

SmartX Actuator Linkages for 2-1/2" to 6" Globe Valves General Instructions

Application

AV-607 and AV-609 linkages are designed to link Schneider Electric spring return and non-spring return SmartX actuators to 2-1/2" to 6" VB-9xxx and 2-1/2" to 6" VB-8xx3 globe valves.

Table-1 Actuator/Valve Combinations

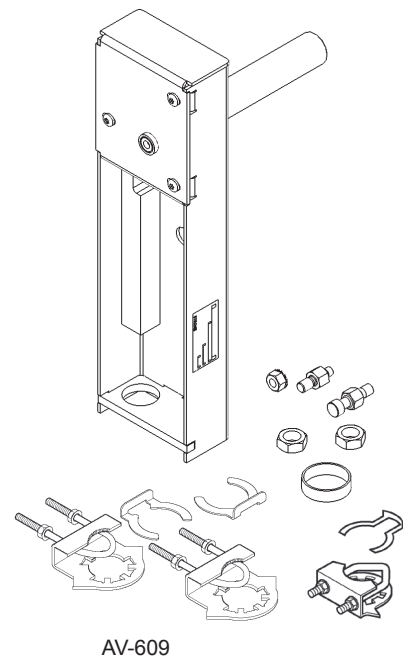
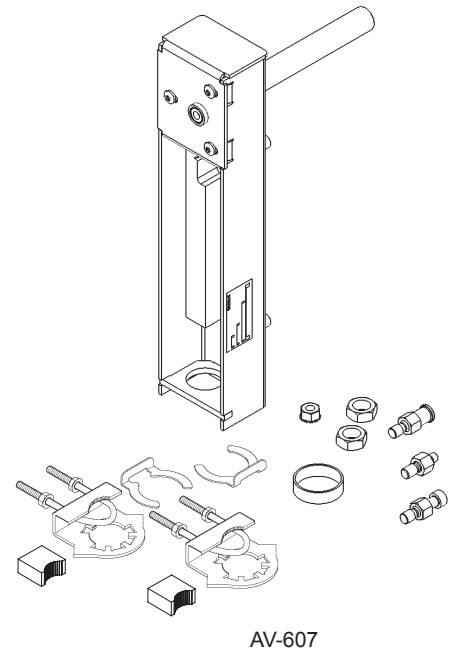
SmartX Actuators	Linkage	Factory-Assembled Valve Sizes 2-way & 3-way	Field-Assembled to VB Valve Bodies 2-way & 3-way
Mx41-6153 Mx41-707x Mx41-715x Mx40-717x	AV-607	65 mm to 80 mm VB-9xx5	2-1/2" to 5" VB-8xx3
			65 mm to 80 mm VB-9xx5
		2-1/2" to 4" VB-931x,	2-1/2" to 4" VB-931x
		2-1/2" to 5" VB-8xx3	1-1/2" and 2" ^{a b} VB-92xx
			2-1/2" to 4" VB-92xx ^b
Mx41-634x Mx41-715x Mx40-717x	AV-609	5" and 6" VB-9xxx,	6" VB-8xx
		6" VB-8xx3	5" and 6" VB-931x, VB-92xx ^b

^aWith AV-608 in addition to actuator and linkage

^bDiscontinued

Features

- Compatible with Schneider Electric (Siebe, Barber-Colman) 2-1/2" to 6" VB-8xx3, 2-1/2" to 6" VB-931x, and discontinued 1-1/2" to 4" VB-92xx valves and Schneider Electric SmartX actuators
- Maintenance-free construction
- Corrosion protected heavy-duty steel rack and pinion construction and metal housing
- Precision rack self aligns with the valve stem



Applicable Literature

F-Number	Description	Audience	Purpose	
F-26080	EN-205 Water System Guidelines	<ul style="list-style-type: none"> – Application Engineers – Installers – Service Personnel – Start-up Technicians 	Describes Schneider Electric recommended water treatment practices.	
F-26642	MA40-704x, MA4x-707x, MA4x-715x Spring Return Two-Position SmartX Actuators General Instructions	<ul style="list-style-type: none"> – Sales Personnel – Application Engineers – Installers – Service Personnel – Start-up Technicians 	Describes the actuator's features, specifications, and possible applications. Provides step-by-step mounting instructions and wiring instructions for the actuators.	
F-26742	MA40-717x Spring Return Direct Coupled SmartX Actuator General Instructions			
F-26644	MF4x-7xx3 Spring Return Floating SmartX Actuator General Instructions			
F-26645	MS4x-7xx3 Spring Return Proportional SmartX Actuator General Instructions			
F-26748	MS40-717x Spring Return Direct Coupled SmartX Actuator General Instructions			
F-26749	MF40-7173 Spring Return Direct Coupled SmartX Actuator General Instructions			
F-27160	Mx41-6xxx-220/-230 and Mx4x-7xxx-220/-230 Series Actuator/Linkage Assemblies for 2-1/2" to 6" Globe Valves General Instructions			
F-27215	MF41-6153/MS41-6153 Series Non-spring Return Rotary Electronic Damper Actuator General Instructions			
F-26752	Vx-7000 and Vx-9000 Series Linked Globe Valve Assemblies and Mx4x-7xxx and Mx4x-6xxx Series Actuator/Linkage Assemblies with SmartX Actuators, Selection Guide			Provides features, specifications, mounting dimensions, and other criteria useful to the selection of Vx-9xxx linked globe valve assemblies and actuator/linkage assemblies with Schneider Electric SmartX actuators.
F-27253	AV-608 Linkage Adapter Kit General Instructions			Provides step-by-step instructions for mounting Mx-631x3 actuators or AV-607 linkages onto discontinued 1-1/2" and 2" VB-9xxx valves
F-27199	Vx-8xxx Valve Selection Guide	Provides features, specifications, mounting dimensions, and other criteria useful to the selection of Vx-8xx3 actuator/linkage/valve assemblies and Schneider Electric SmartX actuator/linkage assemblies.		

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)

**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-2, below, to determine the remainder of the assembly path for a specific actuator and valve.

Table-1 Procedure for Mounting Actuator and Linkage to Valve Body.

SmartX 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 ^a				X	
	2-Way and 3-Way, Normal Position Valve Stem Down ^a					X

^aPower is required to position the actuator during assembly.

Section A. Mounting Linkage to Valve

A1. Mounting Linkage to Valve — VB-9xxx and Appropriate¹ Actuator Models

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

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

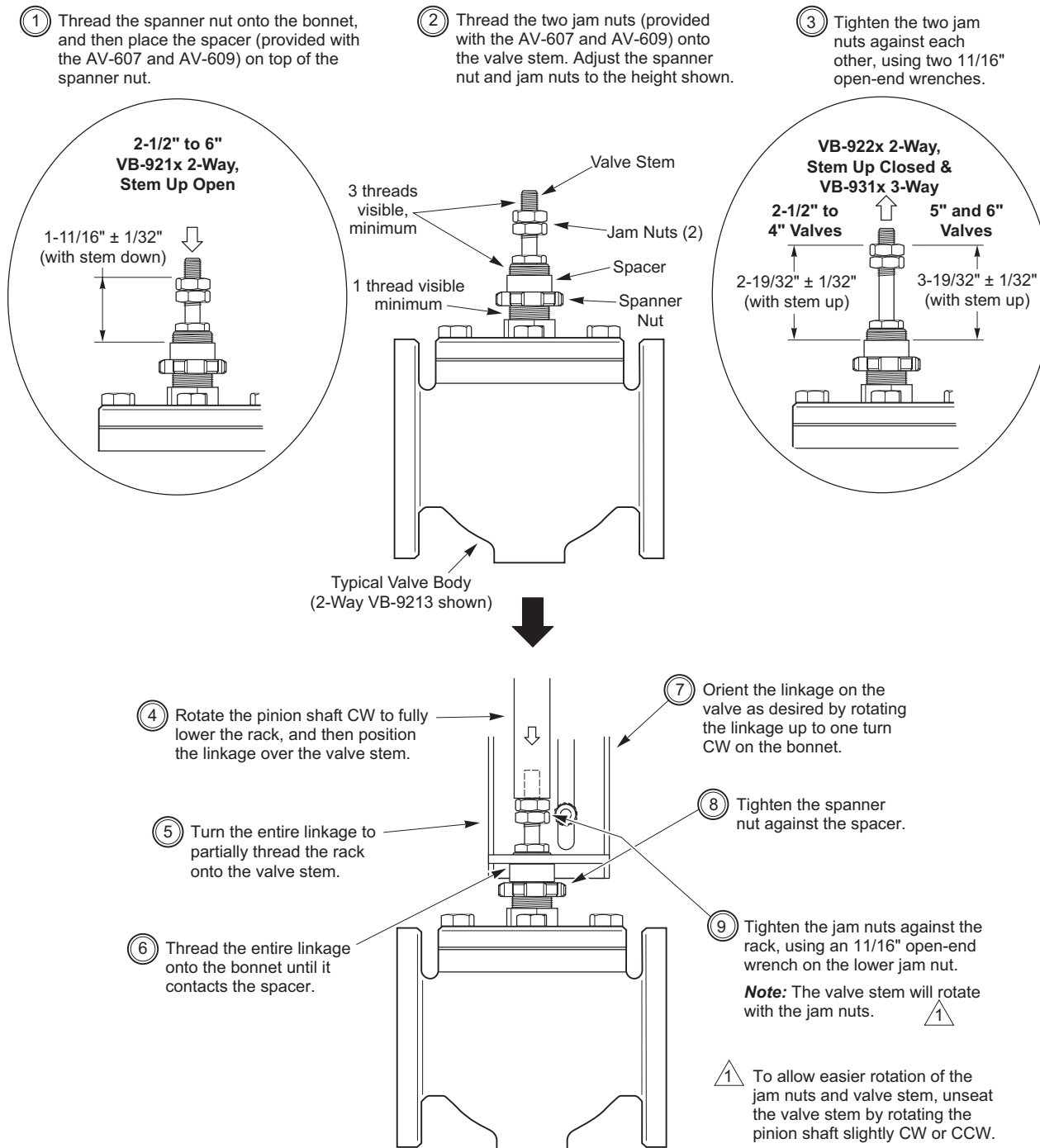


Figure-1 Assembling Linkage to Valve.

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

¹ See Table-1

A2. Mounting Linkage to Valve — VB-8xx3 and Appropriate² Actuator Models

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

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

- ① Thread the spanner nut onto the bonnet, and then place the spacer (provided with the AV-607 and AV-609) on top of the spanner nut.

- ② Thread the two jam nuts (provided with the AV-607 and AV-609) onto the valve stem. Adjust the spanner nut and jam nuts to the height shown.

- ③ Tighten the two jam nuts against each other, using two 11/16" open-end wrenches.

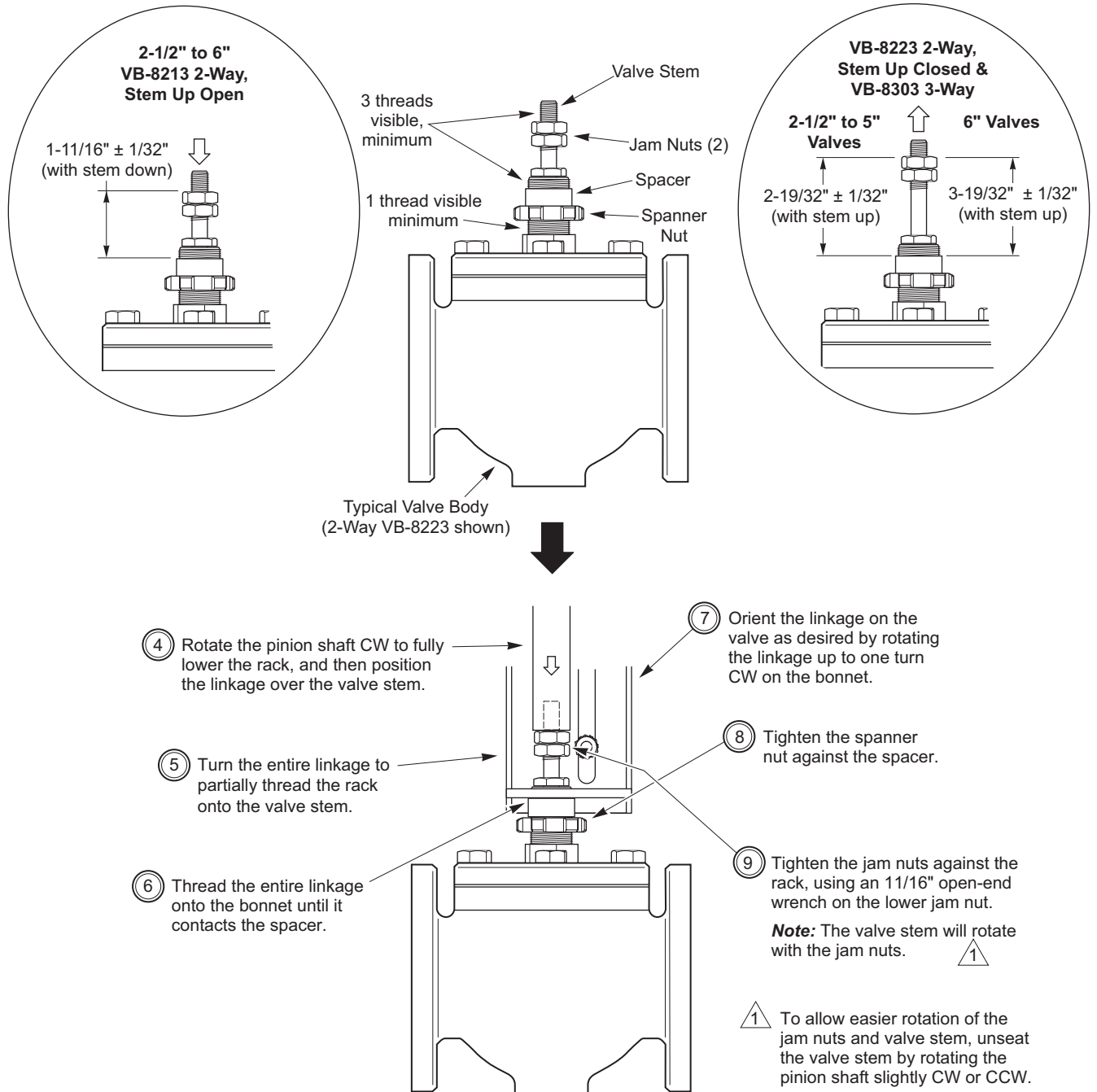


Figure-2 Assembling Linkage to Valve.

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

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-3.

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 11.

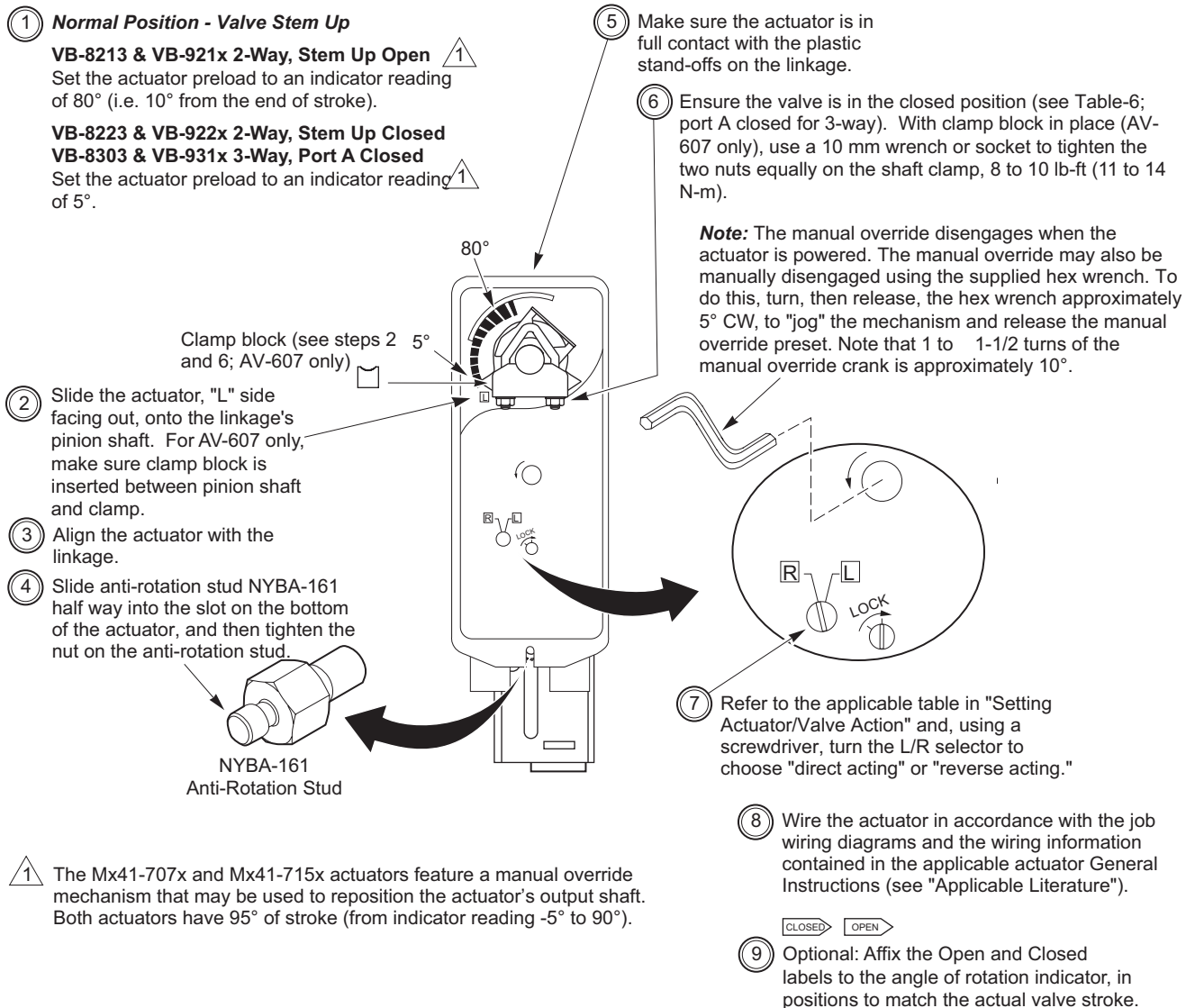


Figure-3 Mounting Mx41-707x or Mx41-715x and Setting Up Actuator/Linkage/Valve Assembly.

- 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 11.
- 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-4.

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 11.

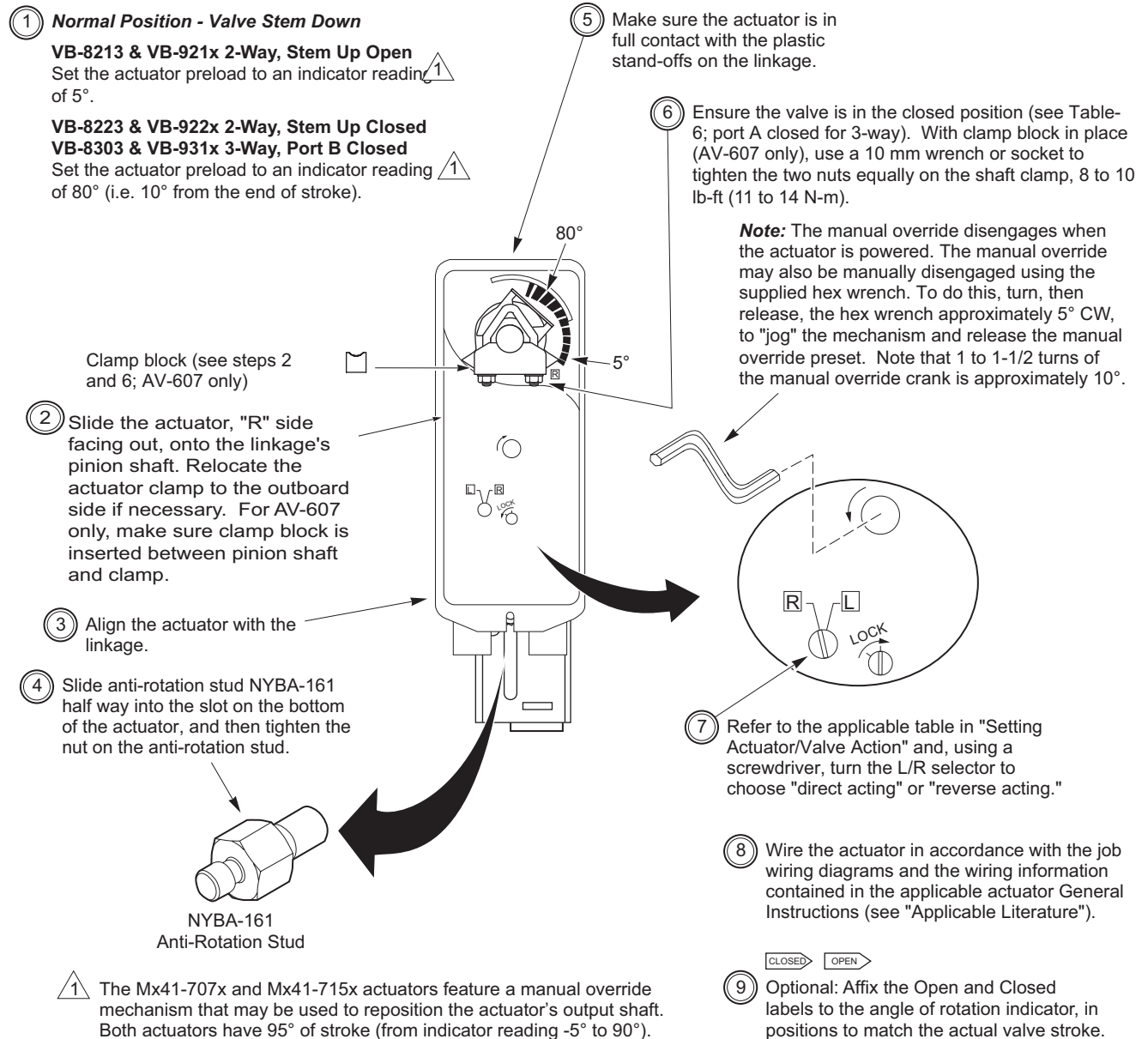


Figure-4 Mounting Mx41-707x or Mx41-715x and Setting Up Actuator/Linkage/Valve Assembly.

- 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 11.
- 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-5.

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

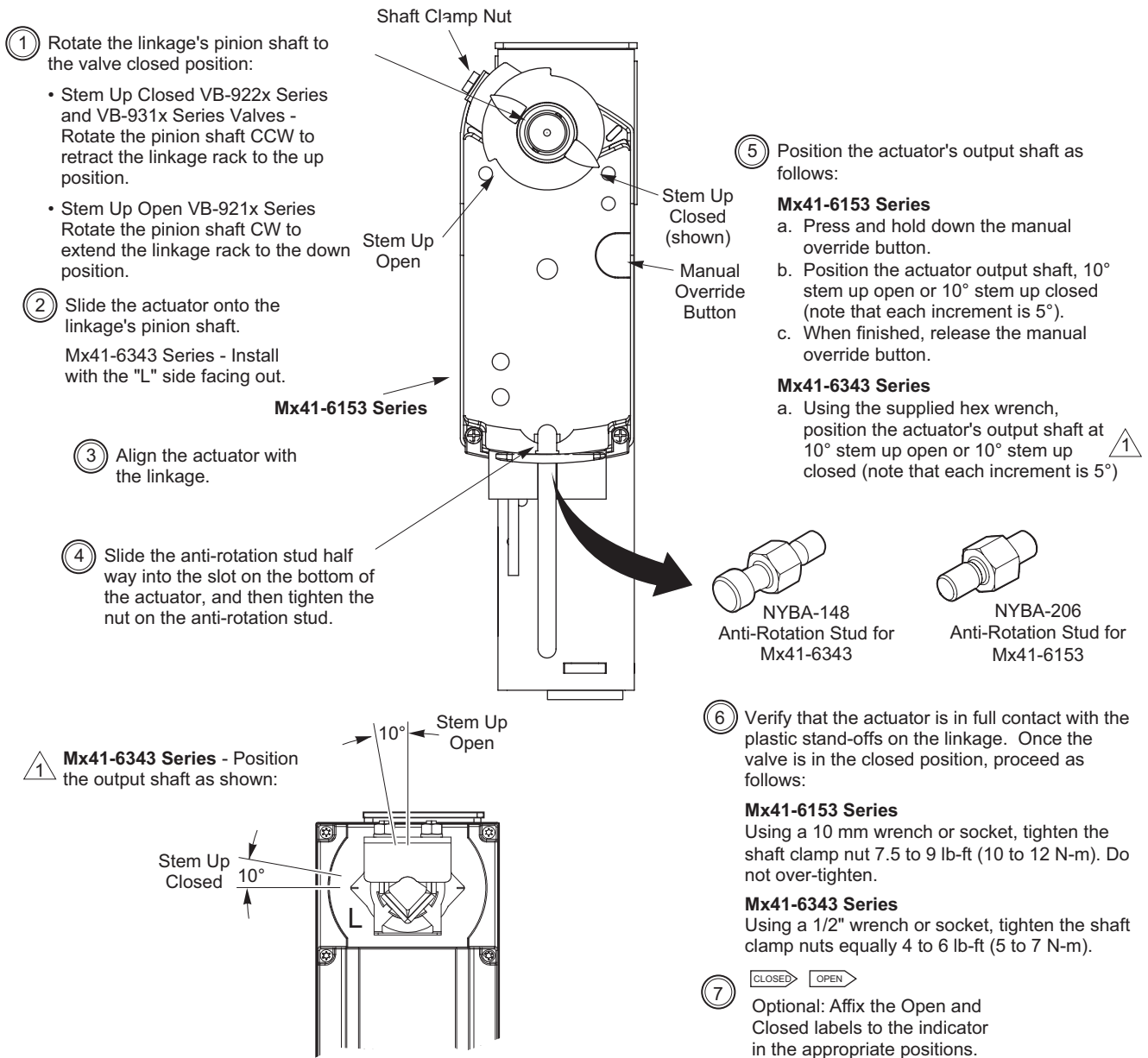


Figure-5 Mounting Mx41-6153 Series or Mx41-634x Series Actuators and Setting Up Actuator/Linkage Valve Assembly

- 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 11.
- 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.

B5. Spring-Return Actuators without Manual Override⁴

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-7. Use the two clamps supplied with the linkage.

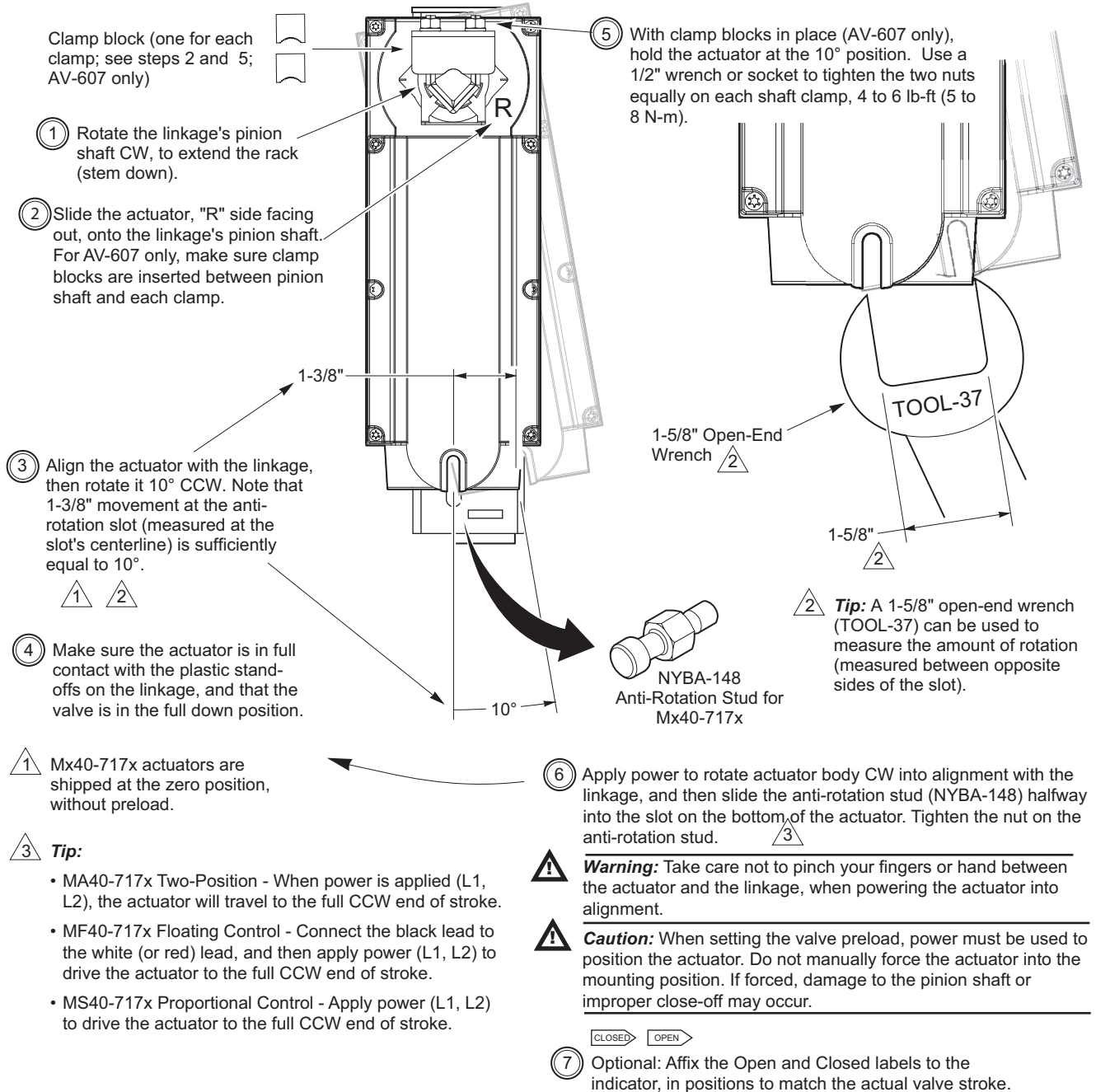


Figure-7 Mounting Mx40-717x and Setting Up Actuator/Linkage/Valve Assembly

- 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 11.
- 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.

⁴ 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-3, Table-4, or Table-5.

Table-2 MS4x-7xx3 Series Proportional Spring Return SmartX Actuators.

Valve Part Number	Actuator		Signal Increase			Spring Return	
	Facing Side	Switch Setting	Actuator Rotation ^a	Valve Stem Moves	Valve Action	Actuator Rotation ^a	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	

^aAs viewed from the facing side.

Table-3 MA4x-7xxx Series Two-Position and MF4x-7xxx Series Floating Spring Return SmartX Actuators.

Valve Part Number	Actuator Facing Side	Signal Increase			Spring Return	
		Actuator Rotation ^a	Valve Stem Moves	Valve Action	Actuator Rotation ^a	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)

^aAs viewed from the facing side.

Table-4 Mx41-6153 Series and Mx41-634x Series Proportional Non-Spring Return SmartX Actuators.

Valve Part Number	Actuator		Signal Increase		
	Action Mx41-6153 ^a	Facing Side Mx41-634x	Actuator Rotation ^b	Valve Stem Moves	Valve Action
VB-921x	CW	L	CW	Down	Closes
VB-8213	CCW	R	CCW	Up	Opens
VB-922x	CW	L	CW	Down	Opens
VB-8223	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

^a Mx41-6153 used with VB-9xxx only.

^b As viewed from the facing side.

Valve Body Action

Table-5 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 ^a	Port A Closed Port B Open ^a	Port A Open Port B Closed ^a
VB-921x	Two-way stem up open	Open	Closed
VB-922x	Two-way stem up closed	Closed	Open
VB-931x	Three-way mixing ^a	Port A Closed Port B Open ^a	Port A Open Port B Closed ^a

^aAB port is the common port on 3-way valves