)**

**Mx41-6153 Series (VB-9xxx only) Actuator with AV-607 Linkage, Mx41-634x Actuator with AV-609 Linkage**

- a. Install the actuator onto the linkage and valve, and set up the assembly, according to Figure-13.

**Note:** For Mx41-634x actuators, Use the two clamps supplied with the linkage.

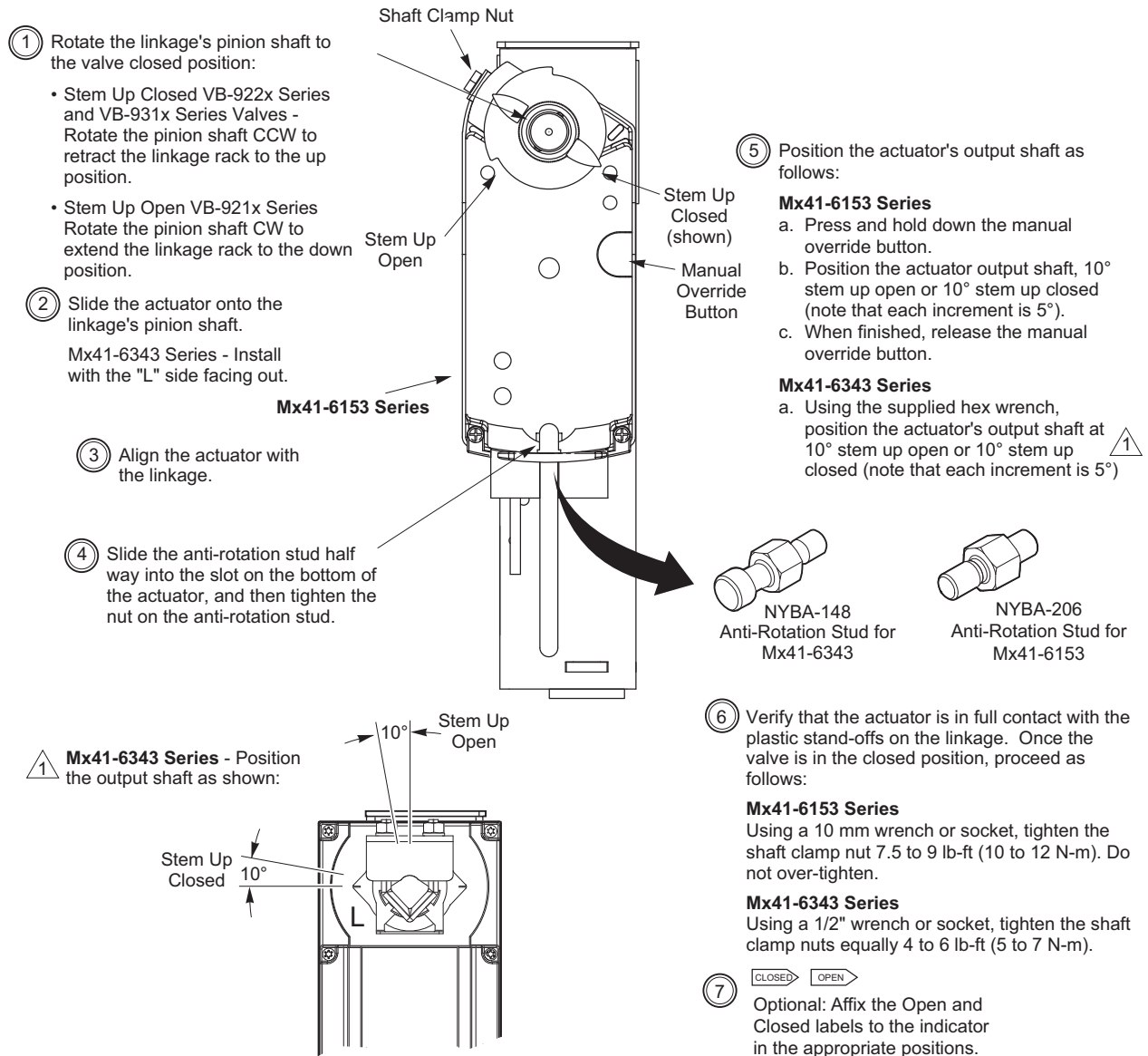


Figure-13 Mounting Mx41-6153 Series or Mx41-634x Series Actuators and Setting Up Actuator/Linkage Valve Assembly

- Power the actuator and check the system's operation for heating or cooling output, in response to the control signal. See "Setting Actuator/Valve Action" on page 18.
- Refer to the appropriate actuator General Instructions sheet for additional actuator wiring and application information (see "Applicable Literature" on page 2). For valve body installation and application information, refer to the appropriate valve body General Instructions sheet.

#### B4. Spring Return Actuators without Manual Override<sup>1</sup>

**VB-8223, VB-922x 2-Way Valves (Normal Position — Valve Stem Up, Closed)**

**VB-8303, VB-931x 3-Way Valves (Normal Position — Valve Stem Up, Port A Closed)**

##### Mx40-717x (AV-607 and AV-609)

- a. Install the actuator onto the linkage and valve, and set up the assembly, according to Figure-14. Use the two clamps supplied with the linkage.

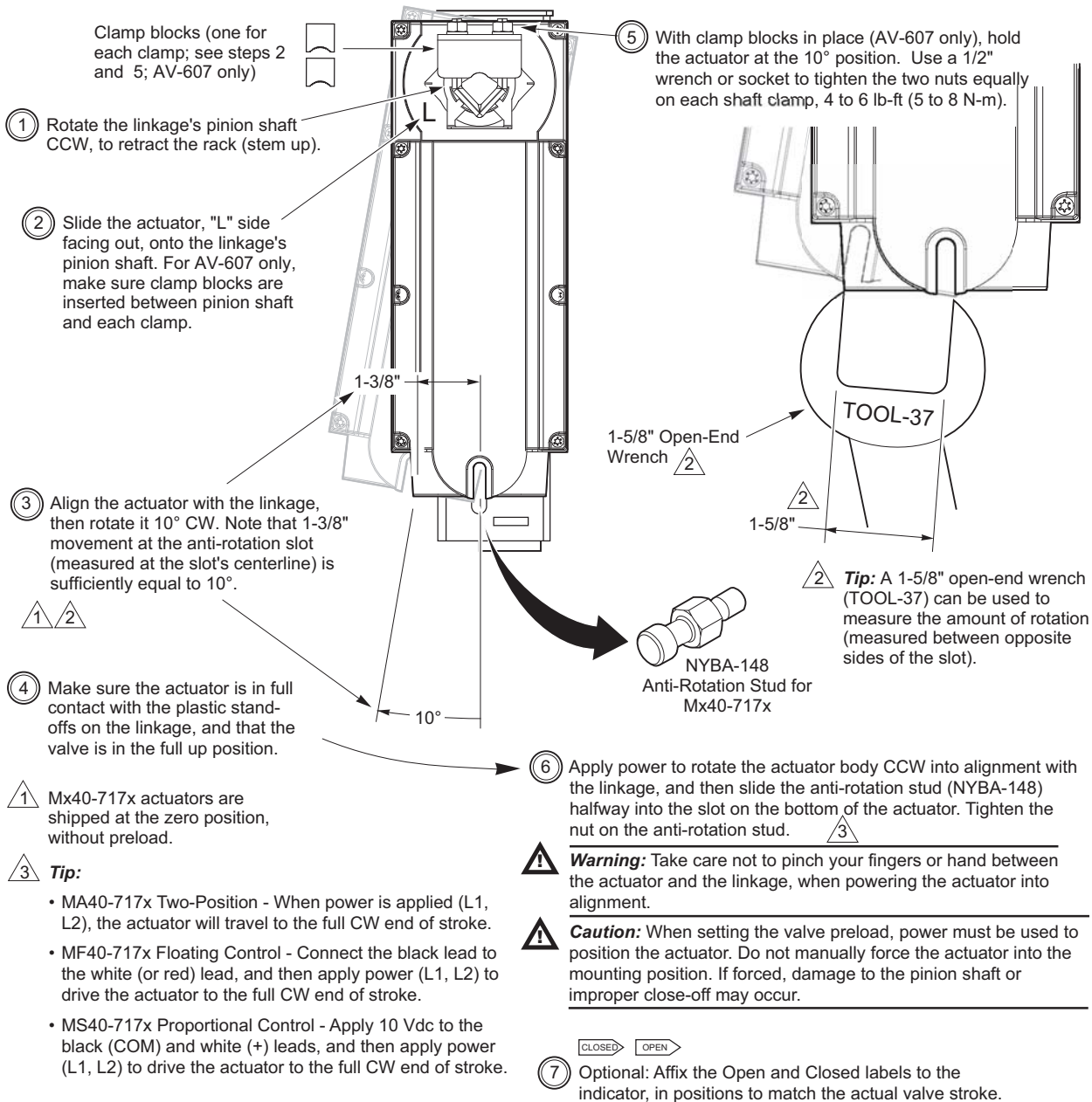


Figure-14 Mounting Mx40-717x and Setting up Actuator/Linkage/Valve Assembly.

- b. Power the actuator and check the system's operation for heating or cooling output, in response to the control signal. See "Setting Actuator/Valve Action" on page 18.
- c. Refer to the appropriate actuator General Instructions sheet for additional actuator wiring and application information (see "Applicable Literature" on page 2). For valve body installation and application information, refer to the appropriate valve body General Instructions sheet.

<sup>1</sup> For normally open valve assemblies, an actuator with manual override must be used.



## B5. Spring-Return Actuators without Manual Override<sup>1</sup>

**VB-8213, VB-921x 2-Way Valves (Normal Position — Valve Stem Down, Closed)**

**VB-8303, VB-931x 3-Way Valves (Normal Position — Valve Stem Down, Port B Closed)**

### Mx40-717x (AV-607 and AV-609)

- a. Install the actuator onto the linkage and valve, and set up the assembly, according to Figure-15. Use the two clamps supplied with the linkage.

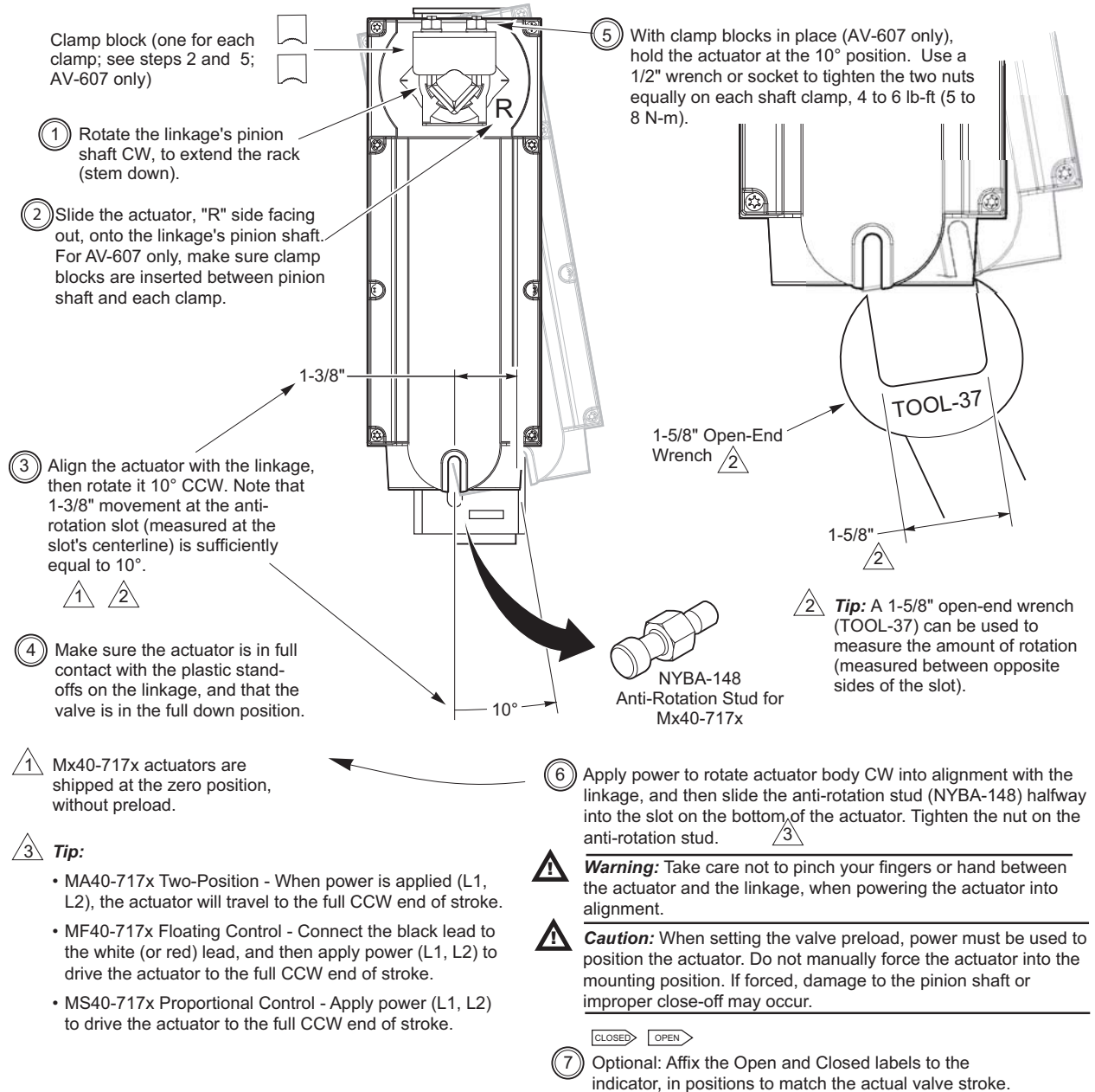


Figure-15 Mounting Mx40-717x and Setting Up Actuator/Linkage/Valve Assembly

- b. Power the actuator and check the system's operation for heating or cooling output, in response to the control signal. See "Setting Actuator/Valve Action" on page 18.
- c. Refer to the appropriate actuator General Instructions sheet for additional actuator wiring and application information (see "Applicable Literature" on page 2). For valve body installation and application information, refer to the appropriate valve body General Instructions sheet.

<sup>1</sup>. For normally open valve assemblies, an actuator with manual override must be used.

## Setting Actuator/Valve Action

Set the actuator/valve action according to Table-6, Table-7, or Table-8.

**Table-6 MS4x-7xx3 Series Proportional Spring Return Actuators.**

Valve Part Number	Actuator		Signal Increase			Spring Return	
	Facing Side	Switch Setting	Actuator Rotation <sup>a</sup>	Valve Stem Moves	Valve Action	Actuator Rotation <sup>a</sup>	Valve Normal Position
VB-921x VB-8213	L	L	CW	Down	Closes	CCW	Open (Stem Up)
	L	R	CCW	Up	Opens	CCW	
VB-922x VB-8223	L	L	CW	Down	Opens	CCW	Closed (Stem Up)
	L	R	CCW	Up	Closes	CCW	
VB-931x	L	L	CW	Down	"B" Closes	CCW	"B" Open "A" Closed (Stem Up)
	L	R	CCW	Up	"B" Opens	CCW	
VB-8303	L	L	CW	Down	"B" Closes	CCW	"B" Open "A" Closed (Stem Up)
	L	R	CCW	Up	"A" Closes	CCW	
VB-921x VB-8213	R	L	CW	Down	Closes	CW	Closed (Stem Down)
	R	R	CCW	Up	Opens	CW	
VB-922x VB-8223	R	L	CW	Down	Opens	CW	Open (Stem Down)
	R	R	CCW	Up	Closes	CW	
VB-931x	R	L	CW	Down	"B" Closes	CW	"A" Open "B" Closed (Stem Down)
	R	R	CCW	Up	"B" Opens	CW	
VB-8303	R	L	CW	Down	"B" Closes	CW	"A" Open "B" Closed (Stem Down)
	R	R	CCW	Up	"A" Closes	CW	

<sup>a</sup> As viewed from the facing side.

**Table-7 MA4x-7xxx Series Two-Position and MF4x-7xxx Series Floating Spring Return Actuators.**

Valve Part Number	Actuator Facing Side	Signal Increase			Spring Return	
		Actuator Rotation <sup>a</sup>	Valve Stem Moves	Valve Action	Actuator Rotation <sup>a</sup>	Valve Normal Position
VB-921x VB-8213	L	CW	Down	Closes	CCW	Open (Stem Up)
VB-922x VB-8223	L	CW	Down	Opens	CCW	Closed (Stem Up)
VB-931x	L	CW	Down	"B" Closes "A" Opens	CCW	"B" Open "A" Closed (Stem Up)
VB-8303	L	CW	Down	"B" Closes "A" Opens	CCW	"B" Open "A" Closed (Stem Up)
VB-921x VB-8213	R	CCW	Up	Opens	CW	Closed (Stem Down)
VB-922x VB-8223	R	CCW	Up	Closes	CW	Open (Stem Down)
VB-931x	R	CCW	Up	"B" Opens "A" Closes	CW	"A" Open "B" Closed (Stem Down)
VB-8303	R	CCW	Up	"B" Opens "A" Closes	CW	"A" Open "B" Closed (Stem Down)

<sup>a</sup> As viewed from the facing side.

**Table-8 Mx41-6153 Series and Mx41-634x Series Proportional Non-Spring Return Actuators.**

Valve Part Number	Actuator		Signal Increase		
	Action Mx41-6153 <sup>a</sup>	Facing Side Mx41-634x	Actuator Rotation <sup>b</sup>	Valve Stem Moves	Valve Action
VB-921x VB-8213	CW	L	CW	Down	Closes
	CCW	R	CCW	Up	Opens
VB-922x VB-8223	CW	L	CW	Down	Opens
	CCW	R	CCW	Up	Closes
VB-931x	CW	L	CW	Down	"B" Closes "A" Opens
	CCW	R	CCW	Up	"B" Opens "A" Closes
VB-8303	—	L	CW	Down	"B" Closes "A" Opens
	—	R	CCW	Up	"B" Opens "A" Closes

<sup>a</sup> Mx41-6153 used with VB-9xxx only.

<sup>b</sup> As viewed from the facing side.

## Valve Body Action

**Table-9 Valve Body Action**

Valve Body Part Number	Description	Valve Action	
		Stem Up	Stem Down
VB-8213	Two-way stem up open	Open	Closed
VB-8223	Two-way stem up closed	Closed	Open
VB-8303	Three-way diverting/mixing <sup>a</sup>	Port A Closed Port B Open <sup>a</sup>	Port A Open Port B Closed <sup>a</sup>
VB-921x	Two-way stem up open	Open	Closed
VB-922x	Two-way stem up closed	Closed	Open
VB-931x	Three-way mixing <sup>a</sup>	Port A Closed Port B Open <sup>a</sup>	Port A Open Port B Closed <sup>a</sup>

<sup>a</sup> AB port is the common port on 3-way valves

## Valve Mounting

The valve should be mounted in a weather-protected area, in a location that is within the ambient temperature limits of the actuator. The installation of the actuator assembly should provide clearance on all sides to allow for any maintenance that may be needed.

1. Following general piping practices is recommended.
2. Apply pipe sealant sparingly to all but the last two threads of a properly threaded, reamed, and cleaned pipe. Make sure the pipe chips, scale, etc. do not get into the pipe since this material may lodge in the valve seat and prevent proper closing and opening of the valve. The valve must be piped with an inlet and an outlet.
3. Start the joint hand-threading the pipe into the valve. If the thread alignment feels normal, continue to turn the pipe by hand as far as it will go.
4. Use a pipe wrench to fully tighten the pipe to the valve.

---

**Caution:** Do not over-tighten the pipe, which may cause stripped threads. Avoid twisting or crushing the valve while tightening the pipe.

---

5. Insulate only the valve body.
6. In chilled or cold water systems where the environment is humid, use a drip pan under the valve to catch condensate.

**Caution:**

- Do not insulate the actuator/linkage. Doing so will result in excess heat buildup within the actuator.
- The globe valve assembly must be mounted so that the actuator is at least 5° above the horizontal (Figure-16) to ensure that any condensate that forms will not travel into the linkage or actuator.
- On steam applications, the globe valve assembly must be mounted at 45° from vertical (Figure-17).

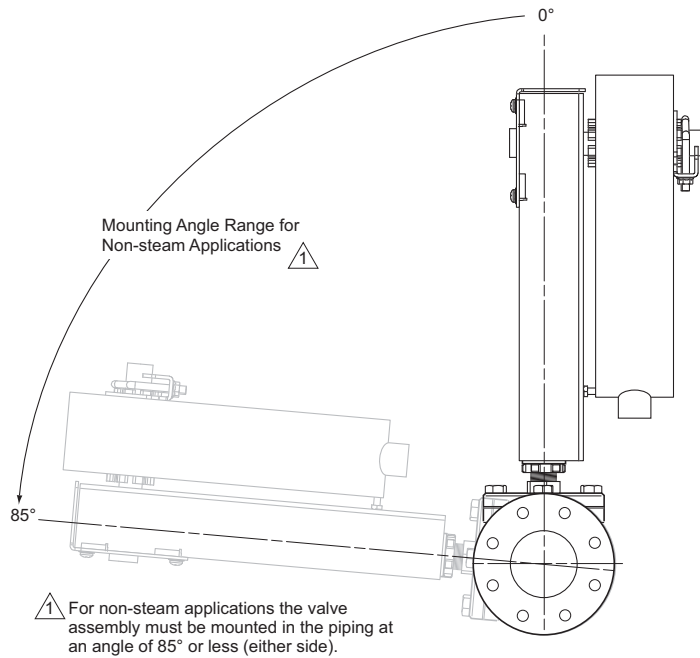


Figure-16 Typical Mounting Position.

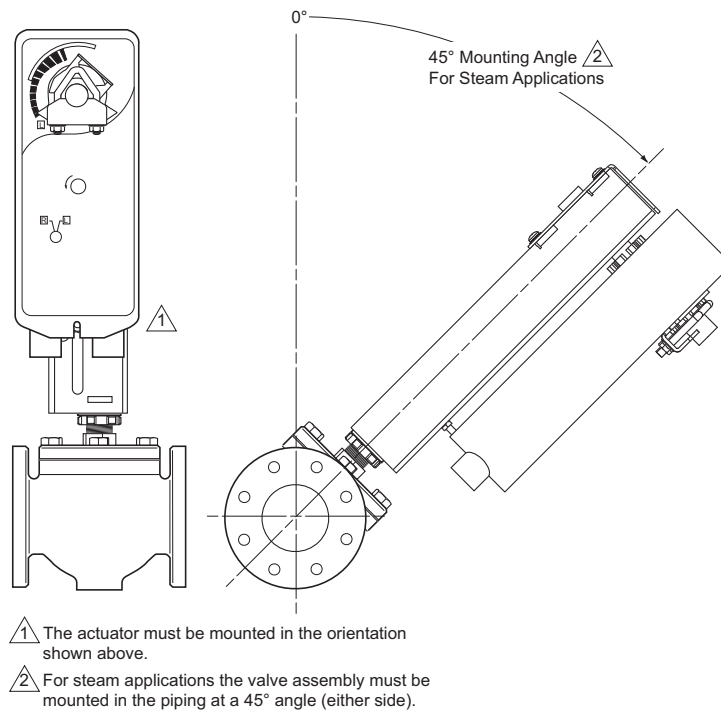


Figure-17 Steam Application Mounting Position.

## Manual Override for Mx41-6153 Non-Spring Return Actuators

When necessary, the Mx41-6153 actuator's output shaft can be manually repositioned. To move the valve and lock the position when no power is present, use the manual override according to Figure-18.

---

### Caution:

- Only use manual override when the actuator drive motor is not powered.
  - Engaging the manual override when the actuator is powered will cause damage to the gears.
  - Avoid manually repositioning the actuator beyond its adjustable travel limit setting.
- 

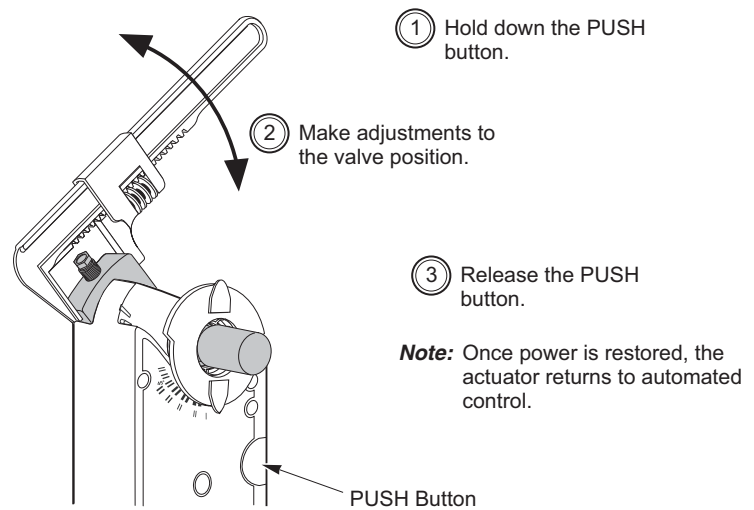
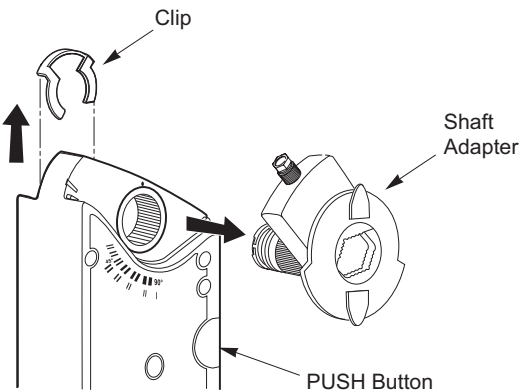
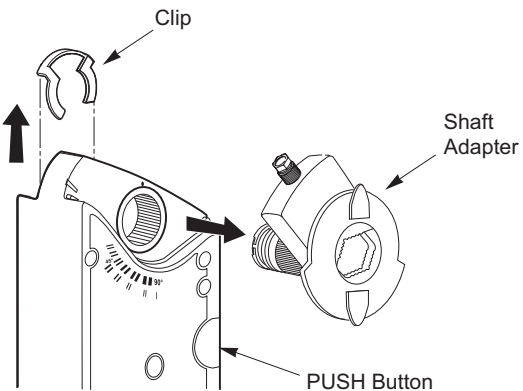


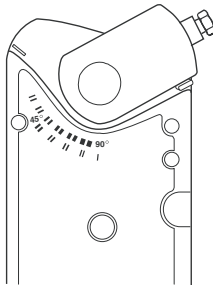
Figure-18 Manual Override Button on Mx41-6153 Actuators.

## Mechanical Range Adjustment for Mx41-6153 Non-Spring Return Actuators

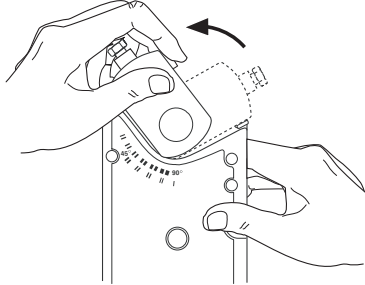
The range of angular rotation is adjustable between 0° and 90°, at 5° intervals. The range of shaft movement is limited by mounting the shaft adapter.

- ① Loosen the shaft adapter from the linkage shaft and remove the actuator from the linkage.
 
- ② Remove the clip and the shaft adapter from the actuator.
 
- ③ Return the actuator gear train to the "0" position, using the following steps as applicable for CW or CCW linkage shaft rotation:
 

**CW to Open**

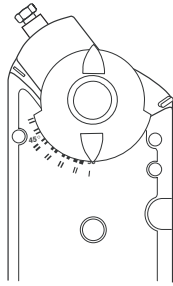
  - a. Insert the shaft adapter to the right as close as possible to the raised stop (View A).
  - b. Hold down the PUSH button and rotate the shaft adapter to the left until it stops (View B).
  - c. Release the PUSH button.
  - d. If the shaft adapter is not resting against the left raised stop, remove the adapter and insert it against the left stop.
  - e. Place the position indicator in the "0" position on the outside scale (View C).

**View A**



**View B**

**CCW to Open**

  - a. Insert the shaft adapter to the left as close as possible to the raised stop.
  - b. Hold down the PUSH button and rotate the shaft adapter to the right until it stops.
  - c. Release the PUSH button.
  - d. If the shaft adapter is not resting against the right raised stop, remove the adapter and insert it against the right stop.
  - e. Place the position indicator in the "0" position on the inside scale.

**View C**
- ④ Determine the angle of rotation for the linkage shaft. Subtract that amount from 90°.
- ⑤ Remove the shaft adapter and insert it with the position indicator pointing to the mark on the scale calculated in step 4 (View C).
- ⑥ Install the clip on the shaft adapter.
- ⑦ Rotate the linkage shaft to its "0" position.
- ⑧ Return the actuator to the linkage shaft and tighten the shaft adapter.

Figure-19 Mechanical Range Adjustment on Mx41-6153 Actuators.

## Manual Override for Mx41-707x and Mx41-715x Spring Return Actuators

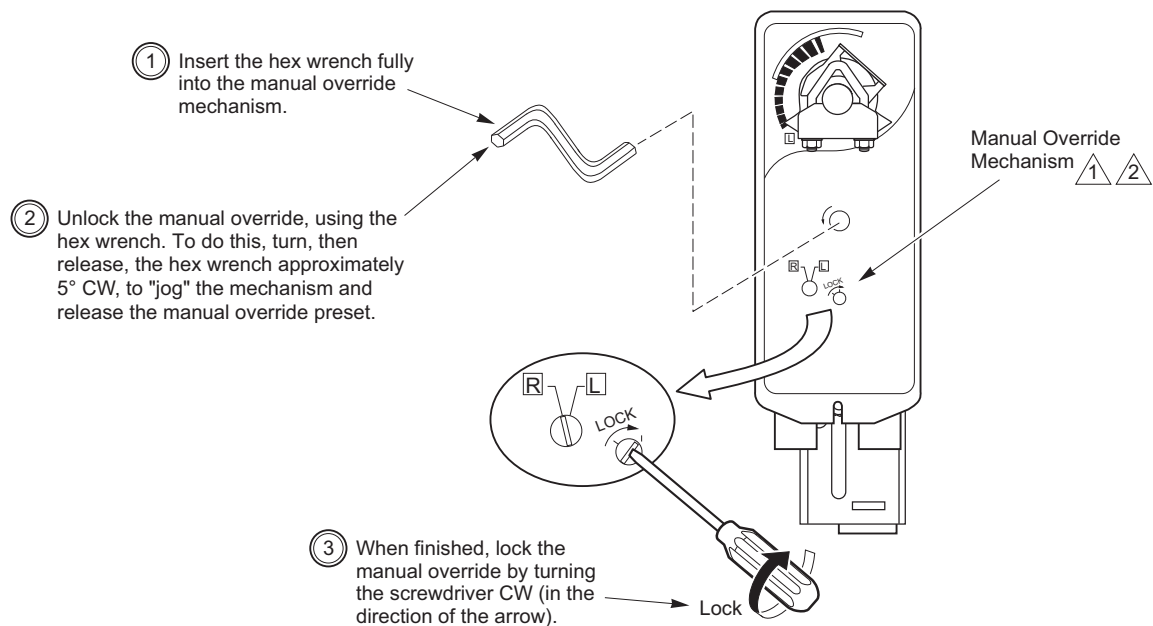
When necessary, the Mx41-707x or Mx41-715x actuator's output shaft can be repositioned, using the manual override mechanism as follows:

1. Disconnect power from the actuator.
2. Crank the manual override mechanism and lock it into the override position, as shown in Figure-20.
3. The actuator will return to normal operation (the manual override lock will release) the next time power is applied.

---

### Caution:

- Only use manual override when the actuator drive motor is not powered.
  - Engaging the manual override when the actuator is powered will cause damage to the gears.
  - Using power tools to adjust the override will cause damage to the gears.
  - Avoid manually repositioning the actuator beyond its adjustable travel limit setting.
- 



- ① Mx41-707x and Mx41-715x actuators are shipped at +5° to provide proper valve preload. When necessary, the manual override mechanism may be used to reposition the actuator at any point between -5° and 85°. This mechanism is accessible on both sides of the actuator and can be used to ensure tight close-offs for valves.
- ② If the rotation indicator is not pointing to +5°, the proper actuator preload is not set. Unlock the actuator according to steps 1 and 2, and then rotate the hex wrench one full turn (approximately 10°) so that the actuator indicator is at +5°. When finished cranking, lock the manual override according to step 3. The lock will release the next time the actuator is powered.

When using the manual override mechanism:

- Fully engage the hex wrench in the manual override before cranking.
- When operating the manual override, ensure proper release by backing off 5° from the full open mechanical stop.

**Caution:** Do not use the manual override while a unit is powered, or when units are mounted in tandem.

Figure-20 Manual Override on Mx41-707x or Mx41-715x Spring Return Actuators

## CHECKOUT

1. Checkout the operation of the valve/actuator/linkage assembly:
  - a. Power the actuator and run the valve to the stem down position. The valve stem should operate smoothly. At the stem down position, the valve should shut off tightly or fully open, depending on the valve body style. See Table-6 and Table-7 on page 18.

- b. For spring-return actuators, allow the actuator to spring-return to the stem up position. For non-spring return actuators, power the actuator to the stem up position. The valve stem should operate smoothly. At the stem up position, the valve should be in its full open or closed position, depending on the valve body style. See Table-8 on page 19.
2. Ensure that the valve seats before the actuator reaches the end of its stroke.

---

**Note:** 3-way valves must seat before the actuator reaches either end of stroke. If this does not occur, proper close-off may not be achieved. Return to the "Mounting" section and repeat the appropriate procedure.

---

3. If the valve stem does not operate smoothly, the valve may have been twisted or crushed during installation, or the stem may have been bent from rough handling. These conditions may require that the valve be replaced.
4. With the piping under pressure, check the valve body and the connections for leaks.

## THEORY OF OPERATION

The actuator/linkage assembly offers a rack and pinion design that converts the rotary motion output of the actuator into linear motion, in order to operate 2-1/2" to 6" VB-9xxx, 2-1/2" to 6" VB-8xxx, and older globe style valves.

The unit is designed to furnish the specified actuator torque in both actuator drive directions, to fully close off the valve against the flow. The rack and pinion design also provides uniform force and timing over the entire valve stroke.

## MAINTENANCE

The actuator/linkage requires no maintenance. Regular maintenance of the total system is recommended to assure sustained optimum performance.

### Water and Steam System Maintenance

All heating and cooling systems are susceptible to valve and system problems caused by improper water treatment and system storage procedures. The information in this section is provided to help avoid valve and water system problems resulting from improperly treated water or incorrect storage procedures, and to obtain maximum life from Schneider Electric valves.

The durability of valve stems and valve packing depends on the maintenance of nondamaging water conditions. Inadequate water treatment or filtration that is not in accordance with chemical supplier/ASHRAE handbook recommendations, can result in the formation of corrosion, scale, and abrasive particles. Scale and particulates can cause scratches in valve stems and packing, and can adversely affect the life of the valve packing and other parts of the hydronic system.

To maintain safe conditions, clean the system prior to start-up, using a nitrite or molybdate based treatment program. Use filtration equipment where needed. Properly store off-line systems and monitor water treatment results, using corrosion test coupons.

Follow the advice of a water treatment professional. For further details, consult *EN-205 Water and Steam System Guidelines, Engineering Information, F-26080*.

## FIELD REPAIR

None. Linkage, actuator, and valve body may be replaced separately. Replace inoperative components with functional ones.

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