Life Is On | Schneider Electric

Globe Valves & Actuators Catalog

North America
EcoBuilding Division Catalog | Spring 2017

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Schneider Electric is the global specialist in energy management and automation. With revenues of ~€27 billion in FY2015, our 160,000+ employees serve customers in over 100 countries, helping them to manage their energy and process in ways that are safe, reliable, efficient and sustainable.

From the simplest of switches to complex operational systems, our technology, software and services improve the way our customers manage and automate their operations. Our connected technologies reshape industries, transform cities and enrich lives.

At Schneider Electric, we call this Life Is On.

This catalog covers Schneider Electric's comprehensive portfolio of Globe Valves and Globe Valve Actuators.

Superior engineering, product design patents, ISO9001 certification, and Six Sigma lean manufacturing ensure our products conform to the highest standards of internationally recognized quality to deliver solid performance, unsurpassed value and exceptional reliability.

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When viewing the printed catalog, taking a picture with a Smart phone of the Quick Response (QR) code graphics shown in this catalog with navigate you to a webpage about that product.

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https://ecobuilding.schneider-electric.com/product-selection-tool/valve-actuator-selection

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Part Number Determination

NOTICE: Many valve assembly codes are shown in this catalog. Some are no longer factory assembled due to a history of low usage. Please check with the factory, or check iPortal, to confirm availability.

You may select and define a new valve assembly for your system in one of two ways:

1. Determine a part number for a factory assembly, Vxx-xxxx-xxx-x-xx

or

2. Order the required parts and assemble them locally. Use the selection tools and parts in the assemblies sections:

2.1 Valve body
2.2 Linkage (if required)
2.3 Actuator
2.4 Assemble at your site or facility,

or alternately

2.5 Install the valve body.
2.6 Install the actuator at a later date

The most commonly used valve/actuator assemblies are available pre-assembled from the factory and are listed in this section. Assemblies that are less common may be ordered and then configured at your choice of location.

Table of Contents

1. VB-7xxx Globe Valves

2-Way and 3-Way Globe Valves

Venta VB-7200 Series

2-Way Globe Valves

Venta VB-7300 Series

3-Way Globe Valves

2-Way and 3-Way Globe Valves

The Venta VB-7200 Series ½"…2" 2-Way globe valves feature the industry's highest performance, most energy efficient control valves for chilled water, hot water and steam applications. The Venta VB-7300 Series ½"…2" 3-Way globe valves provide efficient control for chilled and hot water applications. Units have a patented precision plug for high rangeability, providing efficient heat transfer over a broad range of HVAC applications. The Venta seal design provides tight close-off to ensure energy efficiency and provides a high tolerance to high differential pressures.

Venta globe valves are used for two-position, floating or proportional control applications. Valve assemblies may be purchased from the factory or purchased separately, requiring a linked actuator.

Features

- High rangeability provides fine, accurate control for more efficient, responsive and comfortable regulation.
- Tight sealing with ultra-low energy leakage on shutoff for energy conservation with soft seating.
- High differential-pressure rating of up to 87 psi for reliable operation in demanding applications.
- Very low Cv models (as low as 0.1) for precise control of small and light-load applications.
- Multiple Cv and fitting choices to match loads and piping.
- RoHS compliant product is environmentally friendly and meets ANSI, PED, CRN and other standards.
- Stroke positions are suitable for all Schneider Electric actuators.
- Stem strength exceeds:
- 600 lb. force on 2-Way and mixing valves
  300 lb. force on diverting valves

DANGER: Do not use these valves for combustible gas applications. They are not rated for combustible applications; and if used in these applications gas leaks and explosions could result.

MORE INFO

Scan the QR code
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Visit:
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Assembly Ordering VB-7000 Series

Determine the Part Number of Your Selected Valve or Valve/Actuator Assembly by Specifying These Six Type Designations

1) Control Signal

V□□

Refer to the guide below.

2) Trim and Valve Configuration

–□□□

Refer to the guide below.

3) Pipe End Connections

□–

Refer to the guide below.

4) Actuator or Linkage

□□□

Refer to the following pages for Spring & Non-Spring Return Electric and Pneumatic Spring Return Actuator Codes, part numbers and Linkage part numbers based on required close-off pressure.

5) Pattern Code

–□–

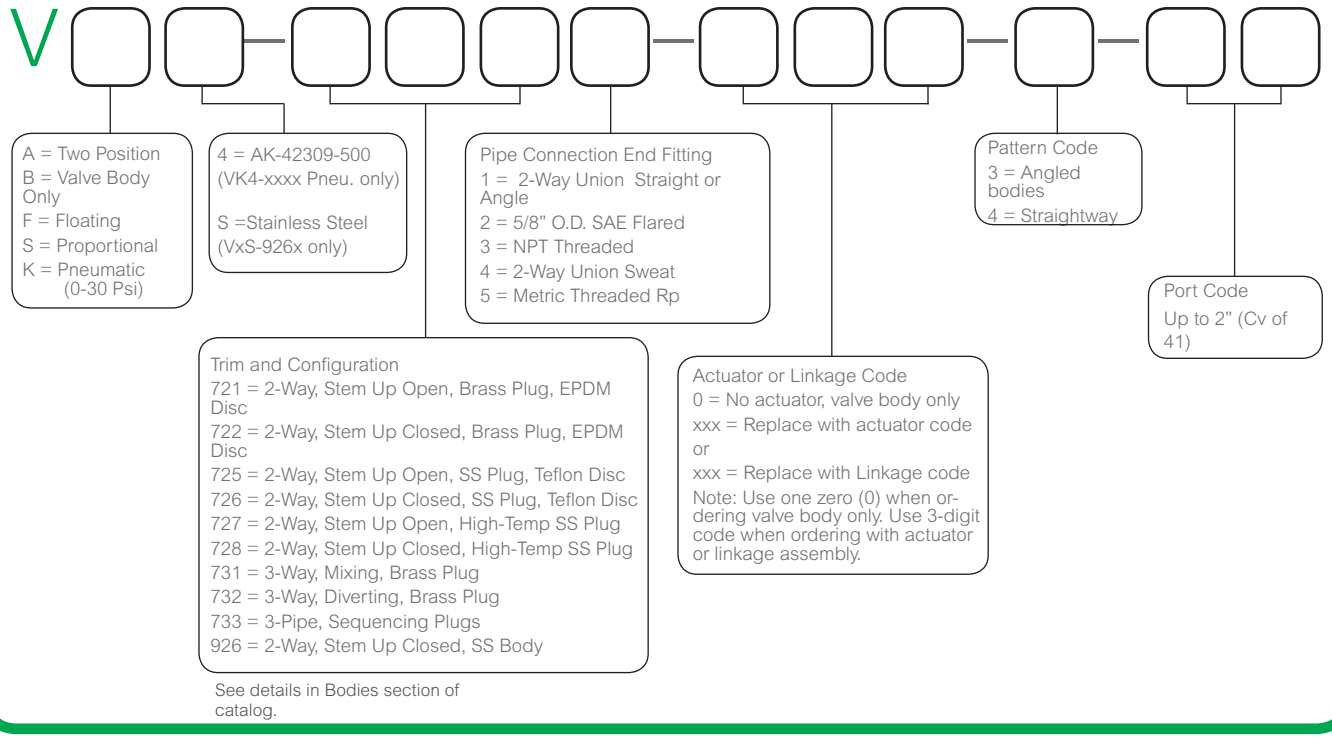
Refer to the guide below.

6) Port Code Cv Value

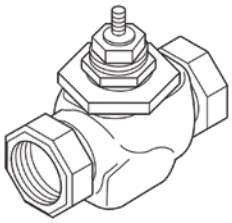
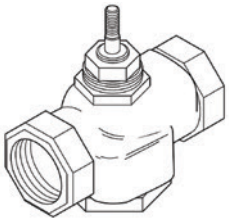
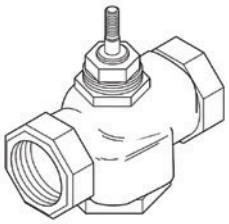
□□

For water, steam, glycol and similar non flammable, non toxic fluids, choose based on the Capacity Sizing section of this catalog. Above 2", go to the VB-8000/9000 Flanged Valve sections of this catalog.

Assembly Ordering VB-7000 Series



Brass Trim Threaded with Soft Seats

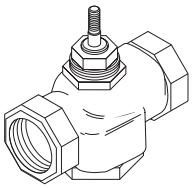
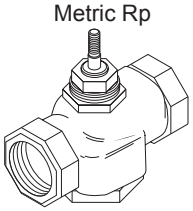
2-Way Brass Trim Body Type				Threaded NPT 	Threaded NPT 	Threaded Metric Rp 
Series Part Number				VB-7213-0-4-	VB-7223-0-4-	VB-7225-0-4-
Pipe Sizes				½"…2"		
Stem Action				Up Open	Up Closed	Up Closed
ANSI Pressure Class				250 psi (up to 400 psi below 150°F)		PN 16, 250 psi (up to 400 psi below 150°F)
ANSI Seat Leakage[c]				Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off. Long term seat leakage dependent on proper water conditioning maintenance of the system.		
Control Media and Temperature				20…281°F (-7 to 138°C) water (up to 60% glycol/water solution), low pressure, saturated, treated steam		
Flow Curve				Modified Equal Percentage		
Allowable ΔP for Water[b]				87 psi (600 kPa) Max. for normal lifea		
Max. inlet pressure, saturated steam				35 psi (240 kPa)		
Max ΔP for sizing, saturated steam[b]				80% of inlet pressure up to 15 psig and 42% of absolute (gage pressure plus 14.7) inlet pressure above 15 psig inlet		
Max ΔP at close-off, saturated steam[b]				Inlet pressure (35 psi) (actuator must be rated to provide close-off pressure)		
Size	**Cv**	**Kvs**	**Rangeability greater than**	**Valve Body Part Numbers**		
½"	0.4	0.3	100:1	VB-7213-0-4-01	VB-7223-0-4-01	VB-7225-0-4-01
	1.3	1.1	100:1	VB-7213-0-4-02	VB-7223-0-4-02	VB-7225-0-4-02
	2.2	1.9	100:1	VB-7213-0-4-03	VB-7223-0-4-03	VB-7225-0-4-03
	4.4	3.8	100:1	VB-7213-0-4-04	VB-7223-0-4-04	VB-7225-0-4-04
¾"	5.5	4.8	100:1	VB-7213-0-4-05	VB-7223-0-4-05	VB-7225-0-4-05
	7.5	6.5	100:1	VB-7213-0-4-06	VB-7223-0-4-06	VB-7225-0-4-06
1"	10	8.7	100:1	VB-7213-0-4-07	VB-7223-0-4-07	VB-7225-0-4-07
	14	12.1	100:1	VB-7213-0-4-08	VB-7223-0-4-08	VB-7225-0-4-08
1¼"	20	17.3	100:1	VB-7213-0-4-09	VB-7223-0-4-09	VB-7225-0-4-09
1½"	28	24.2	100:1	VB-7213-0-4-10	VB-7223-0-4-10	VB-7225-0-4-10
2"	40	34.6	100:1	VB-7213-0-4-11	VB-7223-0-4-11	VB-7225-0-4-11

[a]To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation zone may result in noise and internal valve damage.

[b]Maximum recommended differential pressure in open position. Do not exceed recommended differential pressure (pressure drop), as integrity of parts may be affected.

[c]Refer to Seat Leakage Classes table.

Stainless Steel Trim Threaded with Soft Seats

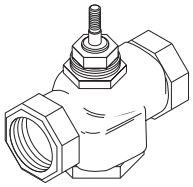
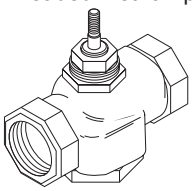
2-Way Stainless Trim (Soft Seal) Body Type				Threaded NPT 		Metric Rp 
Series Part Number				VB-7253-0-4-	VB-7263-0-4-	VB-7265-0-4-
Pipe Sizes				½"…2"	½"…2"	15…50 mm
Stem Action				Up Open	Up Closed	Up Closed
ANSI Pressure Class				250 psi (up to 400 psi below 150°F)		PN 16 , 250 psi (up to 400 psi below 150°F)
Seat Leakage[c]				Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off. Long term seat leakage dependent on proper water conditioning maintenance of the system.		
Control Media and Temperature				20…340°F (-7 to 171°C) water (up to 60% glycol/water solution), low pressure, treated steam		
Flow Curve				Modified Linear		
Allowable ΔP for Water[b]				87 psi (600 kPa) Max. for normal lifea		
Max. inlet pressure, saturated steam				100 psi (690 kPa)		
Max ΔP for sizing, saturated steam[b]				80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet		
Max ΔP at close-off, saturated steam[b]				Inlet pressure (100 psi) (actuator must be rated to provide close-off pressure)		
Size	**Cv**	**Kvs**	**Rangeability Greater Than**	**Valve Body Part Numbers**		
½"	0.1	0.09	13:1	-	VB-7263-0-4-31	VB-7265-0-4-31
	0.22	0.2	18:1	-	VB-7263-0-4-33	VB-7265-0-4-33
	0.4	0.3	100:1	VB-7253-0-4-01	VB-7263-0-4-01	VB-7265-0-4-01
	0.75	0.6	100:1	-	VB-7263-0-4-34	VB-7265-0-4-34
	1.0	0.9	100:1	-	VB-7263-0-4-36	VB-7265-0-4-36
	1.3	1.1	100:1	VB-7253-0-4-02	VB-7263-0-4-02	VB-7265-0-4-02
	1.8	1.6	100:1	-	VB-7263-0-4-28	VB-7265-0-4-28
	2.2	1.9	100:1	VB-7253-0-4-03	VB-7263-0-4-03	VB-7265-0-4-03
	2.9	2.5	100:1	-	VB-7263-0-4-30	VB-7265-0-4-30
	3.25	2.8	100:1	-	VB-7263-0-4-39	VB-7265-0-4-39
	4.4	3.8	100:1	VB-7253-0-4-04	VB-7263-0-4-04	VB-7265-0-4-04
¾"	5.5	4.8	100:1	VB-7253-0-4-05	VB-7263-0-4-05	VB-7265-0-4-05
	6.3	5.4	100:1	-	VB-7263-0-4-41	VB-7265-0-4-41
	7.5	6.5	100:1	VB-7253-0-4-06	VB-7263-0-4-06	VB-7265-0-4-06
1"	8.2	7.1	100:1	-	VB-7263-0-4-51	VB-7265-0-4-51
	9.0	7.8	100:1	-	VB-7263-0-4-52	VB-7265-0-4-52
	10	8.7	100:1	VB-7253-0-4-07	VB-7263-0-4-07	VB-7265-0-4-07
	12	10.4	100:1	VB-7253-0-4-08	VB-7263-0-4-08	VB-7265-0-4-08
1¼"	14	12.1	100:1	-	VB-7263-0-4-61	VB-7265-0-4-61
	16	13.8	100:1	-	VB-7263-0-4-62	VB-7265-0-4-62
	18	15.6	100:1	-	VB-7263-0-4-63	VB-7265-0-4-63
	20	17.3	100:1	VB-7253-0-4-09	VB-7263-0-4-09	VB-7265-0-4-09
1½"	22	19.0	100:1	-	VB-7263-0-4-71	VB-7265-0-4-71
	24	20.8	100:1	-	VB-7263-0-4-72	VB-7265-0-4-72
	28	24.2	100:1	VB-7253-0-4-10	VB-7263-0-4-10	VB-7265-0-4-10
2"	31	26.8	100:1	-	VB-7263-0-4-81	VB-7265-0-4-81
	34	29.4	100:1	-	VB-7263-0-4-82	VB-7265-0-4-82
	40	34.6	100:1	VB-7253-0-4-11	VB-7263-0-4-11	VB-7265-0-4-11

[a]To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation zone may result in noise and internal valve damage.

[b]Maximum recommended differential pressure in open position. Do not exceed recommended differential pressure (pressure drop), as integrity of parts may be affected. Exceeding maximum recommended differential pressure voids product warranty.

[c]Refer to Seat Leakage Classes table.

Stainless Steel Trim Threaded with Metal to Metal Seats

2-Way Stainless Trim (Metal to Metal) Body Type				Threaded NPT 		Threaded Metric Rp 
Series Part Number				VB-7273-0-4-	VB-7283-0-4-	VB-7285-0-4-
Pipe Sizes				½"…2"		
Stem Action				Up Open	Up Closed	Up Closed
ANSI Pressure Class				250 psi (up to 400 psig below 150°F)		PN 16, 250 psi (up to 400 psi below 150°F)
Seat Leakage[c]				ANSI III		
Control Media and Temperature				20…400°F (-7 to 204°C) water (up to 60% glycol/water solution), low pressure, treated steam		
Flow Curve				Modified Linear		
Allowable ΔP for Water[b]				87 psi (600 kPa) Max. for normal life a		
Max Inlet Pressure, saturated steam				150 psi (1034 kPa)		
Max ΔP for sizing, saturated steam[b]				80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet		
Max ΔP at close-off, saturated steam[b]				Inlet pressure (150 psi) (actuator must be rated to provide close-off pressure)		
Size	**Cv**	**Kvs**	**Rangeability**	**Valve Body Part Numbers**		
½"	0.4	0.3	5:1	VB-7273-0-4-01	VB-7283-0-4-01	VB-7285-0-4-01
	1.3	1.1	15:1	VB-7273-0-4-02	VB-7283-0-4-02	VB-7285-0-4-02
	2.2	1.9	25:1	VB-7273-0-4-03	VB-7283-0-4-03	VB-7285-0-4-03
	4.4	3.8	40:1	VB-7273-0-4-04	VB-7283-0-4-04	VB-7285-0-4-04
¾"	5.5	4.8	50:1	VB-7273-0-4-05	VB-7283-0-4-05	VB-7285-0-4-05
	7.5	6.5	60:1	VB-7273-0-4-06	VB-7283-0-4-06	VB-7285-0-4-06
1"	10	8.7	60:1	VB-7273-0-4-07	VB-7283-0-4-07	VB-7285-0-4-07
	12	10.4	75:1	VB-7273-0-4-08	VB-7283-0-4-08	VB-7285-0-4-08
1¼"	20	17.3	75:1	VB-7273-0-4-09	VB-7283-0-4-09	VB-7285-0-4-09
1½"	28	24.2	75:1	VB-7273-0-4-10	VB-7283-0-4-10	VB-7285-0-4-10
2"	40	34.6	75:1	VB-7273-0-4-11	VB-7283-0-4-11	VB-7285-0-4-11

[a]To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation zone may result in noise and internal valve damage.

[b]Maximum recommended differential pressure in open position. Do not exceed recommended differential pressure (pressure drop), as integrity of parts may be affected. Exceeding maximum recommended differential pressure voids product warranty.

[c]Refer to Seat Leakage Classes table below.

Seat Leakage Classes

ANSI/FCI 70-2 Leakage Class	Maximum Seat Leakage
Class II	0.5% of rated Cv
Class III	0.1% of Rated Cv
Class IV	0.01% of Rated Cv
Class V	0.0005 ml per minute per inch of orifice diameter per psi differential

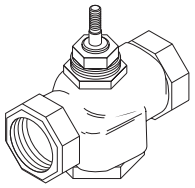
MORE INFO

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/pdruzA

VBS-9263 ½" & ¾" 2-Way Stainless Steel

316 Stainless Bodies with Soft Seats

2-Way Stainless Trim & Body Soft Seats	Threaded NPT - 316 Stainless Body 
Series Part Number	VBS-9263-0-4-xx
Pipe Sizes	½" & ¾"
Stem Action	Up Closed Only
Seats	316 Stainless on PTFE
ANSI Pressure Class	300] psi (up to 400 psig below 150°F)
Max Leakage	ANSI IV
Control Media and Temperature	20…400°F (-7 to 204°C)
Flow Curve	Modified Linear
Allowable ΔP for Water	35 psi (241 kPa) Max. for normal lifea
Max Inlet Pressure, saturated steam	100 psi (690 kPa)
Max ΔP for sizing, saturated steam	80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet - Refer to steam charts.
Max ΔP at close-off, saturated steam	Inlet pressure (100 psi) (actuator must be rated to provide close-off pressure) and withstand media temperature

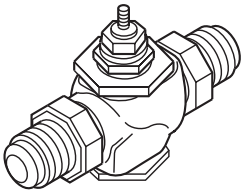
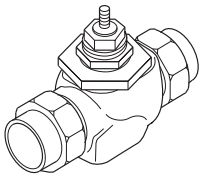
Size	Cv	Kvs	Rangeability	Valve Body Part Numbers	
½"	0.1	0.087	5:1	VBS-9263-0-4-31	**CAUTION:** Pressure reducers do not lower temperatures from boilers significantly. Select only valve actuators that withstand actual pipe temperatures near the boiler output temperature.
	0.22	0.19	5:1	VBS-9263-0-4-33	
	0.3	0.26	5:1	VBS-9263-0-4-34	
	0.4	0.3	5:1	VBS-9263-0-4-1	
	0.75	0.65	15:1	VBS-9263-0-4-35	
	0.95	0.82	15:1	VBS-9263-0-4-36	
	1.3	1.1	15:1	VBS-9263-0-4-2	
	1.75	1.5	25:1	VBS-9263-0-4-37	
	2.2	1.9	25:1	VBS-9263-0-4-3	
	2.8	2.4	35:1	VBS-9263-0-4-38	
	3.25	2.8	35:1	VBS-9263-0-4-39	
	3.6	3.0	35:1	VBS-9263-0-4-4	
¾"	4.3	3.7	40:1	VBS-9263-0-4-45	
	5.0	4.1	40:1	VBS-9263-0-4-5	
	6.2	5.0	50:1	VBS-9263-0-4-6	

[a]Operating within the cavitation zone or an operating differential pressure above 35 psi (241 kPa) may result in noise and internal valve damage.

Seat Leakage Classes

ANSI/FCI 70-2 Leakage Class	Maximum Seat Leakage
Class II	0.5% of rated Cv
Class III	0.1% of Rated Cv
Class IV	0.01% of Rated Cv
Class V	0.0005 ml per minute per inch of orifice diameter per psi differential

Brass Trim Copper Connection with Soft Seats

2-Way Brass Trim Body Type			5/8" OD 45° SAE Flared 		Union Sweat 	
Series Part Number			VB-7212-0-4-	VB-7222-0-4-	VB-7214-0-4-	VB-7224-0-4-
Pipe Sizes			½" I.D.		½"…2"	
Stem Action			Up Open	Up Closed	Up Open	Up Closed
ANSI Pressure Class			250 psi (up to 400 psi below 150°F)			
ANSI Seat Leakage[e]			ANSI IV		Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off with long term seat leakage dependent on proper water conditioning maintenance of the system.	
Control Media and Temperature			20…281°F (-7 to 138°C) water (up to 60% glycol/water solution), low pressure, treated steam			
Flow Curve			Modified Equal Percentage			
Allowable ΔP for Water[b]			35 psi (241 kPa) Max. for normal lifea		87 psi (600 kPa) Max. for normal lifee	
Max. inlet pressure, saturated steam			35 psi (240 kPa)			
Max ΔP for sizing, saturated steam[b]			80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet			
Max ΔP at close-off, saturated steam[b]			Inlet pressure (actuator must be rated to provide close-off pressure)			
Size	**Cv**	**Kvs**	**Rangeability[c]**	**Valve Body Part Numbers**			
½"	0.4	0.3	5:1	VB-7212-0-4-01	VB-7222-0-4-01	VB-7214-0-4-01c	VB-7224-0-4-01c
	1.3	1.1	15:1	VB-7212-0-4-02	VB-7222-0-4-02	VB-7214-0-4-02c	VB-7224-0-4-02c
	2.2	1.9	25:1	VB-7212-0-4-03	VB-7222-0-4-03	VB-7214-0-4-03c	VB-7224-0-4-03c
	4.4	3.8	40:1	VB-7212-0-4-04	VB-7222-0-4-04	VB-7214-0-4-04c	VB-7224-0-4-04c
¾"	5.5	4.8	50:1	–	–	VB-7214-0-4-05c	VB-7224-0-4-05c
	7.5	6.5	60:1	–	–	VB-7214-0-4-06c	VB-7224-0-4-06c
1"	10	8.7	60:1	–	–	VB-7214-0-4-07cd	VB-7224-0-4-07cd
	14	12.1	60:1	–	–	VB-7214-0-4-08cd	VB-7224-0-4-08cd
1¼"	20	17.3	75:1	–	–	VB-7214-0-4-09cd	VB-7224-0-4-09cd
1½"	28	24.2	75:1	–	–	VB-7214-0-4-10cd	VB-7224-0-4-10cd
2"	40	34.6	75:1	–	–	VB-7214-0-4-11cd	VB-7224-0-4-11cd

[a] To minimize noise, ensure the flow rate in the piping is less than three meters (10ft)/second and the differential pressure is less than 35 psi (241 kPa). Operating within the cavitation zone or an operating differential pressure above 35 psi (241 kPa) may result in noise and internal valve damage.

[b] Maximum recommended differential pressure in open position. Do not exceed recommended differential pressure (pressure drop), as integrity of parts may be affected. Exceeding maximum recommended differential pressure voids product warranty.

[c] The VB-7214-0-4- and VB-7224-0-4- ½"…2" series valves all have rangeabilities greater than 100:1.

[d] These part numbers do not have RoHs compliant nuts and tail pieces.

[e] To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation zone may result in noise and internal valve damage.

Seat Leakage Classes

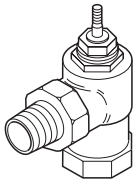
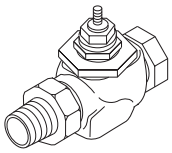
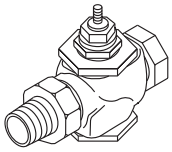
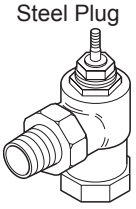
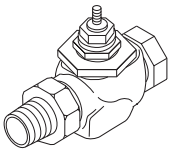
ANSI/FCI 70-2 Leakage Class	Maximum Seat Leakage
Class II	0.5% of rated Cv
Class III	0.1% of Rated Cv
Class IV	0.01% of Rated Cv
Class V	0.0005 ml per minute per" of orifice diameter per psi differential

MORE INFO

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/oYPchT

Brass & SS Trim Soft Seat Union for Radiators and Other Applications

2-Way Brass Trim Body Type				Union Angle NPT 	Union Straight NPT 	Union Straight NPT 	Union Angle NPT with Stainless Steel Plug 	Union Straight NPT with Stainless Steel Plug 
Series Part Number				VB-7211-0-3-	VB-7211-0-4-	VB-7221-0-4-	VB-7251-0-3-	VB-7251-0-4-
Pipe Sizes				½"…1¼"				
Stem Action				Up Open	Up Open	Up Closed	Up Open	Up Open
ANSI Pressure Class				250 psi (up to 400 psig below 150°F)				
ANSI Seat Leakage[e]				Class IV	Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off with long term seat leakage dependent on proper water conditioning maintenance of the system.		Class IV	
Control Media and Temperature				20…281°F (-7 to 138°C) water (up to 60% glycol/water solution), low pressure, treated steam				
Flow Curve				Modified Equal Percentage				
Allowable ΔP for Water[b]				35 psi (241 kPa) Max. for normal lifea	87 psi (600 kPa) Max. for normal lifed		35 psi (241 kPa) Max. for normal lifea	
Max inlet pressure for saturated steam				35 psi (240 kPa)				
Max ΔP for sizing, saturated steam[b]				80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet				
Max ΔP at close-off, saturated steam[b]				Inlet pressure (35 psi) (actuator must be rated to provide close-off pressure)				
Size	**Cv**	**Kvs**	**Rangeability Greater Than[c]**	**Valve Body Part Numbers**				
½"	0.4	0.3	5:1	VB-7211-0-3-01	VB-7211-0-4-01c	VB-7221-0-4-01c	VB-7251-0-3-01	VB-7251-0-4-01
	1.3	1.1	15:1	VB-7211-0-3-02	VB-7211-0-4-02c	VB-7221-0-4-02c	VB-7251-0-3-02	VB-7251-0-4-02
	2.2	1.9	25:1	VB-7211-0-3-03	VB-7211-0-4-03c	VB-7221-0-4-03c	VB-7251-0-3-03	VB-7251-0-4-03
	4.4	3.8	40:1	–	VB-7211-0-4-04c	VB-7221-0-4-04c	–	VB-7251-0-4-04
	5.0	4.3	40:1	VB-7211-0-3-04	–	–	VB-7251-0-3-04	–
¾"	5.5	4.8	50:1	VB-7211-0-3-05	VB-7211-0-4-05 c	VB-7221-0-4-05c	VB-7251-0-3-05	VB-7251-0-4-05
	7.5	6.5	60:1	–	VB-7211-0-4-06c	VB-7221-0-4-06c	–	VB-7251-0-4-06
	8.5	7.4	50:1	VB-7211-0-3-06	–	–	VB-7251-0-3-06	–
1"	10	8.7	60:1	–	VB-7211-0-4-07c	VB-7221-0-4-07c	–	VB-7251-0-3-07
	14	12.1	60:1	VB-7211-0-3-07	VB-7211-0-4-08c	VB-7221-0-4-08c	VB-7251-0-3-07	VB-7251-0-4-08
	16	13.8	75:1	VB-7211-0-3-08	–	–	VB-7251-0-3-08	–
1¼"	20	17.3	75:1	–	VB-7211-0-4-09c	VB-7221-0-4-09c	–	VB-7251-0-4-09
	22	19	75:1	VB-7211-0-3-09	–	–	VB-7251-0-3-09	

[a]To minimize noise, ensure the flow rate in the piping is less than three meters (10ft)/second and the differential pressure is less than 35 psi (241 kPa). Operating within the cavitation zone or an operating differential pressure above 35 psi (241 kPa) may result in noise and internal valve damage.

[b]Maximum recommended differential pressure in open position. Do not exceed recommended differential pressure (pressure drop), as integrity of parts may be affected. Exceeding maximum recommended differential pressure voids product warranty.

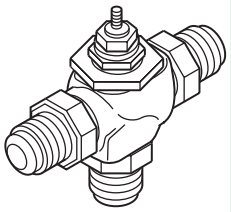
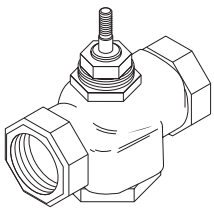
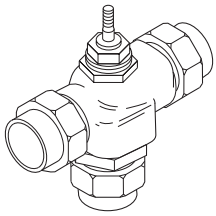
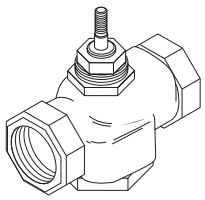
[c]The VB-7211-0-4-xx and VB-7221-0-4-xx series valves all have rangeabilities greater than 100:1.

[d]To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation zone may result in noise and internal valve damage.

[e]Refer to Seat Leakage Classes table.

VB-7300 ½"…2" 3-Way Mixing Valves

Mixing Valves

3-Way Brass Trim Mixing Valves Body Type[b]			5/8" OD 45° SAE Flared 	Threaded NPT 	Union Sweat 	NPT Threaded with Stainless Steel Trim 
Series Part Numbers			VB-7312-0-4-	VB-7313-0-4-	VB-7314-0-4-	VB-7363-0-4-
Pipe Size			½" I.D.	½"…2"		½"…2"
Stem Flow Action			Stem Up Closes A Port and Opens B Port to the Common AB Port			
ANSI Pressure Class			250 psi (up to 400 psi below 150°F)			250 psi. (up to 400 psi below 150°F)
ANSI A Port Seat Leakage			ANSI Class IIIa	Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off with long term seat leakage dependent on proper water conditioning maintenance of the system.d		
ANSI B Port Seat Leakage			ANSI Class III			
Control Media and Temperature			20…281°F (-7 to 138°C) water (up to 60% glycol/water solution)			20…340°F (-7 to 171°C) water (up to 60% glycol/water solution)
Water Flow Curve			Modified Linear			
Allowable ΔP for water			35 psi (241 kPa)a	87 psi (600 kPa) Max. for normal lifed		
Size	**Cv**	**Kvs**	**Valve Body Part Numbers**			
½"	2.2	1.9	VB-7312-0-4-02	VB-7313-0-4-02	VB-7314-0-4-02	VB-7363-0-4-02b
	4.4	3.8	VB-7312-0-4-04	VB-7313-0-4-04	VB-7314-0-4-04	VB-7363-0-4-04b
¾"	7.5	6.5	–	VB-7313-0-4-06	VB-7314-0-4-06	VB-7363-0-4-06b
1"	12	10.4	–	–	–	VB-7363-0-4-08b
	14	12.1	–	VB-7313-0-4-08	VB-7314-0-4-08c	–
1¼"	20	17.3	–	VB-7313-0-4-09	VB-7314-0-4-09c	VB-7363-0-4-09b
1½"	28	24.2	–	VB-7313-0-4-10	VB-7314-0-4-10c	VB-7363-0-4-10b
2"	36	31.3	–	–	–	VB-7363-0-4-11b
	41	35.5	–	VB-7313-0-4-11	VB-7314-0-4-11c	–

[a]To minimize noise, ensure the flow rate in the piping is less than three meters (10ft)/second and the differential pressure is less than 35 psi (241 kPa). Operating within the cavitation zone or an operating differential pressure above 35 psi (241 kPa) may result in noise and internal valve damage.

[b]The VB-7363-0-4- series has stainless steel trim.

[c]These part numbers do not have RoHs compliant nuts and tail pieces.

[d]To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation zone may result in noise and internal valve damage.

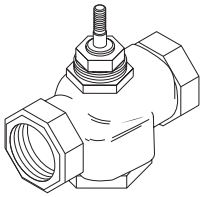
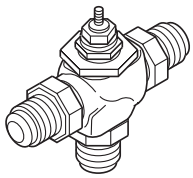
MORE INFO - VB-7313

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/QqZ7if

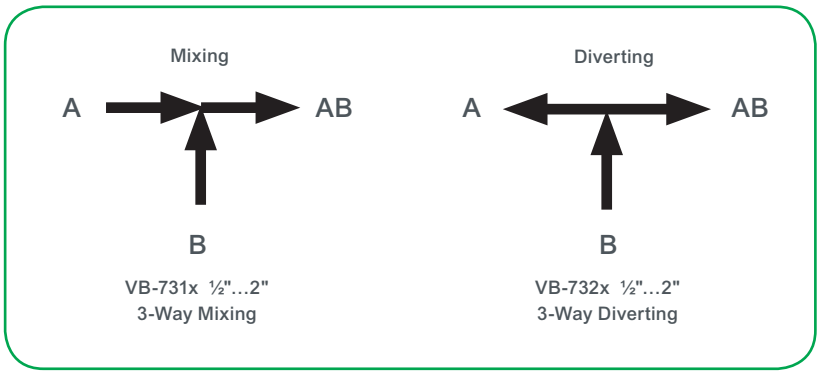
VB-7300 ½"…2" 3-Way Diverting & Sequencing

Diverting and Sequencing Valves

3-Way Brass Trim Diverting and Sequencing Valves Body Types			Diverting Threaded NPT 	5/8" OD 45° SAE Flared Sequencing 
Series Part Numbers			VB-7323-0-4-	VB-7332-0-4-
Pipe Size			½"…2"	½" I.D.
Stem Flow Action			Stem Up Closes A Port and Opens AB Port to the Common B Port	Stem Up Opens B to AB and Stem Down Opens A to AB, Stem Mid Position A and B are Both Closed
Stem Force Allowed			300 Lbs.	
ANSI Pressure Class[a]			250 psi (up to 400 psi below 150°F)	250 psi (up to 400 psi below 150°F)
ANSI A Port Seat Leakage			ANSI Class III	
Control Media and Temperature			20…281°F (-7 to 138°C) water (up to 60% glycol/water solution)	
Water Flow Curve			Modified Linear	Sequencing, Modified Linear
Allowable ΔP for water			35 psi (241 kPa) Max. for normal Life	
Size	**Cv**	**Kvs**	**Valve Body Part Numbers**	
	2.2	1.9	–	VB-7332-0-4-03
	4.4	3.8	VB-7323-0-4-04	VB-7332-0-4-04
¾"	7.5	6.5	VB-7323-0-4-06	–
1"	14	12.1	VB-7323-0-4-08	–
1¼"	20	17.3	VB-7323-0-4-09	–
1½"	28	24.2	VB-7323-0-4-10	–
2"	40	34.6	VB-7323-0-4-11	–

[a]Refer to Seat Leakage Classes.

3-Way Flow Patterns



Note: Diverting valves as shipped have the arrow on the "A" port reversed.

Notes

2. Venta Globe Valves Sizing Selection

Sizing for Water

Two-Position

Two-position control valves are normally selected "line size" to keep pressure drop at a minimum. If it is desirable to reduce the valve below line size, then 10% of "available pressure" (that is, the pump pressure differential available between supply and return mains with design flow at the valve location) is normally used to select the valve.

Proportional and Floating

Proportional and floating control valves are usually selected to take a pressure drop equal to at least 50% of the "available pressure." As "available pressure" is often difficult to calculate, the normal procedure is to select the valve using a pressure drop at least equal to the drop in the coil or other load being controlled (except where small booster pumps are used) with a minimum recommended pressure drop of 5 psi (34 kPa). When the design temperature drop is less than 60°F (33°C) for conventional heating systems, higher pressure drops across the valve are needed for good results.

2.1 Conventional Heating System

Design Temperature Load Drop °F (°C)	Recommended Pressure Drop (% of Available Pressure)	Multiplier on Load Drop
60 (33) or more	50%	1x Load Drop
40 (22)	66%	2x Load Drop
20 (11)	75%	3x Load Drop

Reducer Affects

On full flow bodies, offset the affects of directly connected reducer(s) by choosing flow coefficients 6% or more higher.

Cv (Flow Coefficient) Determination

The valves' water capacity is based on the following formula:

$$C_v = \frac{GPM}{\sqrt{\Delta P}} \quad \text{or} \quad C_v = GPM \sqrt{\frac{\text{Specific Gravity}}{\Delta P}}$$

Where:

C_v = Coefficient of flow

C_v is defined as the flow in GPM with ΔP = 1 psi with the valve completely open

GPM = U.S. gallons per minute (60°F, 15.6°C)

ΔP = Differential pressure in psi (pressure drop)

Proportional 3-Way Valves

Recommended Pressure Drop - Bypass Application: 50% of "available pressure," or equal to pressure drop through the load at full flow.
3-Way valves in the return used to control output by throttling water flow to the load (bypass applications) are controlling output in the same manner as throttling 2-Way valves, and must be selected using the same high pressure drops if good control results are to be obtained.

Recommended Pressure Drop - Constant Flow Applications: 20% of "available pressure," or equal to 1/4 of the pressure drop through the load at full flow.
3-Way valves used with individual pumps to control output by varying water temperature to the load (constant flow applications) are controlling output by mixing two water sources at different temperatures and do not require high pressure drops for good control results.

Water Capacity Graph Instructions

To select the appropriate valve Cv from the Graph:
1. Select the required flow from the "Flow in GPM" axis.
2. Select available pressure drop from the "Pressure Drop in psi" axis.
3. Select the appropriate line and follow to the Capacity Cv (Kv) listing and choose the closest valve Cv flow coefficient.
4. Confirm the selection by calculation from the water equations.

Additional Water Valve Sizing Information

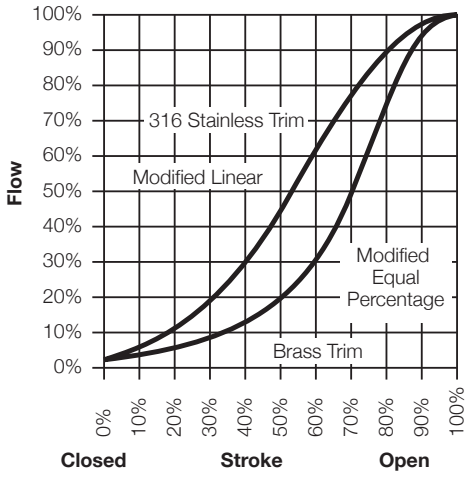
For more information, download these documents from our website.

- CA-27 3-Way Valves Application Information
- Valve Selection Table Water, F-11080

VB-7200 ½"…2" 2-Way Flow, Temp. & Materials

2.2 Flow Characteristics

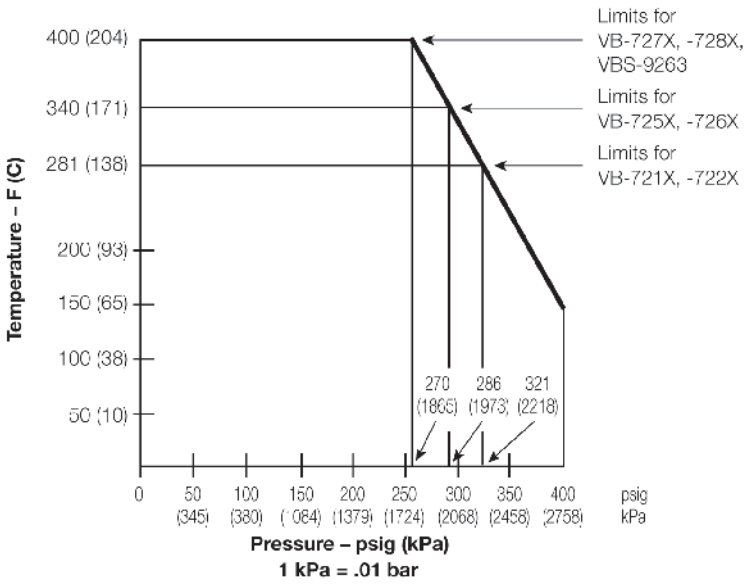
2-Way valves with brass plugs have modified equal percentage flow curves and valves with stainless steel plugs have modified linear flow curves. With modified equal percentage flow curves, for equal increments of valve stem stroke, the change in flow rate with respect to valve stroke may be expressed as a constant percent of the flow rate at the time of the change. The change of flow rate with respect to valve stroke is relatively small when the valve plug is near the valve seat and relatively high when the valve plug is nearly wide open. With modified linear flow curves, the flow is directly proportional to the valve stem position.



2.3 Temperature Pressure Ratings

Consult the appropriate valve linkage general instruction sheet for the effect of valve body ambient temperatures on specific actuators. Ratings conform with published values and disclaimer.

VB-72xx-0-4-P (Cast Bronze Body)
Standards: Pressure to ANSI B16.15 Class 250 with 400 psig up to 150° F decreasing to 321 psig at 281° F, ASTM B584



CAUTION: Pressure/temperature ratings are for the body only, not the piping. Consult ANSI 816.22 for ratings of solder joint fittings. The lowest piping component ratings are the high limit.

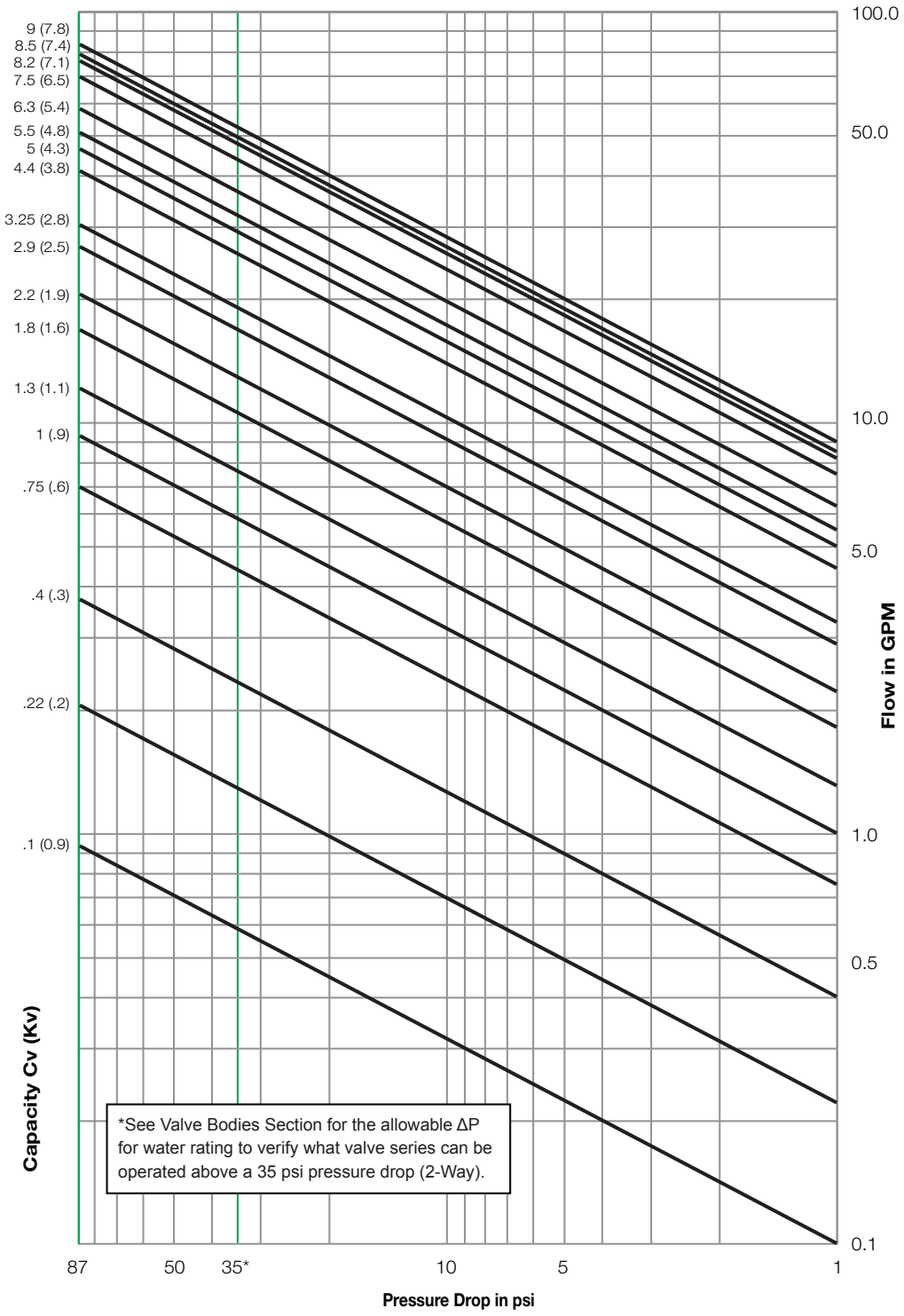
2.4 VB-7200 2-Way Globe Valves Material Specifications

VB-7200 Valve Series…		VB-7211-0-4 (½"…1¼"), VB-7213, VB-7221-0-4 (½"…1¼"), VB-7223, VB-7214, VB-7224, VB-7215, VB-7225	VB-7211-0-3 (½"…1¼"), VB-7212 (½"), VB-7222 (½")	VB-7251-0-3 (½"…1¼"), VB-7251-0-4 (½"…1¼")	VB-7253, VB-7255, VB-7263, VB-7265	VB-7273, VB-7275, VB-7283, VB-7285	VBS-9263
Body		Bronze, ASTM B584					316 SS
Seat		Bronze, ASTM B584			316 Stainless Steel		
Stem		316 Stainless Steel					
Plug		Brass		316 Stainless Steel			
Packing		Spring-Loaded PTFE/EPDM					PTFE
Seal	½" & ¾"	PTFE	EPDM	PTFE		Metal to Metal 316 Stainless Steel	PTFE
	1"…2"	EPDM					

Packing and Seal materials: Polytetrafluoroethylene (PTFE), ethylene propylene diene monomer (EPDM)

VB-7200 ½"…1" Capacity 2-Way Valves

2.5 Water Capacity for 0.1 to 9.0 Cv Valves



1 GPM = .06309 l/s = .22712 cubic m/h

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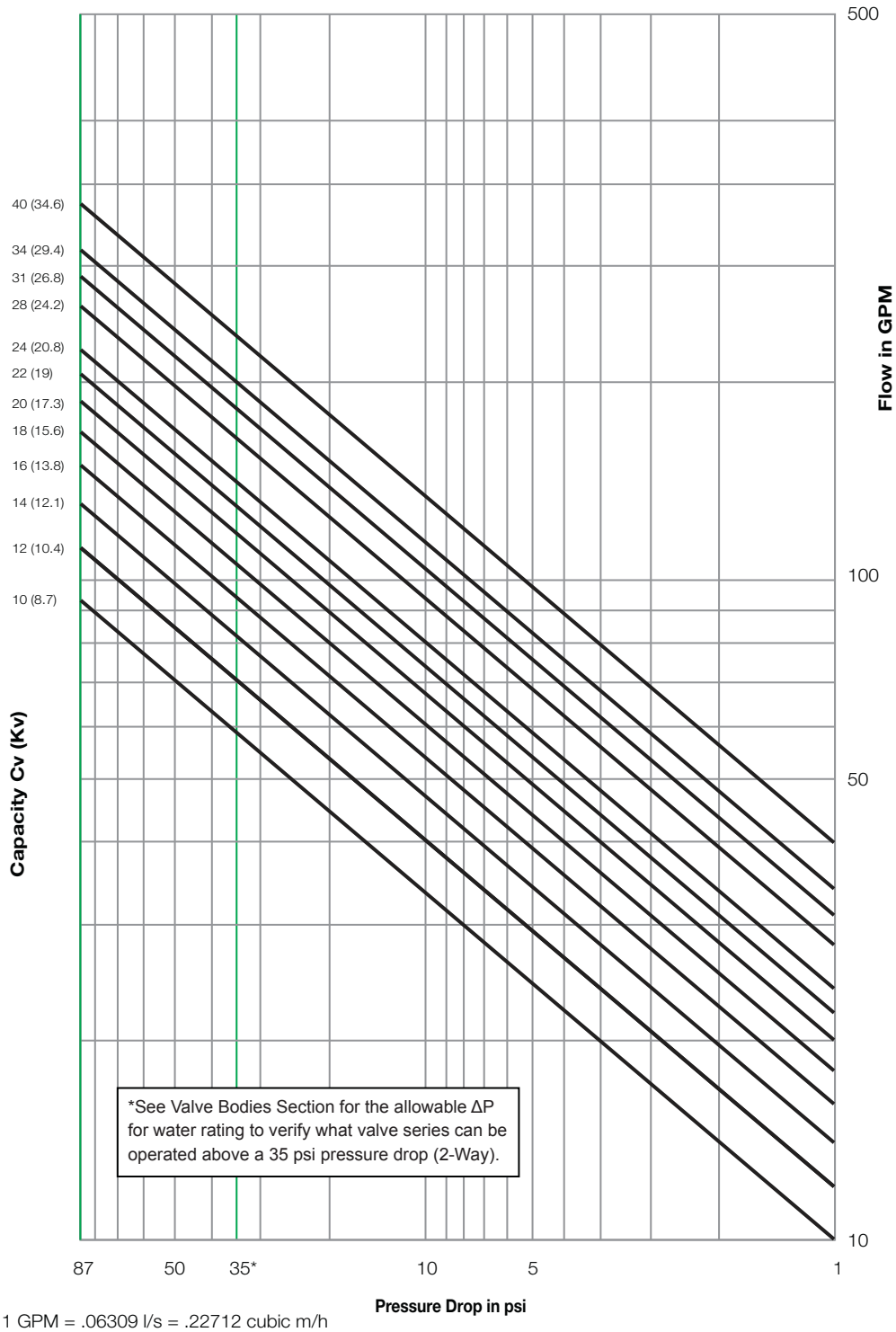
2.6 Water Capacity for 10 to 40 Cv Valves



1 GPM = .06309 l/s = .22712 cubic m/h

VB-7300 ½"…2" 3-Way Flow, Temp. & Materials

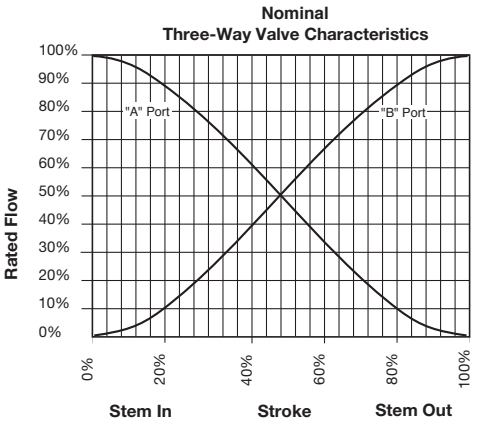
2.7 Flow Characteristics

3-Way mixing valves are designed so that the flow from inlet ports, (A and B), to the outlet port (AB) is modified linear.

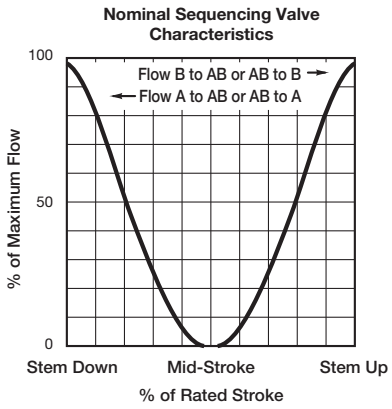
3-Way diverting valves are designed so that the flow from the inlet port (B) to the outlet ports (A and AB) is modified linear.

Sequencing valves have both ports (A and B) closed off in the center of stroke and have modified linear flow for each port as it opens to supply it's coil.

Rangeability is greater than 100:1 for both the A and B ports.



3-Way Mixing and Diverting Valves



VB-7332 Sequencing Valve

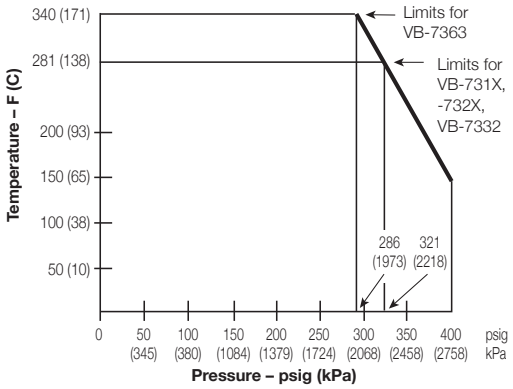
2.8 Temperature Pressure Ratings

Consult the appropriate valve linkage general instruction sheet for the effect of valve body ambient temperatures on specific actuators. Ratings conform with published values and disclaimer.

VB-73xx-0-x-P (Cast Bronze Body)

Standards: Pressure to ANSI B16.15 Class 250 with 400 psig up to 150° F decreasing to 321 psig at 281° F, ASTM B584.

CAUTION: Pressure/temperature ratings are for the body only, not the piping. Consult ANSI 816.22 for ratings of solder joint fittings. The lowest piping component ratings are the high limit.



2.9 VB-7300 3-Way Globe Valves Material Specifications

Material		VB-7313, VB-7314, VB-7315	VB-7312, VB-7332, VB-7323, VB-7325	VB-7363
Body		Bronze ASTM, B584		
A Port Seat		Brass		316 Stainless Steel
B Port Seat		Bronze ASTM, B584		
Stem		316 Stainless Steel		
Plug		Brass		316 Stainless Steel
Packing		Spring-Loaded PTFE/EPDM		
A Port Seal	½" and ¾"	PTFE	Metal to Metal	PTFE
	1"…2"	EPDM		
B Port Seal	½" and ¾"	Metal to Metal		Metal to Metal 316 Stainless Steel
	1"…2"			

Packing and Seal materials: Polytetrafluoroethylene (PTFE), ethylene propylene diene monomer (EPDM)

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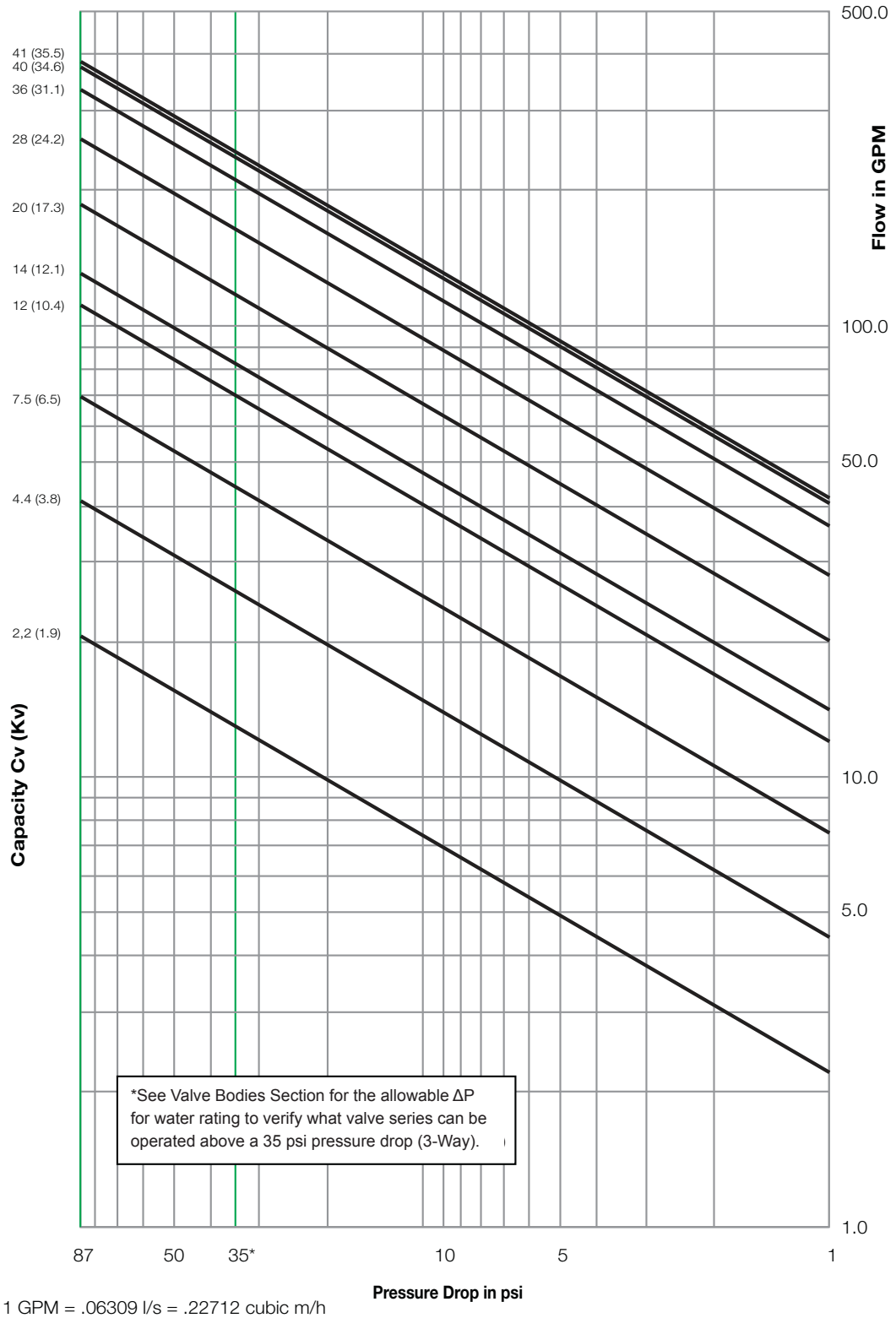
VB-7300 ½"…2" 3-Way Valves

2.10 Water Capacity



1 GPM = .06309 l/s = .22712 cubic m/h

VB-7000 ½"…2" Cavitation Limitations 2 and 3-Way

Cavitation Limitations on Valve Pressure Drop

A valve selected with too high a pressure drop can cause erosion of seals and/or wire drawing of the seat. In addition, cavitation can cause noise, damage to the valve trim (and possibly the body), and choke the flow.

Do not exceed the maximum differential pressure (pressure drop) for the valve selected.

The following formula can be used on higher temperature water systems, where cavitation could be a problem, to estimate the maximum allowable pressure drop across the valve:

$$P_m = 0.5 (P1 – P_v)$$

Where:

P_m = Maximum allowable pressure drop (psi)
P1 = Absolute inlet pressure (psia)
P_v = Absolute vapor pressure (psia)

Note: Add 14.7 psi to gauge supply pressure to obtain absolute pressure value.

For example, if a valve is controlling 200°F water at an inlet pressure of 18 psig, the maximum pressure drop allowable would be:

Pm = 0.5 [(18 + 14.7) – 11.53] = 10.6 psi
(Vapor pressure of 200°F water is 11.53 psia)

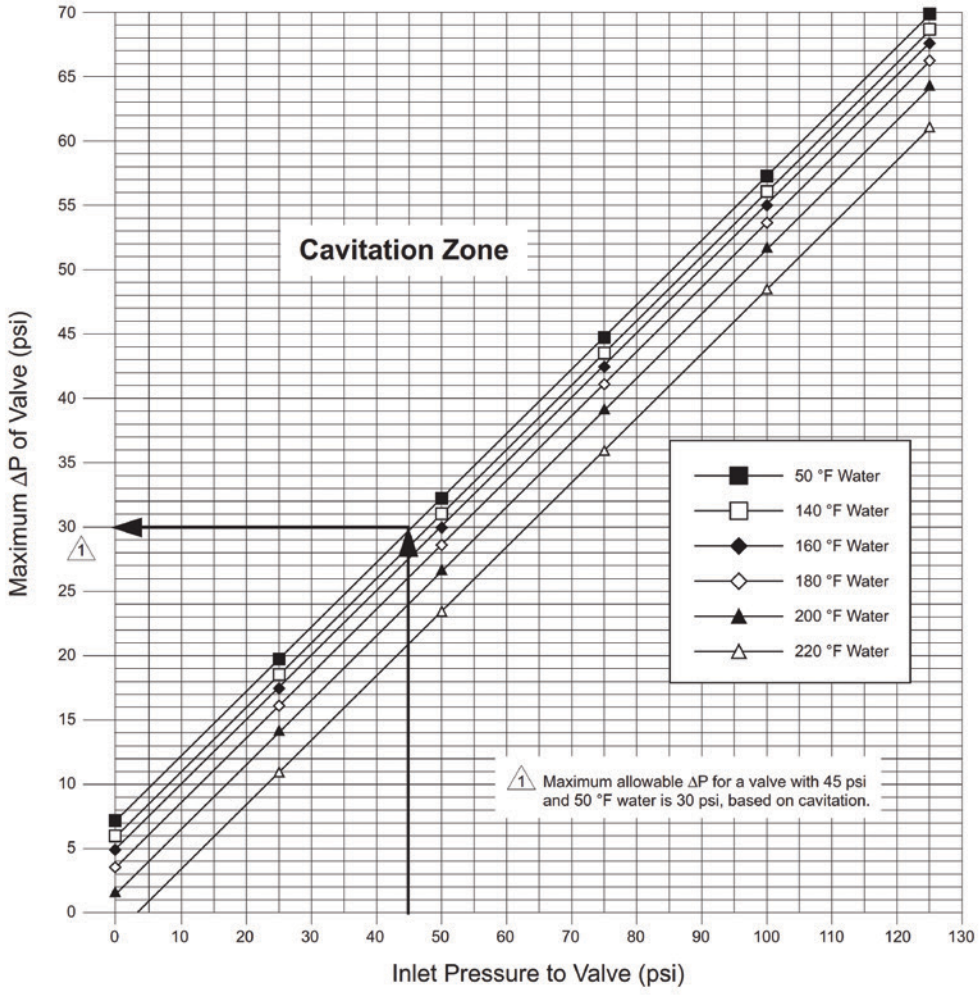
Systems where cavitation is shown to be a problem can sometimes be adjusted to provide higher downstream back pressures. Valves having harder seat materials should be furnished if velocities are excessive.

2.11 Vapor Pressure Of Water

Temp. (°F)	Pressure (psia)	Temp. (°F)	Pressure (psia)	Temp. (°F)	Pressure (psia)	Temp. (°F)	Pressure (psia)
40	0.12	90	0.70	140	2.89	190	9.34
50	0.18	100	0.95	150	3.72	200	11.53
60	0.26	110	1.28	160	4.74	210	14.12
70	0.36	120	1.69	170	5.99	220	17.19
80	0.51	130	2.22	180	7.51	230	20.78

VB-7000 ½"…2" Cavitation Limitations 2 and 3-Way

2.12 Cavitation Limitations on Valve Pressure Drop



Maximum Allowable Differential Pressure (ΔP)for Water Valves.

All Steam Sizing to 6” Valves (2-Way only)

2.13 Saturated Steam

STEAM VALVE SELECTION									
Dp (psi.)	**2**	**5**	**10**	**15**	**25**	**35**	**50**	**75**	**100**
	“Low Pressure Steam”				**“High Pressure Steam”**				
Lb/Hour	**Select proportional valve Cv close to chart value.**								
2	0.16	0.15	0.13	0.12	0.04	0.03	0.02	0.02	0.01
3	0.24	0.23	0.20	0.18	0.05	0.04	0.03	0.02	0.02
5	0.41	0.38	0.34	0.31	0.09	0.07	0.06	0.04	0.03
8	0.65	0.60	0.54	0.49	0.15	0.12	0.09	0.06	0.05
11	0.90	0.83	0.74	0.67	0.20	0.16	0.12	0.09	0.07
16	1.3	1.2	1.1	1.0	0.29	0.23	0.18	0.13	0.10
24	2.0	1.8	1.6	1.5	0.44	0.35	0.27	0.19	0.15
35	2.9	2.6	2.3	2.1	0.64	0.51	0.39	0.28	0.22
50	4.1	3.8	3.4	3.1	0.91	0.73	0.56	0.40	0.32
74	6.0	5.6	5.0	4.5	1.4	1.1	0.83	0.60	0.47
109	8.9	8.2	7.3	6.7	2.0	1.6	1.2	0.88	0.69
160	13	12	11	10	2.9	2.3	1.8	1.3	1
240	20	18	16	15	4.4	3.5	2.7	1.9	1.5
350	29	26	23	21	6.4	5.1	3.9	2.8	2.2
500	41	38	34	31	9.1	7.3	5.6	4	3.2
750	61	56	50	46	14	11	8	6	5
1100	90	83	74	67	20	16	12	9	7
1600	131	120	107	98	29	23	18	13	10
2400	196	180	161	147	44	35	27	19	15
3500	285	263	235	214	64	51	39	28	22
5000	408	376	335	306	91	73	56	40	32
7000	571	526	469	428	128	102	78	57	44

Body Size	Cv	Port Code
½”	0.10	31
	0.22	33
	0.40	01
	0.75	34
	1	36
	1.3	02
	1.8	28
	2.2	03
	2.9	30
	3.25	39
	4.4	04
¾”	5.5	05
	6.3	41
	7.5	06
1”	8.2	51
	9	52
	10	07
	12	08
1¼”	14	61
	16	62
	18	63
	20	09
1½”	22	71
	24	72
	28	10
2”	31	81
	34	82
	40	11
2½”	56	12
3”	85	13
4”	145	14
5”	240	15
6”	370	16

Selection Instructions

Warning
Pressure reducers do not lower boiler temperatures significantly, resulting in superheated steam. Select only steam valves which can withstand temperatures near the original boiler temperature.

Caution
Do not size a steam valve with a pressure drop greater than 42% of the absolute pressure. Actuator must be rated to provide adequate close off pressure.

Two Position Control
Unless otherwise specified, select line-size, 2-Way valves, stem-up open or closed and are normally sized using a minimum of 10% of inlet pressure (psig).

Proportional

1. Go to rows which are nearest to minimum pounds/hour flow required.
2. Go to columns nearest to the assured supply pressure.
3. Note Cv values at the column/row intersection.
4. Select the listed valve Cv which provides adequate flow.
5. If reducers are used, expect flow to be reduced as much as 15%.

Reference

For further information, download CA-28 Control valve sizing, F-13755, from iPortal.
The following is the terminology and the equations for the table above:

“Low Pressure” steam
(Up to 15 psig.)

$C_v = Q/(2.1 \times (\Delta P \times (P1 + P2)^{\wedge 0.5}$

“High Pressure” steam
(Above 15 psig.)

$C_v = Q/(1.38 \times P1abs)$

C_v = Flow Coefficient
Q = Lbs. per hour of steam
ΔP = Differential pressure in psi (pressure drop)
P_2 = Outlet pressure in psia (absolute)
psig + 14.7 = psia (absolute)
K = 1 + (0.0007 x °F super-heat)

3. VB-7000 Close-Off Pressure Capability

3.1 Seat Leakage Classes

ANSI/FCI 70-2 Leakage Class	Maximum Seat Leakage
Class II	0.5% of rated Cv
Class III	0.1% of Rated Cv
Class IV	0.01% of Rated Cv
Class V	0.0005 ml per minute per inch of orifice diameter per psi differential

Close-off Ratings

Nominal actuator close-off ratings range from ANSI III (metal to metal trim) to ANSI IV and ANSI V (EPDM and PTFE Discs). Refer to VB-7000 Bronze Bodies for your specific application requirements.

Note: Valve body and actuator size determine the close-off capabilities. Example: All ½", 2-Way globe valves will make the same close-off, regardless of the Cv rating, for a given actuator.

Note: The following tables offer a quick guide to valve actuator combination / close-off ratings. Please refer to specific close-off ratings.

3.2 Electric Spring Return (SR)

VB-7000 & VBS-9263
Hydraulic & Electric Close-Off (psi) Stem Up Open, Closed & Mixing

	Mx-5200		MA-5200		M40-704x	Mx51-710x		Mx41-707x	M900Ax-VB	Mx51-720x	M41-715x	M40-717x
Linkage	AV-7600				AV-611	None		AV-602	None	None	AV-602	
Actuator Code	Choose code from assembly and actuator sections.											
Pipe	Power Down Closed a,c,d	Spring Up Closed b,c,d	Power Down Closed a,c,d	Spring Up Closed b,c,d	Power or Spring							
						N.O.a	N.C.b					
½"	130	130	130	200	250	250	250	250	250	250	250	250
¾"	80	80	80	130	250	200	200	250	250	250	250	250
1"	40	40	40	50	125	150	90	180	180	230	250	250
1¼"	25	25	25	35	75	90	60	120	110	150	200	250
1½"	15	25	60	35	50	60	35	80	75	100	140	160
2"	10	14	35	20	25	32	20	40	40	65	80	120
VB-7323 Diverting: Bottom port is the common. All are 250 psi. close-off												Too Strong

[a]Normally Open (N.O.) assembly using stem up open valve body.

[b]Normally Closed (N.C.) assembly using stem up closed valve body or 3-Way A port.

[c]With appropriate AV-7600 springs.

[d]For 3-Way mixing close-offs you must consider power down and spring-up close offs.

3.3 Electric Non-Spring Return (NSR)

VB-7000 & VBS-9263 Electric Close-Off (psi)
Stem Up Open, Closed & Mixing

	M400A-VB	Mx41-6043	Mx41-6083	M800A-VB	Mx41-6153	M1500-VB
Linkage	None	AV-611	AV-611	None	AV-611	None
Actuator Code	Choose code from assembly and actuator sections					
Pipe	Holds in place. Use power to move.					
½"	250	225	250	250	250	250
¾"	198	225	200	250	250	250
1"	92	100	130	207	250	250
1¼"	56	60	100	130	225	250
1½"	37	40	70	88	140	177
2"	19	20	40	48	80	98
VB-7323 Diverting: Bottom port is the common. All are 250 psi. close-off						

Note: The valve body and actuator size determine the close off capabilities. For example: all ½" 2-Way globe valves will make the same close off regardless of the Cv rating for the same actuator. Close offs shown are minimums (see section 4. for possible higher close off information).

3.4 VB-7000 Pneumatic Close-Off Ratings (psi)

	Actuator	MK-2690 (6 Square Inch)								
	Optional Positioner	AK-42309-500								
	Linkage	AV-7400								
	Spring Range	3 to 7 psi.			5 to 10 psi.			8 to 13 psi.		
	Actuator Code	201			202			203		
	Supply Air (Psi.)	15/20	15	20	15/20	15	20	15/20	15	20
	Stem Closed Positiona	Up N.C.	Down	Down	Up N.C.	Down	Down	Up N.C.	Down	Down
Two Way and Mixing	½"	-	130	220	50	60	170	130	-	90
	¾"	-	80	130	30	40	120	60	-	60
	1"	-	35	70	9	15	50	30	-	25
	1¼"	-	20	40	-	8	30	15	-	15
	1½"	-	14	29	-	5	20	10	-	9
	2"	-	6	14	-	-	10	-	-	-
Diverting: bottom port as the common. Use MK-46xx below for tightest close-off.										

[a]In two- or 3-Way mixing "A" port valves, Up N.C. is normally closed in up position. Down closes a N.O. valve or 3-Way mixing "B" port.

3.5 VB-7000 Pneumatic Close-Off Ratings (psi)

	Actuator	MK-46xx (11 Square Inch)								
	Optional Positioner	AK-42309-500								
	Linkage	AV-401								
	Spring Range	3 to 7 psi.			5 to 10 psi.			8 to 13 psi.		
	Actuator Code	301			302			303		
	Supply Air (Psi.)	15/20	15	20	15/20	15	20	15/20	15	20
	Stem Closed Positiona	Up N.C.	Down	Down	Up N.C.	Down	Down	Up N.C.	Down	Down
Two Way and Mixing	½"	30	250	250	100	120	250	250	10	200
	¾"	20	180	250	70	80	180	160	-	120
	1"	5	90	150	30	35	100	60	-	65
	1¼"	-	50	90	15	20	60	40	-	40
	1½"	-	30	60	10	10	40	35	-	25
	2"	-	15	30	-	-	25	15	-	10
Diverting: bottom port as the common. All sizes are balanced for 250 psi close-off.										

[a]In two- or 3-Way mixing "A" port valves, Up N.C. is normally closed in up position. Down closes a N.O. valve or 3-Way mixing "B" port.

3.6 VB-7000 Pneumatic Close-Off Ratings (psi)

	Actuator	MK-66xx (50 Square Inch, half inch stroke)								
	Optional Positioner	AK-42309-500								
	Actuator & Linkage	MK-6601-301			MK-6611-302			MK-6621-303		
	Linkage	AV-430								
	Spring Range	3 to 8			5 to 10			8 to 13		
	Actuator Code	611			612			613		
	Supply Air (Psi.)	15/20	15	20	15/20	15	20	15/20	15	20
	Stem Closed Positiona	Up N.C.	Down	Down	Up N.C.	Down	Down	Up N.C.	Down	Down
Two Way and Mixing	1½"	40	170	250	80	110	230	170	40	160
	2"	20	90	160	50	60	120	90	20	90
Caution! Diverting: bottom port as common. Actuator may be too strong, use smaller actuator.										

[a]In two- or 3-Way mixing "A" port valves, Up N.C. is normally closed in up position. Down closes a N.O. valve or 3-Way mixing "B" port.

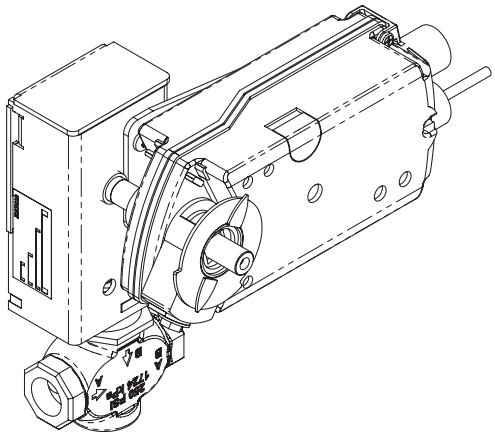
3. VB-7000 Actuator Close-Off Pressure Capability

Notes

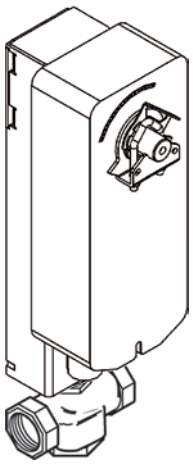
4. VB-7000 Valve / Actuator Assemblies

VB-7000 ½"…2" Valve/ Actuator Assemblies

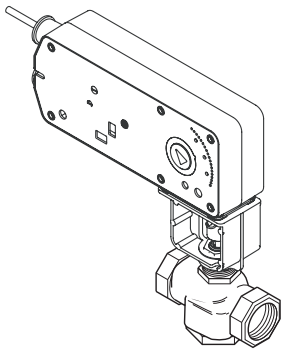
Mx4x-6xxx and Mx4x-7xxx Series Spring and Non-Spring Return Actuator/Linkage Assemblies with SmartX actuators.



2-Way Linked Globe Valve Assembly
(Non-Spring Return Model shown)



3-Way Linked Globe Valve Assembly
(Spring Return Model shown)

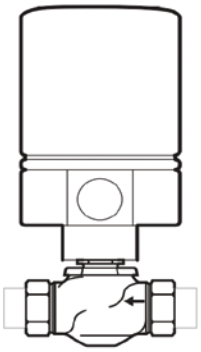


VB-73xx Series ½"…2" 3-Way Assembly
with SmartX Linear SR Actuators

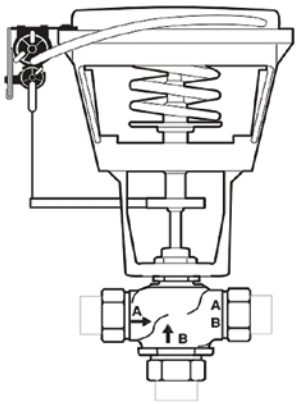
Globe Valve Assemblies

The VA, VF, and VS-7000 series Linked Globe Valve Assemblies are complete actuator/valve assemblies that accept two-position, floating or proportional control, respectively, from a DDC system or from a thermostat, for control of hot water, chilled water and steam coils. These valve assemblies consist of linked spring return and non-spring return actuators mounted on ½" up to 2" (15 mm… 50 mm) 2-Way and 3-Way globe valve bodies, using a specially designed linkage assembly. 3-Way assemblies are available for mixing (½"…2") and diverting (½"…2") applications.

Typical applications include reheat on VAV boxes, fan coil units, hot and chilled water coils in air handling units, unit ventilators, and central system applications. Kits are available separately to allow field assembly of SmartX actuators to valve bodies.



VB-72xx 2-Way Globe Valve with
MA/MP/MPR-5XXX Hydraulic Actuator



VB-73xx 3-Way Globe Valve with
MK-66x1 Pneumatic Actuator

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Globe Valve Assembly Selection Procedure

Globe Valve Assembly Selection Procedure

When selecting a globe valve assembly, you must determine the applicable codes for the control signal type, valve body configuration, end connection, port size and actuator. Select a globe valve assembly part number as follows:

1. Control Signal Type, Valve Body Configuration and End Connection

Referring to the “Determining a Part Number" select the appropriate codes for the part-number fields.

2. Valve Size (Flow Coefficient)

If the required flow coefficient (Cv) has not been determined, do so as follows:

a. Refer to Sizing and Selection to calculate the required Cv.

b. Select the nearest available Cv value and corresponding valve body port code from the “Part Numbering System.”

3. Actuator

Select the appropriate actuator and code, according to the “Part Numbering System” based on the control signal type, required valve normal position, and voltage requirements. For detailed actuator information, refer to Actuators and Linkages for applicable actuator specifications.

Note: Globe Valve Assemblies are not available with Mx51-7103-0x0 actuators (equipped with appliance wire). However, if required, you may field-assemble one of these actuators to a globe valve body. For information on Mx51-7103-0x0 actuators, refer to the applicable specifications pages.

4. Close-off Pressure

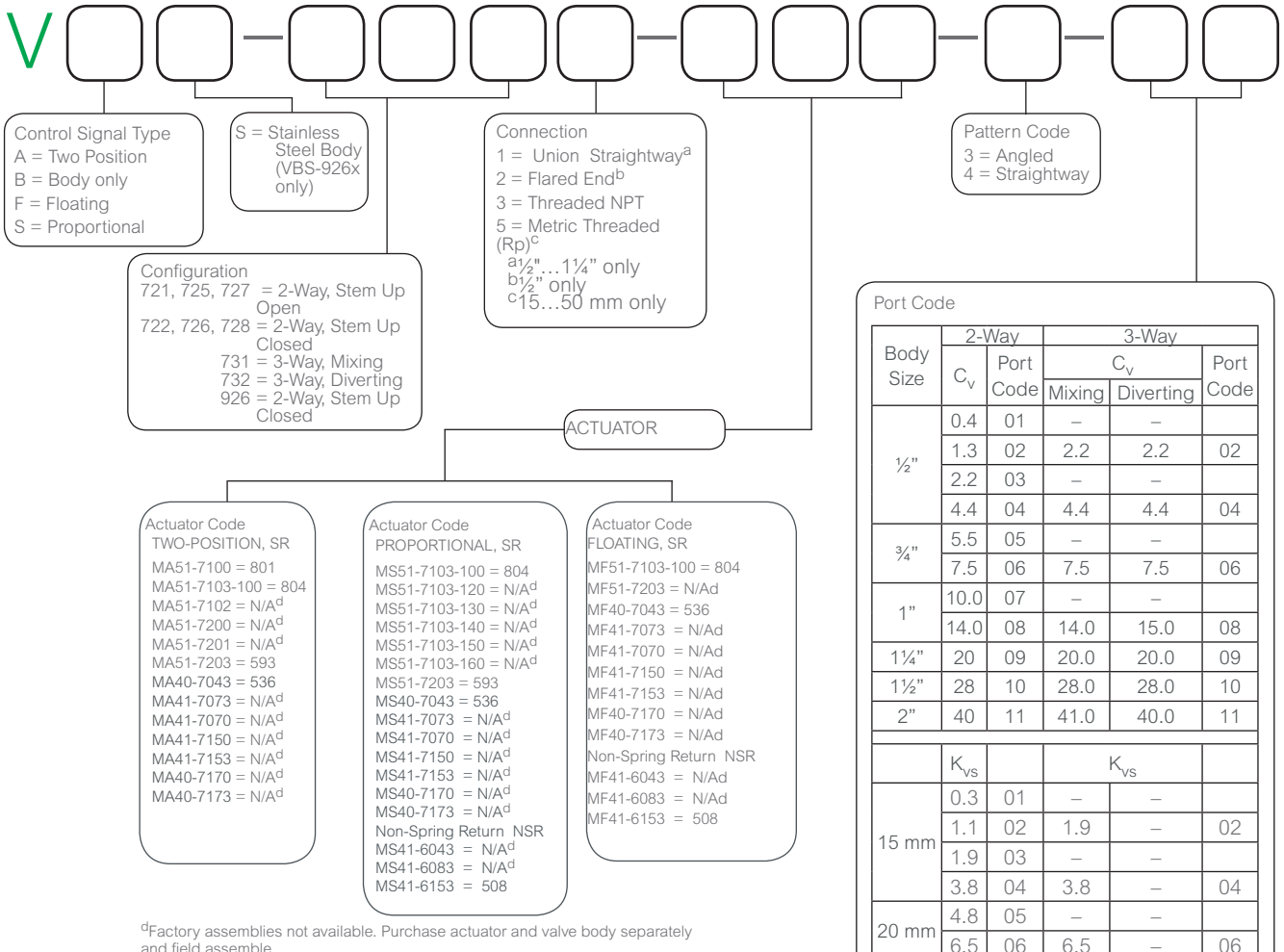
Confirm, with respect to Actuator Close-Off Capacity, that the selected actuator and valve body combination provides sufficient close-off pressure. If no close-off pressure is shown, the valve body/actuator combination is not valid.

5. Available Space

If available space is a consideration, check the appropriate dimensional figure in Dimensions and its accompanying table for any potential fit issues.

Assembly Ordering Linked VB-7000 Globe Valve SmartX

Assembly Ordering Linked VB-7000 Globe Valve SmartX



[d]Factory assemblies not available. Purchase actuator and valve body separately and field assemble.

Port Code

Body Size	2-Way C_v	2-Way Port Code	3-Way C_v Mixing	3-Way C_v Diverting	3-Way Port Code
½"	0.4	01	–	–	
	1.3	02	2.2	2.2	02
	2.2	03	–	–	
	4.4	04	4.4	4.4	04
¾"	5.5	05	–	–	
	7.5	06	7.5	7.5	06
1"	10.0	07	–	–	
	14.0	08	14.0	15.0	08
1¼"	20	09	20.0	20.0	09
1½"	28	10	28.0	28.0	10
2"	40	11	41.0	40.0	11

	K_{vs}		K_{vs}		
15 mm	0.3	01	–	–	
	1.1	02	1.9	–	02
	1.9	03	–	–	
	3.8	04	3.8	–	04
20 mm	4.8	05	–	–	
	6.5	06	6.5	–	06
25 mm	8.7	07	–	–	
	12	08	12	–	08
32 mm	17	09	17	–	09
40 mm	24	10	24	–	10
50 mm	35	11	36	–	11

The configuration of the valve assembly determines the valve stem position and flow, as shipped from the factory. See the table below.

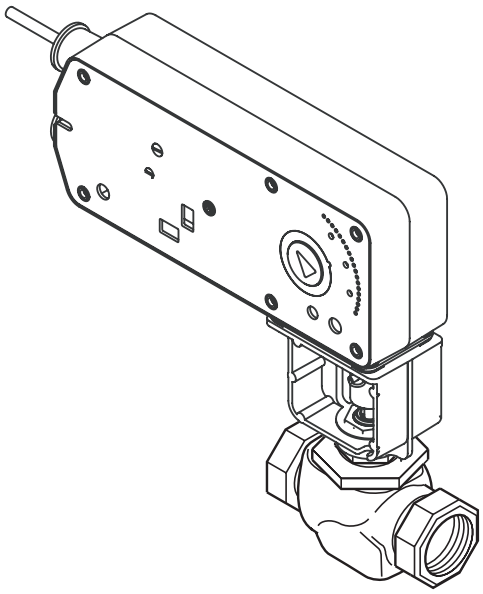
Valve Assemblies	Valve Body Action	Factory Shipped Position		Action
		Valve Stem	Flow	
Vx-721x-xxx-4-P **Vx-725x-xxx-4-P** **Vx-727x-xxx-4-P**	2-Way Stem Up Open	Up	Open	A to AB Flow decreases as actuator extends
Vx-722x-xxx-4-P **Vx-726x-xxx-4-P** **Vx-728x-xxx-4-P** **Vxs-9263-xxx-x-P**	2-Way Stem Up Closed	Up	Closed	A to AB Flow increases as actuator extends
Vx-731x-xxx-4-P	3-Way Mixing	Up	Flow B to AB	A to AB Flow increases as actuator extends B to AB Flow decreases as actuator extends
Vx-732x-xxx-4-P	3-Way Diverting	Up	Flow B to AB	B to A Flow increases as actuator extends B to AB Flow decreases as actuator extends

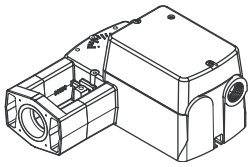
½"…2" 2-Way Assemblies with SmartX Linear SR Actuators

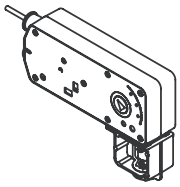
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

Selection Table – 2-Way Linked Globe Valve Assemblies with Linear Series Spring Return Actuators

2-Way Linked Globe Valve Assemblies







Actuator Force Rating	
105 lbf (467 N)	220 lbf (979 N)
Actuator Model (Actuator Code)[a]	
Two-Position MA51-710x (801) MA51-7103-100 (804) Floating MF51-7103-100 (804) Proportional MS51-7103-1x0 (804)	Two-Position MA51-720x (593) Floating MF51-7203 (593) Proportional MS51-7203 (593)

Valve Assembly Part Number[bj]	P Code	Valve Size in. (mm)	Cv[c]	kvs[b]	Actuator Close-off Pressure psi[de]		
					N.O.[f, j]	N.C.[g, j]	
Vx-72x1-xxx-4-P Vx-72x-xxx-4-P Vx-72x3-xxx-4-P Vx-72x5-xxx-4-P[h] VxS-9263-0-4-P	1	½ (15)	0.4	0.3	250	250	—
	2		1.3	1.1			
	3		2.2	1.9			
	4		4.4	3.8			
	5	¾ (20)	5.5	4.8	200	200	
	6		7.5	6.5			
	7	1 (25)	10.0	8.7	150	90	
	8		14.0	12			
	9	1¼ (32)	20.0	17	90	60	150
Vx-72x3-xxx-4-P Vx-72x5-xxx-4-P[h]	10	1½ (40)	28.0	24	60	35	100
	11	2 (50)	40.0	35	32	20	65

[a] Models without actuator codes are not offered as factory assemblies. Purchase the actuator and the valve body separately and field assemble. For available factory assemblies, consult the price schedule.

[b] To determine a specific part number, see "Assembly Ordering" for the relevant part series.

[c] C_v = gpm /$\sqrt{\Delta P}$ (where ΔP is measured in psi.) $k_{vs} = C_v / 1.156$

[d] Close-off ANSI IV (.01%) for soft seats.

[e] Close-off pressure ratings describe only the differential pressure which the actuator can close-off with adequate seating force. Consult valve body specifications for other limitations. The rating value is the pressure difference between the inlet and outlet ports.

[f] Normally open (N.O.) assembly using stem up open valve body.

[g] Normally closed (N.C.) assembly using stem up closed valve body.

[h] Metric thread 15…50 mm (Rp ½ to Rp 2).

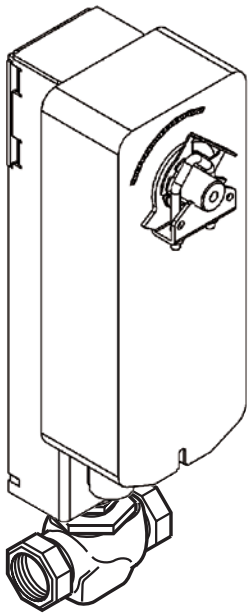
[j] Valve body and actuator size determine the close-off capabilities. Example: All ½", 2-Way globe valves will make the same close-off regardless of the C_v rating for a given actuator.

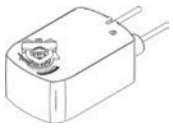
½"…2" 2-Way Assemblies with SmartX Linear SR Actuators

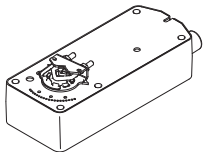
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application.

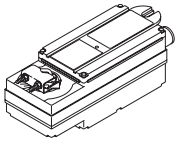
Selection Table – 2-Way Linked Globe Valve Assemblies with Spring Return Actuators

2-Way Spring Return Linked Globe Valve Assemblies









Valve Assembly Part Number [a]	P Code	Valve Size in. (mm)	Cv[b]	kvs[b]	Actuator Close-off Pressure psi[cd]			
						Single Actuator	Single Actuator	Single Actuator
					Actuator Torque Rating (minimum)			
					35 lb-in (4 N-m)	60 lb-in (7 N-m)	133 lb-in (15 N-m)	150 lb-in (17 N-m)
					Actuator Model (Actuator Code)			
					Two-Position MA40-704x (536) Floating MF40-7043 (536) Proportional MS40-7043 (536) (537)	Two-Position MA41-707x Floating MF41-7073 Proportional MS41-7073 (546) (547)	Two-Position MA41-715x Floating MF41-7153 Proportional MS41-7153 (556) (557)	Two-Position MA40-717x Floating MF40-7173 Proportional MS40-717x (572) (574) (576)
					Note: Not all factory actuator codes are available.			
					Linkage Kit Part Number			
					AV-611 (½"…2")	AV-602 (1"…2")	AV-602 (1¼" to 2")	
Vx-7214-xxx-4-P Vx-7224-xxx-4-P	01	½ (15)	0.4	0.3	250	—	—	—
Vx-7211-xxx-4-P Vx-7213-xxx-4-P Vx-7215-xxx-4-P[e]	02		1.3	1.1	250	—	—	—
Vx-7221-xxx-4-P Vx-7223-xxx-4-P Vx-7225-xxx-4-P[e]	03		2.2	1.9	250	—	—	—
Vx-7253-xxx-4-P Vx-7263-xxx-4-P Vx-7273-xxx-4-P Vx-7283-xxx-4-P VxS-9263-xxx-4-P	04		4.4	3.8	250	—	—	—
	05	¾ (20)	5.5	4.8	250	—	—	—
	06		7.5	6.5	250	—	—	—
	07	1 (25)	10.0	8.7	125	180	—	—
	08		14.0	12	125	180	—	—
	09	1¼ (32)	20.0	17	75	120	200	—
Vx-7213-xxx-4-P	10	1½ (40)	28.0	24	50	80	140	160
Vx-7215-xxx-4-Pe Vx-7223-xxx-4-P Vx-7225-xxx-4-Pe	11	2 (50)	40.0	35	25	40	80	120

[a] To determine a specific part number, see "Assembly Ordering" for the relevant part series.

[b] kvs = m^3/h (ΔP = 100 kPa) kvs = Cv / 1.156 Cv = kvs x 1.156

[c] All Vx-72xx leakage ratings are ANSI V to 35psi and ANSI IV above 35psi; with the exception of Vx-7273 and Vx-7283 (ANSI III).

[d] For seat leakage ratings, refer to Seat Leakage Classes.

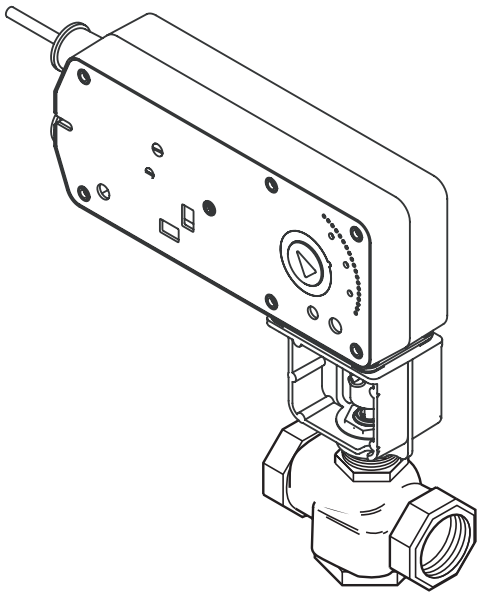
[e] Metric thread 15…50 mm (Rp ½ to Rp 2).

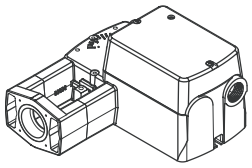
½"…2" 3-Way Assemblies with SmartX Linear SR Actuators

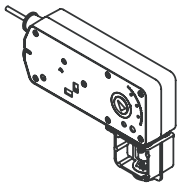
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

Selection Table – 3-Way Linked Globe Valve Assemblies with Linear Series Spring Return Actuators

3-Way Linked Globe Valve Assemblies[a]







Actuator Force Rating	
105 lbf (467 N)	220 lbf (979 N)
Actuator Model (Actuator Code)[a]	
Two-Position MA51-710x (801) MA51-7103-100 (804) Floating MF51-7103-100 (804) Proportional MS51-7103-1x0 (804)	Two-Position MA51-720x (593) Floating MF51-7203 (593) Proportional MS51-7203 (593)

Valve Assembly Part Number[c]	P Code	Valve Size in. (mm)	Cv[d]	kvs[c]	Actuator Close-off Pressure psia[e]	
Mixing Vx-7313-xxx-4-P Vx-7315-xxx-4-P[f]	2	½ (15)	4.4	3.8	250	—
	4					
	6	¾ (20)	7.5	6.5	200	
	8	1 (25)	14.0	12.0	90	
	9	1¼ (32)	20.0	17	60	150
	10	1½ (40)	28	24	35	100
	11	2 (50)	41	36	20	65
Diverting Vx-7323-xxx-4-P	4	½ (15)	4.4	3.8	250	—
	6	¾ (20)	7.5	6.5		
	8	1 (25)	15.0	13.0		
	9	1¼ (32)	20.0	17.3		250
	10	1½ (40)	28	24.2		
	11	2 (50)	40	34.6		

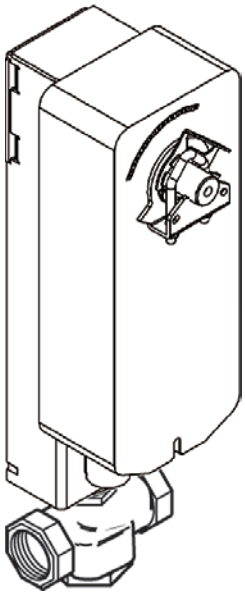
[a] Refer to 3-Way flow patterns.
[b] Models without actuator codes are not offered as factory assemblies. Purchase the actuator and the valve body separately and field assemble. For available factory assemblies, consult the price schedule.
[c] To determine a specific part number, see "Assembly Ordering" for the relevant part series.
[d] $C_v = gpm / \sqrt{\Delta P}$ (where ΔP is measured in psi.) $k_{vs} = C_v / 1.156$
[e] Close-off pressure ratings describe only the differential pressure which the actuator can close-off with adequate seating force. Consult valve body specifications for other limitations. The rating value is the pressure difference between the inlet and outlet ports.
[f] Metric thread 15…50 mm (Rp ½ to Rp 2).

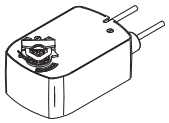
½"…2" 3-Way Assemblies with SmartX SR Actuators

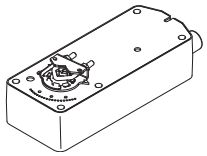
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

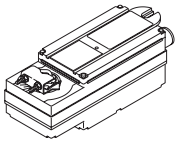
Selection Table – 3-Way Linked Globe Valve Assemblies with Spring Return Actuators

3-Way Spring Return Linked Globe Valve Assemblies[a]









Valve Assembly Part Number[b]	P Code	Valve Size in. (mm)	Cvc	kvs[c]	Actuator Torque Rating (minimum)			
					35 lb-in (4 N-m)	60 lb-in (7 N-m)	133 lb-in (15 N-m)	150 lb-in (17 N-m)
					Actuator Model (Actuator Code)			
					Two-Position MA40-704x (536) Floating MF40-7043 (536) Proportional MS40-7043 (536) (537)	Two-Position MA41-707x Floating MF41-7073 Proportional MS41-7073 (546) (547)	Two-Position MA41-715x Floating MF41-7153 Proportional MS41-7153 (556) (557)	Two-Position MA40-717x Floating MF40-7173 Proportional MS40-717x (572) (574) (576)
					Note: Not all factory actuator codes are available.[e]			
					Linkage Kit Part Number			
					AV-611 (½"…2")	AV-602 (1"…2")	AV-602 (1½"…2")	AV-602
					Actuator Close-off Pressure psi[gd]			
						Single Actuator	Single Actuator	Single Actuator
Vx-7313-xxx-4-P Vx-7315-xxx-4-P[f]	02	½ (15)	2.2	1.9	250	—	—	250
	04		4.4	3.8	250	—	—	
	06	¾ (20)	7.5	6.5	250	—	—	
	08	1 (25)	14.0	12.0	125	180	—	
	09	1¼ (32)	20.0	17	75	100	—	
	10	1½ (40)	28	24	50	70	140	160
	11	2 (50)	41	36	25	40	80	120
Vx-7323-xxx-4-P	02	½ (15)	2.2	1.9	250	—	—	—
	04		4.4	3.8	250	—	—	—
	06	¾ (20)	7.5	6.5	250	—	—	—
	08	1 (25)	15	13.0	250	—	—	—
	09	1¼ (32)	20	17.3	250	—	—	—
	10	1½ (40)	28	24.2	250	—	—	—
	11	2 (50)	40	34.6	250	—	—	—

[a]Refer to 3-Way flow patterns.

[b]To determine a specific part number, see "Assembly Ordering" for the relevant part series.

[c] kvs = m^3/h (ΔP = 100 kPa) kvs = Cv / 1.156 Cv = kvs x 1.156

[d]Mixing Valves A port seat leakage ANSI IV, B port seat leakage ANSI III, Diverting Valves seat leakage is ANSI III.

[e]For field assembly, factory actuator, linkage and valve assembly may be offered.

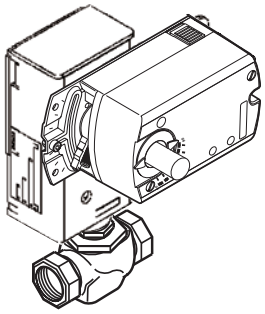
[f]Metric thread 15…50 mm (Rp ½ to Rp 2).

½"…2" Linked 2-Way with NSR Actuators

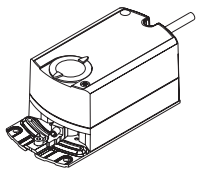
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

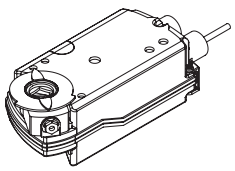
Selection Table – 2-Way Linked Globe Valve Assemblies with Non-Spring Return Actuators

2-Way Non-Spring Return Linked Globe Valve Assemblies



Note: Only bronze bodies listed. VBS-9263-0-4-P stainless steel bodies to -06 are available with the same close-off performance.





Valve Assembly Part Number[a]	P Code	Valve Size in. (mm)	Cv[b]	kvs[b]	Actuator Torque Rating (minimum)		
					44 lb-in. (5 N-m)	88 lb-in. (10 N-m)	133 lb-in. (15 N-m)
					Actuator Model (Actuator Code)		
					Floating MF41-6043 Proportional MS41-6043	Floating MF41-6083 Proportional MS41-6083	Floating MF41-6153 (508) Proportional MS41-6153 (508)
					Note: Not all factory actuator codes are available.[f]		
					Linkage Kit Part Number		
					AV-611		
					Actuator Close-off Pressure psi[cd]		
							Single Actuator
Vx-7211-xxx-4-P	01	½ (15)	0.4	0.3	225	—	—
Vx-7213-xxx-4-P	02		1.3	1.1			
Vx-7214-xxx-4-P	03		2.2	1.9			
Vx-7215-xxx-4-P[e]	04		4.4	3.8			
Vx-7221-xxx-4-P	05	¾ (20)	5.5	4.8			
Vx-7223-xxx-4-P							
Vx-7224-xxx-4-P	06		7.5	6.5			
Vx-7225-xxx-4-P[e]	07	1 (25)	10.0	8.7	100	130	—
Vx-7253-xxx-4-P							
Vx-7263-xxx-4-P	08		14.0	12			
Vx-7273-xxx-4-P							
Vx-7283-xxx-4-P	09	1¼ (32)	20.0	17	60	100	—
Vx-7213-xxx-4-P	10	1½ (40)	28.0	24	40	70	140
Vx-7215-xxx-4-P[e]							
Vx-7223-xxx-4-P	11	2 (50)	40.0	35	20	40	80
Vx-7225-xxx-4-P[e]							

[a] To determine a specific part number, see "Assembly Ordering" for the relevant part series.

[b] kvs = m^3/h (ΔP = 100 kPa) kvs = Cv / 1.156 Cv = kvs x 1.156

[c] All Vx-72xx leakage ratings are ANSI V to 35psi and ANSI IV above 35psi; with the exception of Vx-7273 and Vx-7283 (ANSI III).

[d] Close-off pressure ratings describe only the differential pressure which the actuator can close-off with adequate seating force. Consult valve body specifications for other limitations. See section 1. VB-7000 Bronze Bodies. The rating value is the pressure difference between the inlet and outlet ports.

[e] Metric thread 15…50 mm (Rp ½ to Rp 2).

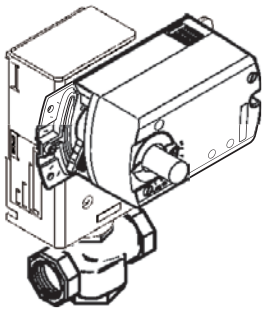
[f] Shown for field assembly. Consult for factory assembly.

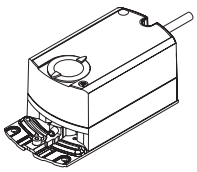
VB-7000 ½"…2" 3-Way Assemblies with NSR Actuators

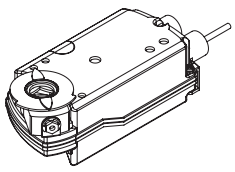
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

Selection Table – 3-Way Linked Globe Valve Assemblies with Non-Spring Return Actuators

3-Way Non-Spring Return Linked Globe Valve Assemblies







Actuator Torque Rating (minimum)		
44 lb-in (5 N-m)	88 lb-in (10 N-m)	133 lb-in (15 N-m)
Actuator Model (Actuator Code)		
Floating MF41-6043 (505) Proportional MS41-6043 (505)	Floating MF41-6083 (506) Proportional MS41-6083 (506)	Floating MF41-6153 (508) Proportional MS41-6153 (508)
Note: Not all factory actuator codes are available.		
Linkage Kit Part Number		
AV-611		

Valve Assembly Part Number[a]	P Code	Valve Size in. (mm)	Cv[b]	kvs[b]	Actuator Close-off Pressure psi[ce]		
Vx-7313-xxx-4-P Vx-7315-xxx-4-P[d]	02	½ (15)	2.2	1.9	225	—	—
	04		4.4	3.8			
	06	¾ (20)	7.5	6.5			
	08	1 (25)	14.0	12.0	100	180	—
	09	1¼ (32)	20.0	17	60	120	—
	10	1½ (40)	28	24	40	75	140
	11	2 (50)	41	36	20	40	80
Vx-7323-xxx-4-P Vx-7325-xxx-4-P[d]	02	½ (15)	2.2	1.9	250	—	—
	04		4.4	3.8			
	06	¾ (20)	7.5	6.5			
	08	1 (25)	15.0	13.0			
	09	1¼ (32)	20.0	17.3			
	10	1½ (40)	28	24.2			
	11	2 (50)	40	34.6			

[a]To determine a specific part number, see "Assembly Ordering" for the relevant part series.

[b] kvs = m^3/h (ΔP = 100 kPa) kvs = Cv / 1.156 Cv = kvs x 1.156

[c]Mixing Valves A port seat leakage ANSI IV, B port seat leakage ANSI III, Diverting Valves seat leakage is ANSI III.[e]Dual actuators are not available as factory assemblies.

[d]Metric thread 15…50 mm (Rp ½ to Rp 2).

[e]Some factory assembly may be available but components may be ordered separately for field assembly.

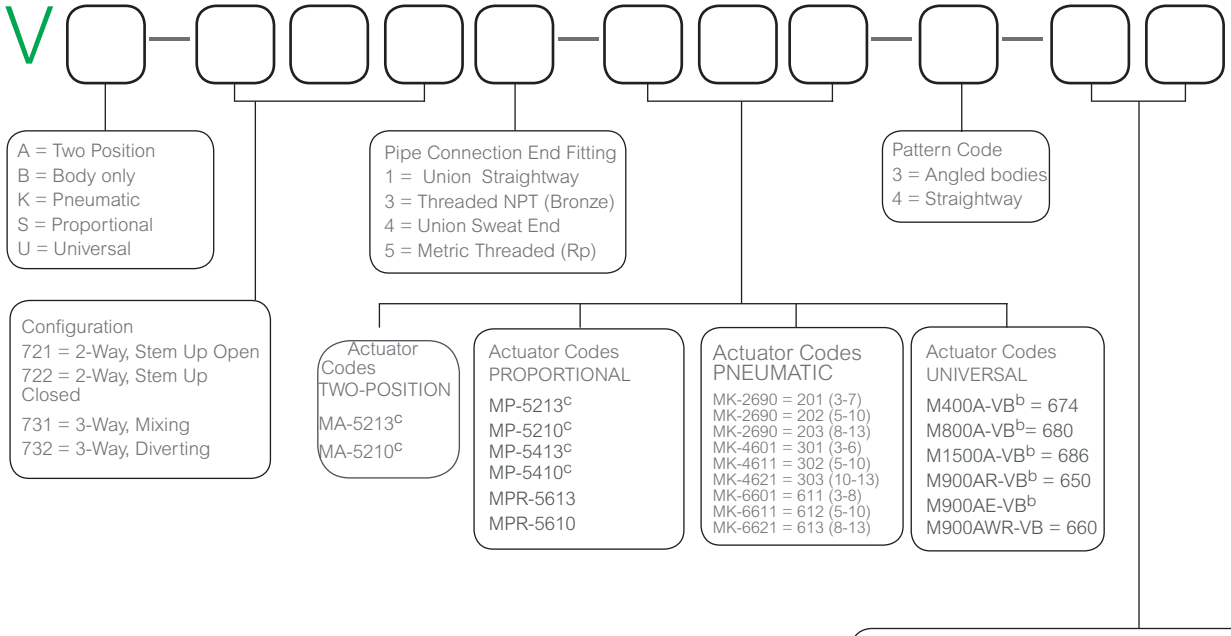
MORE INFO

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/BnGiYc

Assembly Ordering VB-7000 Hydraulic, Pneumatic & Forta

Assembly Ordering VB-7000 Linked Globe Valve
Hydraulic, Pneumatic & Forta



The configuration of the valve assembly determines the valve stem position and flow, as shipped from the factory. See the table below.

Valve Assemblies	Valve Body Action	Factory Shipped Position		Action
		Valve Stem	Flow	
Vx-721x-xxx-4-P	2-Way Stem Up Open	Up	Open	A to AB Flow decreases as actuator rotates CW
Vx-722x-xxx-4-P	2-Way Stem Up Closed	Up	Closed	A to AB Flow increases as actuator rotates CW
Vx-731x-xxx-4-P	3-Way Mixing	Up	Flow B to AB	A to AB Flow increases as actuator rotates CW B to AB Flow decreases as actuator rotates CW
Vx-732x-xxx-4-P	3-Way Diverting	Up	Flow B to AB	B to A Flow increases as actuator rotates CW B to AB Flow decreases as actuator rotates CW

[a]Includes AV-601.

[b]Add -S2 for auxillary switch. Only available as a field assembly.

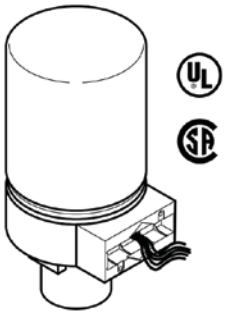
[c]Add -500 for auxillary switch. Only available as a field assembly.

Port Code
Up to 2" (Cv of 41)

Body Size	2-Way		3-Way		
	C_v*	Port Code	C_v Mixing	C_v Diverting	Port Code
½"	0.4	01	–	–	
	1.3	02	2.2	2.2	02
	2.2	03	–	–	
	4.4	04	4.4	4.4	04
¾"	5.5	05	–	–	
	7.5	06	7.5	7.5	06
1"	10.0	07	–	–	
	14.0	08	14.0	15.0	08
1¼"	20	09	20.0	20.0	09
1½"	28	10	28.0	28.0	10
2"	40	11	41.0	40.0	11

*Brass trim models listed.

2-Way Screwed & Union Sweat Valves with SR Hydraulic Actuators



MORE INFO

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/EpcPNP

Select Actuator Type or Actuator Code (xxx) series with correct Input Signal having sufficient close-off for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

Actuator Valve Selection for the Hydraulic Spring Return Actuators

Actuator					MA-521x	MP-5xxx	MPR-561x
Input Signal					2-Position Electric	Vdc	mAdc
Actuator Code (xxx)					a	a	
	Factory Available Valve Assembly	Valve Body	P Code	Size	Close-off Pressure Rating (psi)		
N.O.	VA-7213-2xx-4-P VS-7213-xxx-4-P	VB-7213-0-4-P VB-7214-0-4-P VB-7253-0-4-P VB-7273-0-4-P	-01, -02, -03, -04	½"(15 mm)	130		
			-05, -06	¾" (20 mm)	80		
			-07, -08	1" (25 mm)	40		
			-09	1¼" (32 mm)	25		
			-10	1½" (40 mm)	15		
			-11	2" (40 mm)	10		
N.C.	VA-7223-2xx-4-P VS-7223-xxx-4-P	VB-7223-0-4-P VB-7224-0-4-P VB-7263-0-4-P VB-7283-0-4-P	-01, -02, -03, -04	½"(15 mm)	200	130	
			-05, -06	¾" (20 mm)	130	80	
			-07, -08	1" (25 mm)	50	40	
			-09	1¼" (32 mm)	35	25	
			-10	1½" (40 mm)	35	25	
			-11	2" (40 mm)	20	14	

[a]Hydraulic actuators require AV-7600-1 linkage if field assembled. MP-541x and MPR-561x require AV-601 linkage extension for field assembly.

3-Way Hydraulic Valve/Actuator Close-Off Ratings

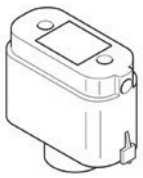
Valve Linkage (½…2" in.)				AV-7600-1a		AV-7600-1	
Input Signal				Electronic Vdc & 4…20 mA		SPDT Floating & 2-Position	
Actuator Code (XXX)				2XX		2XX	
Actuator Type				MP-5X1X-XXXb MPR-561X		MA-521X	
Factory Available Valve Assemblies	Valve Body	P Code	Size (in.)	ACTUATOR CLOSE-OFF PRESSURE RATINGS (psi)[c] [d] [e]			
				SU[f] "A"	SD[f] "B"	SU[f] "A"	SD[f] "B"
VA-7313-XXX-4-P VS-7313-XXX-4-P	VB-7313-0-4-P VB-7314-0-4-P	-02,-04	½	130		200	130
		-06	¾	80		130	80
		-08	1	40		50	40
		-09	1¼	25		35	25
		-10	1½	15		35	25
		-11	2	10		20	14
VA-7323-XXX-4-P VS-7323-XXX-4-P	VB-7323-0-4-P	-04	½	250		250	
		-06	¾	250		250	
		-08	1	250		250	
		-09	1¼	250		250	
		-10	1½	250		250	
		-11	2	250		250	
VF-7313-XXX-4-P	VB-7312-0-4-P VB-7313-0-4-P VB-7314-0-4-P	-02,-04	½ or 5/8	—		200	130
		-06	¾	—		130	80
		-08	1	—		50	40
		-09	1¼	—		35	25
		-10	1½	—		20	15
		-11	2	—		14	10

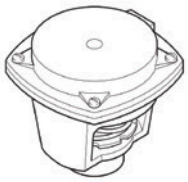
[a]MP-541X, MPR-5XXX use AV-7600-1 or AV-600 and AV-601.
[b]Factory shipments have unpainted large springs. For 0…10 volt and 4…20 mA controllers, use blue and booster springs.
[c]Close-off ratings for mixing or sequencing valves: (SU = "A" port, SD = "B" port). "A" port (SU) ratings equal pressure at port "A" minus pressure at port e"B"; "B" port (SD) ratings equal pressure at port "B" minus pressure at port "A".
[d]Close-off pressure ratings describe only the differential pressure which the actuator can close-off to standards with adequate seating force. Consult valve body specifications for other limitations. See section 1. VB-7000 Bronze Bodies.
[e]Diverting valves may be used in mixing applications with minor affects on flow.
[f]SU— Stem Up; SD—Stem Down. Refer to section 1. for flow pattern, port designations, and normal position.

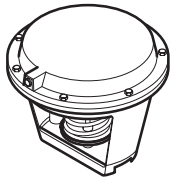
Screwed & Union Sweat Valves with Pneumatic Actuators

2-Way ½"…2" Globe Valves with Pneumatic Actuators

Select Actuator Type or Actuator Code (xxx) series with correct Input Signal having sufficient close-off for the application. If selecting component parts, select Valve Body and Positive Positioner if required.







Effective Area		6 Sq. in.			11 Sq. in.			50 Sq. in.		
Actuator		MK-2690			MK-4601	MK-4611	MK-4621	MK-6601	MK-6611	MK-6621
Factory Actuator Code (xxx)*		201	202	203	301	302	303	611	612	613
Spring Range (psig)		3 to 7	5 to 10	8 to 13	3 to 6	5 to 10	10…13	3 to 8	5 to 10	8 to 13
Linkage		AV-7400			AV-401			AV-430		
Positive Positioner (VK4)		AK-42309-500			AK-42309-500			AK-42309-500		
Factory Available Assembly with Positive Positioner	N.O. Valves	Yes	No	No	Yes	No	No	Yes	No	No
	N.C. Valves	No	No	Yes	No	No	Yes	No	No	Yes

ACTUATOR CLOSE-OFF PRESSURE RATING (psi)

NP	Factory Available Valve Assembly	Valve Body	P Code	Size in.	Supply Air Pressure (psig)						Supply Air Pressure (psig)						Supply Air Pressure (psig)					
					15	20	15	20	15	20	15	20	15	20	15	20	15	20	15	20	15	20
2-Way N.O	VK-7213-xxx-4-P VK4-7213-xxx-4-P VK-7214-xxx-4-P VK4-7214-xxx-4-P	VB-7213-0-4-P VB-7214-0-4-P VB-7253-0-4-P VB-7373-0-4-P	-1-2-3-4	½	130	220	60	170	—	90	250	250	120	250	10	200	—	—	—	—	—	—
			-5-6	¾	80	130	40	120	—	60	180	250	80	180	—	120	—	—	—	—	—	—
			-7-8	1	25	70	15	50	—	25	90	150	35	100	—	65	—	—	—	—	—	—
			-9	1¼	20	40	8	30	—	15	50	90	20	60	—	40	—	—	—	—	—	—
			-10	1½	14	29	5	20	—	9	30	60	10	40	—	25	170	250	110	230	40	160
			-11	2	6	14	—	10	—	—	15	30	—	20	—	—	90	160	60	120	20	90
2-Way N.C.	VK-7223-xxx-4-P VK4-7223-xxx-4-P VK-7224-xxx-4-P VK4-7224-xxx-4-P	VB-7223-0-4-P VB-7224-0-4-P VB-7263-0-4-P VB-7283-0-4-P	-1-2-3-4	½	—		50		130		30		100		250		—		—		—	
			-5-6	¾	—		30		60		20		70		160		—		—		—	
			-7-8	1	—		9		30		5		30		60		—		—		—	
			-9	1¼	—		—		15		—		15		40		—		—		—	
			-10	1½	—		—		10		—		10		35		40		80		170	
			-11	2	—		—		—		—		—		15		20		50		90	

*Not all actuator codes are factory assembled. If the assembly is no longer available but a close-off is shown on the tables above you may order the components that make up the assembly for field assembly. Note: Only bronze bodies listed. VBS-9263-0-4-P stainless steel bodies to -06 size are available with the same close off performance.

3-Way 5/8" Globe Valves with Pneumatic Actuators

Positive Positioner					AK-42309-500							AK-42309-500												
Actuator					MK-2690							MK-4601		MK-4611		MK-4621		MK-4621-422						
Factory Actuator Code (xxx)					201		202		203			301		302		303		313						
Spring Range (psig)					3 to 7		5 to 10		8 to 13			3 to 6		5 to 10		10…13		10…11.25						
Linkage					AV-7400							AV-401				AV-430								
ACTUATOR CLOSE-OFF PRESSURE RATING (psi)[ab]																								
Supply Air Pressure (psig)					15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20
Stem Position[c]					SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD
NP[d]	Valve Assembly	Valve Body	P Code	Size																				
SU[c]	VK-7312-xxx-4-P	VB-7312-0-4-P	-2-4	5/8"	5	100	75	60	50	135	95	5	85	35	250	250	130	220	240	250	30	170	—	—	—
	VK-7332-xxx-4-P	VB-7332-0-4-P	-2-3-4		—	—	—	—	—	—	35	—	35	—	—	—	—	—	—	35	—	35	35	—	35

[a]Close-off ratings for mixing valves: (SU = "A" port, SD = "B" port). The "A" port (SU) ratings equal pressure at Port "A" minus pressure at port "B". The "B" port (SD) ratings equal pressure at port "B" minus pressure at port "A". Close-off ratings in the table are true only when the indicated supply air pressure is applied to the actuator. A change in air pressure at the actuator alters the actual close-off pressure.

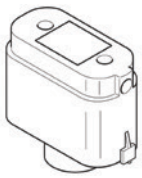
[b]Close-off pressure ratings describe only the differential pressure which the actuator can close off to standards with adequate seating force. Consult valve body specifications limitations in section 1. VB-7000 Threaded Bronze Bodies to 2".

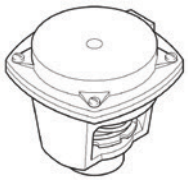
[c]SU – Stem Up (Flow "B" to "AB"); SD – Stem Down (Flow "A" to "AB"); Normal Position Stem Up (Flow "B" to "AB").

[d]NP = Normal Position.

Screwed & Union Sweat Valves with Pneumatic Actuators

3-Way Mixing & DIverting/Sequencing ½"…2" Globe Valves with Pneumatic Actuators





Effective Area				6 Sq. In.									11 Sq. In.								
Valve Linkage				AV-7400									AV-401								
Positive Positioner				AK-42309-500									AK-42309-500								
Factory Assembly with Positive Positioner				No			Yes			Yes			No			Yes			Yes		
Actuator Code (XXX)				201			202			203			301			302			303		
Actuator				MK-2690									MK-4601			MK-4611			MK-4621		
Spring Range (psig)				3 to 7			5 to 10			8 to 13			3 to 6			5 to 10			10…13		
ACTUATOR CLOSE-OFF PRESSURE RATING[abc]																					
Supply Air Pressure (psig)				15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20
Stem Position[d]				SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD
Valve Assembly	**Valve Body**	**P Code**	**Size in.**	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VK-7313-XXX-4-P VK4-7313-XXX-4-P VK-7314-XXX-4-P VK4-7314-XXX-4-P	VB-7313-0-4-P VB-7314-0-4-P	-2-4	½	—	150	150	50	60	170	100	—	90	30	250	250	100	150	250	250	35	200
		-6	¾	—	60	120	30	40	100	60	—	60	20	180	230	70	80	180	160	15	120
		-8	1	—	30	60	9	15	50	30	—	25	5	90	150	30	40	100	60	5	65
		-9	1¼	—	—	—	—	8	30	15	—	15	—	50	90	15	25	60	40	—	40
		-10	1½	—	—	—	—	—	20	10	—	9	—	30	60	10	15	40	35	—	25
		-11	2	—	—	—	—	—	10	—	—	—	—	15	30	—	5	20	15	—	10
VK-7323-XXX-4-P VK4-7323-XXX-4-P	VB-7323-0-4-P	-4	½	—	250																
		-6	¾	—																	
		-8	1	—																	
		-9	1¼	—																	
		-10	1½	—																	
		-11	2	—																	

[a]Close-off ratings for mixing or sequencing valves: (SU = "A", SD = "B" port). "A" port (SU) ratings equal pressure at port "A" minus pressure at port "B". "B" port (SD) ratings equal pressure at port "B" minus pressure at port "A". Close-off ratings in the table are true only when the indicated supply air pressure is applied to the actuator. A change in air pressure at the actuator alters the actual close-off pressure.

[b]Close-off pressure ratings describe only the differential pressure which the actuator can close-off with adequate seating force. Consult valve body specifications for other limitations in section 1. VB-7000 Threaded Bronze Bodies to 2".

[c]Mixing valves are not to be used in diverting applications. Diverting valves may be used in mixing applications with minor affects on flow.

[d]SU— Stem Up; SD— Stem Down. Refer to section 1. for flow pattern, port designations and normal position.

MORE INFO
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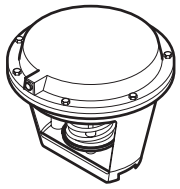
Visit:
http://goo.gl/3ftGOA

Screwed & Union Sweat Valves with Pneumatic Actuators

3-Way Mixing & DIverting/Sequencing 1½" & 2" Globe Valves with Pneumatic Actuators



Effective Area (stroke)				50 Sq. In. (½ In.)							
Valve Linkage VB-7313-0-4-P				AV-430							
Valve Linkage VB-7323-0-X-P				AV-430							
Positive Positioner				AK-42309-500							
Factory Assembly with Positive Positioner				No			Yes			Yes	
Actuator Code (XXX)				611			612			613	
Actuator				MK-6601			MK-6611			MK-6621	
Spring Range (psig)				3 to 8			5 to 10			8 to 13	
				ACTUATOR CLOSE-OFF PRESSURE RATING (psi)[abc]							
Supply Air Pressure (psig)				15/20	15	20	15/20	15	20	15/20	15	20
Stem Position[d]				SU	SD	SD	SU	SD	SD	SU	SD	SD
Valve Assembly	Valve Body	P Code	Size in.	—	—	—	—	—	—	—	—	—
VK-7313-XXX-4-P VK4-7313-XXX-4-P	VB-7313-0-4-P VB-7314-0-4-P	-10	1½	40	170	250	80	110	230	170	30	160
		-11	2	20	90	160	50	60	120	90	15	90
VK-7323-XXX-4-P VK4-7323-XXX-4-P	VB-7323-0-4-P	-10	1½	250	250	250	250	250	250	250	250	250
		-11	2									

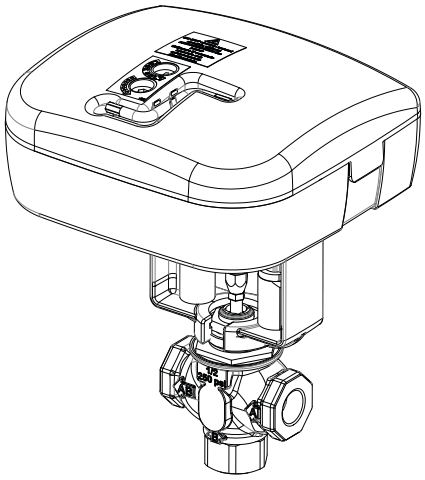
[a]Close-off ratings for mixing or sequencing valves: (SU = "A", SD = "B" port). "A" port (SU) ratings equal pressure at port "A" minus pressure at port "B". "B" port (SD) ratings equal pressure at port "B" minus pressure at port "A". Close-off ratings in the table are true only when the indicated supply air pressure is applied to the actuator. A change in air pressure at the actuator alters the actual close-off pressure.

[b]Close-off pressure ratings describe only the differential pressure which the actuator can close-off to standards with adequate seating force. Consult valve body specifications for other limitations in section 1. VB-7000 Threaded Bronze Bodies to 2".

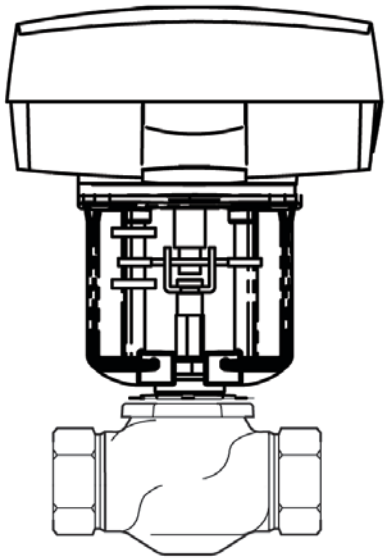
[c] Mixing valve are not to be used in diverting applications. Diverting valves may be used in mixing applications with minor affects on flow.

[d] SU—Stem Up; SD—Stem Down. Refer to section 1. for flow pattern, port designations and normal position.

With Forta M900Axx-VB SR and Non-SR Actuators



Forta M900A-VB Valve Actuator Mounted on a 3-Way VB-7000 Series Valve



Forta Mx00A-VB Valve Actuator Mounted on a 2-Way VB-7000 Series Valve

Applications

Schneider Electric Spring Return and Non-Spring Return Forta M900AxxVB series linear actuators mount directly onto ½"…2" VB-7xxx series and obsolete VB-9xxx ½"…1¼" 2-Way and 3-Way globe valve bodies. Applications include chilled or hot water and steam, NEMA 1 or 2 (M900Axx-VB) or NEMA 4 (M900AxW-VB) models. Field selectable input signals include reverse and direct acting, floating or proportional 0…1 Vdc, 2…10 Vdc or 4…20 mAdc and proportional sequencing input signal ranges.

Applicable Literature

- Schneider Electric Forta M900 Datasheet, F-27682
- Forta M900 Installation Instructions, F-27683
- AV-821 Installation Instructions, F-27701
- CA-28 Control Valve Sizing, F-13755

Valve and Actuator Selection Procedure

1. Determine the required flow coefficient (Cv/kvs).

Using the required flow and pressure drop for the application, determine the required flow coefficient (consult CA28, F-13755 if necessary).

2. Determine valve body part number.

Select a 2-Way valve body from section 1.0 VB-7000 Valve Bodies having the required flow coefficient, size, body pattern, end connection, and temperature/pressure ratings appropriate for the application. Determine the desired loss of power position of the valve (M900AR-VB Spring retract, M900 AE-VB Spring extend).

3. Select the Forta Actuator and appropriate spring-return action.

Using the required close-off pressure for the application and the appropriate spring-return action, consult section 4 and select a Forta actuator having sufficient close-off pressure on the valve body selected in step 2. Additional Forta actuator specifications may be found in section 5 Actuators and Linkages.

4. Determine the Assembly Part Number

If a complete factory valve and actuator assembly is required, consult section 4 for the actuator code of the Forta actuator selected in Step 3. For the complete assembly part number:

- Change the valve body part number prefix from VB to VU.
- Insert the actuator code in the third field of the part number.
- Confirm the factory assembly is available.

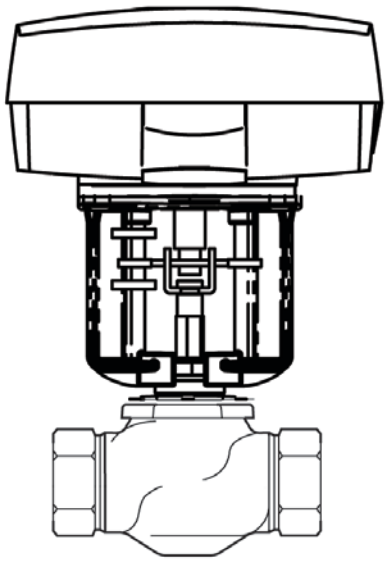
Example

Valve Body: VB-7253-0-4-4
Actuator: M900AR-VB
Complete Assembly: VU-7253-650-4-4

(Note: Not available as a factory assembly, order the valve body and actuator for field assembly.)

Forta actuators are field configured for the desired control signal type and range plus the desired action. Consult the appropriate Forta Installation Instructions for further information (see Applicable Literature).

With Forta M900Axx-VB Non-Spring Return Actuators



Forta Mx00A-VB Valve Actuator Mounted on a 2-Way VB-7000 Series Valve

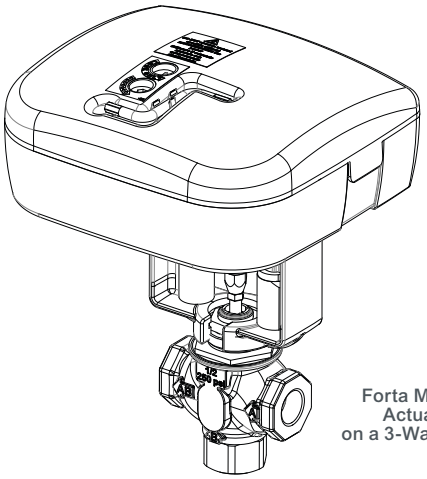
Select a valve/actuator combination having sufficient close off for the application.

Actuator Valve Selection for the Forta Non-Spring Return Actuators

Valve Body[a]			Close-off Ratings, psi (kPa)		
2-Way Valves[bc]	P Code	Size	M400A (VB) 674	M800A (VB) 680	M1500A (VB) 686
VB-7211-0-3-P VB-7211-0-4-P VB-7212-0-4-P VB-7213-0-4-P VB-7214-0-4-P VB-7215-0-4-P VB-7221-0-4-P VB-7222-0-4-P VB-7223-0-4-P VB-7224-0-4-P VB-7225-0-4-P VB-7253-0-4-P VB-7263-0-4-P VB-7273-0-4-P VB-7283-0-4-P	-01, -02, -03, -04	½"(15 mm)	250 (1712)	250 (1712)	—
	-05, -06	¾" (20 mm)	198 (1356)	250 (1712)	—
	-07, -08	1" (25 mm)	92 (630)	207 (1418)	—
	-09	1¼" (32 mm)	56 (384)	130 (890)	—
	-10	1½" (40 mm)	37 (253)	88 (603)	177 (1212)
	-11	2" (40 mm)	19 (130)	48 (329)	98 (671)
3-Way Valves[b]	P Code	Size	M400A (VB)	M800A (VB)	M1500A
VB-7312-0-4-P VB-7313-0-4-P VB-7314-0-4-P VB-7315-0-4-P	-02, -04	½"(15 mm)	250 (1712)	250 (1712)	—
	-06	¾" (20 mm)	198 (1356)	250 (1712)	—
	-08	1" (25 mm)	92 (630)	207 (1418)	—
	-09	1¼" (32 mm)	56 (384)	130 (890)	—
	-10	1½" (40 mm)	37 (253)	88 (603)	—
	-11	2" (40 mm)	19 (130)	48 (329)	—
VB-7323-0-4-P	-04, -06, -08, -09, -10, -11	½"…2"	250 (1712)		Do not use

[a]Not all bodies are available for all port codes.
[b]Substitute VU- for VB- and add the actuator code to substitute for the -0- (i.e., 674, 680, etc.).
[c]Not all valve styles are available in all sizes or "P" codes.

With Forta M900Axx-VB Spring Return Actuators



Forta M900A-VB Valve Actuator Mounted on a 3-Way VB-7000 Series Valve

Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

Select VB-7xxx Valve/ M900Axx(-VB)[a] Spring Return Actuator Having Sufficient Close-off for the Application

Valve Body[ac]	Valve Action	P-Code	Size	Close-off Ratings PSI M900Axx[b]
VB-7211-0-3-P VB-7211-0-4-P VB-7212-0-4-P VB-7214-0-4-P VB-7213-0-4-P VB-7215-0-4-P VB-7253-0-4-P VB-7273-0-4-P	Stem up Open	1, 2, 3, 4	½"	250
		5, 6	¾"	250
		7, 8	1"	180
		9	1 1/4"	110
		10	1 ½"	75
		11	2"	40
VB-7221-0-4-P VB-7222-0-4-P VB-7224-0-4-P VB-7223-0-4-P VB-7225-0-4-P VB-7263-0-4-P VB-7283-0-4-P	Stem up Closed	1, 2, 3, 4	½"	250
		5, 6	¾"	250
		7, 8	1"	180
		9	1 1/4"	110
		10	1 ½"	75
		11	2"	40
VB-7312-0-4-P VB-7313-0-4-P VB-7314-0-4-P VB-7315-0-4-P	3 Way Mixing	2, 4	½"	250
		6	¾"	250
		8	1"	180
		9	1 1/4"	110
		10	1 ½"	75
		11	2"	40
VB-7323-0-4-P VB-7325-0-4-P	3 Way Diverting	4	½"	250
		6	¾"	250
		8	1"	250
		9	1 1/4"	250
		10	1 ½"	250
		11	2"	250
VBS-9263-0-4-P	Stem Up Closed	1, 2, 3, 4	½"	250
		5, 6	¾"	250

[a] Substitute VU- for VB- and add the actuator code 650 (M900AR-VB) or 660 (M900ARW-VB) to substitute for the -0-
[b] M900Axx-VB or M900Axx Styles
[c] Not all valve styles are available in all sizes or "P" codes.

5. VB-7000 Globe Valves Actuators and Linkages

NSR Forta M4xx, M8xx and M15xx A-VB Actuators

Schneider Electric NSR Forta Actuator Model Table									
Model	Actuator Code	Force, lbf (N)	Power	Running VA	Transformer Sizing VA	Floating Control[a]	Proportional Control[a]	Feedback	(2) SPDT Auxiliary Switches
M400A-VB	674	90 (400)	24 Vac ±10% 50/60 Hz, or 20…29 Vdc	6	30d	Yes	0…1 Vdc, 2…10 Vdc, or 4…20 mAdc with 500 ohm resistor	2…10 Vdc	No
M400A-S2-VB	-b								24 Vac, 4a res
M800A-VB	680	180 (800)		15	50d				No
M800A-S2-VB	-b								24 Vac, 4a res
M1500A-VB[c]	686	337 (1500)		24	50d				No
M1500A-S2-VB[c]	-b								24 Vac, 4a res

[a]DIP switch selectable.

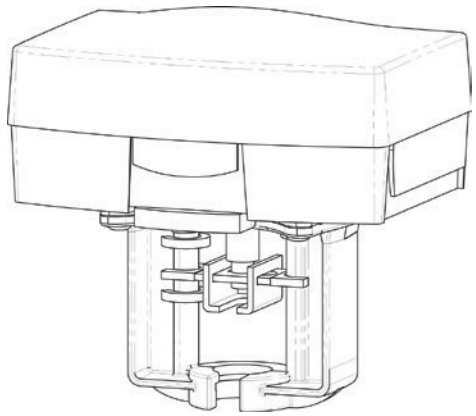
[b]No actuator code. No factory assemblies offered.

[c]Do not use M1500 actuators on VB-7323 3-Way diverting valves.

[d]M400/800 DC Power 20W, M1500 Dc Power 30W.

Restrictions on Ambient Temperature for Forta Valve Actuators	
Fluid Temperature in Valve Body	Maximum Allowable Ambient Temperature[a]
Chilled Water	122°F (50°C)
281°F (138°C)	113°F (45°C)
300°F (149°C)	107°F (42°C)
340°F (171°C)	100°F (38°C)

NSR Forta M4xx, M8xx and M15xx A-VB Actuators



Screw Mount Style Forta

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Application

Forta M400A (VB) / M800A (VB) /M1500A (VB) series Non-Spring Return linear actuators are available in two styles. The U-Bolt Mount style mounts to Schneider Electric globe valves with AV-821 linkage kits for mounting to VB-7xxx valves. The Screw Mount style screws directly to the bonnet nut on VB-7xxx valves (no adapter required).
Applications include chilled or hot water and steam. Field-selectable input signals include reverse and direct-acting, Floating or Proportional 0…10, 2- 10 vdc or 4…20 ma with a 500 ohm resistor (supplied) plus proportional sequencing input signal ranges.

Benefits

- Two Mounting Styles, U-Bolt Mx00A or Screw Mx00A-VB
- Floating configuration - controlled by a SPDT floating controller
- Proportional configuration - 0…10, 2…10 vdc or 4…20 mA with the addition of a 500 ohm resistor (included)
- Direct/Reverse action switch selectable
- 90 lbf (400N) linear force
- 180 lbf (800N) linear force
- 337 lbf (1500N) linear force
- 24 Vac or 24 Vdc Powered
- Die-cast housing with plenum-rated plastic cover for NEMA 2 (IP54 vertical mount only) applications
- Manual override to allow positioning of valve
- Electronic valve sequencing and electronic flow curve (equal percentage or Linear) selection.
- Torque overload protection throughout stroke
- Easy “One Touch” input signal/stroke calibration

Applicable Literature

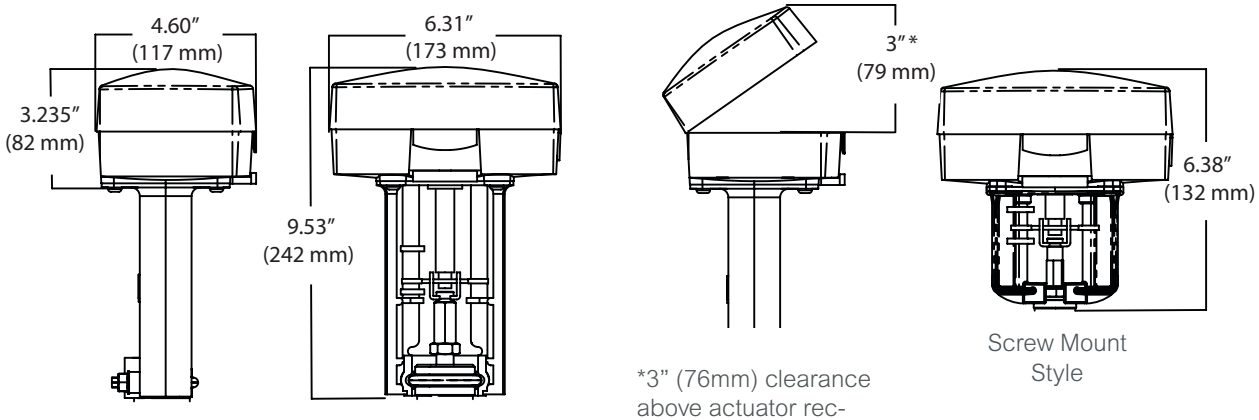
- Schneider Electric Forta M400A (VB) Series, M800A (VB) Series, and M1500A (VB) Series Installation Instructions, (F-27599)
- Forta/VB-7xxx Selection Guide, F-27490
- Forta/VB-8xxx, VB-9xxx Selection Guide, F-27491
- AV-800 Series Linkage Adapters for Competitors Valves, F-27470
- AV-821 Linkage VB-7xxx, F-27701- U-Bolt Style Only
- AV-822 Linkage VB-8xxx, VB-9xxx, F-27702 U-Bolt Style Only
- CA-28 Control Valve Sizing, F-13755

Specifications						
Screw Mount Style	**M400A-VB**	**M400A-S2-VB**	**M800A-VB**	**M800A-S2-VB**	**M1500A-VB**	**M1500A-S2-VB**
AC Power	24 Vac +- 10% 50-60 Hz					
DC Power	20 - 29 Vdc 20 W				20 - 29 Vdc 30 W	
Running VA	6		15		24	
Transformer Size VA	30		50		50	
Floating Control	Yes					
Proportional Control	0…10 Vdc, 2…10 Vdc or 4…20mA with 500 ohm resistor					
Feedback	2…10 Vdc					
Force	90 lbf (400 N)		180 lbf (800 N)		337 lbf (1500 N)	
Auxiliary Switch	None	2SPDT	None	2SPDT	None	2SPDT

NSR Forta M4xx, M8xx and M15xx A-VB Actuators

Specifications (Cont.)	
	Stroke
M800-VB, M1500-VB	Screw Mount Style >3/8"…1 7/8" (9…48mm)
M400-VB	Screw Mount Style >3/8"…1 1/4" (9…48mm)
Stroke Timing	Floating: 60 or 300 sec selectable, Proportional: 15 sec @½" stroke
Feedback AO	2…10 Vdc
Power Supply Type	Half Wave
Motor Type	Brushless DC
Enclosure	NEMA 2 (IP 54, vertical mount only) with both conduit connectors used. NEMA 1 IP40 with one connector used.
Sound Power Level	Maximum 32 dba
Ambient Temperature Storage	-13 °F…149 °F (-25…65 °C) ambient
Ambient Temperature Operational	122 °F (50 °C) For chilled water applications 113 °F (45°C) ambient at 281 °F (138°C) fluid temperature 107 °F (42 °C) ambient at 300 °F (149 °C) fluid temperature 100 °F (38 °C) ambient at 340 °F (171°C) fluid temperature 90°F (32°C) ambient at 366 °F (186 °C) fluid temperature
Minimum Operating Temperature	14 °…150 ° F
Ambient Humidity	15…95 % RH non-condensing
Housing Material	Die-Cast Aluminum

Dimensions

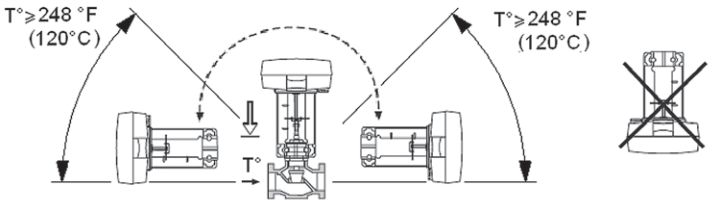


*3" (76mm) clearance above actuator recommended to remove actuator

Screw Mount Style

Mounting

The actuator may be mounted horizontally, vertically and in any position in between, but not upside down. **Please note that to maintain NEMA 2 (IP54) rating the actuator must be mounted vertically.**



Life Is On Schneider Electric

With Forta M900Axx-VB Spring Return Actuators

Spring Return Forta Factory Assemblies Model Table

Model	Act Code	Force	Power	Running Watts	Transformer Size	Floating Control[a]	Proportional Control[b]	Feedback Voltage[a]	(2) SPDT Aux Switchesc	Spring Return Action
M900AR-VB	650	157 lbf (700 N)	24 Vac 50/60 Hz 20–30 Vdc 1.5 A	21	50 Va	Yes	0…1 Vdc, 2…10 Vdc, 4…20 Ma	2…10 Vdc or 0-5 Vdc	No	Retract
M900ARW-VB	660									

aDip switch selectable.
b0-5, 2-6 or 5 -10, 6 -10 also selectable by dip switch.
cS2 auxiliary switches may be added in the field order 880 0104 000.
NOTE: Suffix W= NEMA 4 Weather

Spring Return Forta Actuators for Field Assembly

Model	Mounting Kit Required	Force	Power	Running Watts	Transformer Size	Floating Control[a]	Proportional Control[b]	Feedback Voltage[a]	(2) SPDT Aux Switchesc	Spring Return Action
M900AR	AV-821	157 lbf (700 N)	24 Vac 50/60 Hz 20–30 Vdc 1.5 A	21	50 Va	Yes	0…10 Vdc, 2…10 Vdc, 4…20 Ma	2…10 Vdc or 0-5 Vdc	No	Retract
M900AE										Extend
M900AR-VB	None									Retract
M900ARW	AV-821									
M900ARW-VB	None									
M900ARW-S2	AV-821								Yes	Retract
M900AEW-S2										Extend

a Dip switch selectable.
b0-5, 2-6 or 5 -10, 6 -10 also selectable by dip switch.
c S2 auxiliary switches may be added in the field. Order 880 0104 000.
NOTE: Suffix W= NEMA 4 Weather

Ambient Temperature Restrictions for Forta Valve Actuators

Fluid Temperature in Valve Body	Maximum Allowable Ambient Temperature[a]
Chilled Water	122°F (50°C)
281°F (138°C)	113°F (45°C)
300°F (149°C)	107°F (42°C)
340°F (171°C)	100°F (38°C)
366°F (186°C)	90°F (32°C)

[a]Minimum allowable ambient operating temperature 14°F (-10°C).

Note: When installing valve and actuator assemblies, observe the minimum and maximum fluid and ambient temperature limits shown .

Spring Return Actuators

Mx51-7103 Series SmartX Actuator
(Code 804)
24 Vac
105 lb (467 N)

Specifications	
Connection	3 ft. (0.9 m) Plenum cable
Housing	Polymer, NEMA 2
Dimensions	6-5/16 x 6¾ x 3½ (160 x 170 x 90 mm)
Position Indicator	Visual indicator
Override	Manual
Control Signal	MA51-7103-100 MF51-7103-100 MS51-7103-100: 2…10 Vdc MS51-7103-120: 0 - 3 Vdc MS51-7103-130: 6 - 9 Vdc MS51-7103-140: 6 - 9 Vdc MS51-7103-150: 0 - 10 Vdc MS51-7103-160: 4 - 20 mAdc The control signal is factory set for direct action. It can be field-adjusted for reverse action.
Voltage	24 Vac ± 20%, 20-30 Vdc
VA@60 HZ	MA51-7103-100: 5.3 MF51-7103-100: 6.9 MS51-7103-100: 6.6
Watts @ 60 Hz	4.7
Auxiliary Switch	None
Timing (seconds)	Powered <60 Spring return <15
Feedback	For voltage ranges, feedback & input signal ranges are the same. 4…20 mA input range has a 2…10 Vdc position feedback signal. MS51-7103-140 has no feedback output. MF51-7103-100 has a 2…10Vdc output.
General Instructions	F-27169

MA51-7100 Series SmartX Actuator

120 Vac
105 lb (467 N)

Specifications	
Connection	3 ft. (0.9 m) Plenum cable
Housing	Polymer, NEMA 2
Dimensions	6-5/16 x 6¾ x 3½ (160 x 170 x 90 mm)
Position Indicator	Visual indicator
Override	Manual
Control Signal	MA51-7100: 2-position SPST
Voltage	120 Vac ± 10%
VA@60 HZ	7.9
Watts @ 60 Hz	6.2
Auxiliary Switch	None
Timing (seconds)	Powered approx. 44 Spring return approx. 19
Feedback	None
General Instructions	F-27169

MORE INFO
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Spring Return Actuators

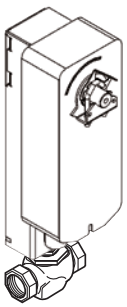
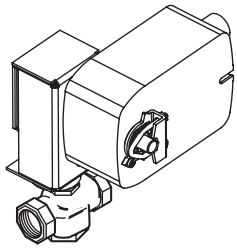
Mx51-7203 Series SmartX Actuator
24 Vac
220 lb (979 N)

Specifications	
Connection	3 ft. (0.9 m) Plenum cable
Housing	Aluminum die-cast, NEMA 1
Dimensions	7 x 10-5/8 x 2-9/16 (178 x 270 x 65 mm)
Position Indicator	Visual indicator
Override	Manual
Control Signal	MA51-7203: 2-position SPST MF51-7203: Floating MS51-7203: 2…10 Vdc MS51-7203-40: 6-9 Vdc MS51-7203-50: 0…10 Vdc The control signal is factory set for direct action. It can be field-adjusted for reverse action.
Voltage	24 Vac ± 20%, 22-30 Vdc
VA@60 HZ	9.7
Watts @ 60 Hz	MA51-7203: 7.5 MF51-7203: 7.1 MS51-7203: 7.5
Auxiliary Switch	None
Timing (seconds)	Powered <100 Spring return <35
Feedback	MA51 & MF51: None MS51: 2…10 Vdc only The MS51-7203-40 does not have a feedback output.
General Instructions	F-27120

MA51-7200 Series SmartX Actuator
120 Vac
220 lb (979 N)

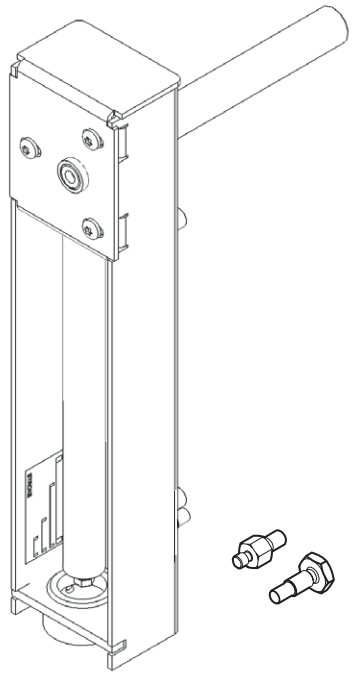
Specifications	
Connection	3 ft. (0.9 m) Plenum cable
Housing	Aluminum die-cast, NEMA 1
Dimensions	7 x 10-5/8 x 2-9/16 (178 x 270 x 65 mm)
Position Indicator	Visual indicator
Override	Manual
Control Signal	MA51-7200: 2-position SPST
Voltage	120 Vac ± 10%
VA@60 HZ	MA51-7200: 10
Watts @ 60 Hz	MA51-7200: 6.2
Auxiliary Switch	None
Timing (seconds)	Powered <100 Spring return <35
General Instructions	F-27120

½"…2" SmartX Linked SR Assembly Specifications

Specifications – ½"…2" Vx-7xxx-5xx-4-P Series Linked Globe Valve Assemblies			
		2-Way	3-Way
Linked Globe Valve Assemblies		½" through 2" Valve Assemblies 	½" through 2" Valve Assemblies 
Applications		Chilled or Hot Water, or Steam	Chilled or Hot Water
Type of End Fitting		NPT, Rp Screwed Union Straightway (up to 1¼")	NPT, Rp Screwed
Size		Vx-7xxx-5xx-4-P ½" through 2" (15 mm through 50 mm)	
Action		Stem Up Open or Stem Up Closed	Mixing or Diverting
Valve Assembly Series[a]		Vx-72xx-5xx-4-P	Vx-73xx-5xx-4-P
Flow Type		Modified Equal Percentageb	Modified Linearb
Valve Body Materials	Body	Bronze	
	Seat	Bronze	
	Stem	316 Stainless Steel	
	Plug	Brass	
	Packing	Spring-loaded TFE & EPDM	
Linkage Materials	Part Number	AV-602	AV-611
	Housing	Corrosion-Resistant Steel	
	Rack & Pinion	Steel	
ANSI Pressure Class		250 psig up to 400 psig below 150 °F (66 °C)c	
Pressure Class (VB-7xx5)		PN16	
Rangeability		See Bodies in section 1.	500:1
Seat Leakage			ANSI Class III (0.1%)
STEAM			
Inlet Pressure — Maximum		35 psig (241 kPa)	—
Fluid Temperature — Maximum		See VB-7000 Bodies section 1.	—
Allowable Differential Pressure[d]		35 psi (241 kPa)	—
WATER			
Fluid Temperature — Minimum		½" through 2" 20 °F (-7 °C)	
Fluid Temperature — Maximum		½" through 2" 281 °F (138 °C)	
Allowable Differential Pressure[d]		87 psi (600 kPa) Max. for Normal Lifespan (refer to "Cavitation Limitations on Valve Pressure Drop" in section 2.)	

[a]To determine a specific part number, see "Assembly Ordering" for the relevant part series.
[b]For a detailed description of the flow, see the sections for Sizing Selection and Piping.
[c]Do not apply the above pressure rating to the piping system.
[d]Maximum recommended differential pressure. Do not exceed the recommended differential pressure (pressure drop) or the integrity of valve parts may be affected. Exceeding the maximum recommended differential pressure voids the product warranty.

AV-602 Linkage



AV-602 Globe Valve Linkage

Application

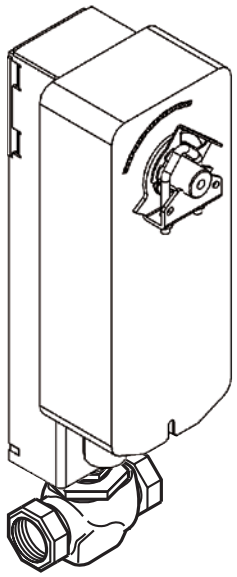
The AV-602 links Schneider Electric rotary actuators to 1"…2" VB-7xxx globe valves.

Actuator/Valve Combinations		
Actuator	**Factory - Assembled Valve Sizes 2-Way & 3-Way**	**Field-Assembled to VB Valve Bodies 2-Way & 3-Way**
Mx41-707x Mx41-715x Mx40-717x	1½…2" 1½…2" 1½…2"	1…2"

Specifications

Motor mounting: In any upright position with the motor above center the line of the valve body.

Actuator/Valve Combinations		
Actuator	**Globe Valve**	**SR**
Mx40-717x	1½…2"	SR (Spring Return)
Mx41-707x	1…2"	SR (Spring Return)
Mx41-715x	1¼" to 2"	



Typical Actuator/Linkage Mounting

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Mx4x-7xxx Series Spring Return Actuators

Mx4x-7xxx Series Spring Return Actuators

Part Numbers	Power Input								SPDT Auxiliary Switches	Approximate Timing in Seconds @ 70°F (21 °C) with No Load		Actuator Output Torque Rating lb.-in. (N-m)	Manual Override	Linkage Part Numbers
	Voltage 50/60 Hz	Running					Holding			Powered	Spring Return			
		50 Hz		60 Hz		DC Amps	50 Hz	60 Hz						
		VA	W	VA	W		W	W						
MA40-7043	24 Vac ± 20% 22-30 Vdc	4.4	2.9	4.4	2.9	0.11	0.8	0.8	No	<50	<26	35 (4)	No	AV-611
MA40-7043-501									One[a]				No	
MA40-7040	120 Vac ± 10%	6.4	3.8	4.3	3.4	—	1.6	1.2	No	<50	<26		No	
MA40-7040-501									One[a]				No	
MA40-7041	230 Vac ± 10%	5.8	4.1	4.6	3.9	—	1.5	1.2	No	<50	<26		No	
MA40-7041-501									One[a]				No	
MF40-7043[b]	24 Vac ± 20% 22-30 Vdc	5.9	4.4	5.9	4.4	0.17	2.9	2.9	No	<130	<25		No	
MF40-7043-501[b]									One[a]				No	
MS40-7043[b]	24 Vac ± 20% 22-30 Vdc	5.6	4.2	5.6	4.2	0.15	2.4	2.4	No				No	
MS40-7043-501[b]									One[a]				No	
MS40-7043	24 Vac ± 20% 22-30 Vdc	6.6	5.0	6.6	5.0	0.17	3.2	3.2	No				No	
MS40-7043-MP5									One[a]				No	
MA41-7073	24 Vac ± 20% 22-30 Vdc	4.8	3.2	4.8	3.2	0.13	0.8	0.8	No	<80	<40	60 (7)	Yes	AV-602
MA41-7073-502									Two[c]				Yes	
MA41-7070	120 Vac ± 10%	10.7	4.2	5.6	3.6	—	2.0	1.2	No				Yes	
MA41-7070-502									Two[c]				Yes	
MA41-7071	230 Vac ± 10%	17.0	5.1	8.0	4.0	—	2.7	1.4	No				Yes	
MA41-7071-502									Two[c]				Yes	
MF41-7073	24 Vac ± 20% 22-30 Vdc	6.2	4.8	6.2	4.8	0.18	2.8	2.8	No	<195	<30		Yes	
MF41-7073-502									Two[c]				Yes	
MS41-7073	24 Vac ± 20% 22-30 Vdc	5.8	4.6	5.8	4.6	0.17	2.3	2.3	No	<195	<30		Yes	
MS41-7073-502									Two[c]				Yes	
MA41-7153	24 Vac ± 20% 22-30 Vdc	9.8	7.5	9.7	7.5	0.29	2.8	2.8	No	<190	<30	133 (15)	Yes	
MA41-7153-502									Two[c]				Yes	
MA41-7150	120 Vac ± 10%	11.7	8.8	10.0	8.4	—	3.6	5.0	No				Yes	
MA41-7150-502									Two[c]				Yes	

[a]One switch adjustable from 15° to 95° rotation.

[b]With plenum rated cable.

[c]One switch fixed at 5° and one switch adjustable 25° to 85°.

Mx4x-7xxx Series Spring Return Actuators (cont.)

Part Numbers	Power Input								SPDT Auxiliary Switches	Approximate Timing in Seconds @ 70°F (21 °C) with No Load		Actuator Output Torque Rating lb.-in. (N-m)	Manual Override	Linkage Part Numbers
	Voltage 50/60 Hz	Running					Holding			Powered	Spring Return			
		50 Hz		60 Hz		DC Amps	50 Hz	60 Hz						
		VA	W	VA	W		W	W						
MA41-7151	230 Vac ± 10%	15.5	9.5	10.6	8.5	—	4.6	3.3	No	<190	<30	133 (15)	Yes	AV-602
MA41-7151-502									Twoc				Yes	
MF41-7153	24 Vac ± 20% 22-30 Vdc	9.8	7.7	9.7	7.7	0.30	3.3	3.3	No				Yes	
MF41-7153-502									Twoc				Yes	
MS41-7153	24 Vac ± 20% 22-30 Vdc	9.8	7.4	9.7	7.4	0.28	2.9	2.9	No				Yes	
MS41-7153-502									Twoc				Yes	

[a]One switch, adjustable from 15° to 95° rotation (0 to 1 scale).
[b]With plenum-rated cable.
[c]One switch, adjustable from 25° to 85° rotation and one set to operate @ 5° fixed.

Auxiliary Switch Ratings

	Mx41-715x-502 / Mx41-707x-502	Mx40-7043-501	Mx40-7040-501
AC Rating	7 A resistive @ 250 Vac	6 A resistive @ 24 Vac	6 A resistive @ 250 Vac
DC Rating	12 to 30 Vdc, DC 2 A		

Mx40-717x Series Spring Return Actuators

Part Numbers	Power Input @ 50/60 Hz				SPDT Auxiliary Switches	Approximate Timing in Seconds @ 70 °F (21 °C) with No Load		Actuator Output Torque Rating lb.-in. (N-m)	Linkage Part Numbers
	Voltage	VA		Running Watts		Powered	Spring Return		
		Running	Holding						
MA40-7173	24 Vac ± 20% 22-30 Vdc	7.4	5.1	5.3	No	162	72	150 (17)	AV-602
		5.0	3.0	5.0	No				
MA40-7170	120 Vac ± 10%	8.4	6.6	6.2	No				
MA40-7171	240 Vac ± 10%	9.8	8.5	6.5	No				
MF40-7173	24 Vac ± 20% 22-30 Vdc	8.1	5.3	5.8	No				
		5.7	3.6	5.7	No				
MS40-7173	24 Vac ± 20% 22-30 Vdc	7.8	4.7	5.5	No	147	65		
		5.6	2.5	5.0	No				
MS40-7170	120 Vac ± 10%	8.5	5.2	6.4	No				
MS40-7171	240 Vac ± 10%	10.8	9.0	7.2	No				

MX40-7043 Series
SmartX Actuator
24 Vac
35 lb-in (4 Nm)

Spring Return Actuator

Specifications

Connection	3 ft. (0.9 m) cable, ½ in. conduit connectors
Rotation	CW or CCW spring return using reverse mounting
Control Action	Direct/reverse signal selection MS40- only
Shaft Size	5/8 in. (15.9 mm) diameter, ½ in. (13 mm) square
Housing	NEMA 2 (IEC IP54) with conduit connector in the down position
Dimensions	6-51/64 x 4 x 3½ in. (68 x 100 x 89 mm)
Overload Protection	Throughout rotation
Angle of Rotation	95° nominal (adjustable 40…95°)
Position Indicator	Visual indicator
Built-In Auxiliary Switch	1-SPDT 6A on MA40-7043-501, MF40-7043-501, MS40-7043-501
Override	No manual override
Linkages	AV-611
General Instructions	MA40-7043: F-26642, MF40-7043: F-26644, MS40-7043: F-26645
Agency Certifications	EMC DIrective (89/336/EEC). Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No. 24-93. Australia RCM

Electrical Specifications

Part Number	Actuator Inputs			Outputs		Approx. Timing in Seconds		Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	Spring Return	
MA40-7043	2-Position	24 Vac ± 20% 22-30 Vdc	4.4	None	No	<50	<26	4.3 (1.9)
MA40-7043-501					One			
MF40-7043	Floating		5.9		No	<130	<25	
MF40-7043-501					One			
MS40-7043	Proportional 2…10 Vdc 4…20 mAa		5.6	2…10 Vdc	No			
MS40-7043-501					One			

Application
The AM-708 500 ohm resistor converts a 4…20 mA signal to a 2…10 Vdc signal.
Specifications
- Actuators: MS40-7043, MS41-7073, MS41-7153, MS40-717x, MS41-6083, MS41-6153 and MS41-6343.
- Wire leads.

AM-708
500 Ohm
Resistor

Mx40-704x SR Actuator Specifications

Mx40-704x Spring Return Actuator Specifications

Inputs

Control Signal

MA40-704x – ON/OFF SPST control contacts or Triacs (500 mA rated)
MS40-7043 – Proportional, 2…10Vdc or 4…20 mAdc with 500 Ω resistor.
MS40-7043-MP/-MP5 – Proportional 6…9 Vdc.
MF40-7043 – Floating point control, 24 Vac.

Power Requirements

All 24 Vac circuits are Class 2.

Part Number[a]	Voltage 50/60 Hz	Running				Holding	
		50 Hz		60 Hz		50 Hz	60 Hz
		VA	W	VA	W	W	W
MA40-7043	24 Vac ± 20%	4.4	2.9	4.4	2.9	0.8	0.8
MS40-7043	24 Vac ± 20%	5.6	4.2	5.6	4.2	2.4	2.4
MF40-7043	24 Vac ± 20%	5.9	4.4	5.9	4.4	2.9	2.9
MS40-7043-MP	24 Vac ± 20%	6.9	5.0	6.6	5.0	3.2	3.2
MS40-7043-MP5	24 Vac ± 20%						
MA40-7040	120 Vac ± 10%	6.4	3.8	4.3	3.4	1.6	1.2
MA40-7041	230 Vac ± 10%	5.8	4.1	4.6	3.9	1.5	1.2

[a]See Auxiliary Switches under Electrical below.

Connections

MA40-704x and MA40-704x-501 – 3 ft. (0.9 m) long, appliance cables, ½" conduit connector. For M20 Metric conduit, use AM-756 adapter.
MF40-7043 and MF40-7043-501, MS40-7043 and MS40-7043-501 – 3 ft. (0.9 m) long, plenum rated cables, ½" conduit connector. For M20 Metric conduit, use AM-756 adapter.

Motor Type

MA40-704x – Brush.
MF40-7043, MS40-7043 – Brushless DC.

Outputs

Electrical

Auxiliary Switches: One auxiliary switch available with Mx40-7043-501 and MS40-7043-MP5, SPDT 6A resistive @ 24 Vac, adjustable 0…95° (0 to 1 scale). Switch meets VDE requirements for 6 (1.5)A, 24 Vac. One auxiliary switch available with MA40-7040-501 or MA40-7041-501, SPDT 6A resistive @ 250 Vac, adjustable 0…95° (0 to 1 scale). Switch meets VDE requirements for 6 (1.5)A, 250 Vac.
Position Feedback Voltage "AO" (MS40- model only): 2…10 Vdc (maximum 0.7 mA) output signal for position feedback or operation of up to four slave actuators.
Control Mode: Switch provided for selection of direct acting or reverse acting control mode on proportional models.
Timing: MA40-704x - Approx. 50 sec. MF40- and MS40-7043 - Approx. 130 sec.
Auxiliary Power Supply: MS40-7043-MP and MS40-7043-MP5 – +20 Vdc @ 25 mA (max.)

Mechanical

Stroke: Angle of rotation is limited to a maximum of 95°, with mechanical stop.
Output torque rating: Mx40-704x—35 lb-in (4 N-m)
Position indicator: Visual indicator with a scale numbered from 0…90°, provided for position indication.

Environment

Temperature Limits

Shipping and storage: -40…160 °F (-40…71 °C) ambient.
Operating: -22…140 °F (-30…60 °C).

Humidity

5…95% RH, non-condensing

Location

NEMA Type 2 (IEC IP54)

Mx41-7073 SmartX Actuator Specifications

Mx41-7073 Series SmartX Actuator
24 Vac 60 lb-in

Spring Return Actuator

Specifications	
Torque	60 lb-in (7 Nm) minimum
Connection	3 ft. (0.9 m) cable, ½ in. conduit connectors
Rotation	CW or CCW spring return using reverse mounting
Control Action	Direct/reverse signal selection (MS41- only)
Shaft Size	¾ in. (19 mm) diameter, ½ in. (13 mm) square
Housing	NEMA 1, NEMA 2 (IEC IP54) with conduit connector in the down position
Dimensions	10½ x 4 x 3½ in. (287 x 100 x 89 mm)
Overload Protection	Throughout rotation
Angle of Rotation	93° nominal
Position Indicator	Pointer and scale
Built-In Auxiliary Switch	2-SPDT 7A on MA41-7073-502, MF41-7073-502, MS41-7073-502 only
Override	Manual
Motor Type	All brushless DC except MA41-7073-brush
Linkages	AV-602
General Instructions	MA41-7073: F-26642, MF41-7073: F-26644, MS41-7073: F-26645
Agency Certifications	UL-873. EMC DIrective (89/336/EEC). Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No. 24-93. Australia RCM

Electrical Specifications

Part Number	Actuator Inputs			Outputs		Approx. Timing in Seconds		Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	Spring Return	
MA41-7073	2-Position	24 Vac ± 20% 22-30 Vdc	4.8	None	No	<80	<40	6.8 (3.1)
MA41-7073-502					Two			7.0 (3.2)
MF41-7073	Floating 24 Vac		6.2		No	<195	<30	6.5 (2.9)
MF41-7073-502					Two			7.0 (3.2)
MS41-7073	2…10 Vdc 4…20 mAdca		5.8	2…10 Vdc	No			6.5 (2.9)
MS41-7073-502					Two			7.0 (3.2)

Application
The AM-708 500 ohm resistor converts a 4…20 mA signal to a 2…10 Vdc signal.
Specifications
- Actuators: MS40-7043, MS41-7073, MS41-7153, MS40-717x, MS41-6083, MS41-6153 and MS41-6343.
- Wire leads.

AM-708
500 Ohm Resistor

Mx41-707x & Mx41-715x SR Actuator Specifications

Mx41-7xxx Series
Smart X Electric Actuator
133/60 lb.-in.

Mx41-707x & Mx41-715x Spring Return Actuator Specifications

Inputs

Control Signal

MA41-707x, MA41-715x – ON/OFF SPST control contacts or Triacs (500 mA rated).
MF41-7073, MF41-7153 – Floating point control, 24 Vac.
MS41-7073, MS41-7153 – Proportional, 2…10 Vdc or 4…20 mAdc with 500 Ω resistor.

Power Requirements

All 24 Vac circuits are Class 2.

Part Number	Voltage 50/60 Hz	Running				Holding	
		50 Hz		60 Hz		50 Hz	60 Hz
		VA	W	VA	W	W	W
MA41-7153-xxx	24 Vac ± 20%	9.8	7.5	9.7	7.5	2.8	2.8
MS41-7153-xxx	24 Vac ± 20%	9.8	7.4	9.7	7.4	2.9	2.9
MF41-7153-xxx	24 Vac ± 20%	9.8	7.7	9.7	7.7	3.3	3.3
MA41-7150-xxx	120 Vac ± 10%	11.7	8.8	10.0	8.4	3.6	5.0
MA41-7151-xxx	230 Vac ± 10%	15.5	9.5	10.6	8.5	4.6	3.3
MA41-7073-xxx	24 Vac ± 20%	4.8	3.2	4.8	3.2	0.8	0.8
MS41-7073-xxx	24 Vac ± 20%	5.8	4.6	5.8	4.6	2.3	2.3
MF41-7073-xxx	24 Vac ± 20%	6.2	4.8	6.2	4.8	2.8	2.8
MA41-7070-xxx	120 Vac ± 10%	10.7	4.2	5.6	3.6	2.0	1.2
MA41-7071-xxx	230 Vac ± 10%	17.0	5.1	8.0	4.0	2.7	1.4

Connections

3 ft. (0.9 m) long, appliance cable, ½" conduit connectors. For M20 metric conduit, use AM-756 adapter.

Motor Type

MA41-707x – Brush.
MA41-715x, MF41-7073, MF41-7153, MS41-7073, MS41-7153 – Brushless DC.

Outputs

Electrical

Auxiliary Switches: Two auxiliary switches available with Mx41-715x-502, and Mx41-707x-502, SPDT 7A resistive @ 24 Vac, one fixed @ 5° and one adjustable 25…85°. Switches meet VDE requirements for 7 (2.5)A, 24 Vac.
Position Feedback Voltage "AO" (MS41- model only): 2…10 Vdc (maximum 0.5 mA) output signal for position feedback or operation of up to four slave actuators.
Control Mode: Switch provided for selection of direct acting or reverse acting control mode on proportional models.
Timing: MA41-707x - Approx. 80 sec.
MF41 and MS41-7073 - Approx. 195 sec.
Mx41-715x - Approx. 190 sec.

Mechanical

Stroke: Angle of rotation is limited to a maximum of 95°, with mechanical stop.
Output torque rating: Mx41-707x—60 lb-in (7 N-m). Mx41-715x—133 lb in (15 N-m).
Position indicator: Visual indicator with a scale numbered from 0…90°, provided for position indication.
Manual override: Rotation is adjustable from -5°…85° by using manual override crank.

Environment

Temperature Limits

Shipping and storage: -40…160 °F (-40…71 °C) ambient.
Operating: -22…140 °F (-30…60 °C).

Humidity

5…95% RH, non-condensing

Location

NEMA Type 2 (IEC IP54) with conduit connector in the down position.

Mx40-717x SmartX Actuator Specifications

Mx40-717x Series SmartX Actuator
150 lb-in (17 Nm)

Spring Return Actuator

Specifications	
Connection	2 ft. (61 cm) Applicance cable, ½ in. conduit connectors
Rotation	CW or CCW spring return using reverse mounting
Shaft Size	Standard: 3/8 to ½ in. (10…13 mm) round or square Optional: 1.05 in. (25.1 mm) diameter, 5/8 in. (15.9 mm) square
Housing	NEMA 1, NEMA 4 (IEC IP56) with customer-supplied water-tight connector
Dimensions	10-7/8 x 4 x 4 in. (276 x 100 x 100 mm)
Overload Protection	Throughout rotation
Angle of Rotation	93° nominal
Position Indicator	Visual indicator
Built-In Auxiliary Switches	None
Override	None
Motor Type	Brushless DC
Linkages	AV-602
General Instructions	MA40-717x: F-26742, MF40-7173: F-26749, MS40-717x: F-26748
Agency Certifications	UL-873. EMC DIrective (89/336/EEC). Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No. 24-93. Australia RCM

Electrical Specifications

Part Number	Actuator Inputs			Outputs		Approx. Timing in Seconds		Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	Spring Return	
MA40-7170	2-Position	120 Vac ± 10%	11.4	None	No	<162		10.5 (4.8)
MA40-7173		24 Vac ± 20%	9.6					
MF40-7173	Floating		10.0					
MS40-7170[a]	2…10 Vdc 4…20 mAb	120 Vac ± 10%	11.1					
MS40-7173	2…10 Vdc	24 Vac ± 20%	9.4					

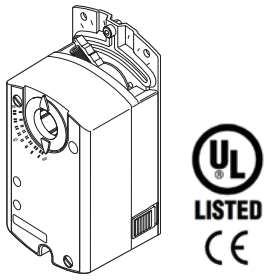
[a]The CE directive is not applicable to this model.
[b]With the addition of a 500 ohm resistor.

Application
The AM-708 500 ohm resistor converts a 4…20 mA signal to a 2…10 Vdc signal.
Specifications
- Actuators: MS40-7043, MS41-7073, MS41-7153, MS40-717x, MS41-6083, MS41-6153 and MS41-6343.
- Wire leads.

AM-708
500 Ohm Resistor

Mx41-6043 SmartX Actuator Specifications

Mx41-6043 Series SmartX Actuator
24 Vac 44 lb-in (5 Nm)



Non-Spring Return Actuator

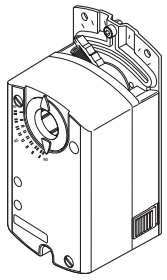
Specifications	
Connection	3 ft. (0.9 m) 18 AWG leads, Plenum rated
Rotation	90° CW or CCW field selectable
Shaft Size	3/8 …5/8 in. (10…15.9 mm) diameter, 1/4 to ½ in. (6.4 to 13 mm) square, 9/16 in. (14.3 mm) hex
Housing	NEMA 2, (IP54 to EN60529) with conduit in the down position
Dimensions	5-7/16 x 2¾ x 3-3/8 in. (140 x 70 x 60 mm)
Overload Protection	Throughout rotation
Angle of Rotation	90° nominal (field-adjustable to limit travel on either end of stroke)
Position Indicator	Adjustable pointer
Built-In Auxiliary Switches	(Use MF41-6083-502 and MS41-6083-502 models with auxiliary switches.)
Operating Temperature Limits	-25 to 130°F (-32…55°C)
Override	Manual
Linkages	AV-611
General Instructions	MF41-6043: F-27213, MS41-6043: F-27214
Agency Certifications	UL-873. EMC DIrective (89/336/EEC). Emissions (EN50081-1). Immunity (EN50082-2). UL tested for Canadian Standards C22.2 No. 24-93.

Electrical Specifications

Part Number	Actuator Inputs			Outputs	Approximate Timing in Seconds	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Powered	
MF41-6043	Floating	24 Vac +20% -15%	2.3	None	<90	1.06 (0.5)
MS41-6043	0…10 Vdc			0…10 Vdc		

Mx41-6083 SmartX Actuator Specifications

Mx41-6083 Series SmartX Actuator
24 Vac 88 lb-in (5 Nm)



Non-Spring Return Actuator

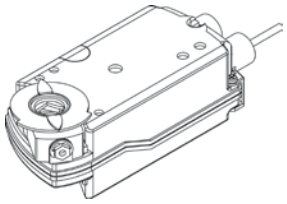
Specifications	
Connection	3 ft. (0.9 m) 18 AWG leads, Plenum rated
Rotation	90° CW or CCW field selectable
Shaft Size	3/8…5/8 in. (10…15.9 mm) diameter, 1/4 to ½ in. (6.4 to 13 mm) square, 9/16 in. (14.3 mm) hex
Housing	NEMA 2, (IP54 to EN60529) with conduit in the down position
Dimensions	5-7/16 x 2¾ x 3-3/8 in. (140 x 70 x 60 mm)
Overload Protection	Throughout rotation
Angle of Rotation	90° nominal (field-adjustable to limit travel on either end of stroke)
Position Indicator	Adjustable pointer
Built-In Auxiliary Switches	Two SPDT on MF41-6083-502, MS41-6083-522, MS41-6083-502 only
Operating Temperature Limits	-25 to 130°F (-32…55°C)
Override	Manual
Linkages	AV-611
General Instructions	MF41-6083: F-27213, MS41-6083: F-27214
Agency Certifications	UL-873. EMC DIrective (89/336/EEC). Emissions (EN50081-1). Immunity (EN50082-2). UL tested for Canadian Standards C22.2 No. 24-93.

Electrical Specifications

Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	
MF41-6083	Floating	24 Vac +20% -15%	2.3	None	No	<125	1.06 (0.5)
MF41-6083-510				0…1000 ohms	No		
MF41-6083-502				None	Two		
MS41-6083	0…10 Vdc		3.3	0…10 Vdc	No		
MS41-6083-520	0…10 Vdc adjustable				No		
MS41-6083-522					Two		
MS41-6083-502	0…10 Vdc				Two		

Mx41-6153 SmartX Actuator Specifications

Mx41-6153 Series SmartX Actuator
24 Vac 133 lb-in (15 Nm)



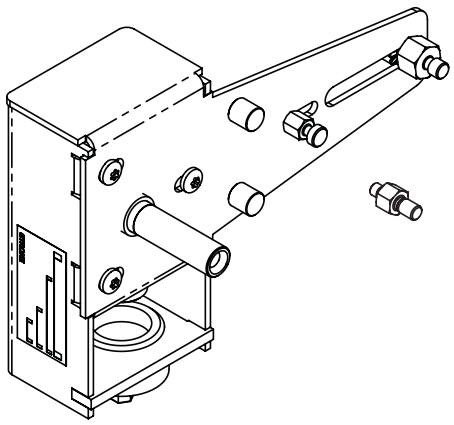
Non-Spring Return Actuator

Specifications	
Connection	3 ft. (0.9 m) 18 AWG leads
Rotation	CW or CCW through reverse mounting
Shaft Size	3/8 to ¾ in. (6.4 to 19 mm) diameter, 1/4 to ½ in. (6.4 to 13 mm) square
Housing	NEMA 1, (IP54 to EN60529)
Dimensions	8-3/8 x 3¼ x 2-2/3 in. (210 x 80 x 70 mm)
Overload Protection	Throughout rotation
Angle of Rotation	90° nominal (field-adjustable to limit travel on either end of stroke)
Position Indicator	Adjustable pointer
Built-In Auxiliary Switches	Two SPDT on MS41-6153-502 only
Operating Temperature Limits	-25 to 130°F (-32…55°C)
Override	Manual
Linkages	AV-611
General Instructions	F-27215
Agency Certifications	UL-873. EMC DIrective (89/336/EEC). Emissions (EN50081-1). Immunity (EN61000-6-2). UL tested for Canadian Standards C22.2 No. 24-93.

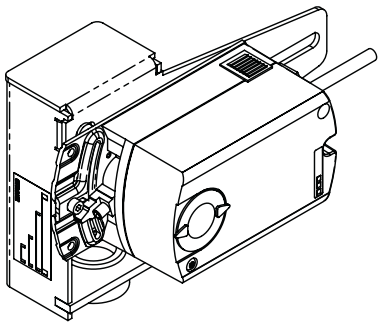
Electrical Specifications

Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	
MF41-6153	Floating	24 Vac +20% -15%	3.0	None	No	<125 (60 Hz)	2.2 (1)
MS41-6153	0…10 Vdc			0…10 Vdc			
MS41-6153-502					2		

AV-611 Linkage



AV-611 SmartX Actuator
Globe Valve Linkage



Typical Actuator Mounting

Application

The AV-611 linkage connects SmartX Actuator Mx-60x3 or 6153 non-spring return and Mx40-704x spring return actuators (listed below) to ½" through 2" VB-7xxx and ½" through 1¼" discontinued VB-9xxx 2-Way and 3-Way globe valves.

Actuators		
Actuator	Descriptions	Size
MF41-6043	Floating 35 lb-in non-spring return	½"…2"
MS41-6043	Proportional 35 lb-in non-spring return	
MF41-6083	Floating 70 lb-in non-spring return	1"…2"
MS41-6083	Proportional 70 lb-in non-spring return	
MF41-6153	Floating 133 lb-in non-spring return	1½"…2"
MS41-6153	Proportional 133 lb-in non-spring return	
MA40-704x	Two-position 35 lb-in spring return	½"…2"
MF40-7043	Floating 35 lb-in spring return	
MS40-7043	Proportional 35 lb-in spring return	

Note: The AV-611 linkage is also compatible with the actuators above with the auxiliary switch option (-5xx in the third part number field).

Applicable Literature

- Mx41-6043, Mx41-6083 Series non-spring return actuator General Instructions, F-27213.
- Mx41-6153 Series Non-spring return actuator General Instructions, F-27215.
- MA40-704x, MA4x-707x, MA4x-715x Series spring return actuator General Instructions, F-26642.
- MF40-7043, MF4x-707x, MF4x-715x Series spring return actuator General Instructions.
- Vx-7000 & Vx-9000 Series Mx41-6xxx & Mx4x-7xxx Series Linked Globe Valve Assemblies Selection Guide, F-26752.

NSR Actuators and Linkage Kits for Field Mounting

Non-Spring Return Actuators

Part Numbers	Power Input @ 50/60 Hz				SPDT Auxiliary Switches	Approximate Timing in Seconds @ 70 °F (21 °C) with No Load	Actuator Output Torque Rating lb.-in. (N-m)	Linkage Part Numbers
	Voltage	VA		Watts				
		Running	Holding					
MF41-6043[ad]	24 Vac +20/-15%	2.3	—	2.0	No	90 @ 60 Hz 108 @ 50 Hz	35 (4)	AV-611
MS41-6043[d]	24 Vac +20/-15%	3.3	1.2	3.0	No			
MF41-6083[d]	24 Vac +20/-15%b	2.3	—	2.0	No	125 @ 60 Hz	70 (8)	
MS41-6083[d]	24 Vac +20/-15%b	3.3	1.2	3.0	No			
MF41-6153	24 Vac +20/-15%c	3.0	—	3.0	No	150 @ 50 Hz	133 (15)	
MS41-6153	24 Vac +20/-15%c	5.0	1.2	4.0	No			

[a]With plenum-rated cable.

[b]Minimum voltage at high temperatures: 24 Vac, +20%, -10% at 90…130 °F ambient.

[c]Minimum voltage at high temperatures: 24 Vac, +20%, -5% (MF models) and 24 Vac, +20%, -10% (MS models) at 85 to 130 °F ambient.

[d]Add -502 for auxiliary switch.

Linkage Kits for Field Mounting Globe Valve Actuators

Linkage Kit[a]	Actuator	Factory-Assembled Valve Sizes 2-Way & 3-Way	Field-Assembled to VB Valve Bodies 2-Way & 3-Way
AV-611	Mx41-6043 Mx41-6083	½"…2" 1"…2"	½"…2"
	Mx41-6153	1½"…2"	

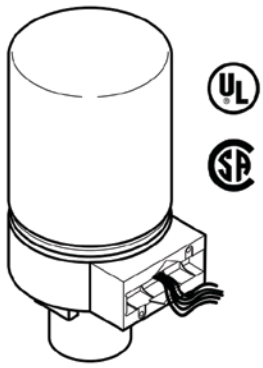
[a]Refer to linkage pages for complete details.

MORE INFO

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/H4Lr0t

MA-52xx Electronic Hydraulic Two-Position SR Actuators



MA-52xx Spring Return Series

Application

These MA-52xx Series actuators are used for two-position control of valves which require a return to the normal position upon power interruption.

Features

- Two-position actuators controlled by an SPST controller
- Spring return
- 24 Vac and 120 Vac models are available
- An actuator with the part number suffix “-500” has a built-in, adjustable, SPDT auxiliary switch
- Die cast lower housing with ½” conduit opening and painted steel upper housing
- Hydraulic actuator with oil-immersed motor and pump

Model Table

Part Number	Actuator Power Input					10 Amps Aux Switch	Timing in Seconds @ 72° F (22° C)	
	AC Voltage +10 -15%	60 Hz		50 Hz			To Extend (No Load Stroke)	Retract on Power Loss
		Watts	Amps	Watts	Amps			
MA-5210	120	5.4	0.14	6.0	0.17	No	60	15
MA-5210-500						Yes		
MA-5213	24	8.8	0.65	9.8	0.80	No		
MA-5213-500						Yes		

Specifications

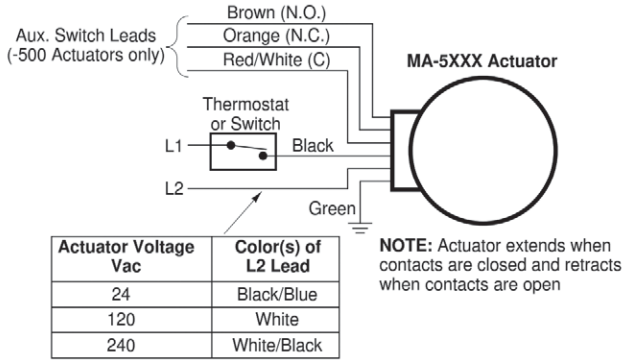
Inputs	
Control Circuit	Two-wire, SPDT
Power Input	Refer to Model Table
Connections	Color-coded 4 ft. (1.2 m) leads.
Outputs	
Electrical	Auxiliary Switch (MA-5xxx-500 models), 10 Amps, 120 Vac adjustable SPDT, factory set to close the N.C. contact at the retracted end of stroke.
Mechanical	Stroke, Valve: Approximately 9/16” (14.3 mm) from fully retracted to fully extended
Environment	
Temperature Limits	Shipping & Storage, -40…140° F (-40…61° C) Operating, -20…140° F (-29 to 60° C) Operating, Damper -20…140° F (-29 to 60° C) Operating, Valve: Refer to Restrictions on Maximum Allowable Ambient Air Temperature for Valve Actuators table (next page).
Humidity	5…95% RH, non-condensing
Location	NEMA Type 1
Dimensions	6¾ x 3-23/32 x 3¼ Dia. in. (171 x 94 x 83 mm)

MA-52xx Electronic Hydraulic Two-Position SR Actuators

Restrictions on Maximum Allowable Ambient Air Temperature for Valve Actuators		
Temperature of Media in the Valve Body (Check the Rating of the Valve) °F (°C)	Maximum Ambient Temperature of MA-521x Series	
	AV-7600-1 (Only) °F (°C)	AV-7600-1 and AV-601 °F (°C)
366 (180)	90 (32)	90 (32)
340 (171)	100 (38)	100 (38)
281 (138)	115 (46)	140 (60)a
181 (83)	140 (60)a	140 (60)a
80 (26)	140 (60)a	140 (60)a

[a]Maximum ambient temperature of the actuator must never exceed 140° F (60° C).

Accessories	
Valve Linkages	
AV-601	Valve linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Valve linkage ½"…2" to be used with VB-7xxx.
Tools	
TOOL-19	Spring-compression tool for AV-7600.



Actuator Voltage Vac	Color(s) of L2 Lead
24	Black/Blue
120	White
240	White/Black

Typical Wiring for MA-5xxx Series Actuators

Application

The AV-7600-1 valve linkage kit is used to field assemble MA-521x, MP-521x, MP-541x and MP-561x round hydraulic actuators to ½" through 2" VB-7xxx series valve bodies.

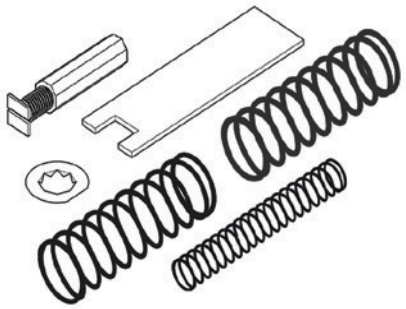
Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies.
- Kit fits all VB-7xxx series valve bodies.
- Includes spring choices for higher 2-Way valve close off.

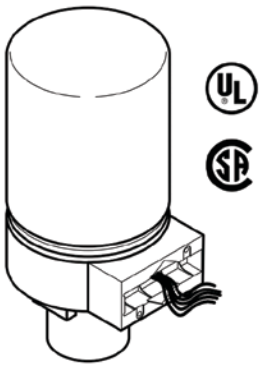
Specifications

- Actuator mounting: In any upright position above the center line of the valve body. For steam applications only, mount the actuator above the valve body at 45° from vertical.

AV-7600-1
Hydraulic Actuator Valve Linkage Kit



MP-52xx Electronic Hydraulic Proportional SR Actuators



MP-52xx Proportional SR Series

Application

These MP-52xx Series actuators provide electronic proportional control of valves requiring the return to normal position upon power interruption.

Features

- Compatibility with 2 to 15 Vdc System 8000 input signals.
- Proportional control by variable Vdc input signal.
- Spring return
- Fixed 3 Vdc operating span.
- Non-adjustable start point and non-positive positioning. Typically, one actuator is controlled from one Vdc output signal.
- 10,000 Ω or greater input impedance.
- 24, 120 and 240 Vac models.
- Die cast lower housing with ½ in. (12.7 mm) conduit opening and painted steel upper housing.
- Hydraulic actuator with oil-immersed motor, transducer, and pump.

Model Table

Part Number	Actuator Power Input					10 Amps Auxiliary Switcha	Timing in Seconds @ 72° F (22° C)			Required Linkage
	AC Voltage ± 10%	60 Hz		50 Hz			To Extend (No Load Stroke)	To Retract	Retract on Power Loss	
		Watts	Amps	Watts	Amps					
MP-5210	120	11.7	0.16	12.9	0.19	No	60	40	15	AV-7600-1 AV-601b
MP-5210-500						Yes				
MP-5213	24	12.0	0.80	13.2	0.97	No				
MP-5213-500						Yes				

[a] Common of switch is in series with AC power supply to the motor. Therefore, the switch must be wired to control the same voltage as the actuator itself.

[b] May be required for steam or hot water. See General Instructions.

Specifications

Inputs	
Compatible with	2 to 15 Vdc from System 8000 controllers Operating Span: Approx. 3 Vdc fixed. See F-26235-2 for valves. Impedance: 10,000 Ω or greater.
Power Input	Refer to Model Table.
Connections	Color-coded 4 ft. (1.2 m) leads.
Outputs	
Electrical	Auxiliary Switch (Mx-52xx-500 models), 10 Amps, 120/240 Vac adjustable SPDT, factory set to close the N.C. contact at the retracted end of stroke.
Mechanical	Stroke, Valve: Approximately 9/16" (14.3 mm) over a nominal 6 Vdc (fully retracted) to 9 Vdc (fully extended).
Environment	
Temperature Limits	Shipping & Storage, -40…140° F (-40…61° C) For valve actuators: Refer to "Valve" section.
Humidity	5…95% RH, non-condensing
Location	NEMA Type 1
Dimensions	6¾ x 3¼ Dia. in. (171 x 83 mm)

MP-52xx Electronic Hydraulic Proportional SR Actuators

Restrictions on the Maximum Ambient Temperature for Valve Actuator				
Maximum Temperature of Media in the Valve Body (Check Valve Ratings)	Maximum Ambient Temperature of MP-541x or MPR-5x1x		Maximum Ambient Temperature of MA-521x or MP-521x	
	AV-600a or AV-7600b Only for Chilled Water Applications Only	AV-600a or AV-7600b & AV-601	AV-600a or AV-7600b Only	AV-600a or AV-7600b & AV-601
366°F (180°C)	Do Not Use	88°F (31°C)	90°F (32°C)	90°F (32°C)
340°F (171°C)	Do Not Use	93°F (34°C)	100°F (38°C)	100°F (38°C)
281°F (138°C)	Do Not Use	103°F (39°C)	115°F (46°C)	140°F (60°C)c
181°F (83°C)	Do Not Use	120°F (48°C)	140°F (60°C)c	140°F (60°C)c
80°F (26°C)	140°F (60°C)c	140°F (60°C)c	140°F (60°C)c	140°F (60°C)c

[a]For detailed valve linkage installation instructions, refer to AV-600 Hydraulic Actuator Valve Linkage Kit General Instructions, F-26279.

[b]For detailed valve linkage installation instructions, refer to AV-7600 Hydraulic Actuator Valve Linkage Kit General Instructions, F-26235.

[c]Maximum allowable ambient temperature of the actuator.

Accessories	
Valve Linkages	
AV-601	Valve linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Valve linkage for VB-7xxx.
Tools	
TOOL-19	Spring-compression tool for AV-7600.

Application

The AV-7600-1 valve linkage kit is used to field assemble MA-521x, MP-521x, MP-541x and MP-561x round hydraulic actuators to ½" through 2" VB-7xxx series valve bodies.

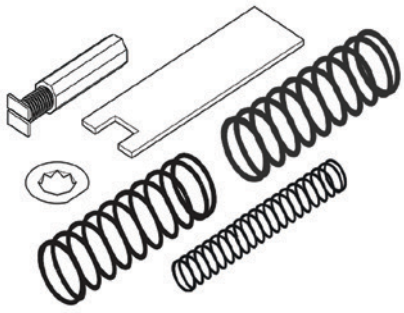
Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies.
- Kit fits all VB-7xxx series valve bodies.
- Includes spring choices for higher 2-Way valve close off.

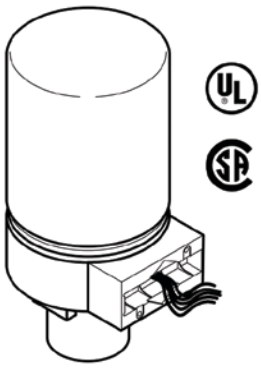
Specifications

- Actuator mounting: In any upright position above the center line of the valve body. For steam applications only, mount the actuator above the valve body at 45° from vertical.

AV-7600-1
Hydraulic Actuator Valve Linkage Kit



MP-541x Electronic Hydraulic Proportional SR Actuators



MP-541x Series Positive Positioning

Application

These MP-54xx Series actuators provide electronic proportional control of valves requiring the return to normal position upon power interruption.

Features

- Proportional control by variable Vdc input signal.
- Compatibility with 2 to 15 Vdc System 8000 input signals.
- Spring return.
- Fixed 3 Vdc operating span.
- Adjustable 2…12 Vdc start point for paralleling or sequencing of actuators.
- 10,000 Ω or greater input impedance.
- 24, 120 and 240 Vac models.
- Damper models with linkage or base models that require separate damper or valve linkage.
- Die cast lower housing with ½ in. conduit opening and painted steel upper housing.
- Hydraulic actuator with oil immersed motor, transducer, and pump.

Model Table

Part Number	Actuator Power Input					Positive Positioner[a]	Timing in Seconds @ 72° F (22° C)			Linkage
	AC Voltage +10% -15%	60 Hz		50 Hz			No Load Stroke		Retract on Power Loss	
		Watts	Amps	Watts	Amps		To Extend	To Retract		
MP-5410	120	11.7	0.16	12.9	0.19	Yes	60	40	15	AV-600 AV-601[b] AV-7600-1
MP-5413	24	12.0	0.80	13.2	0.97					

[a] Internal feedback circuitry provides positive positioning of valve stem in relation to control signal.
[b] May be required for steam or hot water. See General Instructions.

Specifications

Inputs	Compatible with 2 to 15 Vdc from System 8000 controllers
Operating Span	Approx. 3 Vdc fixed.
Start Point	Adjustable 2…12 Vdc. Factory set at 6 Vdc. Impedance: 10,000 Ω or greater.
Connections	Color-coded 4 ft. (1.2 m) leads.
Outputs	
Electrical	Internal Power Supply: 20 Vdc, 25 mA.
Mechanical	Stroke, Valve: Approximately 9/16" (14.3 mm) over a nominal 6 Vdc (fully retracted) to 9 Vdc (fully extended) input range.
Environment	
Ambient Temperature Limits	Operating: -20…140° F (-29 to 60° C) For valve actuators: Refer to "Valve" section.
Humidity	5…95% RH, non-condensing
Location	NEMA Type 1
Dimensions	6¾ x 3¼ Dia. in. (171 x 83 mm)

MP-541x Electronic Hydraulic Proportional SR Actuators

Restrictions on the Maximum Ambient Temperature for Valve Actuator				
Maximum Temperature of Media in the Valve Body (Check Valve Ratings)	Maximum Ambient Temperature of MP-541x or MPR-5x1x		Maximum Ambient Temperature of MA-521x or MP-521x	
	AV-600a or AV-7600b Only for Chilled Water Applications Only	AV-600a or AV-7600b & AV-601	AV-600a or AV-7600b Only	AV-600a or AV-7600b & AV-601
366°F (180°C)	Do Not Use	88°F (31°C)	90°F (32°C)	90°F (32°C)
340°F (171°C)	Do Not Use	93°F (34°C)	100°F (38°C)	100°F (38°C)
281°F (138°C)	Do Not Use	103°F (39°C)	115°F (46°C)	140°F (60°C)[c]
181°F (83°C)	Do Not Use	120°F (48°C)	140°F (60°C)[c]	140°F (60°C)[c]
80°F (26°C)	140°F (60°C)[c]	140°F (60°C)[c]	140°F (60°C)[c]	140°F (60°C)[c]

[a]For detailed valve linkage installation instructions, refer to AV-600 Hydraulic Actuator Valve Linkage Kit General Instructions, F-26279.

[b]For detailed valve linkage installation instructions, refer to AV-7600 Hydraulic Actuator Valve Linkage Kit General Instructions, F-26235.

[c]Maximum allowable ambient temperature of the actuator.

Accessories	
Valve Linkages	
AV-601	Valve linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Valve linkage for VB-7xxx.
Tools	
TOOL-19	Spring-compression tool for AV-7600.

Application

The AV-7600-1 valve linkage kit is used to field assemble MA-521x, MP-521x, MP-541x and MP-561x round hydraulic actuators to ½" through 2" VB-7xxx series valve bodies.

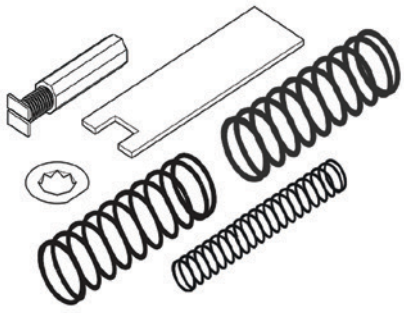
Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies.
- Kit fits all VB-7xxx series valve bodies.
- Includes spring choices for higher 2-Way valve close off.

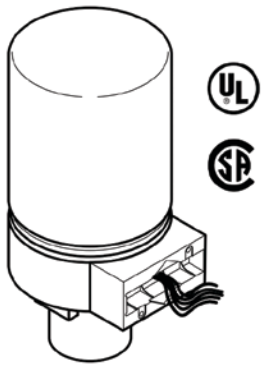
Specifications

- Actuator mounting: In any upright position above the center line of the valve body. For steam applications only, mount the actuator above the valve body at 45° from vertical.

AV-7600-1
Hydraulic Actuator Valve Linkage Kit



MPR-561x SR Hydraulic Proportional SR Actuators



MPR-561x Series Proportional

Application

These MPR-561x Series actuators provide electronic proportional control of valves requiring return to normal position upon power interruption. They are compatible with controllers generating 4…20 mA input signals.

Features

- Spring return.
- 24 and 120 Vac models available.
- Die cast lower housing with ½ in. conduit opening and painted steel upper housing.
- Hydraulic actuator with oil-immersed motor, transducer, and pump.
- Proportional actuators controlled by a variable mAdc input signal.
- 82.5 Ω input impedance.
- Adjustable actuator startpoint.

Model Table

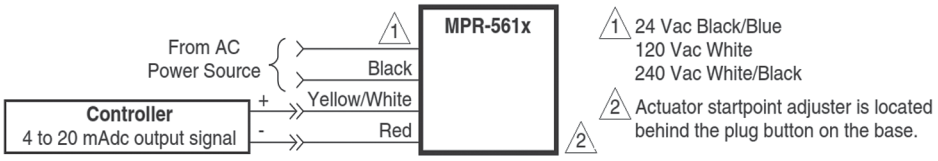
Part Number	Actuator Power Input					Input Signal	Timing in Seconds @ 72° F (22° C) No load stroke		Linkage
	AC Voltage ±10%	60 Hz		50 Hz			Extend	Retract	
		Watts	Amps	Watts	Amps				
MPR-5610	120	11.7	0.16	12.9	0.19	4…20 mA	60	30	AV-600
MPR-5613	24	12.0	0.80	13.2	0.97				AV-601[a]

[a]May be required for steam or hot water. See General Instructions.

Specifications

Inputs	
Control Circuit	MPR-561x Series: Two-wire.
Input Impedance	82.5 Ω for 4…20 mA input.
Power Input	Refer to Model Table
Connections	Color-coded 4 ft. (1.2 m) leads.
Outputs	
Electrical	Position signals: Internal feedback circuitry provides positive positioning of the valve in relation to the controller signal. Startpoint adjustment: Adjustable potentiometer provides manual adjustment of the actuator startpoint.
Mechanical	Stroke, Valve: Approximately 9/16” (14.3 mm) from fully retracted to fully extended. Proportional output torque rating of 15 lb-in (1.7 N-m), available throughout the entire stroke, based on the lowest force available under normal operation, the spring return stroke, or at a minimum (-10%) supply voltage.
Environment	
Temperature Limits	Shipping & Storage: -40…140° F (-40…60° C) Operating: -20…140° F (-29…60° C) Operating, Valve: Refer to “Valve” section in this catalog.
Humidity	5…95% RH, non-condensing
Location	NEMA Type 1
Dimensions	MP-5x1x: 6¾ x 3¼ in. (171 x 83 mm)

Accessories	
Valve Linkages	
AV-601	Valve linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Valve linkage for VB-7xxx.
TOOLS	
TOOL-19	Spring-compression tool for AV-7600



Wiring Diagram 4…20 mAdc Controllers

Application
The AM-708 500 ohm resistor converts a 4…20 mA signal to a 2…10 Vdc signal.
- Wire leads.

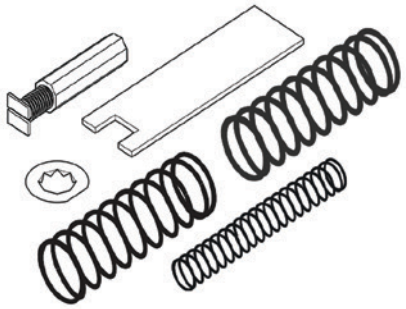
AM-708
500 Ohm Resistor

Application
The AV-7600-1 valve linkage kit is used to field assemble MA-521x, MP-521x, MP-541x and MP-561x round hydraulic actuators to ½" through 2" VB-7xxx series valve bodies.

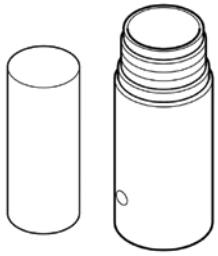
Features
- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies.
- Kit fits all VB-7xxx series valve bodies.
- Includes spring choices for higher 2-Way valve close off.

Specifications
- Actuator mounting: In any upright position above the center line of the valve body. For steam applications only, mount the actuator above the valve body at 45° from vertical.

AV-7600-1
Hydraulic Actuator Valve Linkage Kit



AV-601 Extension for MA, MP 5x1x-xxx, MPR-5x1x and MP-541x Actuators



AV-601 Linkage Extension
for Electric/Electronic Hydraulic Valve Actuators

Application

The AV-601 linkage extension kit is used to increase the allowable ambient temperature range of MA, MP-5x1x-xxx, MPR-5x1x and MP-541x Series actuators. The MP-541x and MPR-5x1x Series of actuators require the AV-601 extension. This kit provides thermal insulation between the valve and the actuator. It does not insulate the actuator from radiant or convective heat transfer.

Specifications

Kit consists of an extension coupling and a spacer.
Dimensions: Add 2-1/32 in. (52 mm) to the "E" dimension for the valve assembly using an AV-601 linkage extension. Refer to complete dimensions in section 6:

- 2-Way Valves, Union End
- 2-Way Valves, Screwed
- 3-Way Mixing and Sequencing Valves, Flared
- 3-Way Mixing and Diverting Valves, Screwed

Restrictions on the Maximum Ambient Temperature for Valve Actuator

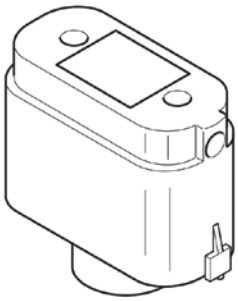
Maximum Temperature of Media in the Valve Body (Check Valve Ratings)	Maximum Ambient Temperature of MP-541x or MPR-5x1x		Maximum Ambient Temperature of MA-521x or MP-521x	
	AV-600a or AV-7600b Only for Chilled Water Applications Only	AV-600a or AV-7600b & AV-601	AV-600a or AV-7600b Only	AV-600a or AV-7600b & AV-601
366°F (180°C)	Do Not Use	88°F (31°C)	90°F (32°C)	90°F (32°C)
340°F (171°C)	Do Not Use	93°F (34°C)	100°F (38°C)	100°F (38°C)
281°F (138°C)	Do Not Use	103°F (39°C)	115°F (46°C)	140°F (60°C)c
181°F (83°C)	Do Not Use	120°F (48°C)	140°F (60°C)c	140°F (60°C)c
80°F (26°C)	140°F (60°C)c	140°F (60°C)c	140°F (60°C)c	140°F (60°C)c

[a]For detailed valve linkage installation instructions, refer to AV-600 Hydraulic Actuator Valve Linkage Kit General Instructions, F-26279.

[b]For detailed valve linkage installation instructions, refer to AV-7600 Hydraulic Actuator Valve Linkage Kit General Instructions, F-26235.

[c]Maximum allowable ambient temperature of the actuator.

MK-2690 Pneumatic Valve Actuator - Proportional



MK-2690 Proportional Pneumatic Valve Actuator

Application

The MK-2690 provides proportional pneumatic control of ½ in. to 2 in. VB-7xxx Series valves (subject to close-off ratings) and discontinued ½ in. to 1¼ in. VB-9xxx valves.

Features

- Compact size with 6 in.2 (39 cm2) effective area
- Rugged die cast aluminum housing
- Replaceable beaded, molded, neoprene diaphragm

Model Table		
Model Number	Nominal Spring Rangea (Spring Color Code)	
	psig	kPa
MK-2690	3 to 7 (Yellow)	21 to 48
	5 to 10 (Black)	34 to 69
	8 to 13 (Blue)	55 to 90

[a]Nominal (no load) condition, spring ranges based on ½ in. (13 mm) maximum stroke, provided by AV-7400 linkage (order separately).

Specifications	
Inputs	Compatible with proportional pneumatic signal. Refer to Model Table.
Start Point	Non-adjustable.
Air Connections	1/8 in. FNPT located on side of housing.
Max. Air Pressure	30 psig (207 kPa)
Mechanical Outputs	
Stroke	5/8 in. available
Environment	
Ambient Temperature Limits	Shipping: -40…220° F (-40…104° C) Operating: -20…220° F (-29 to 104° C)
Humidity	5…95% RH, non-condensing
Spring	Stainless steel spring retracts actuator shaft and raises valve stem on loss of air pressure. Springs provided in AV-400 or AV-7400 linkage (order separately).
Dimensions	3-9/16 H x 5 W x 2¼ D in. (90 x 127 x 57 mm)

Accessories	
Valve Linkages	
AK-42309-500	Positive positioner & linkage; use with MK-2690-0-0…1 or MK-2690-0-0-2 models only.
AV-400	Valve linkage (includes parts for VB-7xxx and VB-9xxx valves and 3-7, 5-10, & 8-13 springs)
AV-7400	Valve linkage for VB-7xxx valves only. (includes 3-7, 5-10, & 8-13 springs.)
TOOLS (factory-available)	
TOOL-095-1	Pneumatic calibration tool kit.
Maintenance Parts	
PNV-144-43	3 to 7 psig spring
PNV-145-45	5 to 10 psig spring
PNV-145-48	8 to 13 psig spring
PNV-102-1	Diaphragm
PNV-104-2	Piston.

AV-7400 Pneumatic Actuator Valve Linkage Kit

Application

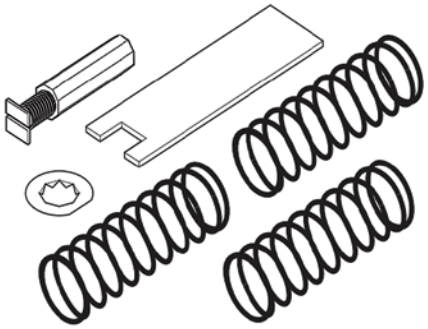
The AV-7400 valve linkage kit is used to field install MK-2690 pneumatic actuators to a variety of ½" through 2" VB-7xxx series valve bodies.

Features

- Springs are provided for control-signal applications, including 3 to 7, 5 to 10 and 8 to 12 psig.
- Kit fits all VB-7xxx series valve bodies.
- Blue spring used with AV-7600-1 supports hydraulic 4…20 mA and 0…10 Vdc applications..

Specifications

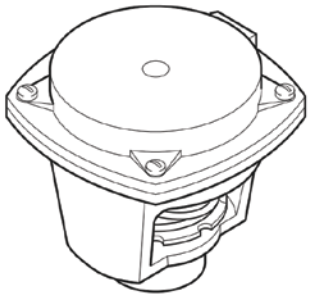
- Actuator mounting: In any upright position with actuator above the center line of the valve body.



AV-7400
Pneumatic Actuator Valve
Linkage Kit

Spring Specifications	
Spring Range psig (kPa)	**Spring Color**
3 to 7 (21 to 48)	Yellow
5 to 10 (34 to 68)	Black
8 to 13 (55 to 89)	Blue

MK-46xx Pneumatic Actuator - Proportional



MK-46xx
Proportional Pneumatic Valve Actuator

Application

The MK-46xx Series and MK-4621-422 proportional pneumatic actuators, with 11 sq. in. (71 cm2) effective diaphragm area, are used to control ½"…2" VB-7xxx series valves.

Features

- Rugged die cast aluminum construction.
- Rolling diaphragm.
- Multiple spring ranges for various applications.
- Adjustable start point (refer to Specifications).
- ½ in. nominal stroke.
- Can also be used on ½" stroke discontinued VB-9xxx series valves (½"…1¼").

Model Table

Model Number	Nominal Spring Range[a]	
	psig	kPa
MK-4601	3…6	21…41
MK-4611	5…10	34…69
MK-4621	10…13	69…90
MK-4621-422	10…11.25	69…77
MK-4641	3…13	21…90

[a]Nominal (no load) condition, spring ranges based on ½ in. (13 mm) maximum stroke.

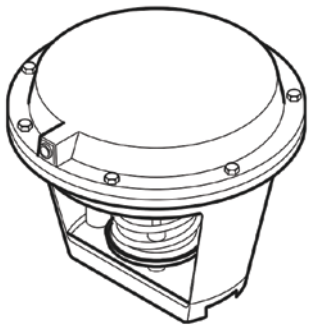
Specifications

Construction	Compatible with proportional pneumatic signal. Refer to Model Table.
Housing	Die cast aluminum.
Diaphragm	Replaceable, beaded, molded, neoprene (Part number PNV-002).
Stroke	½ in. (12.7 mm) nominal.
Spring	Retracts actuator shaft and raises valve stem on loss of air pressure.
Nominal Sring Range	Refer to Model Table.
Starting Point	Field adjustable.
MK-4601, MK-4621	+½ psig (7 to 14 kPa).
MK-4611, MK-4641	±2 psig (14 kPa).
Air Connections	1/8 in. FNPT.
Max. Air Pressure	30 psig (207 kPa).
Environment	
Ambient Temperature Limits	Shipping: -40…220° F (-40…104° C) Operating: -20…220° F (-29 to 104° C)
Valve Linkage	AV-401 (Order separately.)
Mounting	In any upright position with actuator head above the center line of the valve body.
Dimensions	3-7/8 x 4¾ x 4¾ in. (99 x 121 x 121 mm)
Maintenance Parts	See F-26033

Accessories

Positioner	
AK-42309-500	Positive positioner & linkage; use with MK-46x1-0-2.
TOOLS (factory-available)	
TOOL-095-1	Pneumatic calibration tool kit.

MK-66xx Pneumatic Actuator - Proportional



MK-66xx
Proportional Pneumatic Valve Actuator

Application

MK-66xx proportional pneumatic actuators, with 50 sq. in. (323 cm2) effective diaphragm area, are used to control 1½ in. to 2 in. VB-7xxx series valves.

Features

- Rugged die cast aluminum construction.
- Rolling diaphragm.
- Three spring ranges for various applications.
- Start point adjustable ±2 psi.

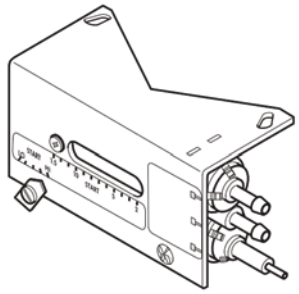
Model Table

Model No.	Nominal Spring Range		Nominal Stroke in. (mm)
	psig	kPa	
MK-6601	3…8	21…55	½ (13.7)
MK-6611	5…10	34…69	½ (13.7)
MK-6621	8…13	55…90	½ (13.7)

Specifications

Construction	
Housing	Die cast aluminum
Diaphragm	Replaceable beaded molded neoprene (Part number PNV-202).
Stroke	Refer to Model Table.
Spring	Retracts actuator shaft and raises valve stem on loss of air pressure.
Nominal spring range	Refer to Model Table.
Starting point	Adjustable ±2 psig (±14 kPa)
Maximum air pressure	30 psig (207 kPa)
Ambient temperature limits	
Shipping	-40…220°F (-40…104°C)
Operating	-20…220°F (-29…104°C)
Air connections	1/8 in. FNPT
Valve linkage	AV-430 (order separately).
Mounting	Any upright position with actuator head above center line of the valve body.
Dimensions	7¾ H x 10½ W x 10½ D in. (199 x 267 x 267 mm)
Maintenance Parts	See F-26033

AK-42309-500 Positive Positioning Relay



AK-42309-500
Positive Positioning Relay

Application

Positive positioner pneumatic relay is used to accurately position an actuator stroke with respect to signal pressure from the controller. It can also be used to change the effective spring range of an actuator and increase the capacity of a controller.

Features

For accurate positioning of valve and damper actuators, this positioner utilizes a pilot-operated, relay-type position-sensing mechanism, much more sensitive to actuator position changes than some competitive“force-balance” positioners.

Model Number	Description
AK-42309-500	Positive Positioning Relay with Mounting Linkage.

Note: This model cannot be used with M556, M572, M573, M574 Series actuators. Use N800-0555 positioner with M556, M573, and M574.

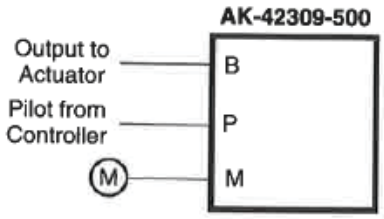


Figure 1 Piping Connections.

Specifications	
Action	Direct (increase in output pressure to actuator with an increase in pilot pressure from controller).
Pilot input	0 to main air pressure, psig.
Output	0 to main air pressure, psig.
Construction	
Housing	Polysulfone
Diaphragm	Neoprene
Start point	Adjustable 1…12 psig (7…83 kPa).
Span	Adjustable 2…13 psi (14…90 kPa); factory set at 5 psig.
Stroke	Adjustable 2…13 psi (14…90 kPa); factory set at 5 psig with feedback spring for 7/16…5 in. stroke.
Supply air pressure	Clean, oil free, dry air required (refer to EN-123).
Maximum	30 psig (207 kPa).
Nominal supply	15…20 psig (103…138 kPa)
Environment	
Ambient temperature limits	Shipping: -40…160°F (-40…71°C). Operating: 32…140°F (0…60°C).
Humidity	5…95% R.H., non-condensing.
Locations	NEMA Type 1 (IP10).
Air connection code	Refer to Figure 1 (next page)
Air connections	
“M” and “B”	Barbed for 1/4 in. O.D. plastic tubing.
“P”	Dual-contoured for 1/4 in. O.D. and 5/32 in. O.D. tubing.
Air consumption for sizing air compressor	19 scim (5.2 mL/s) at 20 psig (138 kPa) supply.
Air capacity for sizing air mains	20 scim (5.5 mL/s).
Flow capacity	860 scim (235 mL/s) at 20 psig (138 kPa) supply.
Mounting linkage	All necessary linkage provided to assemble AK-42309-500 to MK-2690 actuator and the following actuator series; MK-3000, MK-4400, MK-4600, MK-4700, MK-4800, MK-6600, MK-6800, MK-6900, MK-7100, MK-8800 and MK-8900.
Dimensions	2½ H x 4½ W x 3 D in. (64 x 114 x 76 mm).

MORE INFO
Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/LJCLEb

MG-350V Globe Valve Actuator

E9429

MG-350V

Application

MG350V globe valve actuators are non-spring return electro-mechanical actuators for the control of two-way and three-way globe valves for fan coils, unit ventilators, reheat, cooling units, perimeter heating, and other applications.

Proportional, Floating, and Pulse Width Modulated (PWM) models are available for direct mounting on ½" … 2" VB-7000 globe valves. The MG350V actuators are also compatible with older field installed ½" … 1¼" VB-9000 globe valves as well as other valves (with the addition of AV-800 Globe Valve Adapters).

Benefits

- Bi-color LED status indication for motion indication, auto calibration, and alarm notification
- Auto calibration provides precise control by scaling the input signal to match the exact travel of the valve stem
- Proportional models with and without a position output signal with field selectable 2 … 10 Vdc and 0 … 10 Vdc input signals and selectable input signal action (reverse or direct acting)
- Floating and two-position models available with and without a position output signal
- Pulse width modulated (PWM) models with field-selectable 0.59 … 2.93 sec and 0.1 … 25.5 sec input signal ranges with a position output signal
- Stall protected throughout stroke
- Manual override with automatic release
- Position feedback output signal models include field selectable 2 … 10 Vdc or 0 … 5 Vdc output signal
- Removable wiring screw terminal with ½" conduit opening
- Integral linkage and self-adjusting valve position indicator

*The CE mark indicates RoHS2 compliance. Please refer to the CE Declaration of Conformity for additional details.

Specifications

Input Power and Ratings

Part Number	Input Signal	Position Feedback Output Signal	Approx. Timing in Seconds for ½" (12.7 mm) Stroke	Max. Stroke in inch (mm)	Force lbf (N)
MG350V-24F	Three-Wire Floating[1]	-	102	21/32 (16.5)	78 (350)
MGF350V-24FP	Three-Wire Floating, PWM [1, 2]	2 … 10 Vdc, 0 … 5 Vdc[3]	51	21/32 (16.5)	67 (300)
MG350V-24M	2 … 10 Vdc, 0 … 10 Vdc [4]	-	102	21/32 (16.5)	78 (350)
MGF350V-24MP	2 … 10 Vdc, 0 … 10 Vdc, 4 … 20 mA	2 … 10 Vdc, 0 … 5 Vdc[3]	51	21/32 (16.5)	67 (300)

1 Also compatible with two-position Form A 24 Vac/Vdc input signals. 2 Field-selectable 0.59 … 2.93 sec and 0.1 … 25.5 sec PWM ranges.

3 Field selectable. The 2 … 10 Vdc output signal range also includes an alarm signal (see the MGF350V-24FP, MG350V-24M, and MGF350V-24MP Alarm Operation table).

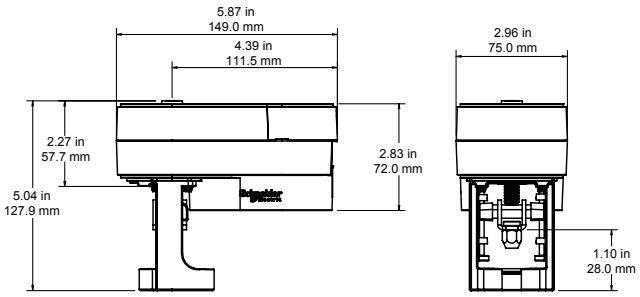
4 Field Selectable.

MG350V Actuator Models

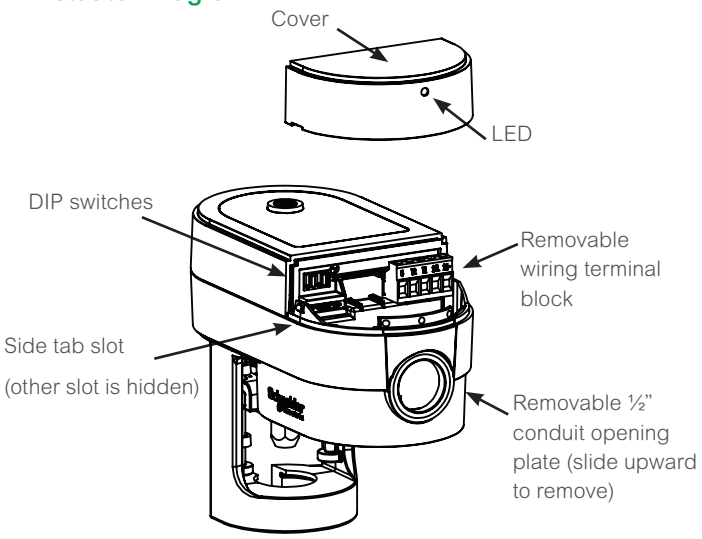
Model	Valve Assembly Prefix	Actuator Code	Force, lbf (N)	Approx. Timing in Seconds for ½" Stroke	Power [a]	Proportional Input [b] (VDC)	Proportional Input [c] (VDC, mA)	Floating, Two Wire (Form A) Two Position	PWM[d]	Position Output Signal[e]
MG350V-24F	VF	110	79 (350)	102	5 VA	—	—	Yes	—	—
MGF350V-24FP	VF	112	67 (300)	51	7.2 VA	—	—	Yes	Yes	2…10 / 0…5 Vdc
MG350V-24M	VS	110	79 (350)	102		Yes	—	—	—	—
MGF350V-24MP	VS	112	67 (300)	51		—	Yes	—	—	2…10 / 0…5 Vdc

MG-350V Globe Valve Actuator

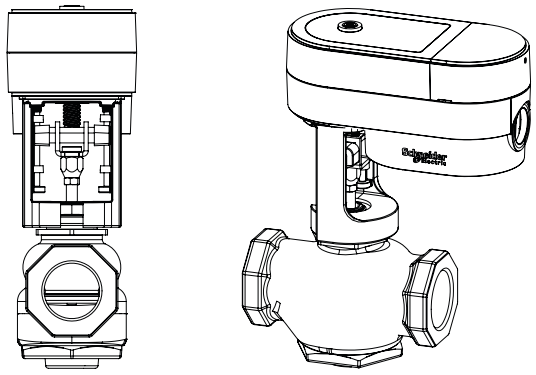
Dimensions (inches)



Actuator Diagram



MG350V Installed on a VB-7000 Globe Valve



End View Side View

Applicable Literature

MG350V Economy Model - Standard Speed, MG350V-24F, MG350V-24M

- F-27907 Specification Sheet
- F-27852 Installation Instructions

MG350V Economy Plus Model - Fast Speed + Feedback/Alarms
MGF350V-24FP, MGF350V-24MP

Select a valve/actuator combination having sufficient close off for the application.

Select Valve/Actuator Combination Having Sufficient Close-Off for Application

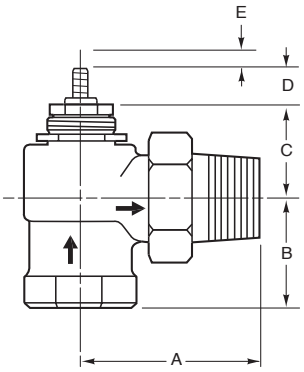
Body		Close-off Ratings, psi (kPa) [b]		Compatible Two-Way Valve Series
P Code	Size	MGF350V-24FP, MGF350V-24MP	MG350V-24F, MG350V-24M	
-01, -02, -03, -04	½" (15 mm)	219 (1510)	250 (1724)	VB-7211-0-3-P, VB-7211-0-4-P, VB-7212-0-4-P, VB-7213-0-4-P, VB-7214-0-4-P, VB-7215-0-4-P, VB-7221-0-4-P, VB-7222-0-4-P, VB-7223-0-4-P, VB-7224-0-4-P, VB-7225-0-4-P, VB-7253-0-4-P, VB-7263-0-4-Pa, VB-7273-0-4-P, VB-7283-0-4-P
-05, -06	¾" (20 mm)	135 (931)	157 (1082)	
-07, -08	1" (25 mm)	67 (462)	79 (545)	
-09	1¼" (32 mm)	42 (290)	49 (338)	
P Code	**Size**	**MGF350V-24FP, MGF350V-24MP**	**MG350V-24F, MG350V-24M**	**Compatible Three-Way Valve Series**
-02, -04	½" (15 mm)	219 (1510)	250 (1724)	VB-7312-0-4-P, VB-7313-0-4-P, VB-7314-0-4-P, VB-7315-0-4-P, VB-7363-0-4-P,
-06	¾" (20 mm)	135 (931)	157 (1082)	
-08	1" (25 mm)	67 (462)	79 (545)	
-09	1¼" (32 mm)	42 (290)	49 (338)	
-04, -06, -08, -09, -10, -11	½"…2"	250 (1712)		VB-7323-0-4-P VB-7325-0-4-P

a) VB-7263 series valves with port codes from -28…-82 have the same close-off ratings as the respective matching pipe size VB-7263 series valves with port codes -01…-11.

Notes

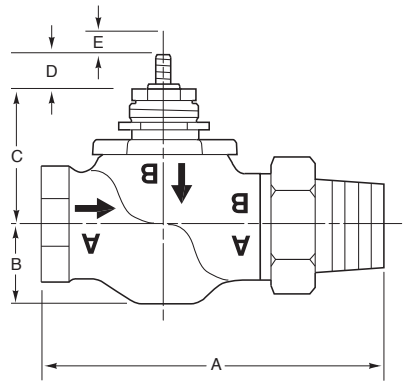
6. VB-7000 Dimensions

½"…2" 2-Way Stem-Up Open Valve Bodies



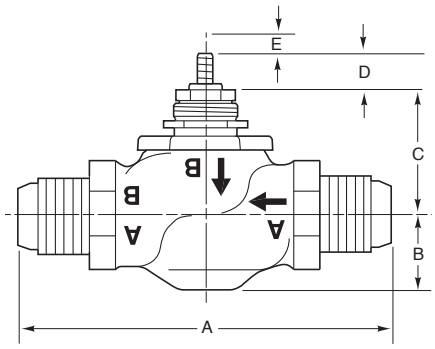
Union Angle: VB-7211-0-3-P, VB-7251-0-3-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	½"	3-1/8 (79)	1-5/8 (41)	1-5/16 (33)	¾ (19)	7-16 (11)
05, 06	¾"	3-5/8 (92)	1-11/16 (43)	1½ (38)		
07, 08	1"	4-1/16 (103	1-15/16 (49)	2-1/8 (54)		
09	1¼"	4-5/16 (110)	2-3/16 (56)	2¼ (57)		

* Stem down



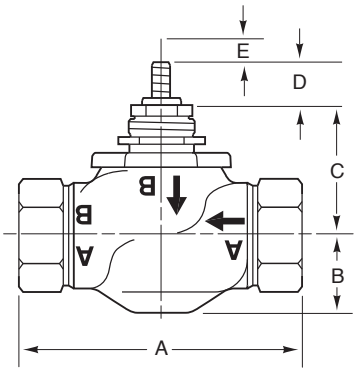
Union Straightway: VB-7211-0-4-P, VB-7251-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	½"	4-3/16 (106	1¼ (32)	1-11/16 (43)	¾ (19)	7/16 (11)
05, 06	¾"	4-15/16 (125)				
07, 08	1"	6 (152)		2-3/8 (60)		
09	1¼"	6¼ (159)	1-3/8 (35)			

* Stem down



SAE Flare: VB-7212-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	5/8" O.D.	4 (102)	1¼ (32)	1-11/16 (43)	¾ (19)	7/16 (11)

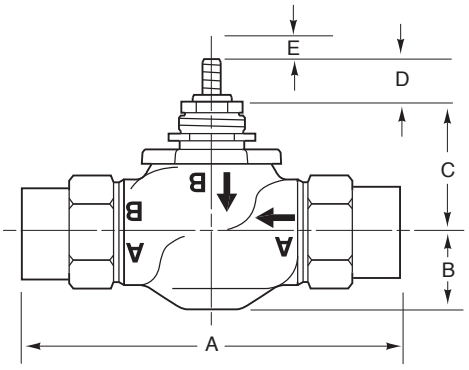
* Stem down



Threaded NPT & Rp: VB-7213-0-4-P, VB-7215-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	½"	3-1/16 (78)	1¼ (32)	1-11/16 (43)	¾ (19)	7-16 (11)
05, 06	¾"	3-5/8 (92)				
07, 08	1"	4-5/8 (118)		2-3/8 (60)		
09	1¼"		1-3/8 (35)			
10	1½"	5-3/8 (137)	1½ (38)	2-7/16 (57)		
11	2"	6-1/8 (156)	1-5/8 (41)	2¾ (70)		

* Stem down

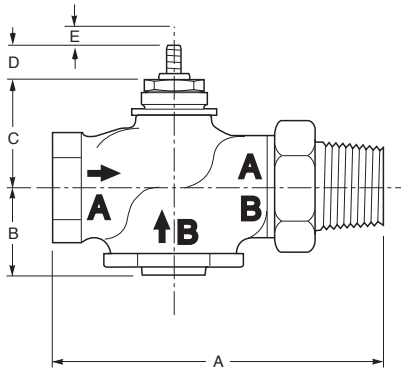
½"…2" 2-Way Stem-Up Open & Closed Valve Bodies



Stem Up Open

Union Sweat: VB-7214-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	½"	4-3/16 (106)	1¼ (32)	1-11/16 (43)	¾ (19)	7-16 (11)
05, 06	¾"	5-7/16 (138)				
07, 08	1"	6-5/8 (168)		1¾ (45)		
09	1¼"	6-13/16 (173)	1-3/8 (35)	2 (51)		
10	1½"	8-5/16 (211)	1½ (38)	2-1/8 (54)		
11	2"	9-3/16 (233)	1-5/8 (41)	2-3/16 (56)		

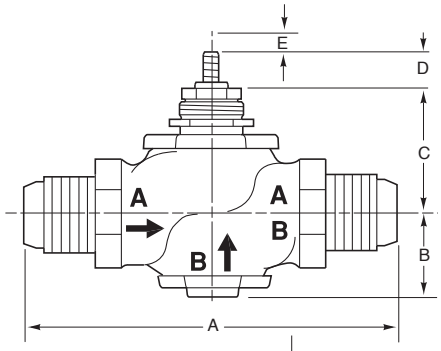
* Stem down



Stem Up Closed

Union Straightway: VB-7221-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	½"	4-3/16 (106	1¼ (32)	1-11/16 (43)	¾ (19)	7/16 (11)
05, 06	¾"	4-15/16 (125)				
07, 08	1"	6 (152)	1¾ (45)	1¾ (45)		
09	1¼"	6¼ (159)		2 (51)		

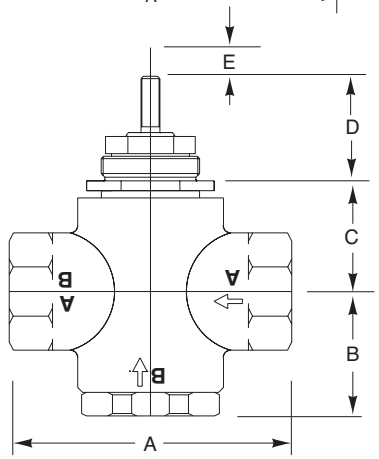
* Stem down



Stem Up Closed

SAE Flare: VB-7222-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	5/8" O.D.	4 (102)	1¼ (32)	1-11/16 (43)	¾ (19)	7/16 (11)

* Stem down

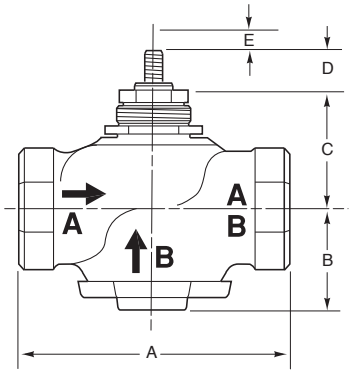


Stem Up Closed

VBS-9263 Series Valves - 2-Way						
Part Number	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D (Stem Down)	Ea (Stroke)
VBS-9263-0-6-P	½"	3 (76)	1-27/64 (36)	1-1/16 (27)	25/32 (20)	½ (13)
	¾"	3-19/32 (91)	1-37/64 (40)	1-13/32 (36)		

[a]Add up to 1/16 in. (1.6 mm) for disc seating and compression.

½"…2" 2-Way Stem-Up Open & Closed Valve Bodies



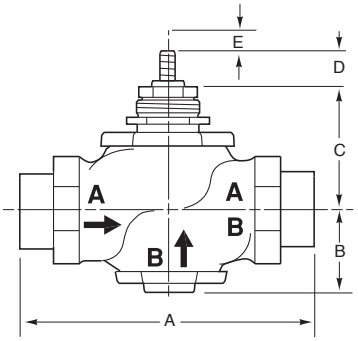
Note - VB-7253-0-4-P, VB-7255-0-4-P, VB-7273-0-4-P and VB-7275-0-4-P, stem-up, normally open valves have inverted A, B, and AB port embossings.

Threaded NPT and Rp: VB-7223-0-4-P, VB-7225-0-4-P VB-7253-0-4-P, VB-7255-0-4-P, VB-7263-0-4-P VB-7265-0-4-P, VB-7273-0-4-P, VB- 7275-0-4-P VB-7283-0-4-P, VB-7285-0-4-P

Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04, 28, 30, 31, 33, 34, 36, 39	½"	3-1/16 (78)	1¼ (32)	1-11/16 (43)	¾ (19)	7/16 (11)
05, 06, 41	¾"	3-5/8 (92)				
07, 08, 51, 52	1"	4-5/8 (118)	1¾ (45)	1¾ (45)		
09, 61, 62, 63	1¼"			2 (51)		
10, 71, 72	1½"	5-3/8 (137)	1-13/16 (46)	2-1/8 (54)		
11, 81, 82	2"	6-1/8 (156)	2-1/16 (53)	2-3/16 (56)		

* Stem down

All valve port codes are not available on all valve series.



Union Sweat: VB-7224-0-4-P

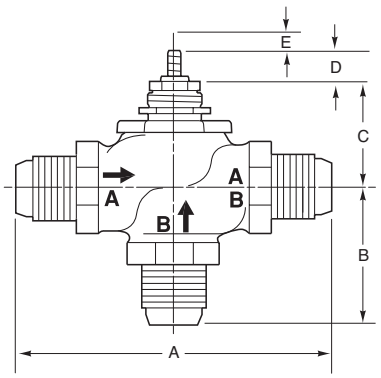
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	½"	4-3/16 (106)	1¼ (32)	1-11/16 (43)	¾ (19)	7/16 (11)
05, 06	¾"	5-7/16 (138)				
07, 08	1"	6-5/8 (168)	1¾ (45)	1¾ (45)		
09	1¼"	6-13/16 (173)		2 (51)		
10	1½"	8-5/16 (211)	1-13/16 (46)	2-1/8 (54)		
11	2"	9-3/16 (233)	2-1/16 (53)	2-3/16 (56)		

* Stem down

Stem and Bonnet Nut-Thread Information for All VB-7000 Valve Series

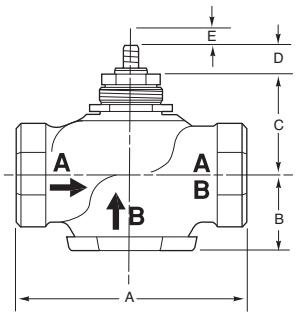
Valve Stem Threads	1/4"-28 UNF-2A Thread
Bonnet Nut Threads	1¼" -16 Thread
Bonnet Nut Outer Hex Size	1-5/8" (use M-370 wrench or equiv.)

VB-7300 ½"…2" 3-Way Valve Bodies



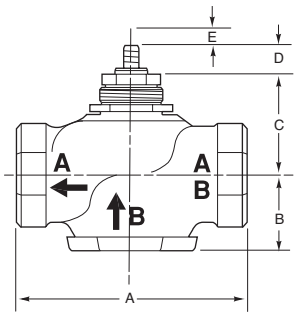
SAE Flare: VB-7312-0-4-P, VB-7332-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04 for 7312	5/8" O.D.	4 (102)	2¼ (57)	1-11/16 (43)	¾ (19)	7/16 (11)
02, 03 for 7332					15/16 (24)	

* Stem down



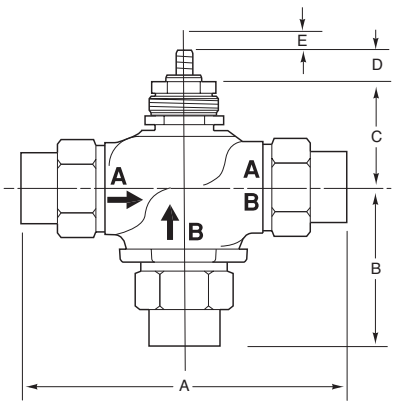
Threaded NPT and Rp: VB-7313-0-4-P, VB-7315-0-4-P, VB-7363						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04	½"	3-1/16 (78)	1¾ (45)	1-11/16 (43)	¾ (19)	7/16 (11)
06	¾"	3-5/8 (92)				
08	1"	4-5/8 (118)	1-3/8 (35)	1¾ (45)		
09	1¼"		1-5/8 (41)	2 (51)		
10	1½"	5-3/8 (137)	1¾ (45)	1-1/8 (29)		
11	2"	6-1/8 (156)	1-7/8 (48)	1-3/16)		

* Stem down



Threaded NPT and Rp: VB-7323-0-4-P, VB-7325-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04	½"	3-1/16 (78)	1¾ (45)	1-11/16 (43)	¾ (19)	7/16 (11)
06	¾"	3-5/8 (92)				
08	1"	4-5/8 (118)	1-3/8 (35)	1¾ (45)		
09	1¼"		1-5/8 (41)	2 (51)		
10	1½"	5-3/8 (137)	1¾ (45)	1-1/8 (29)		
11	2"	6-1/8 (156)	1-7/8 (48)	1-3/16)		

* Stem down



Union Sweat: VB-7314-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04	½"	4-3/16 (106)	2-7/16 (62)	1-11/16 (43)	¾ (19)	7/16 (11)
06	¾"	5-7/16 (138)	2½ (64)			
08	1"	6-5/8 (168)	3-1/8 (79)	1¾ (45)		
09	1¼"	6-13/16 (173)	3½ (89)	2 (51)		
10	1½"	8-5/16 (211)	3-5/8 (92)	1-1/8 (29)		
11	2"	9-3/16 (233)	4 (102)	1-3/16 (30)		

* Stem down

Vx-7200 & Vx-7300 ½"…2" Valve/Actuator SR Assemblies

Dimensions — ½"…2" Globe Valve Assemblies

Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)								
		2-Way (Refer to Figure-1, Figure-3, and Figure-4 on next page)					3-Way (Refer to Figure-2 and Figure-5 on next page)			
		A	B	C	E	J	A	C	E	J
Union Straightway 2-Way (N.C.) **Vx-7221-8xx-4-P**	½	4-3/16 (106)	2-11/16 (68)	1-3/16 (30)	7-7/16 (189)	6-5/8 (168)	—			
	¾	4-15/16 (125)	3-3/16 (81)	1-3/16 (30)	7-7/16 (189)	6-7/8 (175)				
	1	6 (152)	3-5/8 (92)	1¾ (44)	7½ (190)	7-3/8 (187)				
	1¼	6¼ (159)	3-15/16 (100)	1¾ (44)	7¾ (197)	7-3/8 (187)				
Union Straightway 2-Way (N.O.) **Vx-7211-8xx-4-P**	½	4-3/16 (106)	2-11/16 (68)	1-3/16 (30)	7-7/16 (189)	6-5/8 (168)	—			
	¾	4-15/16 (125)	3-3/16 (81)	1-1/16 (27)	7-7/16 (189)	6-7/8 (175)				
	1	6 (152)	3-5/8 (92)	1-3/16 (30)	8-1/8 (206)	7-3/8 (187)				
	1¼	6¼ (159)	3-15/16 (100)	1-3/8 (35)	8-1/8 (206)	7-3/8 (187)				
Flared 2-Way **Vx-7212-8xx-4-P** **Vx-7222-8xx-4-P** 3-Way **Vx-7312-8xx-4-P**	½ a	4 (102)	—	1-3/16 (30)	7-7/16 (189)	7-3/32 (180)	4 (102)	2¼ (57)	7-7/16 (189)	7-3/32 (180)
NPT/Metric Thread 2-Way (N.C.) **Vx-722x-8xx-4-P** **Vx-726x-8xx-4-P** **Vx-728x-8xx-4-P** 3-Way **Vx-731x-8xx-4-P** **Vx-732x-8xx-4-P**	½	3-1/16 (78)	—	1-3/16 (30)	7-7/16 (189)	6-5/8 (168)	3-1/16 (78)	1¾ (44)	7-7/16 (189)	6-5/8 (168)
	¾	3-5/8 (92)		1-3/16 (30)	7-7/16 (189)	6-7/8 (175)	3-5/8 (92)	1-13/16 (46)	7-7/16 (189)	6-7/8 (175)
	1	4-5/8 (118)		1¾ (44)	7½ (190)	7-3/8 (187)	4-5/8 (118)	1¾ (44)	7½ (191)	7-3/8 (187)
	1¼	4-5/8 (118)		1¾ (44)	7¾ (197)	7-3/8 (187)	4-5/8 (118)	1¾ (44)	7¾ (197)	7-3/8 (187)
	1½	5-3/8 (137)		1-13/16 (46)	7-7/8 (200)	7-13/16 (198)	5-3/8 (137)	1-13/16 (46)	7-7/8 (200)	7-13/16 (198)
	2	6-1/8 (156)		2¼ (57)	8-9/16 (217)	8-5/32 (208)	6-1/8 (156)	2¼ (57)	8-9/16 (217)	8-5/32 (208)
NPT/Metric Thread 2-Way (N.O.) **Vx-721x-8xx-4-P** **Vx-725x-8xx-4-P** **Vx-727x-8xx-4-P**	½	3-1/16 (78)	—	1-3/16 (30)	7-7/16 (189)	6-5/8 (168)	—			
	¾	3-5/8 (92)		1-1/16 (27)	7-7/16 (189)	6-7/8 (175)				
	1	4-5/8 (118)		1-3/16 (30)	8-1/8 (206)	7-3/8 (187)				
	1¼	4-5/8 (118)		1-3/8 (35)	8-1/8 (206)	7-3/8 (187)				
	1½	5-3/8 (137)		1½ (38)	8-3/16 (208)	7-13/16 (198)				
	2	6-1/8 (156)		1-9/16 (40)	8-7/16 (214)	8-5/32 (208)				

[a] 5/8" O.D., SAE 45°.

Vx-7200 & Vx-7300 ½"…2" Valve/ Actuator SR Assemblies

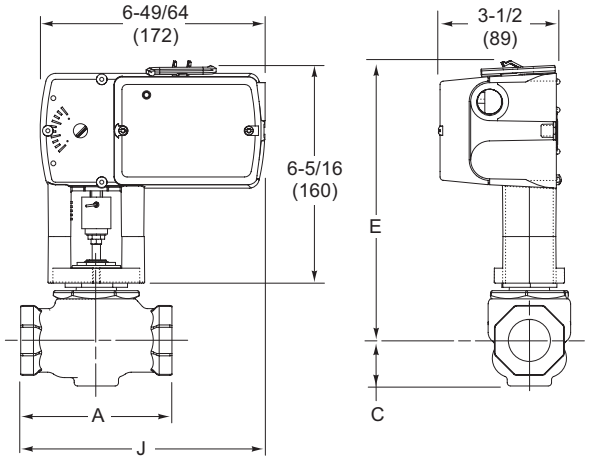


Figure-1 Mx51-710x with 2-Way Globe Valve.

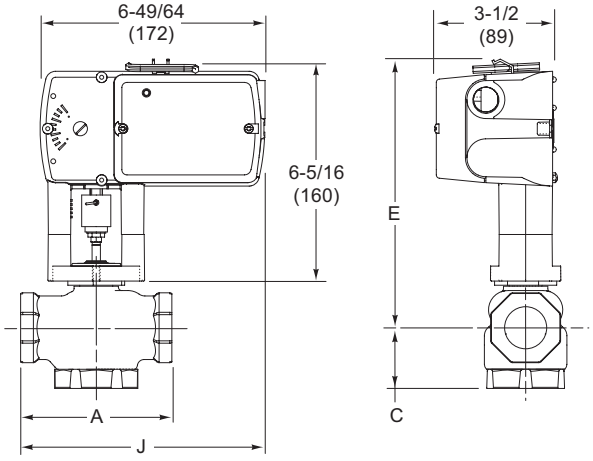


Figure-2 Mx51-710x with 3-Way Globe Valve.

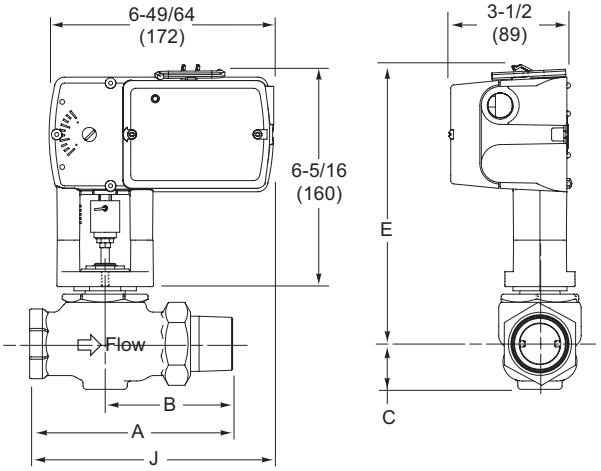


Figure-3 Mx51-710x with 2-Way Union Straightway Globe Valve.

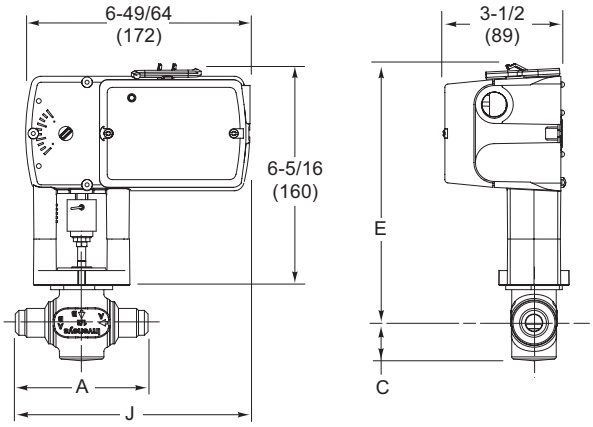


Figure-4 Mx51-710x with 2-Way Flared Globe Valve.

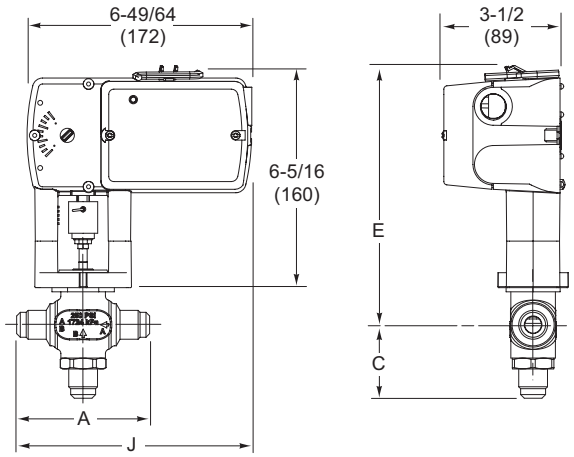


Figure-5 Mx51-710x with 3-Way Flared Globe Valve.

Vx-7200 & Vx-7300 1¼”…2” Valve / Actuator (Mx51-720x) Assemblies

Dimensions — 1¼” to 2” Globe Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)							
		2-Way (Refer to Figure-1 below.)				3-Way (Refer to Figure-2 below.)			
		A	C	E	J	A	C	E	J
NPT/Metric Thread 2-Way (N.C.) **Vx-722x-59x-4-P** **Vx-725x-59x-4-P** **Vx-726x-59x-4-P** **Vx-727x-59x-4-P** **Vx-728x-59x-4-P** 3-Way **Vx-73xx-59x-4-P**	1¼	4-5/8 (117)	1¾ (44)	8-3/8 (213)	11-11/16 (297)	4-5/8 (117)	1¾ (44)	8-3/8 (213)	11-11/16 (297)
	1½	5-3/8 (137)	1-13/16 (46)	8½ (216)	12-1/16 (306)	5-3/8 (137)	1-13/16 (46)	8½ (216)	12-1/16 (306)
	2	6-1/8 (156)	2¼ (57)	9-3/16 (233)	12-7/16 (316)	6-1/8 (156)	2¼ (57)	9-3/16 (233)	12-7/16 (316)
NPT/Metric Thread 2-Way (N.O.) **Vx-721x-59x-4-P**	1¼	4-5/8 (117)	1-3/8 (35)	8¾ (222)	11-11/16 (297)	—			
	1½	5-3/8 (137)	1½ (38)	8-13/16 (224)	12-1/16 (306)				
	2	6-1/8 (156)	1-9/16 (40)	9-1/16 (230)	12-7/16 (316)				

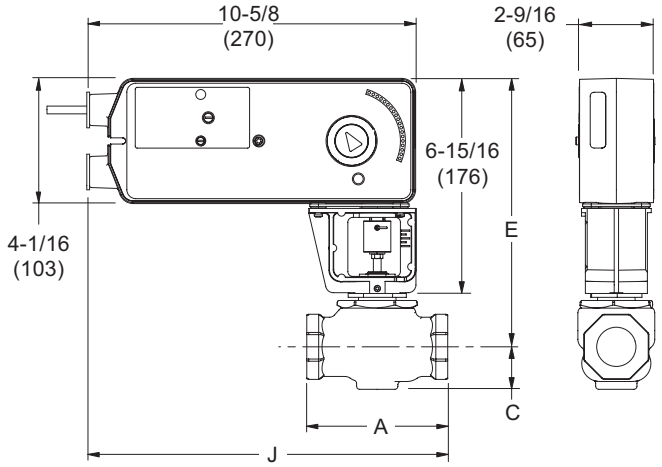


Figure-1 Mx51-720x with ½"…2" 2-Way Globe Valve.

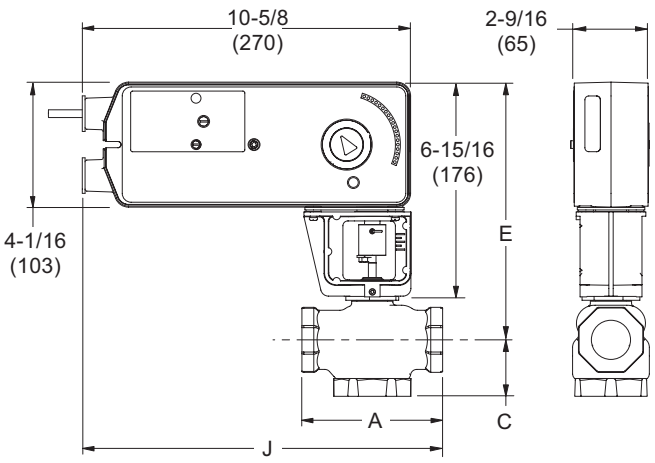


Figure-2 Mx51-720x with ½"…2" 3-Way Globe Valve.

Vx-7200 & Vx-7300 ½"…2" Valve/ Actuator NSR Assemblies

Dimensions — ½"…2" Globe Valve Assemblies

Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)								
		2-Way (Refer to Figure-1 and Figure-3 on next page.)					3-Way (Refer to Figure-2 on next page.)			
		A	B	C	D	E	A	C	D	E
Union Straightway (N.C.) **VF-7221-50x-4-P VS-7221-50x-4-P**	½	4-3/16 (106)	2-11/16 (68)	1-3/16 (30)	1-1/8 (29)	6-3/8 (162)	—			
	¾	4-15/16 (125)	3-3/16 (81)	1-3/16 (30)	1-1/8 (29)	6-3/8 (162)				
	1	6 (152)	3-5/8 (92)	1¾ (44)	1-3/16 (30)	6-7/16 (164)				
	1¼	6¼ (159)	3-15/16 (100)	1¾ (44)	1-7/16 (37)	6-11/16 (170)				
Union Straightway (N.O.) **VF-7211-50x-4-P VS-7211-50x-4-P**	½	4-3/16 (106)	2-7/16 (62)	1-3/16 (30)	1-1/8 (29)	6-3/8 (162)	—			
	¾	4-15/16 (125)	2-13/16 (72)	1-1/16 (27)	1-1/8 (29)	6-3/8 (162)				
	1	6 (152)	3-1/8 (79)	1-3/16 (30)	1-13/16 (46)	7-1/16 (179)				
	1¼	6¼ (159)	3-5/16 (84)	1-3/8 (35)	1-13/16 (46)	7-1/16 (179)				
NPT/Metric Thread 2-Way (N.C.) **VF-7223-50x-4-P VF-7225-50x-4-P VS-7223-50x-4-P VS-7225-50x-4-P** 3-Way **VF-7313-50x-4-P VF-7315-50x-4-P VF-7323-50x-4-P VF-7325-50x-4-P VS-7313-50x-4-P VS-7315-50x-4-P VS-7323-50x-4-P VS-7325-50x-4-P**	½	3-1/16 (78)	—	1-3/16 (30)	1-1/8 (29)	6-3/8 (162)	3-1/16 (78)	1-3/16 (30)	1-1/8 (29)	6-3/8 (162)
	¾	3-5/8 (92)		1-3/16 (30)	1-1/8 (29)	6-3/8 (162)	3-5/8 (92)	1-3/16 (30)	1-1/8 (29)	6-3/8 (162)
	1	4-5/8 (117)		1¾ (44)	1-3/16 (30)	6-7/16 (164)	4-5/8 (118)	1¾ (44)	1-3/16 (30)	6-7/16 (164)
	1¼	4-5/8 (117)		1¾ (44)	1-7/16 (37)	6-11/16 (170)	4-5/8 (118)	1¾ (44)	1-7/16 (37)	6-11/16 (170)
	1½	5-3/8 (136)		1-13/16 (46)	1-9/16 (40)	6-13/16 (173)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	6-13/16 (173)
	2	6-1/8 (156)		2¼ (57)	2¼ (57)	7½ (190)	6-1/8 (156)	2¼ (57)	2¼ (57)	7½ (190)
NPT/Metric Thread 2-Way (N.O.) **VF-7213-50x-4-P VF-7215-50x-4-P VS-7213-50x-4-P VS-7215-50x-4-P**	½	3-1/16 (78)	—	1-3/16 (30)	1-1/8 (29)	6-3/8 (162)	—			
	¾	3-5/8 (92)		1-1/16 (27)	1-1/8 (29)	6-3/8 (162)				
	1	4-5/8 (117)		1-3/16 (30)	1-13/16 (46)	7-1/16 (179)				
	1¼	4-5/8 (117)		1-3/8 (35)	1-13/16 (46)	7-1/16 (179)				
	1½	5-3/8 (136)		1½ (38)	1-7/8 (48)	7-1/8 (181)				
	2	6-1/8 (156)		1-9/16 (40)	2-1/8 (54)	7-3/8 (187)				

Vx-7200 & Vx-7300 ½"…2" Valve/ Actuator NSR Assemblies

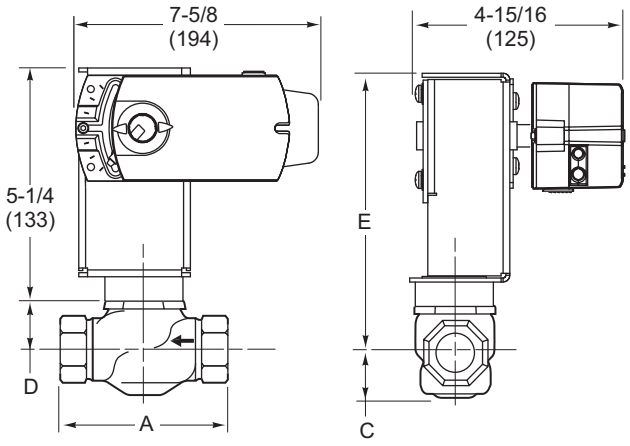


Figure-1 Mx41-6043 or Mx41-6083 with 3-Way Globe Valve with AV-611 Linkage.

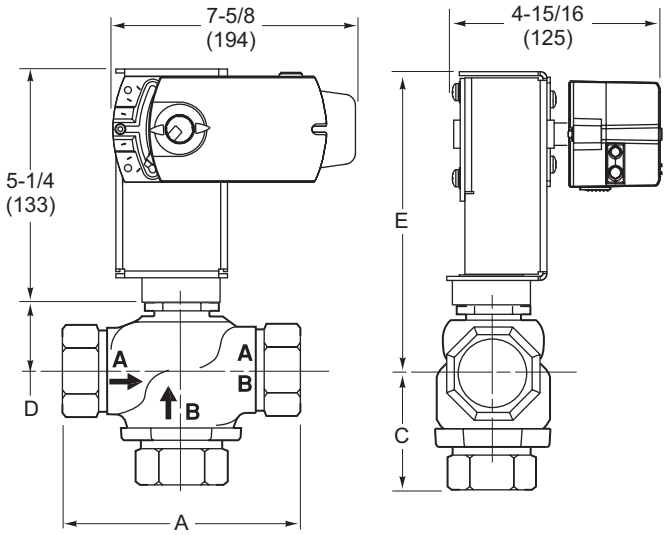


Figure-2 Mx41-6043 or Mx41-6083 with 2-Way Globe Valve with AV-611 Linkage.

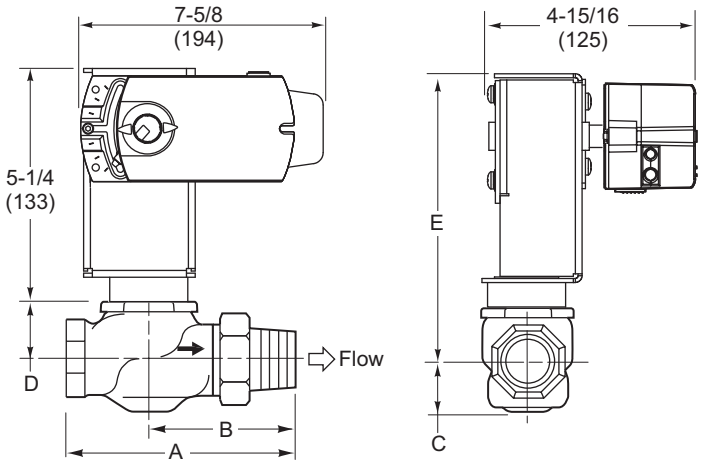


Figure-3 Mx41-6043 or Mx41-6083 with 2-Way Union Straightway Globe Valve with AV-611 Linkage.

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Vx-7200 & Vx-7300 1"…2" NSR Assemblies with AV-611 Linkage

Dimensions — 1"…2" Globe Valve Assemblies										
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)								
		2-Way (Figure-1 below & Figure-3 next page.)					3-Way (Figure-2 next page.)			
		A	B	C	D	E	A	C	D	E
Union Straightway (N.C.) **Vx-7221-xxx-4-P**	1	6 (152)	3-5/8 (92)	1¾ (44)	1-3/16 (30)	6-7/16 (164)	—			
	1¼	6¼ (159)	3-15/16 (100)	1¾ (44)	1-7/16 (37)	6-11/16 (170)				
Union Straightway (N.O.) **Vx-7211-xxx-4-P**	1	6 (152)	3-1/8 (79)	1-3/16 (30)	1-13/16 (46)	7-1/16 (179)	—			
	1¼	6¼ (159)	3-5/16 (84)	1-3/8 (35)	1-13/16 (46)	7-1/16 (179)				
NPT/Metric Thread 2-Way (N.C.) **Vx-7223-xxx-4-P** **Vx-7225-xxx-4-P** 3-Way **Vx-73xx-xxx-4-P**	1	4-5/8 (117)	—	1¾ (44)	1-3/16 (30)	6-7/16 (164)	4-5/8 (118)	1¾ (44)	1-3/16 (30)	6-7/16 (164)
	1¼	4-5/8 (117)		1¾ (44)	1-7/16 (37)	6-11/16 (170)	4-5/8 (118)	1¾ (44)	1-7/16 (37)	6-11/16 (170)
	1½	5-3/8 (137)		1-13/16 (46)	1-9/16 (40)	6-13/16 (173)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	6-13/16 (173)
	2	6-1/8 (156)		2¼ (57)	2¼ (57)	7½ (190)	6-1/8 (156)	2¼ (57)	2¼ (57)	7½ (190)
NPT/Metric Thread 2-Way (N.O.) **Vx-7213-xxx-4-P** **Vx-7215-xxx-4-P**	1	4-5/8 (117)	—	1-3/16 (30)	1-13/16 (46)	7-1/16 (179)	—			
	1¼	4-5/8 (117)		1-3/8 (35)	1-13/16 (46)	7-1/16 (179)				
	1½	5-3/8 (137)		1½ (38)	1-7/8 (48)	7-1/8 (181)				
	2	6-1/8 (156)		1-9/16 (40)	2-1/8 (54)	7-3/8 (187)				

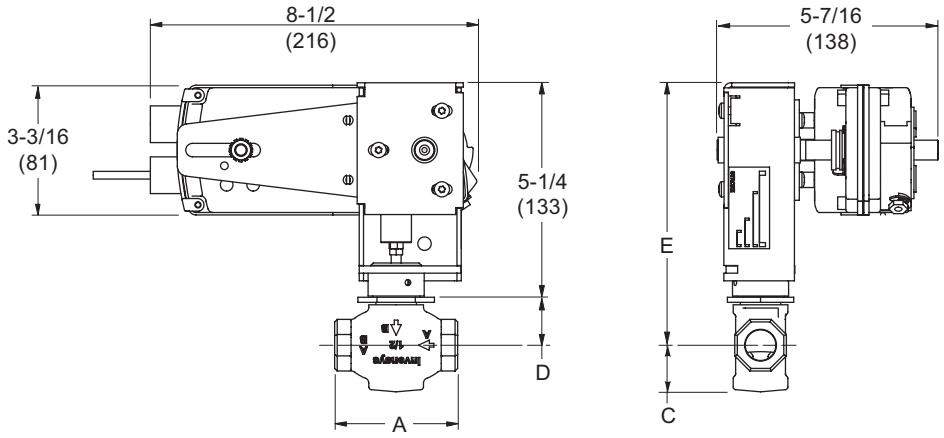


Figure-1 Mx41-6153 with ½"…2" 2-Way Globe Valve with AV-611 Linkage.

Vx-7200 & Vx-7300 1”…2” NSR Assemblies with AV-611 Linkage

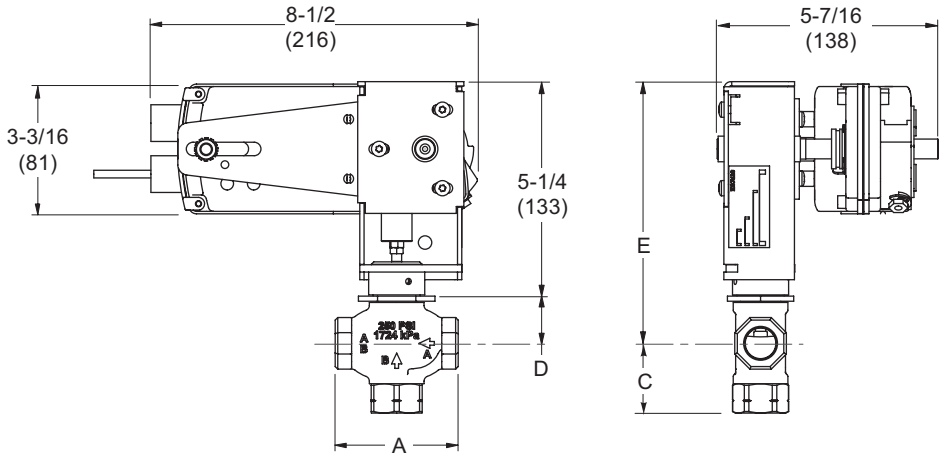


Figure-2 Mx41-6153 with ½"…2" 3-Way Globe Valve with AV-611 Linkage.

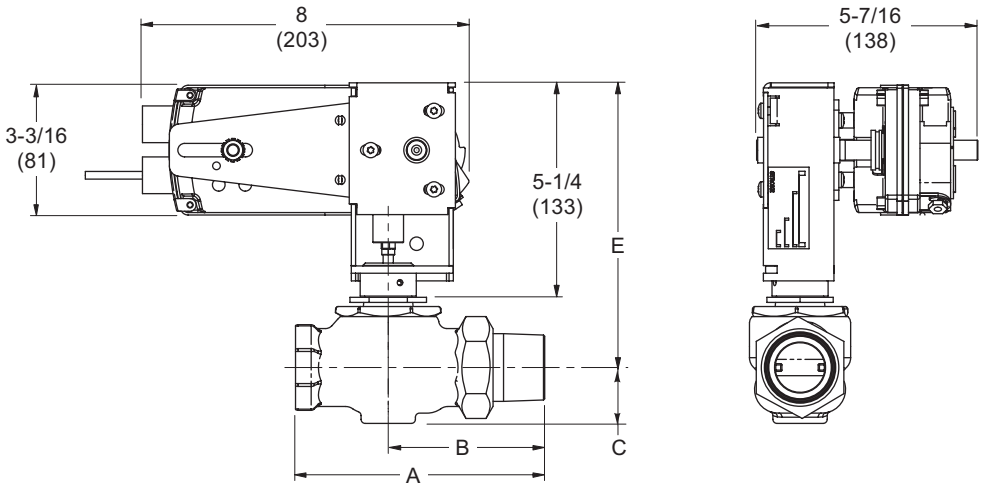


Figure-3 Mx41-6153 with 1” or 1¼” Union Straightway Globe Valve with AV-611 Linkage.

Vx-7200 & Vx-7300 ½"…2" Assemblies with AV-6xx Linkage

Dimensions — ½"…2" Globe Valve Assemblies

Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)								
		2-Way (See Figure-1 below & Figure-3 next page)					3-Way (Refer to Figure-2)			
		A	B	C	D	E	A	C	D	E
Union Straightway (N.C.) **Vx-7221-xxx-4-P**	½	4-3/16 (106)	2-11/16 (68)	1-3/16 (30)	1-1/8 (29)	7 (178)	—			
	¾	4-15/16 (125)	3-3/16 (81)	1-3/16 (30)	1-1/8 (29)	7 (178)				
	1	6 (152)	3-5/8 (92)	1¾ (44)	1-3/16 (30)	7-1/16 (179)				
	1¼	6¼ (159)	3-15/16 (100)	1¾ (44)	1-7/16 (37)	7-5/16 (186)				
Union Straightway (N.O.) **Vx-7211-xxx-4-P**	½	4-3/16 (106)	2-7/16 (62)	1-3/16 (30)	1-1/8 (29)	7 (178)	—			
	¾	4-15/16 (125)	2-13/16 (72)	1-1/16 (27)	1-1/8 (29)	7 (178)				
	1	6 (152)	3-1/8 (79)	1-3/16 (30)	1-13/16 (46)	7-11/16 (195)				
	1¼	6¼ (159)	3-5/16 (84)	1-3/8 (35)	1-13/16 (46)	7-11/16 (195)				
NPT/Metric Thread 2-Way (N.C.) **Vx-7223-xxx-4-P** **Vx-7225-xxx-4-P** 3-Way **Vx-73xx-xxx-4-P**	½	3-1/16 (78)	—	1-3/16 (30)	1-1/8 (29)	7 (178)	3-1/16 (78)	1-3/16 (30)	1-1/8 (29)	7 (178)
	¾	3-5/8 (92)		1-3/16 (30)	1-1/8 (29)	7 (178)	3-5/8 (92)	1-3/16 (30)	1-1/8 (29)	7 (178)
	1	4-5/8 (118)		1¾ (44)	1-3/16 (30)	7-1/16 (179)	4-5/8 (117)	1¾ (44)	1-3/16 (30)	7-1/16 (179)
	1¼	4-5/8 (118)		1¾ (44)	1-7/16 (37)	7-5/16 (186)	4-5/8 (117)	1¾ (44)	1-7/16 (37)	7-5/16 (186)
	1½	5-3/8 (137)		1-13/16 (46)	1-9/16 (40)	7-7/16 (189)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	7-7/16 (189)
	2	6-1/8 (156)		2¼ (57)	2¼ (57)	8-1/8 (206)	6-1/8 (156)	2¼ (57)	2¼ (57)	8-1/8 (206)
NPT/Metric Thread 2-Way (N.O.) **Vx-7213-xxx-4-P** **Vx-7215-xxx-4-P**	½	3-1/16 (78)	—	1-3/16 (30)	1-1/8 (29)	7 (178)	—			
	¾	3-5/8 (92)		1-1/16 (27)	1-1/8 (29)	7 (178)				
	1	4-5/8 (118)		1-3/16 (30)	1-13/16 (46)	7-11/16 (195)				
	1¼	4-5/8 (118)		1-3/8 (35)	1-13/16 (46)	7-11/16 (195)				
	1½	5-3/8 (137)		1½ (38)	1-7/8 (48)	7¾ (197)				
	2	6-1/8 (156)		1-9/16 (40)	2-1/8 (54)	8 (203)				

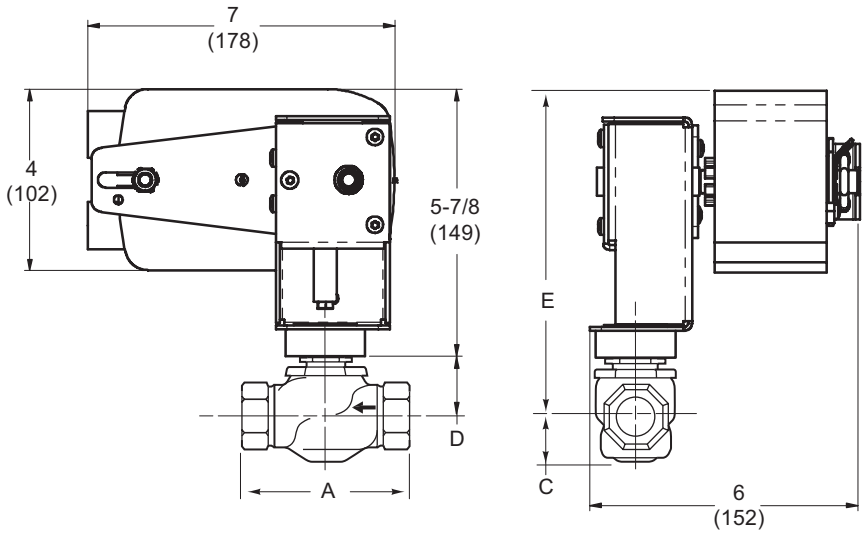


Figure-1 Mx40-704x with ½"…2" 2-Way Globe Valve With AV-611 Linkage.

Vx-7200 & Vx-7300 ½"…2" SR Assemblies with AV-611 Linkage

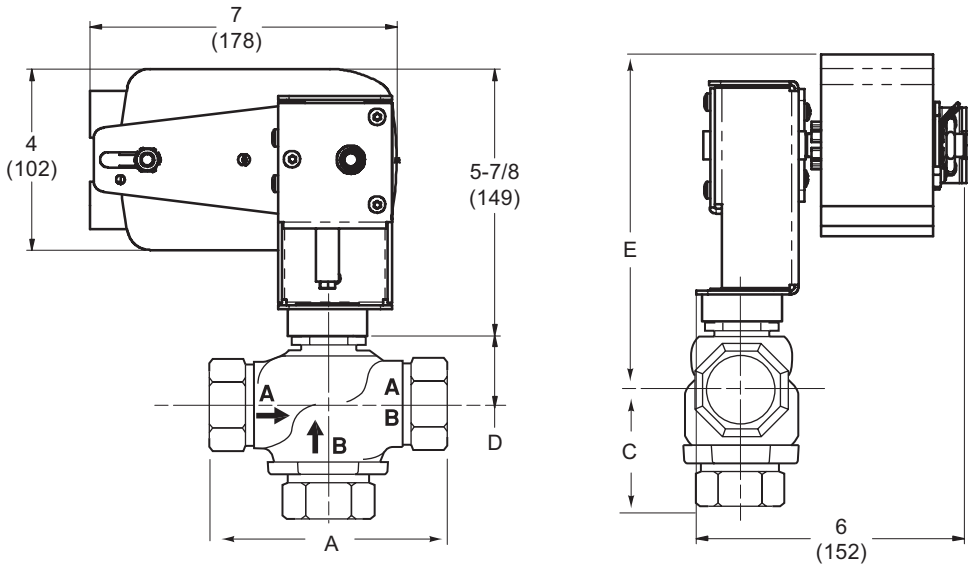


Figure-2 Mx40-704x with ½"…2" 3-Way Globe Valve With AV-611 Linkage.

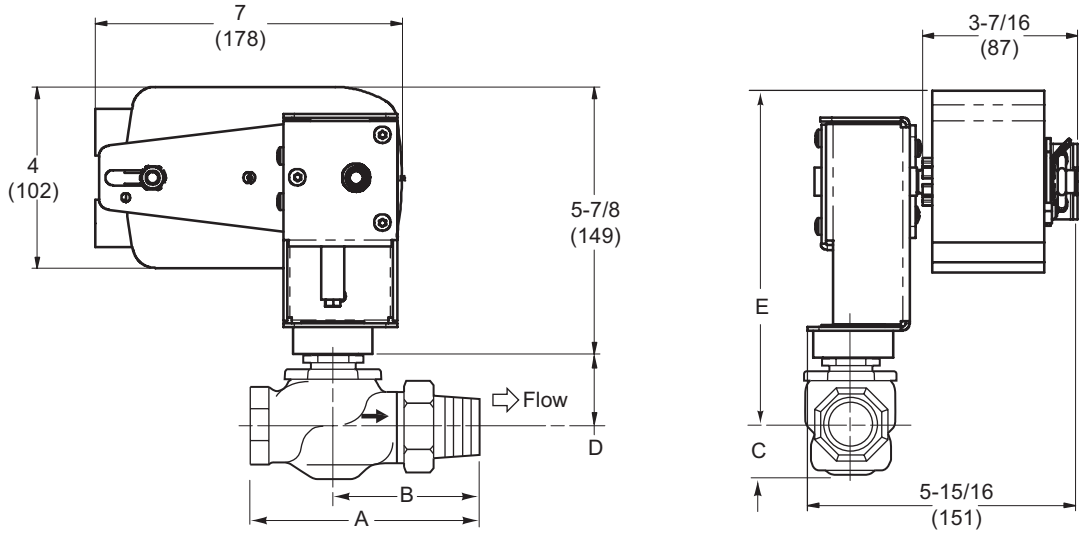


Figure-3 Mx40-704x with ½"…1¼" Union Straightway Globe Valve With AV-611 Linkage.

Vx-7200 & Vx-7300 1"…2" SR Assemblies with AV-602 Linkage

Dimensions — 1"…2" Globe Valve Assemblies

Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)								
		2-Way (Figure-1 below, Figure-3 next page.)					3-Way (Figure-2 next page.)			
		A	B	C	D	E	A	C	D	E
Union Straightway (N.C.) **Vx-7221-xxx-4-P**	1	6 (152)	3-5/8 (92)	1¾ (44)	1-3/16 (30)	12-13/16 (325)	—			
	1¼	6¼ (159)	3-15/16 (100)	1¾ (44)	1-7/16 (37)	13-1/16 (332)				
Union Straightway (N.O.) **Vx-7211-xxx-4-P**	1	6 (152)	3-1/8 (79)	1-3/16 (30)	1-13/16 (46)	13-7/16 (341)	—			
	1¼	6¼ (159)	3-5/16 (84)	1-3/8 (35)	1-13/16 (46)	13-7/16 (341)				
NPT/Metric Thread 2-Way (N.C.) **Vx-7223-xxx-4-P** **Vx-7225-xxx-4-P** 3-Way **Vx-73xx-xxx-4-P**	1	4-5/8 (118)	—	1¾ (44)	1-3/16 (30)	12-13/16 (325)	4-5/8 (118)	1¾ (44)	1-3/16 (30)	12-13/16 (325)
	1¼	4-5/8 (118)		1¾ (44)	1-7/16 (37)	13-1/16 (332)	4-5/8 (118)	1¾ (44)	1-7/16 (37)	13-1/16 (332)
	1½	5-3/8 (137)		1-13/16 (46)	1-9/16 (40)	13-3/16 (335)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	13-3/16 (335)
	2	6-1/8 (156)		2¼ (57)	2¼ (57)	13-7/8 (352)	6-1/8 (156)	2¼ (57)	2¼ (57)	13-7/8 (352)
NPT/Metric Thread 2-Way (N.O.) **Vx-7213-xxx-4-P** **Vx-7215-xxx-4-P**	1	4-5/8 (118)	—	1-3/16 (30)	1-13/16 (46)	13-7/16 (341)	—			
	1¼	4-5/8 (118)		1-3/8 (35)	1-13/16 (46)	13-7/16 (341)				
	1½	5-3/8 (137)		1½ (38)	1-7/8 (48)	13½ (343)				
	2	6-1/8 (156)		1-9/16 (40)	2-1/8 (54)	13¾ (349)				

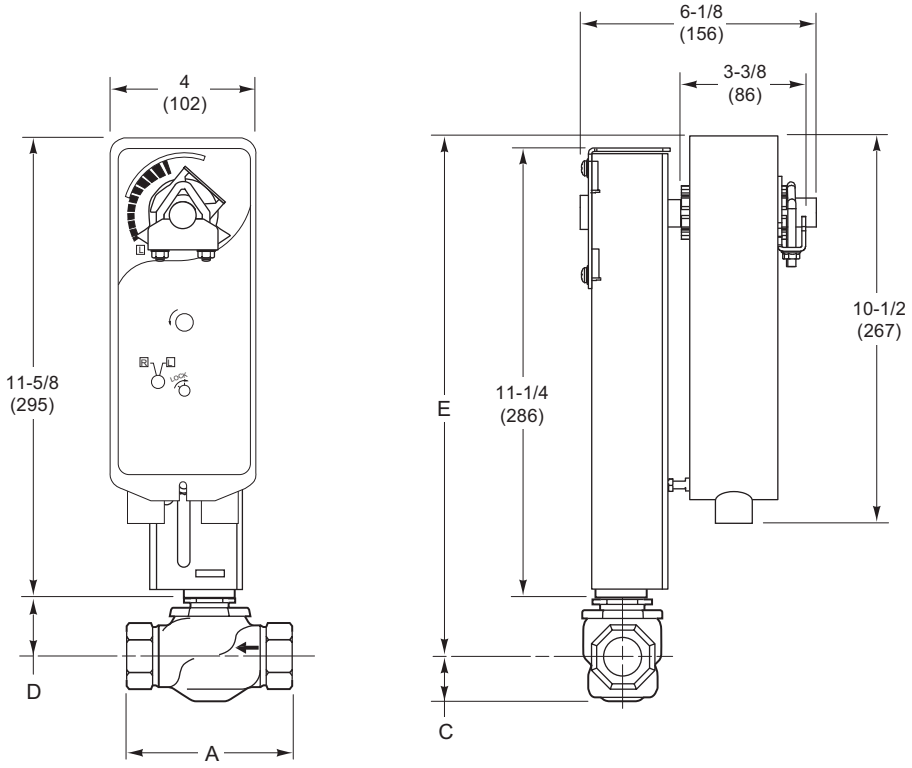


Figure-1 Mx41-715x or Mx41-707x with 1"…2" 2-Way Globe Valve With AV-602 Linkage.

Vx-7200 & Vx-7300 1”…2” SR Assemblies with AV-602 Linkage

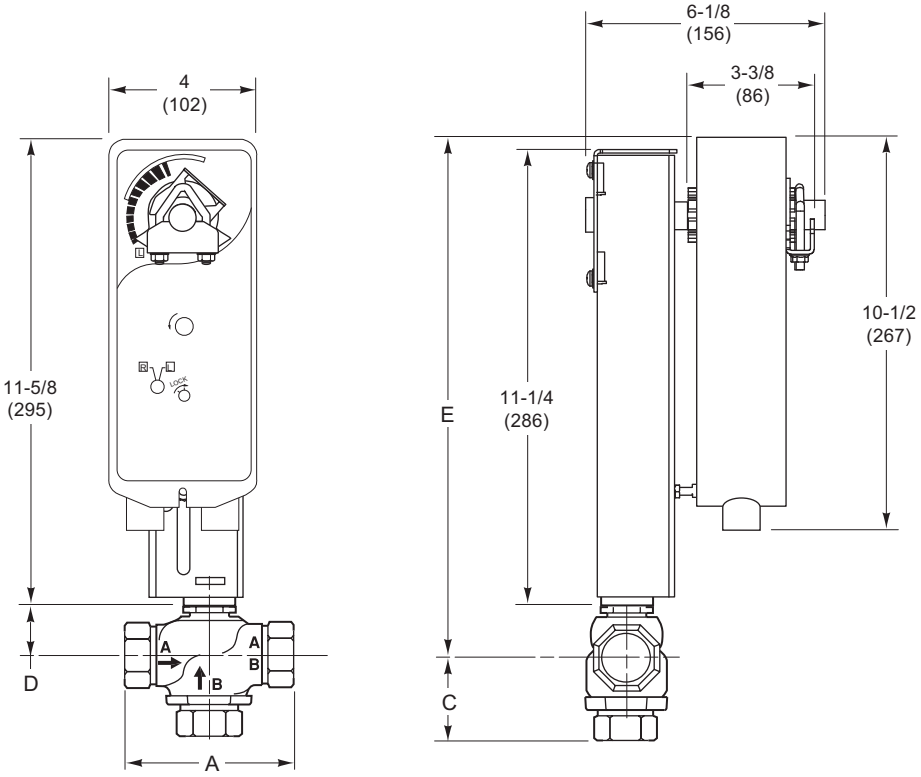


Figure-2 Mx41-715x or Mx41-707x with 1"…2" 3-Way Globe Valve With AV-602 Linkage.

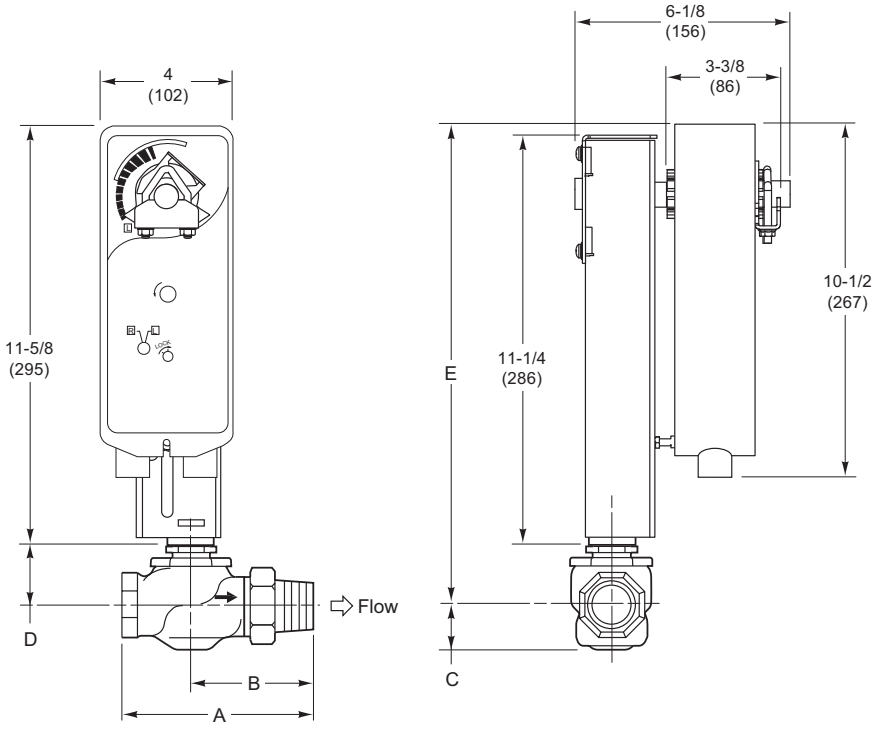


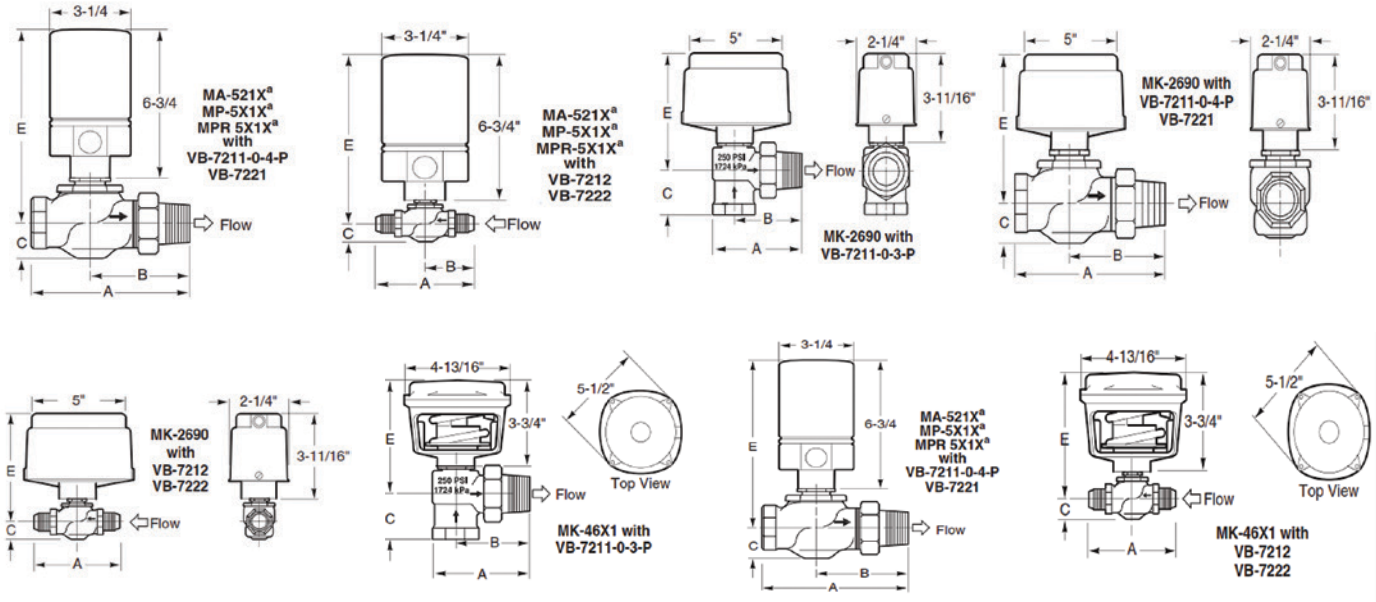
Figure-3 Mx41-715x or Mx41-707x with 1” or 1¼” Union Straightway Globe Valve With AV-602 Linkage.

2-Way Valves, Union End (½"…1¼") & Flared (½" & 5/8" O.D.)

2-Way Globe Valves, Union End (½…1¼ in.) and Flared (½ & 5/8 in. O.D.) with Electric Hydraulic and Pneumatic Actuators

Valve Body					Actuator Series		
					MA-5x1x MP-5x1x MPR-5x1x[a]	MK-2690	MK-46X1
Part Number Series	Size in.	A	B	C	E	E	E
VB-7211 (Angle)	½	3-1/8 (79)	2-3/16 (56)	1-5/8 (41)	7½ (191)	4-7/16 (113)	4/12 (114)
	¾	3-5/8 (92)	2-13/16 (71)	1-11/16 (43)	7-11/16 (195)	4-5/8 (117)	4-5/8 (117)
	1	4-1/16 (103)	3 (76)	1-13/16 (30	8-3/16 (208)	5¼ (133)	5¼ (133)
	1¼	4-5/16 (110)	3-5/16 (84)	2-3/16 (56)	8½ (216)	5-3/8 (136)	5-3/8 (136)
VB-7211 (Straight)	½	4-3/16 (106)	2-11/16 (68)	1-1/16 (27)	7-7/8 (200)	4-13/16 (122)	4-7/8 (124)
	¾	4-15/16 (125)	3-3/16 (81)	1-1/16 (27)	7-7/8 (200)	4-13/16 (122)	4-7/8 (124)
	1	6 (152)	3-5/8 (92)	1¾ (44)	8-9/16 (217)	5½ (140)	5½ (140)
	1¼	6¼ (159)	3-15/16 (100)	1-3/8 (35)	8-9/16 (217)	5½ (140)	5½ (140)
VB-7212	5/8	4 (102)	2 (51)	1-1/16 (27)	7-7/8 (200)	4-13/16 (122)	4-7/8 (124)
VB-7221	½	3 (76)	2-11/16 (68)	1-1/16 (27)	7-7/8 (200)	4-13/16 (122)	4-7/8 (124)
	¾	3-5/8 (92)	3-3/16 (81)	1-1/16 (27)	7-7/8 (200)	4-3/16 (106)	4-7/8 (124)
	1	4-5/8 (117)	3-5/8 (92)	1¾ (44)	8-9/16 (217)	5½ (140)	5½ (140)
	1¼	4-5/8 (117)	3-15/16 (100)	1-3/8 (35)	8-9/16 (217)	5½ (140)	5½ (140)
VB-7222	5/8	4 (102)	2 (51)	1-3/16 (30)	7-7/8 (200)	4-13/16 (122)	4-7/8 (124)

[a]Add 2-3/32 in. (53 mm) to the "E" dimension for a valve assembly using an AV-601 linkage extension.



2-Way Valves, Screwed & Union Sweat (½"…2") Hydraulic Actuators

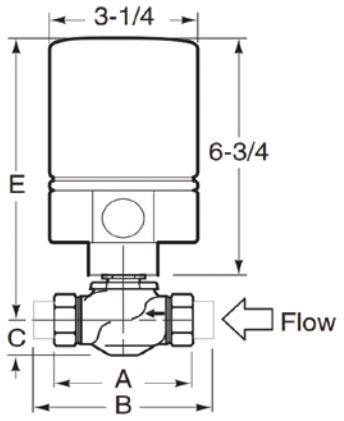
2-Way Globe Valves, Screwed and Union Sweat (½"…2") with Hydraulic Actuators					
Valve Body					Actuator Series
					MA/MP/MPR-5XXX[a]
Part Number	Size In.	A	B[b]	C	E
VB-7213-0-4-P VB-7214-0-4-P	½	3 (76)	4-3/16 (106)	1-1/16 (27)	7-15/16 (202)
	¾	3-5/8 (92)	5-7/16 (138)	1-1/16 (27)	7-15/16 (202)
	1	4-5/8 (117)	6-5/8 (168)	1-1/8 (29)	8-9/16 (217)
	1¼		6-13/16 (173)	1-3/8 (35)	8-9/16 (217)
	1½	5-3/8 (137)	8-5/16 (211)	1½ (38)	8-5/8 (219)
	2	6-1/8 (156)	9-3/16 (233)	1-9/16 (40)	8-7/8 (225)
VB-7253-0-4-P VB-7273-0-4-P	½	3 (76)	4-3/16 (106)	1-3/16 (30)	7-15/16 (202)
	¾	3-5/8 (92)	5-7/16 (138)	1-3/16 (30)	7-15/16 (202)
	1	4-5/8 (117)	6-5/8 (168)	1-1/8 (29)	8-9/16 (217)
	1¼		6-13/16 (173)	1-3/8 (35)	8-9/16 (217)
	1½	5-3/8 (137)	8-5/16 (211)	1½ (38)	8-5/8 (219)
	2	6-1/8 (156)	9-3/16 (233)	1-9/16 (40)	8-7/8 (225)
VB-7223-0-4-P VB-7224-0-4-P VB-7263-0-4-P VB-7283-0-4-P	½	3 (76)	4-3/16 (106)	1¼ (32)	7-15/16 (202)
	¾	3-5/8 (92)	5-7/16 (138)	1¼ (32)	7-15/16 (202)
	1	4-5/8 (117)	6-5/8 (168)	1¾ (44)	7-15/16 (202)
	1¼		6-13/16 (173)	1¾ (44)	8-3/16 (208)
	1½	5-3/8 (137)	8-5/16 (211)	1-13/16 (46)	8-5/16 (211)
	2	6-1/8 (156)	9-3/16 (233)	2-1/16 (52)	8-3/8 (213)

[a]Add 2-3/32 in. (53 mm) to the "E" dimension for a valve assembly using an AV-601 linkage extension.

[b]Use B dimension for VB-7214 and VB-7224 valve bodies.

NOTE: Allow 3 inches clearance above actuator for removal. Mount MA/MP/MPR-5XXX actuators above the valve body at 45° from vertical.

MA/MP/MPR-5XXX[a] with
VB-7213-0-4-P
VB-7214-0-4-P
VB-7223-0-4-P
VB-7224-0-4-P

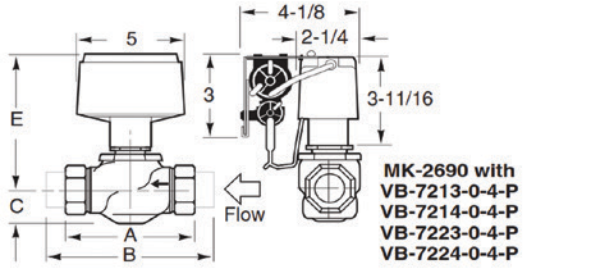


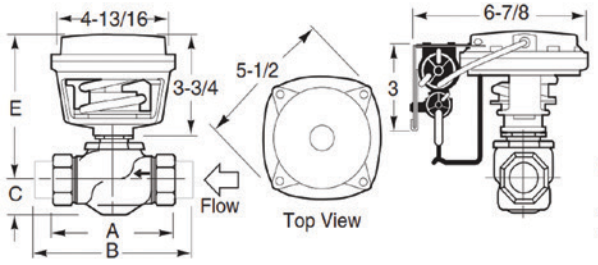
[a]AV-601 linkage extension (not shown) required for hot water applications for MP-54XX, MPR-5XXX, MP-55XX.

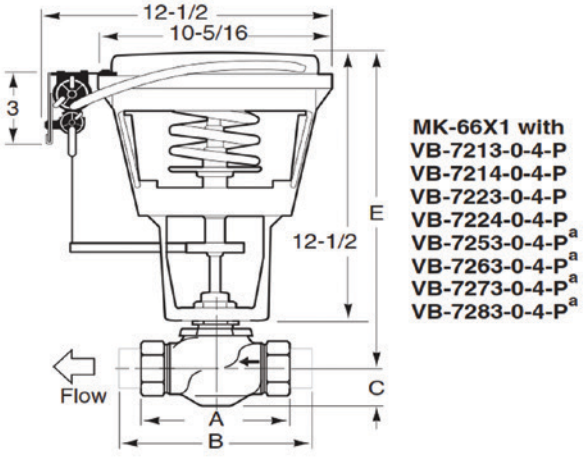
2-Way Valves, Screwed & Union Sweat (½"…2") Pneumatic Actuators

2-Way Globe Valves, Screwed and Union Sweat (½"…2") with Pneumatic Actuators							
Valve Body					Actuator Series		
					200	300	600
					MK-2690	MK-46X1	MK-6XX1
Part Number	Size In.	A	B[a]	C	E	E	E
VB-7213-0-4-P VB-7214-0-4-P	½	3 (76)	4-3/16 (106)	1-1/16 (27)	4-13/16 (122)	4-7/8 (124)	13-5/8 (346)
	¾	3-5/8 (92)	5-7/16 (138)	1-1/16 (27)	4-13/16 (122)	4-7/8 (124)	13-5/8 (346)
	1	4-5/8 (117)	6-5/8 (168)	1-1/8 (29)	5½ (140)	5½ (140)	14-5/16 (364)
	1¼		6-13/16 (173)	1-3/8 (35)	5½ (140)	5½ (140)	14-5/16 (364)
	1½	5-3/8 (137)	8-5/16 (211)	1½ (38)	5-9/16 (141)	5-5/8 (143)	14-3/8 (365)
	2	6-1/8 (156)	9-3/16 (233)	1-9/16 (40)	5-13/16 (148)	5-7/8 (149)	14-5/8 (371)
VB-7253-0-4-P VB-7273-0-4-P	½	3 (76)	4-3/16 (106)	1-3/16 (30)	4-13/16 (122)	4-7/8 (124)	13-5/8 (346)
	¾	3-5/8 (92)	5-7/16 (138)	1-3/16 (30)	4-13/16 (122)	4-7/8 (124)	13-5/8 (346)
	1	4-5/8 (117)	6-5/8 (168)	1-1/8 (29)	5½ (140)	5½ (140)	14-5/16 (364)
	1¼		6-13/16 (173)	1-3/8 (35)	5½ (140)	5½ (140)	14-5/16 (364)
	1½	5-3/8 (137)	8-5/16 (211)	1½ (38)	5-9/16 (141)	5-5/8 (143)	14-3/8 (365)
	2	6-1/8 (156)	9-3/16 (233)	1-9/16 (40)	5-13/16 (148)	5-7/8 (149)	14-5/8 (371)
VB-7223-0-4-P VB-7224-0-4-P VB-7263-0-4-P VB-7283-0-4-P	½	3 (76)	4-3/16 (106)	1¼ (32)	4-13/16 (122)	4-7/8 (124)	13-5/8 (346)
	¾	3-5/8 (92)	5-7/16 (138)	1¼ (32)	4-13/16 (122)	4-7/8 (124)	13-5/8 (346)
	1	4-5/8 (117)	6-5/8 (168)	1¾ (44)	4-13/16 (122)	4-15/16 (125)	13-11/16 (347)
	1¼		6-13/16 (173)	1¾ (44)	5-1/16 (129)	5-1/8 (130)	13-15/16 (354)
	1½	5-3/8 (137)	8-5/16 (211)	1-13/16 (46)	5-3/16 (132)	5-5/16 (135)	14-1/16 (357)
	2	6-1/8 (156)	9-3/16 (233)	2-1/16 (52)	5-5/16 (135)	5-7/16 (138)	14-1/8 (358)

[a]Use B dimension for VB-7214 and VB-7224 valve bodies.







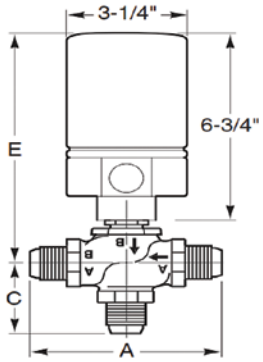
[a]Not available factory assembled.

(Actuators shown with optional Positive Positioner.)

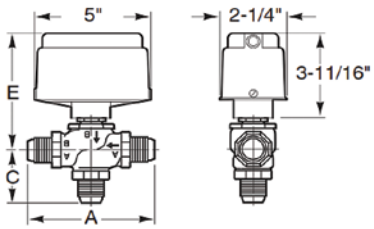
3-Way Mixing & Sequencing Valves, Flared (5/8" O.D.)

3-Way Mixing and Sequencing Globe Valves, Flared (5/8" O.D.) with Electric Hydraulic and Pneumatic Actuators						
Valve Body				Valve Assembly (Actuator Type)		
				VK-73X2-2XX (MK-2690)	VK-73X2-3XX (MK-46X1)	VA-7312-2X1, VS-73X2-2X1 (MX-5X1X, MPR-5X1X)[a]
Part Number Series	Size (in.)	A	C	E	E	E
VB-7312 VB-7332	5/8	4 (102)	2¼ (57)	4-13/16 (122)	5 (127)	7-7/8 (200)

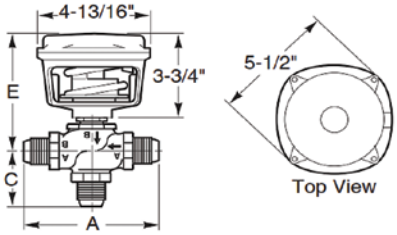
[a]Add 2-1/32 in. (52 mm) to the "E" dimension for a valve assembly using an AV-601 linkage extension.
NOTE: Allow 3 inches clearance above actuator for removal. Mount MA/MP/MPR-5XXX actuators above the valve body at 45° from vertical.



MA-521X
MP-5X1X[a]
MPR-5X1X[a]
MP-5X1X[a]
with
VB-7312
VB-7332



MK-2690
with
VB-7312
VB-7332



MK-46X1
with
VB-7312
VB-7332

[a]AV-601 linkage extension (not shown) required for hot water applications. Refer to page 78.

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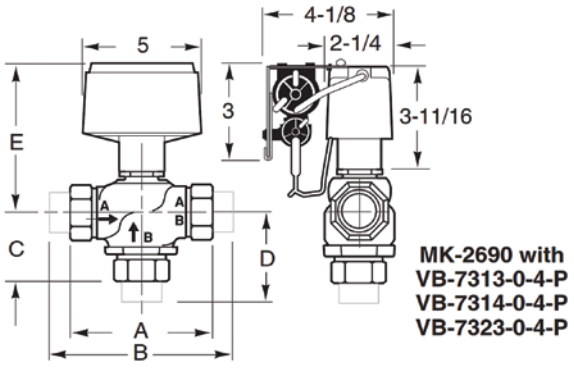
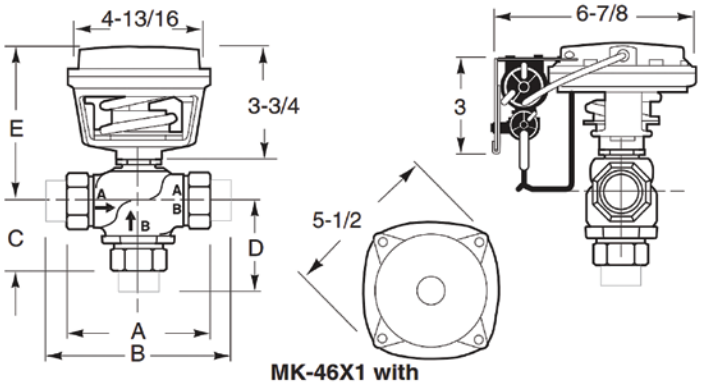
3-Way Mixing, Diverting, Screwed & Union Sweat (½"…2")

3-Way Globe Valves, Mixing, Diverting , Screwed & Union Sweat (½"…2") Pneumatic Actuators								
Valve Body						Actuator Code (XXX) (Actuator)		
						2XX (MK-2690)	30X (MK-46X1)	6XX (MK-6XX1)
Part Number	Size in.	A	B[a]	C	Da	E	E	E
VB-7313-0-4-P VB-7314-0-4-P[a] VB-7323-0-4-P	½	3 (76)	4-3/16 (106)	1-3/8 (35)	2-5/16 (59)	4-13/16 (122)	4-7/8 (124)	13-5/8 (346)
	¾	3-5/8 (92)	5-7/16 (138)	1-11/16 (43)	2-5/8 (67)	4-13/16 (122)	4-7/8 (124)	13-5/8 (346)
	1	4-5/8 (117)	6-5/8 (168)	1-9/16 (40)	3-1/8 (79)	4-7/8 (124)	4-15/16 (125)	13-11/16 (348)
	1¼		6-13/16 (173)	1-5/8 (41)	3-7/16 (86)	5-1/8 (130)	5-1/8 (130)	13-15/16 (354)
	1½	5-3/8 (137)	8-5/16 (211)	1-5/8 (41)	3¾ (95)	5¼ (133)	5¼ (133)	14-1/16 (357)
	2	6-1/8 (156)	9-3/16 (233)	1-7/8 (48)	4-3/16 (106)	5-5/16 (135)	5-3/8 (136)	14-1/8 (359)

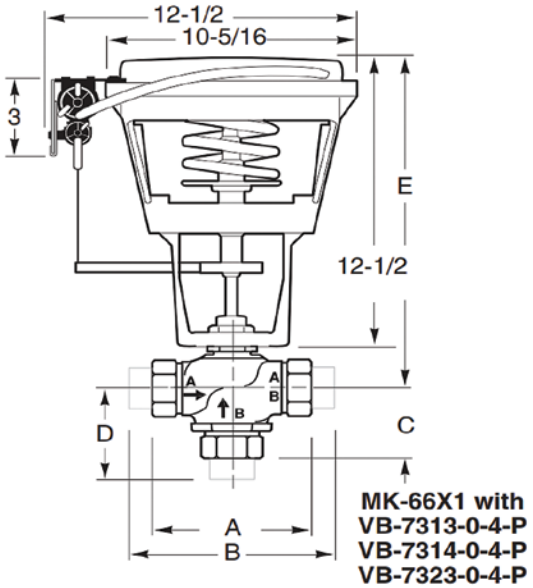
[a]Use B and D dimensions for VB-7314 valve body.



MK-2690 with
VB-7313-0-4-P
VB-7314-0-4-P
VB-7323-0-4-P



MK-46X1 with
VB-7313-0-4-P
VB-7314-0-4-P
VB-7323-0-4-P



MK-66X1 with
VB-7313-0-4-P
VB-7314-0-4-P
VB-7323-0-4-P

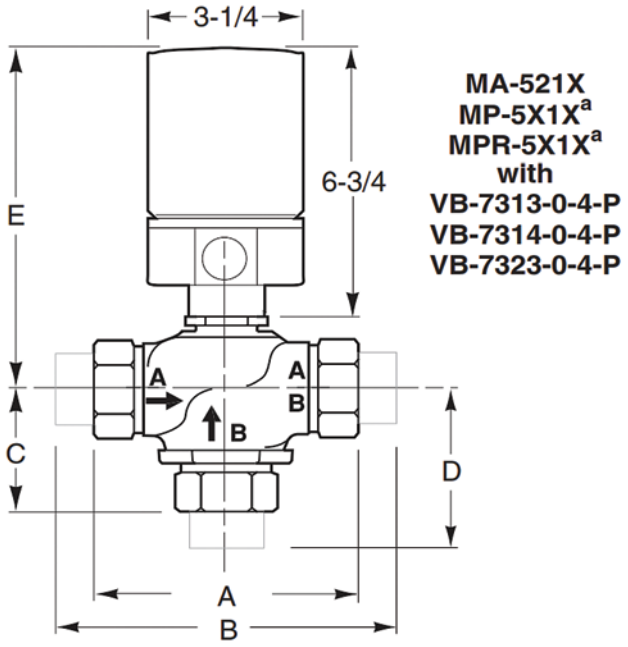
(Actuators shown with optional Positive Positioner.)

3-Way Mixing, Diverting, Screwed & Union Sweat (½"…2")

3-Way Globe Valves, Mixing (½…2" in.), Diverting (½…2" in.), and Screwed, Union Sweat (½…2" in.) with Hydraulic Actuators						
Valve Body						Actuator Series
						MA/MP/MPR-5XXX[a]
Part Number	Size (in.)	A	B[b]	C	D[b]	E
VB-7313-0-4-P VB-7314-0-4-P VB-7323-0-4-P	½	3 (76)	4-3/16 (106)	1-3/8 (35)	2-5/16 (59)	7-7/8 (200)
	¾	3-5/8 (92)	5-7/16 (138)	1-11/16(43)	2-5/8 (67)	7-7/8 (200)
	1	4-5/8 (117)	6-5/8 (168)	1-9/16 (40)	3-1/8 (79)	7-15/16 (202)
	1¼		6-13/16 (173)	1-5/8 (41)	3-7/16 (86)	8-3/16 (208)
	1½	5-3/8 (137)	8-5/16 (211)	1-9/16 (40)	3¾ (121)	8-5/16 (211)
	2	6-1/8 (156)	9-3/16 (233)	1-7/8 (48)	4-3/16 (106)	8-3/8 (213)

[a]Add 2-3/32 in. (53 mm) to the "E" dimension for a valve assembly using an AV-601 linkage extension.

[b]Use B and D dimensions for VB-7314 valve body.



[a]AV-601 linkage extension (not shown) required for hot water applications.

Dimensions - 2-Way Valves (see Figure-1 and Figure-2 on next page.)					
Valve Body Part Number	Size	Dimensions in Inches (mm)			
		A	B	C	Screw Mount Style[a]-D
VB-7211-0-3-P	½“	3-1/8 (79)	1-5/8 (41)	¾ (19)	7-13/32 (188)
	¾ “	3-5/8 (92)	1-11/16 (43)	15/16 (24)	7-19/32 (193)
	1 “	4-1/16 (103)	1-15/16 (49)	1¼ (32)	7-29/32 (201)
	1¼ “	4-5/16 (110)	2-3/16 (56)	1-11/16 (43)	8-11/32 (212)
VB-7211-0-4-P	½ ‘	4-3/16 (106)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	¾“	4-15/16 (125)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	1“	6 (152)	1-1/8 (29)	1-3/16 (30)	7-27/32 (199)
	1¼“	6¼ (159)	1-3/8 (35)	1-7/16 (37)	8-3/32 (206)
VB-7212-0-4-P	5/8“ O.D.	4 (102)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
VB-7213-0-4-P VB-7215-0-4-P VB-7253-0-4-P VB-7273-0-4-P	½” (15 mm)	3 (76)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	¾“ (20 mm)	3-5/8 (92)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	1“ (25 mm)	4-5/8 (117)	1-1/8 (29)	1-3/16 (30)	7-27/32 (199)
	1¼“ (32 mm)	4-5/8 (117)	1-3/8 (35)	1-7/16 (37)	8-3/32 (206)
	1½ (40 mm)	5-3/8 (137)	1½ (38)	1-7/8 (48)	8-17/32 (217)
	2“(50 mm)	6-1/8 (156)	1-9/16 (40)	2-1/854)	8-25/32 (223)
VB-7214-0-4-P	½“	4-3/16 (106)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	¾“	5-7/16 (138)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	1“	6-5/8 (168)	1-1/8 (29)	1-3/16 (30)	7-27/32 (199)
	1¼“	6-13/16 (173)	1-3/8 (35)	1-7/16 (37)	8-3/32 (206)
	1½“	8-5/16 (211)	1½ (38)	1-7/8 (48)	8-17/32 (217)
	2“	9-3/16 (233)	1-9/16 (40)	2-1/854)	8-25/32 (223)
VB-7221-0-4-P	½”	4-3/16 (106)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
	¾”	4-15/16 (125)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
	1”	6 (152)	1¾ (45)	1-3/16 (30)	7-27/32 (199)
	1¼”	6¼ (159)	1¾ (45)	1-7/16 (37)	8-3/32 (206)
VB-7222-0-4-P	5/8” OD	4 (102)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
VB-7223-0-4-P VB-7225-0-4-P VB-7263-0-4-P VB-7283-0-4-P	½” (15 mm)	3-1/16 (78)	1-3/16 (30)	1-1/8 (29)	7-25/32 (198)
	¾“ (20 mm)	3-5/8 (92)	1-3/16 (30)	1-1/8 (29)	7-25/32 (198)
	1“ (25 mm)	4-5/8 (117)	1¾ (44)	1-3/16 (30)	7-27/32 (199)
	1¼“ (32 mm)	4-5/8 (117)	1¾ (44)	1-7/16 (37)	8-3/32 (206)
	1½ (40 mm)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	8-7/32 (209)
	2“ (50 mm)	6-1/8 (156)	2¼ (57)	1-5/8 (42)	8-9/32 (210)
VB-7224-0-4-P	½”	4-3/16 (106)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
	¾”	5-7/16 (138)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
	1”	6-5/8 (168)	1¾ (45)	1-3/16 (30)	7-27/32 (199)
	1¼”	6-13/16 (173)	1¾ (45)	1-7/16 (37)	8-3/32 (206)
	1½”	8-5/16 (211)	1-13/16 (45)	1-9/16 (40)	8-7/32 (209)
	2”	9-3/16 (233)	2-1/16 (53)	1-5/8 (42)	8-9/32 (210)

[a]Assembly height, centerline of valve body to top of actuator (see Figure-1). Leave an additional 3” (76 mm) clearance for cover removal.

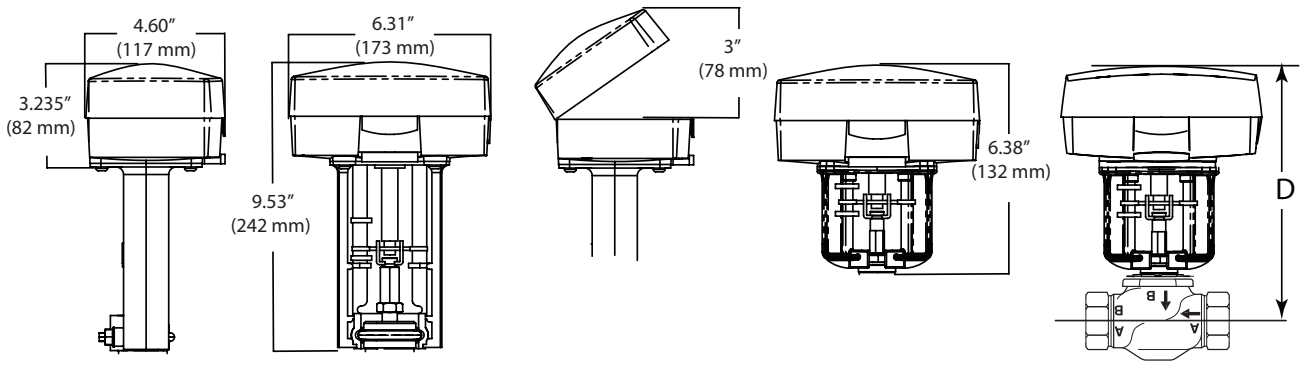


Figure-1 Forta Actuator Dimensions

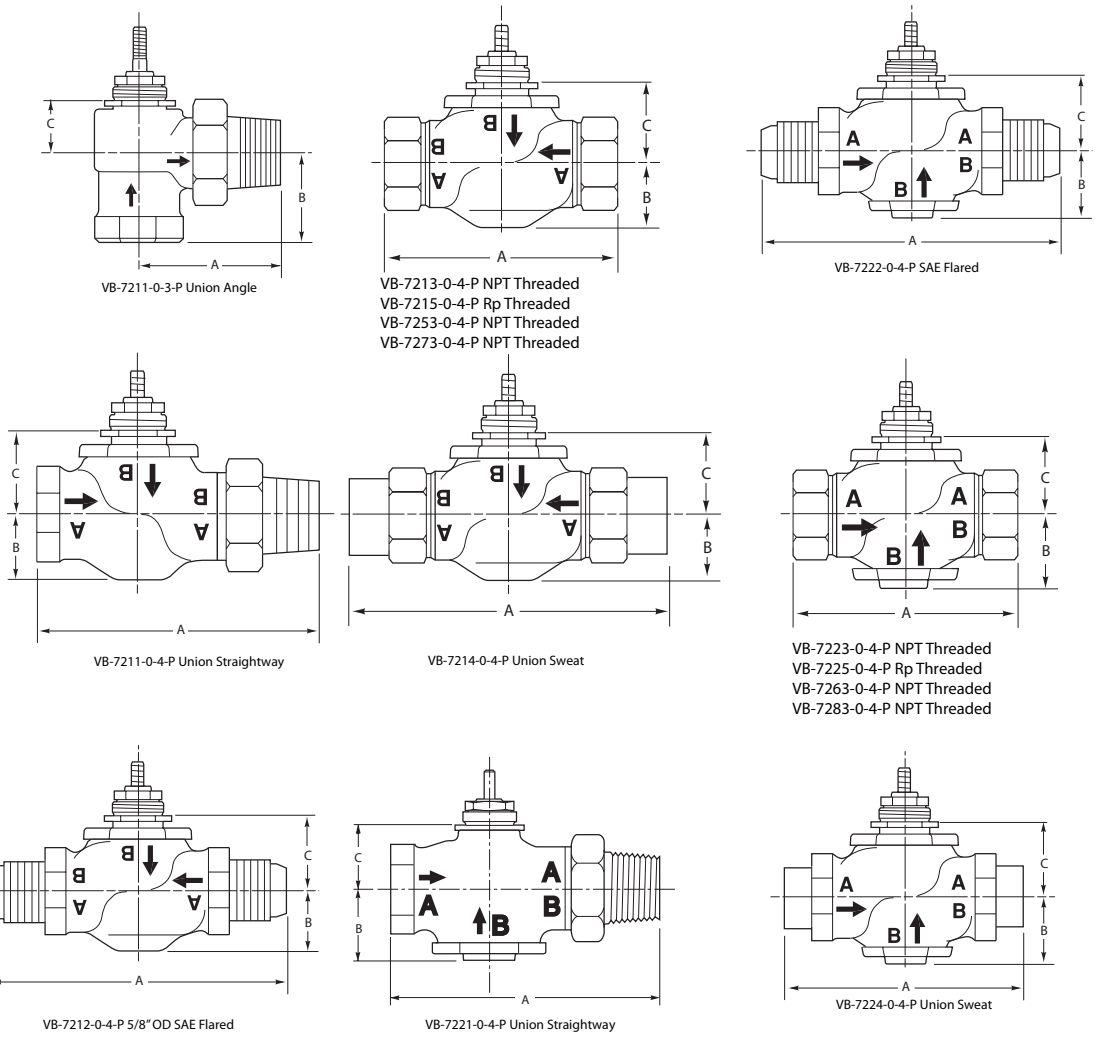


Figure-2 VB-72xx Valve Dimensions

Dimensions - 3-Way Valves (See Figure-1 and Figure-3 below.)					
Valve Body Part Number	Size	Dimensions in Inches (mm)			
		A	B	C	Screw Mount Style[a]-D
VB-7312-0-4-P	5/8" OD	4 (102	2¼ (57)	1-1/8 (29)	7-25/32 (198)
VB-7313-0-4-P VB-7315-0-4-P	½" (15 mm)	3-1/16 (76)	1¾ (44)	1-1/8 (29)	7-25/32 (198)
	¾"" (20 mm)	3-5/8 (92)	1-13/16 (46)	1-1/8 (29)	7-25/32 (198)
	1" (25 mm)	4-5/8 (118)	1¾ (44)	1-3/16 (30)	7-27/32 (199)
	1¼" (32 mm)	4-5/8 (118)	1¾ (44)	1-7/16 (37)	8-3/32 (206)
	1½" (40 mm)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	8-7/32 (209)
	2" (50 mm)	6-1/8 (156)	2¼ (57)	1-5/8 (42)	8-9/32 (210)
VB-7314-0-4-P	½"	4-3/16 (106)	2-5/16 (59)	1-1/8 (29)	7-25/32 (198)
	¾"	5-7/16 (138)	2-5/8 (67)	1-1/8 (29)	7-25/32 (198)
	1"	6-5/8 (168)	3-3/16 (81)	1-3/16 (30)	7-27/32 (199)
	1¼"	6-13/16 (173)	3-7/16 (87)	1-7/16 (37)	8-3/32 (206)
	1½"	8-5/16 (211)	3¾ (95)	1-9/16 (40)	8-7/32 (209)
	2"	9-3/16 (233)	4-3/16 (106)	1-5/8 (42)	8-9/32 (210)
VB-7323-0-4-P	½"	3-1/16 (76)	1-3/8 (35)	1-1/8 (29)	7-25/32 (198)
	¾"	3-5/8 (92)	1-11/16 (43)	1-1/8 (29)	7-25/32 (198)
	1"	4-5/8 (118)	1-9/16 (40)	1-3/16 (30)	7-27/32 (199)
	1¼"	4-5/8 (118)	1-5/8 (41)	1-7/16 (37)	8-3/32 (206)
	1½"	5-3/8 (137)	1-11/16 (43)	1-9/16 (40)	8-7/32 (209)
	2"	6-1/8 (156)	1-7/8 (48)	1-5/8 (42)	8-9/32 (210)

[a]Assembly height, centerline of valve body to top of the actuator (see Figure 1 on previous page). Leave an additional 3" (76mm) clearance for cover removal.

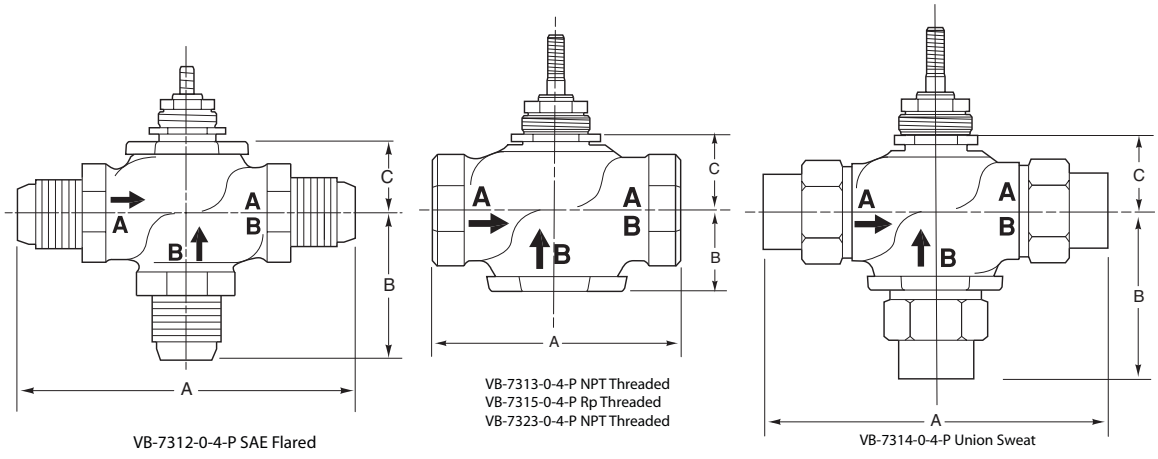


Figure-3 3-Way VB-73xx Valve Body Dimensions

Forta SR M900Axx (VB) with VB-7200 Valves

Dimensions - 2-Way Valves (see Figure-1 and Figure-2 on next page.)					
Valve Body Part Number	Size	Dimensions in Inches (mm)			
		A	B	C	D - M900Axx-VB Screw Mount Style[a]
VB-7211-0-3-P	½"	3-1/8 (79)	1-5/8 (41)	¾ (19)	7-13/32 (188)
	¾"	3-5/8 (92)	1-11/16 (43)	15/16 (24)	7-19/32 (193)
	1"	4-1/16 (103)	1-15/16 (49)	1¼ (32)	7-29/32 (201)
	1¼"	4-5/16 (110)	2-3/16 (56)	1-11/16 (43)	8-11/32 (212)
VB-7211-0-4-P	½"	4-3/16 (106)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	¾"	4-15/16 (125)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	1"	6 (152)	1-1/8 (29)	1-3/16 (30)	7-27/32 (199)
	1¼"	6¼ (159)	1-3/8 (35)	1-7/16 (37)	8-3/32 (206)
VB-7212-0-4-P	5/8" O.D.	4 (102)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
VB-7213-0-4-P VB-7215-0-4-P VB-7253-0-4-P VB-7273-0-4-P	½" (15 mm)	3 (76)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	¾" (20 mm)	3-5/8 (92)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	1" (25 mm)	4-5/8 (117)	1-1/8 (29)	1-3/16 (30)	7-27/32 (199)
	1¼" (32 mm)	4-5/8 (117)	1-3/8 (35)	1-7/16 (37)	8-3/32 (206)
	1½" (40 mm)	5-3/8 (137)	1½ (38)	1-7/8 (48)	8-17/32 (217)
	2" (50 mm)	6-1/8 (156)	1-9/16 (40)	2-1/8 (54)	8-25/32 (223)
VB-7214-0-4-P	½"	4-3/16 (106)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	¾"	5-7/16 (138)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	1"	6-5/8 (168)	1-1/8 (29)	1-3/16 (30)	7-27/32 (199)
	1¼"	6-13/16 (173)	1-3/8 (35)	1-7/16 (37)	8-3/32 (206)
	1½"	8-5/16 (211)	1½ (38)	1-7/8 (48)	8-17/32 (217)
	2"	9-3/16 (233)	1-9/16 (40)	2-1/8 (54)	8-25/32 (223)
VB-7221-0-4-P	½"	4-3/16 (106)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
	¾"	4-15/16 (125)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
	1"	6 (152)	1¾ (45)	1-3/16 (30)	7-27/32 (199)
	1¼"	6¼ (159)	1¾ (45)	1-7/16 (37)	8-3/32 (206)
VB-7222-0-4-P	5/8" O.D.	4 (102)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
VB-7223-0-4-P VB-7225-0-4-P VB-7263-0-4-P VB-7283-0-4-P	½" (15 mm)	3-1/16 (78)	1-3/16 (30)	1-1/8 (29)	7-25/32 (198)
	¾" (20 mm)	3-5/8 (92)	1-3/16 (30)	1-1/8 (29)	7-25/32 (198)
	1" (25 mm)	4-5/8 (117)	1¾ (44)	1-3/16 (30)	7-27/32 (199)
	1¼" (32 mm)	4-5/8 (117)	1¾ (44)	1-7/16 (37)	8-3/32 (206)
	1½" (40 mm)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	8-7/32 (209)
	2" (50 mm)	6-1/8 (156)	2¼ (57)	1-5/8 (42)	8-9/32 (210)
VB-7224-0-4-P	½"	4-3/16 (106)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
	¾"	5-7/16 (138)	1¼ (32)	1-1/8 (29)	7-25/32 (198)
	1"	6-5/8 (168)	1¾ (45)	1-3/16 (30)	7-27/32 (199)
	1¼"	6-13/16 (173)	1¾ (45)	1-7/16 (37)	8-3/32 (206)
	1½"	8-5/16 (211)	1-13/16 (45)	1-9/16 (40)	8-7/32 (209)
	2"	9-3/16 (233)	2-1/16 (53)	1-5/8 (42)	8-9/32 (210)

[a]Assembly height, centerline of valve body to top of actuator (see Figure-1). For M900Axx-xx, leave an additional 3" (76 mm) and for M900AxW-xx leave additional 5" (127 mm) clearance for cover removal.

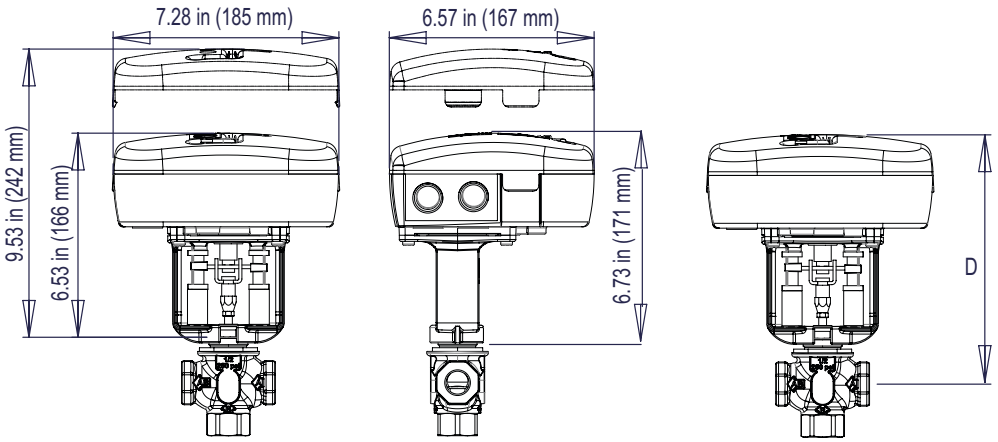


Figure-1 Forta M900Axx-VB Style Dimensions[a]

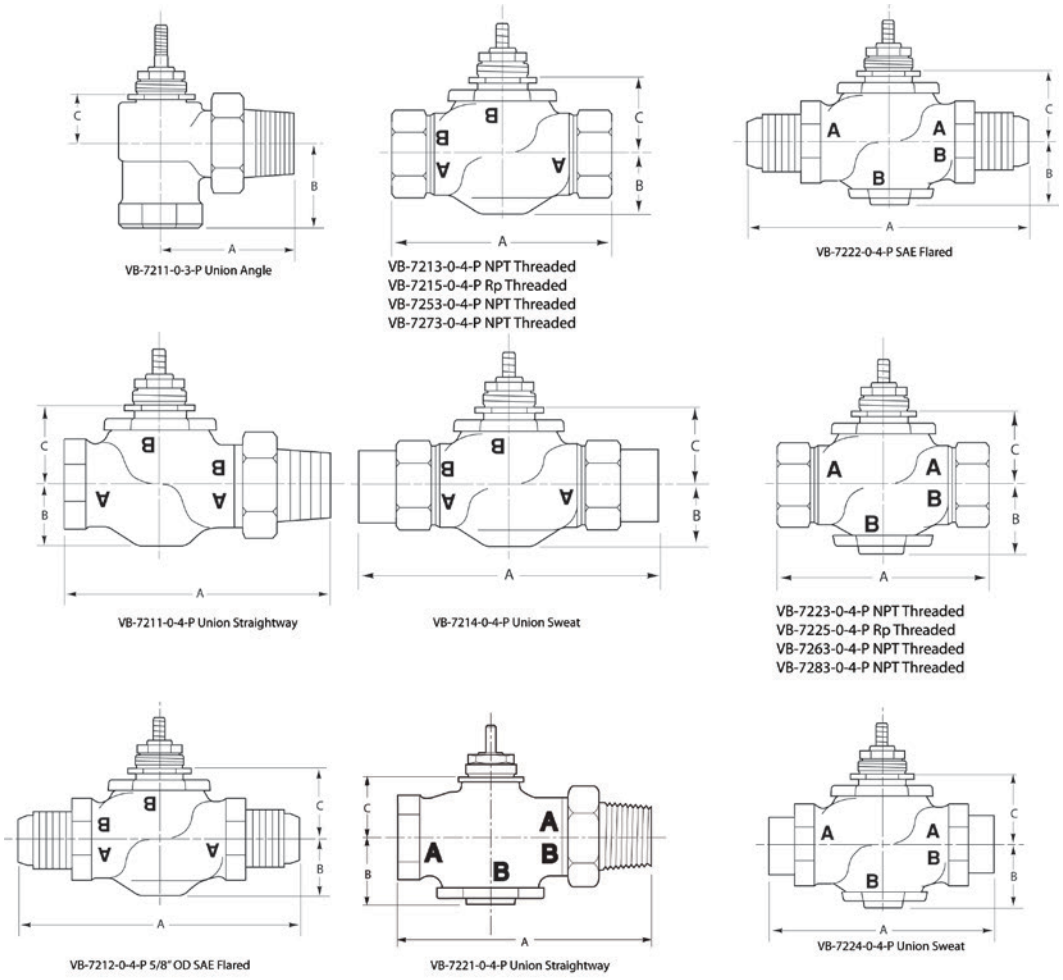


Figure-2 2-Way VB-7xxx Valve Body Dimensions

[a]M900Axx-VB (NEMA ½) model shown. The recommended clearance above the actuator to remove M900Ax actuator cover is 3" (76 mm) and M900AxW actuator cover is 5 " (127 mm).

Dimensions - 3-Way Valves (See Figure-1 on previous page and Figure-3 below.)					
Valve Body Part Number	Size	Dimensions in Inches (mm)			
		A	B	C	D - M900Axx-VB Screw Mount Style[a]
VB-7312-0-4-P	5/8" OD	4 (102)	2¼ (57)	1-1/8 (29)	7-25/32 (198)
VB-7313-0-4-P VB-7315-0-4-P	½" (15 mm)	3-1/16 (76)	1¾ (44)	1-1/8 (29)	7-25/32 (198)
	¾" (20 mm)	3-5/8 (92)	1-13/16 (46)	1-1/8 (29)	7-25/32 (198)
	1" (25 mm)	4-5/8 (118)	1¾ (44)	1-3/16 (30)	7-27/32 (199)
	1¼" (32 mm)	4-5/8 (118)	1¾ (44)	1-7/16 (37)	8-3/32 (206)
	1½" (40 mm)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	8-7/32 (209)
	2" (50 mm)	6-1/8 (156)	2¼ (57)	1-5/8 (42)	8-9/32 (210)
VB-7314-0-4-P	½"	4-3/16 (106)	2-5/16 (59)	1-1/8 (29)	7-25/32 (198)
	¾"	5-7/16 (138)	2-5/8 (67)	1-1/8 (29)	7-25/32 (198)
	1"	6-5/8 (168)	3-3/16 (81)	1-3/16 (30)	7-27/32 (199)
	1¼"	6-13/16 (173)	3-7/16 (87)	1-7/16 (37)	8-3/32 (206)
	1½"	8-5/16 (211)	3¾ (95)	1-9/16 (40)	8-7/32 (209)
	2"	9-3/16 (233)	4-3/16 (106)	1-5/8 (42)	8-9/32 (210)
VB-7323-0-4-P	½"	3-1/16 (76)	1-3/8 (35)	1-1/8 (29)	7-25/32 (198)
	¾"	3-5/8 (92)	1-11/16 (43)	1-1/8 (29)	7-25/32 (198)
	1"	4-5/8 (118)	1-9/16 (40)	1-3/16 (30)	7-27/32 (199)
	1¼"	4-5/8 (118)	1-5/8 (41)	1-7/16 (37)	8-3/32 (206)
	1½"	5-3/8 (137)	1-11/16 (43)	1-9/16 (40)	8-7/32 (209)
	2"	6-1/8 (156)	1-7/8 (48)	1-5/8 (42)	8-9/32 (210)

[a]Assembly height, centerline of valve body to top of actuator (see Figure-1). For M900Ax-xx, leave an additional 3" (76 mm) and for M900AxW-xx leave additional 5" (127 mm) clearance for cover removal.

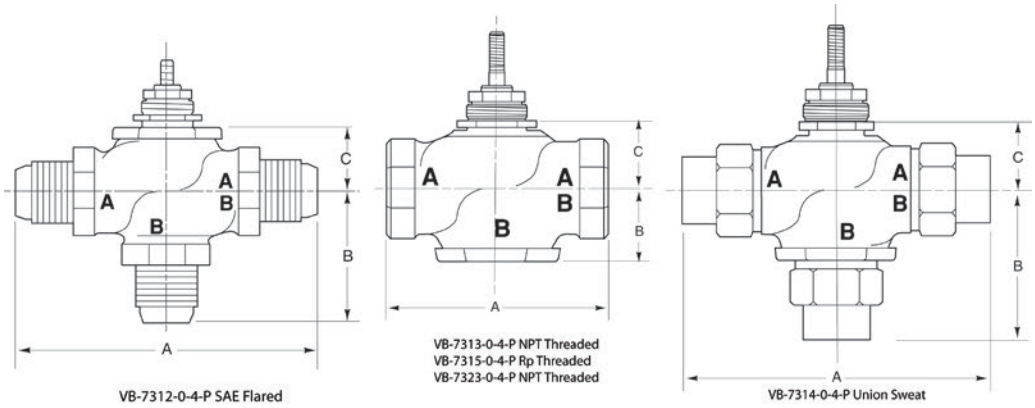


Figure-3 3-Way VB-73xx Valve Body Dimensions

7. 2½"... 6" Flanged Globe Valves

Assembly Ordering VB-8000/VB-9000

Specifying the Available Four Type Designations (1, 2, 4 and 6 below) to Determine the Part Number of a Selected Valve/Actuator Assembly

1) Control Signal

V □□

Refer to the guide below.

2) Trim and Valve Configuration

–□□□

Refer to the guide below.

3) Pipe End Connections

3–

Specify Option 3 (Flanged) for all valves.

4) Actuator or Linkage

□□□

Refer to the following pages for Spring & Non-Spring Return Electric and Pneumatic Spring Return Actuator Codes, part numbers and Linkage part numbers based on required close-off pressure.

5) Pattern Code

–5–

Specify Option 5 (Flanged) for all valves.

6) Port Code Cv Value

□□

For water, steam, glycol and similar non flammable, non toxic fluids, choose based on the Capacity Sizing section of this catalog. Below 2½", go to the VB-7000 sections of this catalog.

Assembly Ordering VB-8000/VB-9000

V □□–□□□3–□□□–5–□□

A = Two Position
B = Valve Body Only
F = Floating
S = Proportional
K = Pneumatic 0-30 Psi

4 = AK-42309-500 (VK4-xxxx Pneu only)

Pipe Connection End Fitting
3 = Flanged

Trim and Configuration
821 = 2-Way, Stem Up Open, Brass Trim EPDM Seat
822 = 2-Way, Stem Up Closed, Brass Trim EPDM Seat
830 = 3-Way, Mixing or Diverting, Brass Trim (Bottom port is "Common")
931 = 3-Way, Mixing, Brass Trim, Metal-to-Metal (One end port is "Common")

Actuator or Linkage Code
0 = No actuator, valve body (VB)only
xxx = Replace with actuator code
Place the appropriate control signal code in the second digit and replace xxx with the desired actuator code.
Note: Use one zero (0) when ordering valve body only. Use 3-digit code when ordering with actuator or linkage assembly.

Connection
5 = Flanged

Port Code
2½"…6" (Cv 56 to 500)
12 = 2½"
13 = 3"
14 = 4"
15 = 5"
16 = 6"

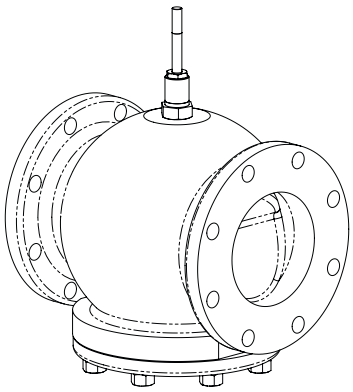
NOTE: Screwed bodies are not available in size 2½" and larger.

2-Way and 3-Way Valves

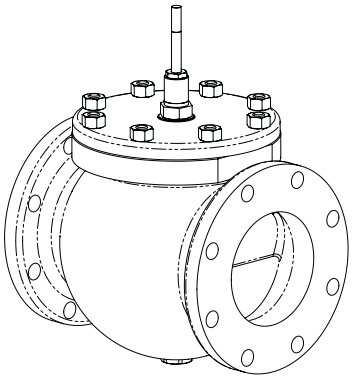
2-Way Stem Up Open or Stem Up Closed

3-Way Mixing/Diverting

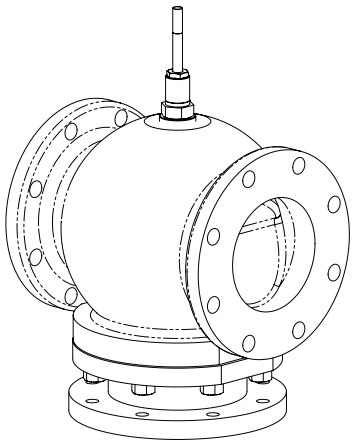
ASA 125 Flanged Cast Iron Body



VB-8213



VB-8223



VB-8303

Schneider Electric VB-8213, VB-8223, & VB-8303 Valve Bodies					
Ports		2-Way Flanged		3-Way Flanged	
Application		Chilled or Hot Water, Steam		Chilled or Hot Water	
Size		2½"…6"	2½"…6"	2½"…6"	
Valve Body Part Number		VB-8213-0-5-P	VB-8223-0-5-P	VB-8303-0-5-P	
Valve Body Action		2-Way Stem Open	2-Way Stem Up Closed	3-Way Mixing/Divertinga	
Material	Flow Type	Equal %		Modifier Linear	
	Body	Cast Iron			
	Seat	Forged Brass			
	Stem	Stainless Steel			
	Plug	Forged Brass			
	Packing	Spring Loaded TFE/EPDM			
	Seat Ring	EPDM		None	
ANSI Pressure Class, psig		125 (up to 200 psig below 150°F)			
Maximum Inlet Pressure Steam psig (kPa)		35 psig (241 kPa)		—	
Allowable Control Media Temperature °F (°C)b		20°F to 281°F (-7°C to 138°C)			
Close-Off Pressure, psi (kPa)		125 psi (856 kPa) d		35 psi (241 kPa)c	
P Code	Valve Size, In.	Cv (kvs)		Cv (kvs) Mixinge	Cv (kvs) Divertingd
12	2½	56 (48)	56 (48)	80 (69)	95 (82)e
					115 (99)f
13	3	85 (74)	85 (74)	110 (95)	120 (104)g
14	4	145 (125)	145 (125)	190 (164)	190 (164)h
15	5	240 (208)	240 (208)	290 (251)	290 (251)h
16	6	370 (320)	370 (320)	500 (433)	500 (433)h

a VB-8303 valves may be used as mixing or diverting valves. VB-8303 valves will also operate satisfactorily as 2-Way angle valves if either end (side) port is closed off.

b CAUTION: Freeze protection required for temperatures below 32°F (0 °C). Avoid ice formation on stems.

c Valve in closed position. See Specifications in following pages for maximum allowable VB-8xxx differential pressure for valve in any open position.

d Mixing configuration, ports A and B are inlets, port AB is outlet (located on bottom).

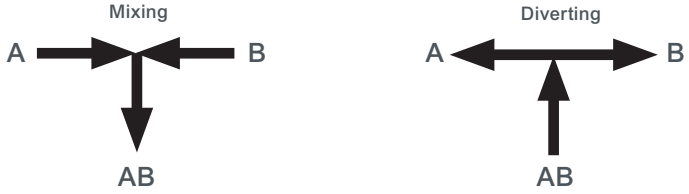
e Diverting configuration, port AB is inlet, ports A and B are outlets. Port AB located on bottom.

f Diverting configuration, flow AB to A ports.

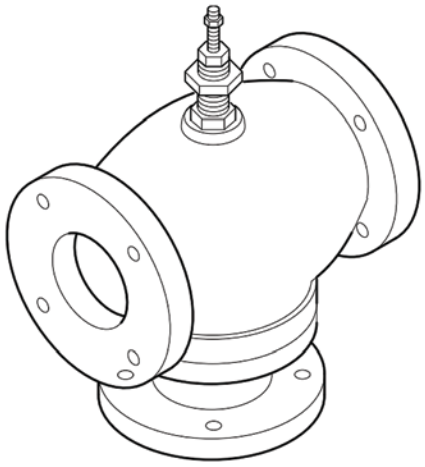
g Diverting configuration, flow AB to B ports.

h All diverting flow configurations, flow AB to either A or B ports.

VB-8000 3-Way Flow Patterns



VB-9313 3-Way Mixing Valve Bodies Specifications



VB-9313-0-5-P
(Typical)

Application

VB-9313 series 3-Way mixing valves control hot or chilled water in heating or air conditioning systems. These valves must be piped with two inlets ("A" and "B" ports) and one outlet ("AB" port). They are used for two-position or proportional control applications. Valve assemblies require an actuator and a valve linkage that may be factory or field assembled.

Features

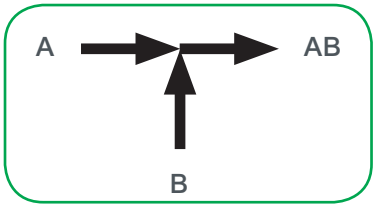
- Valve sizes 2½"…6".
- 125 psig pressure rating per ANSI Standards (B16.1–1993) for flanged cast iron bodies.
- Spring-loaded TFE & EPDM packing.

Specifications		Valve Body Series VB-9313-0-5-P
Service		Chilled or Hot Water
Flow Characteristics		Mixing
Sizes		2½"…6"
Type of End Fitting		125 lb. Flanged
Valve Materials	Body	Cast Iron
	Seat	Bronze
	Stem	Stainless Steel
	Plug	Brass
	Packing	Spring Loaded TFE & EPDM
	Disc	None
ANSI Pressure Class, psig		125 (up to 200 psig below 150°F)
Allowable Control Media Temperature, °F (°C)		40°F …300°F (4°C… 149°C)
Allowable Differential Pressure, Water, psi (kPa)a		35 psi (241 kPa) Max. for Normal Life

Valve Size, In.	Cv Rating	kvsb Rating	Stroke	Complete Valve Body Part Number
2½	74	64	7/8 In. (22 mm)	VB-9313-0-5-12
3	101	87	7/8 In. (22 mm)	VB-9313-0-5-13
4	170	147	7/8 In. (22 mm)	VB-9313-0-5-14
5	290	251	1¾ In. (45 mm)	VB-9313-0-5-15
6	390	337	1¾ In. (45 mm)	VB-9313-0-5-16

[a]Maximum recommended differential pressure in open position. Do not exceed the recommended differential pressure (pressure drop) or integrity of parts may be affected.
Exceeding maximum recommended differential pressure voids the product warranty.

[b]k_{vs}= m^3/h (ΔP = 100 kPa) $k_{vs} = C_v / 1.156$ C_v = gpm /$\sqrt{\Delta P}$ (in psi).



VB-93xx 3-Way Mixing Flow Pattern

8. 2½"…6" Flanged Cast Iron Globe Valves Sizing & Selection

Sizing for Water

Two-Position

Two-position control valves are normally selected "line size" to keep pressure drop at a minimum. If it is desirable to reduce the valve below line size, then 10% of "available pressure" (that is, the pump pressure differential available between supply and return mains with design flow at the valve location) is normally used to select the valve.

Proportional and Floating

Proportional and floating control valves are usually selected to take a pressure drop equal to at least 50% of the "available pressure." As "available pressure" is often difficult to calculate, the normal procedure is to select the valve using a pressure drop at least equal to the drop in the coil or other load being controlled (except where small booster pumps are used) with a minimum recommended pressure drop of 5 psi (34 kPa). When the design temperature drop is less than 60°F (33°C) for conventional heating systems, higher pressure drops across the valve are needed for good results.

Conventional Heating System Pressure Drops

Design Temperature Load Drop °F (°C)	Recommended Pressure Drop (% of Available Pressure)	Multiplier on Load Drop
60 (33) or more	50%	1x Load Drop
40 (22)	66%	2x Load Drop
20 (11)	75%	3x Load Drop

Reducer Affects

On full flow bodies, offset the affects of directly connected reducer(s) by choosing flow coefficients 6% or more higher.

Cv (Flow Coefficient) Determination

The valves' water capacity is based on the following formula:

$$C_v = \frac{GPM}{\sqrt{\Delta P}} \quad \text{or} \quad C_v = GPM \sqrt{\frac{\text{Specific Gravity}}{\Delta P}}$$

Where:

C_v = Coefficient of flow

C_v is defined as the flow in GPM with ΔP = 1 psi with the valve completely open

GPM = U.S. gallons per minute (60°F, 15.6°C)

ΔP = Differential pressure in psi (pressure drop)

Proportional 3-Way Valves

Recommended Pressure Drop - Bypass Application: 50% of "available pressure," or equal to pressure drop through the load at full flow.
3-Way valves in the return used to control output by throttling water flow to the load (bypass applications) are controlling output in the same manner as throttling 2-Way valves, and must be selected using the same high pressure drops if good control results are to be obtained.
Recommended Pressure Drop - Constant Flow Applications: 20% of "available pressure," or equal to 1/4 of the pressure drop through the load at full flow.
3-Way valves used with individual pumps to control output by varying water temperature to the load (constant flow applications) are controlling output by mixing two water sources at different temperatures and do not require high pressure drops for good control results.

Water Capacity Graph Instructions

To select the appropriate valve Cv from the Graph:
1. Select the required flow from the "Flow in GPM" axis.
2. Select available pressure drop from the "Pressure Drop in psi" axis.
3. Select the appropriate line and follow to the Capacity Cv (Kv) listing and choose the closest valve Cv flow coefficient.
4. Confirm the selection by calculation from the water equations.

Additional Water Valve Sizing Information

For more information, download these documents from our website.

- CA-27 3-Way Valves Application Information
- Valve Selection Table Water, F-11080

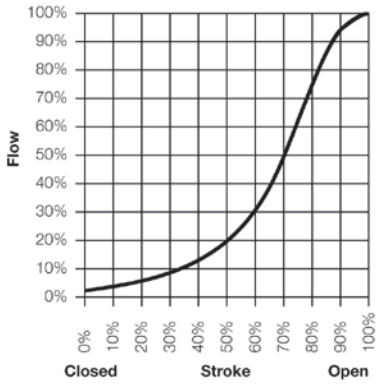
2 & 3-Way Flow, Temp. & Materials
VB-8xx3 Valve Bodies

System Design Considerations

Note: The information in this section describes characteristics of the VB-8xx3 valve bodies, which are used in the Vx-8xx3 valve assemblies.

Control Precision

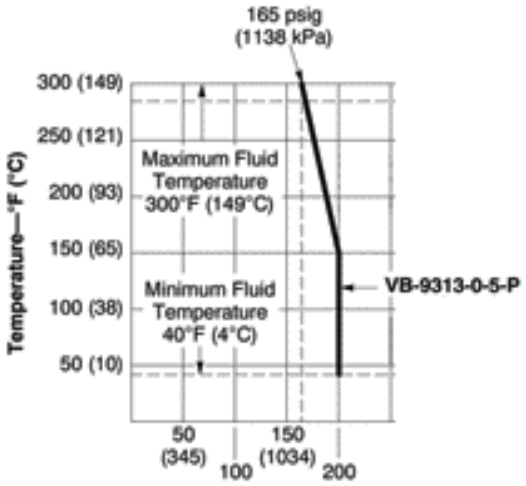
2-Way Valves: The flow curve shown below is representative of all sizes. All valve plugs have lower gain when nearly closed to enhance control at low demand. 2-Way valves are nominally equal percentage and normally used for water and low pressure steam.



Typical Modified Equal Percentage Flow Characteristics

Temperature/Pressure Ratings

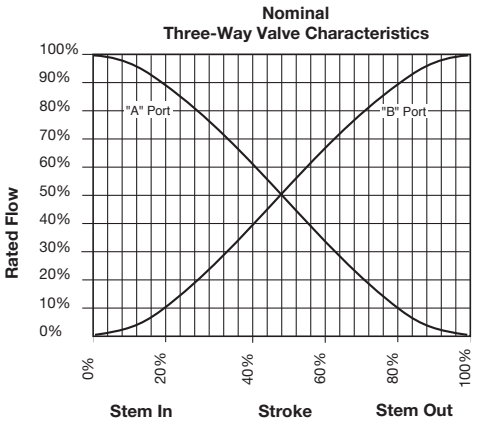
Temperature and pressure ratings of 2-Way and 3-Way valves are shown below. Ratings conform with published values and disclaimer.



Temperature and Pressure Ratings for VB-9313 Series Valve Bodies.

Control Precision

3-Way Valves: 3-Way mixing valves are designed so that the flow from either of the inlet ports to the outlet is nominally linear, which means the total flow from the outlet is almost constant over the stroke of the valve stem. The flow is limited at the initial opening similar to an equal percentage curve to enhance system stability. Typical flow characteristics of the VB-8303 series valve bodies are shown below.



Typical Flow Characteristics

Rangeability

Rangeability is the ratio of rated flow to the minimum controllable flow through a valve. The nominal rangeability of the VB-8xx3 Series is greater than 100:1.

VB-8xx3-0-5-P (Cast Iron Body with Flanged End Fittings)

Standards: Pressure to ANSI B16.1, Class 125, with 200 psi (1379 kPa) up to 150 °F (65 °C), decreasing to 169 psi (1165 kPa) at 281°F (138 °C).

Materials: Valve body: Cast iron, ASTM A126 Class B.

Trim: Stainless steel stem, forged brass plug, metal-to-metal or EPDM seat ring with TFE/EPDM packing parts and silicone packing grease.

Close-off Ratings

Nominal actuator close-off ratings are based on ANSI IV (0.01% leakage) for valves with EPDM seat rings such as VB-8213 and VB-8223. Metal-to-metal trim valves such as VB-8303 are designed for ANSI III (0.1% leakage).

Water

Flow Coefficient (C_V)

Sizing a valve requires selecting a flow coefficient (Cv), which is defined as the flow rate in gallons per minute (gpm) of 60°F water that will pass through the fully open valve with a 1 psi pressure drop (ΔP). It is calculated according to the formulas shown in Cv Equation for Water and Cv Equation for Steam.

Since the flow rate through the heat exchanger is usually specified, the only variable normally available in sizing a valve is the pressure drop. The following information can be used to determine what pressure drop to use in calculating a valve Cv. Using the calculated Cv, consult the Water Capacity table on this page or the Steam Capacity to select the valve body with the nearest available Cv.

Caution: Be sure that the anticipated pressure drop across the valve will not exceed the close-off pressure rating and the maximum pressure differential rating listed in the Vx-8xxx Selection Guide, F-27199.

Two-position

Two-position control valves are normally selected "line size" to keep pressure drop at a minimum. If it is desirable to reduce the valve below line size, then 10% of "available pressure" (that is, the pump pressure differential available between supply and return mains with design flow at the valve location) is normally used to select the valve.

Proportional

Proportional control valves are usually selected to take a pressure drop equal to at least 50% of the "available pressure." As "available pressure" is often difficult to calculate, the normal procedure is to select the valve using a pressure drop at least equal to the drop in the coil or other load being controlled (except where small booster pumps are used) with a minimum recommended pressure drop of 5 psi (34 kPa). When the design temperature drop is less than 60°F (33°C) for conventional heating systems, higher pressure drops across the valve are needed for good results (see the table Conventional Heating System below).

Conventional Heating System Pressure Drops

Design Temperature Load Drop °F (°C)	Recommended Pressure Drop (% of Available Pressure)	Multiplier on Load Drop
60 (33) or More	50%	1 x Load Drop
40 (22)	66%	2 x Load Drop
20 (11)	75%	3 x Load Drop

Secondary Circuits with Small Booster Pumps: 50% of available pressure difference (equal to the drop through load, or 50% of booster pump head).

Water Table

Water Capacity in Gallons Per Minute for VB-82x3 Series

Valve Body Part Number	Cv Rating	Differential Pressure (DP in psi)														
		1	2	3	4	5	6	7	8	9	10	15	20	25	30	35
VB-82x3-0-5-12	56	56	79	97	112	125	137	148	158	168	177	217	250	280	307	331
VB-82x3-0-5-13	85	85	120	147	170	190	208	225	240	255	269	329	380	425	466	503
VB-82x3-0-5-14	145	145	205	251	290	324	355	384	410	435	459	562	648	725	794	858
VB-82x3-0-5-15	240	240	339	416	480	537	588	635	679	720	759	930	1073	1200	1315	1420
VB-82x3-0-5-16	370	370	523	641	740	827	906	979	1047	1110	1170	1433	1655	1850	2027	2189

C_V Equation for Water

Where:

C_V = Coefficient of flow.

gpm = Flow rate of water that will pass through fully open valve, measured in U.S. gallons per minute (60 °F (15.6 °C) water).

DP = Differential pressure (pressure drop), measured in psi.

$$C_V = \frac{GPM}{\sqrt{\Delta P}} \qquad \Delta P = \left(\frac{GPM}{C_V}\right)^2 \qquad GPM = C_V\sqrt{\Delta P}$$

Steam

Two-Position

Two-position zone valves and direct radiation valves are normally sized using a minimum of 10% of inlet pressure (psig).

Proportional

Proportional control valves are normally sized using:

- For low pressure (15 psig or less), use ΔP of 80% of gauge inlet pressure.
- For steam pressures greater than 15 psig, use ΔP of 42% of absolute (gauge plus 14.7) inlet pressure.
- When the Cv required is between two valve sizes, select the larger size. Do not size steam valves using a pressure drop greater than 42% of the absolute inlet pressure.

Steam Table

Steam Capacity in Pounds Per Hour for VB-82x3 Series

Valve Body Part Number	Cv Rating	Differential Pressure (DP in psi)a															
		2 psig Inlet		5 psig Inlet		10 psig Inlet		15 psig Inlet		20 psig Inlet		25 psig Inlet		30 psig Inlet		35 psig Inlet	
		0.2	1.6	0.5	4	1	8	1.5	12	2	14	2.5	16	3	18	3.5	20
VB-82x3-0-5-12	56	305	826	520	1331	818	1942	1093	2448	1359	2860	1620	3271	1879	3683	2136	4094
VB-82x3-0-5-13	85	463	1253	790	2021	1241	2947	1658	3716	2062	4341	2459	4965	2852	5590	3242	6214
VB-82x3-0-5-14	145	790	2138	1348	3447	2118	5027	2829	6339	3518	7405	4195	8470	4865	9536	5531	10601
VB-82x3-0-5-15	240	1308	3539	2231	5706	3505	8322	4683	10493	5823	12257	6943	14021	8053	15784	9156	17548
VB-82x3-0-5-16	370	2016	5456	3439	8796	5404	12830	7219	16177	8977	18896	10704	21615	12415	24334	14115	27053

[a]Left column shows # per hour with a 10 % pressure drop and right column shows # per hour with an 80% pressure drop.

Cv Equation for Steam

Where:

Cv = Coefficient of flow.

Q = Flow rate of steam that will pass through fully open valve, measured as pounds per hour of steam.

$$C_v = \frac{Q \times K}{3\sqrt{\Delta P \times P2}} \qquad Q = \frac{3C_v\sqrt{\Delta P \times P2}}{K}$$

ΔP = Differential pressure (pressure drop), measured in psi.

P2 = Outlet pressure, measured in psia (absolute pressure). P2 = Inlet pressure + 14.7 – ΔP.

K = 1 + (0.0007 x °F superheat). K = 1 for saturated steam.

Cavitation Limitations on Valve Pressure Drop

A valve selected with too high a pressure drop can cause erosion of discs and/or wire drawing of the seat. In addition, cavitation can cause noise, damage to the valve trim (and possibly the body), and choke the flow through the valve.

Do not exceed the maximum differential pressure (pressure drop) for the valve selected.

The following formula can be used on higher-temperature water systems, where cavitation could be a problem, to estimate the maximum allowable pressure drop across the valve:

Pm = 0.5 (P1 – Pv)

Where:

Pm = Maximum allowable pressure drop

P1 = Absolute inlet pressure (psia)

Pv = Absolute vapor pressure (psia) (refer to Table-6)

Note: Add 14.7 psi to the gauge supply pressure to obtain the absolute pressure value.
For example, if a valve is controlling 200°F water at an inlet pressure of 18 psig, the maximum pressure drop allowable would be:
Pm = 0.5 [(18 + 14.7) – 11.53] = 10.6 psi (Vapor pressure of 200°F water is 11.53 psi.)
Therefore, if the pressure drop for this valve is less than 10.6 psi, cavitation should not be a problem.
Systems where cavitation is shown to be a problem can sometimes be redesigned to provide lower inlet velocities. Valves having harder seat materials should be furnished if inlet velocities cannot be lowered.
For additional valve sizing information, see the Vx-8xxx Selection Guide, F-27199.

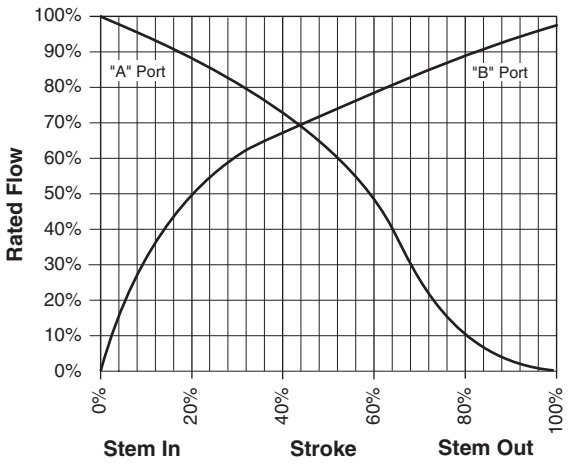
Vapor Pressure of Water Table

Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)
40	0.12	90	0.70	140	2.89	190	9.34
50	0.18	100	0.95	150	3.72	200	11.53
60	0.26	110	1.28	160	4.74	210	14.12
70	0.36	120	1.69	170	5.99	220	17.19
80	0.51	130	2.22	180	7.51	230	20.78

3-Way Flow, Temp. & Materials
VB-9313-0-5-P Valve Bodies

Flow Characteristics

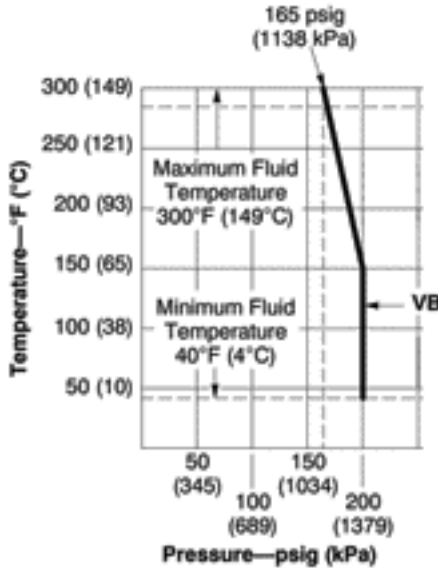
3-Way mixing valves are designed so that the flow from either of the inlet ports to the outlet is approximately linear, which means the total flow from the outlet is almost constant over the stroke of the valve stem. Typical flow characteristics of VB-9313 series valve bodies are shown below.



Typical Flow Characteristics

Temperature/Pressure Ratings

VB-9313-0-5-P (Flanged Cast Iron Body)
Standards: ANSI B16.1–1993
Materials: ASTM A126-93 Class B



Temperature and Pressure Ratings for VB-9313 Series Valve Bodies

Rangeability

Rangeability is the ratio of rated flow to the minimum controllable flow through a valve. For mixing valves, control begins as soon as plug displacement allows flow. Thus, 3-Way valve rangeability normally exceeds 500:1, which is the reciprocal of 0.2% nominal leakage.

Water

Two-position

Two-position control valves are normally selected "line size" to keep pressure drop at a minimum. If it is desirable to reduce the valve below line size, then 10% of "available pressure" (that is, the pump pressure differential available between supply and return mains with design flow at the valve location) is normally used to select the valve.

Proportional to Bypass Flow

Proportional mixing valves used to bypass flow are piped on the outlet side of the load to throttle the water flow through the load and therefore control heat output of the load. These valves are usually selected to take a pressure drop equal to at least 50% of the "available pressure." As "available pressure" is often difficult to calculate, the normal procedure is to select the valve using a pressure drop at least equal to the drop in the coil or other load being controlled (except where small booster pumps are used) with a minimum recommended pressure drop of 5 psi (34 kPa). When the design temperature drop is less than 60°F (33°C) for conventional heating systems, higher pressure drops across the valve are needed for good results (see Conventional Heating System Pressure Drops table below).

Conventional Heating System Pressure Drops

Design Temperature Load Drop °F (°C)	Recommended Pressure Drop* (% of Available Pressure)	Multiplier on Load Drop
60 (33) or More	50%	1 x Load Drop
40 (22)	66%	2 x Load Drop
20 (11)	75%	3 x Load Drop

*Recommended minimum pressure drop = 5 psi (34 kPa).

Secondary Circuits with Small Booster Pumps:13 50% of available pressure difference (equal to the drop through load, or 50% of booster pump head).

3-Way Flow, Temp. & Materials
VB-9313-0-5-P Valve Bodies

Proportional to Blend Water Flows

Proportional valves used to blend two water flows control the heat output by varying the water temperature to the load at constant flow. These valves do not require high pressure drops for good control results. They can be sized for a pressure drop of 20% of the "available pressure" or equal to 25% of the pressure drop through the load at full flow.

Water Table

Water Capacity in Gallons Per Minute for VB-9313 Series.

Valve Body Part Number	Cv Rating	Differential Pressure (ΔP in psi)														
		1	2	3	4	5	6	7	8	9	10	15	20	25	30	35
VB-9313-0-5-12	74	74	105	128	148	165	181	196	209	222	234	287	331	370	405	438
VB-9313-0-5-13	101	101	143	175	202	226	247	267	286	303	319	391	452	505	553	598
VB-9313-0-5-14	170	170	240	294	340	380	416	450	481	510	538	658	760	850	931	1006
VB-9313-0-5-15	290	290	410	502	580	648	710	767	820	870	917	1123	1297	1450	1588	1716
VB-9313-0-5-16	390	390	552	675	780	872	955	1032	1103	1170	1233	1510	1744	1950	2136	2307

C_V Equation

Where:
C_V = Coefficient of flow
GPM = U.S. gallons per minute (60°F, 15.6°C)
ΔP = Differential pressure in psi (pressure drop)

$$C_V = \frac{GPM}{\sqrt{\Delta P}} \qquad \Delta P = \left(\frac{GPM}{C_V}\right)^2 \qquad GPM = C_V\sqrt{\Delta P}$$

Cavitation Limitations on Valve Pressure Drop

A valve selected with too high a pressure drop can cause erosion of discs and/or wire drawing of the seat. In addition, cavitation can cause noise, damage to the valve trim (and possibly the body), and choke the flow through the valve.
Do not exceed the maximum differential pressure (pressure drop) for the valve selected.
The following formula can be used on higher-temperature water systems, where cavitation could be a problem, to estimate the maximum allowable pressure drop across the valve:

Pm = 0.5 (P1 – Pv)

Where:
Pm = Maximum allowable pressure drop
P1 = Absolute inlet pressure (psia)
Pv = Absolute vapor pressure (psia) (Refer to the table below.)
Note: Add 14.7 psi to the gauge supply pressure to obtain the absolute pressure value.
For example, if a valve is controlling 200°F water at an inlet pressure of 18 psig, the maximum pressure drop allowable would be:
Pm = 0.5 [(18 + 14.7) – 11.53] = 10.6 psi (Vapor pressure of 200°F water is 11.53 psi.)
Therefore, if the pressure drop for this valve is less than 10.6 psi, cavitation should not be a problem.
Systems where cavitation is shown to be a problem can sometimes be redesigned to provide lower inlet velocities. Valves having harder seat materials should be furnished if inlet velocities cannot be lowered.
For additional valve sizing information, see the Vx-8xxx Selection Guide, F-27199.

Vapor Pressure of Water Table

Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)
40	0.12	90	0.70	140	2.89	190	9.34
50	0.18	100	0.95	150	3.72	200	11.53
60	0.26	110	1.28	160	4.74	210	14.12
70	0.36	120	1.69	170	5.99	220	17.19
80	0.51	130	2.22	180	7.51	230	20.78

VB-8xx3/9313 Close-Off Pressure Capability

Close-off Ratings (Unless Otherwise Specified)

Nominal actuator close-off ratings are based on ANSI V with EPDM discs; and PTFE discs in steam applications. Metal-to-metal trim, such as brass 3-Way and high-temperature stainless, are designed for ANSI III (0.1-% leakage).

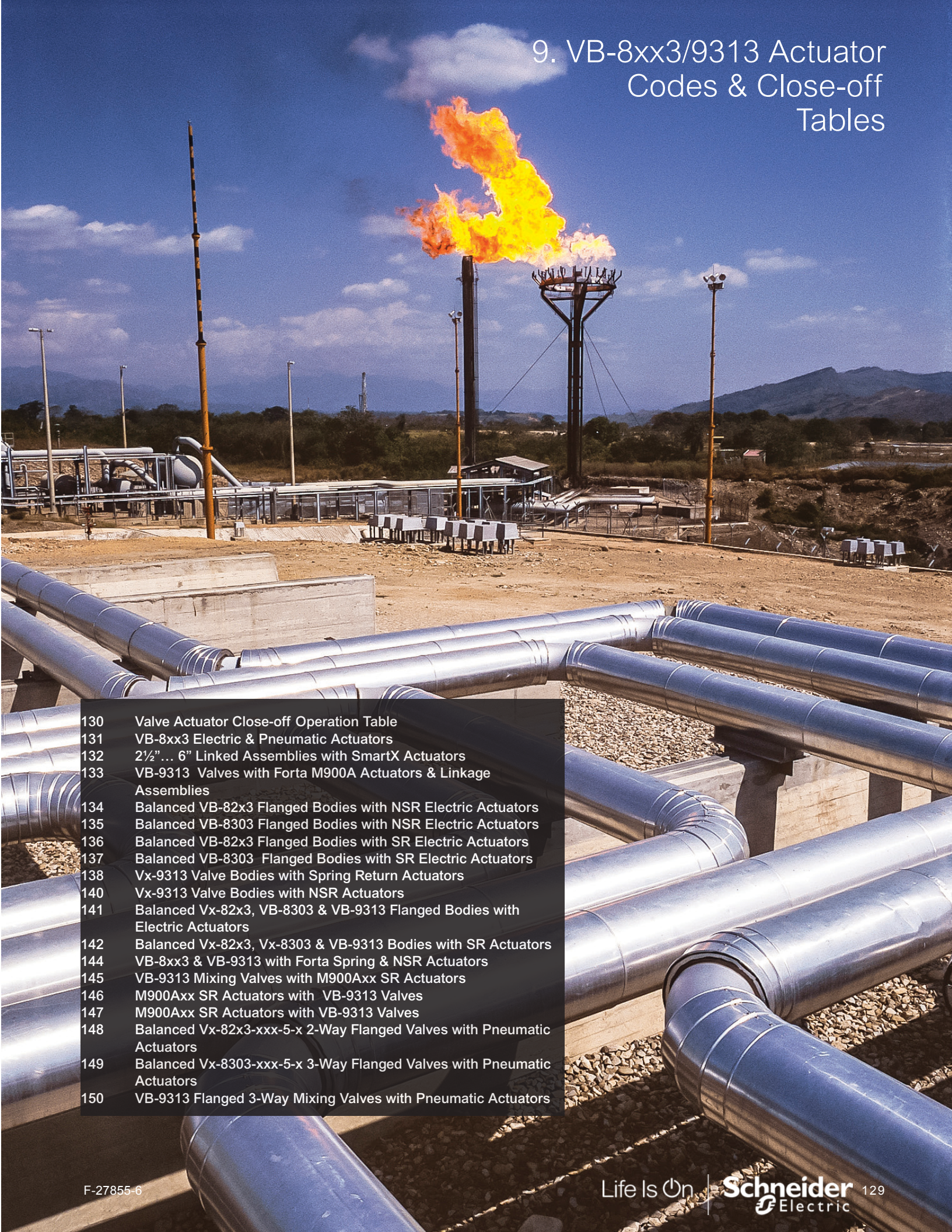
Seat Leakage Classes

ANSI/FCI 70-2 Leakage Class	Maximum Seat Leakage
Class II	0.5% of rated Cv
Class III	0.1% of Rated Cv
Class IV	0.01% of Rated Cv
Class V	0.0005 ml per minute per inch of orifice diameter per psi differential

Note: Valve body and actuator size determine the close-off capabilities. Example: All 4", 2-Way globe valves will make the same close-off regardless of the Cv rating for a given actuator.
Note: The following tables offer a quick guide to valve actuator combination / close-off ratings. Please refer to specific close-off ratings.

Notes

9. VB-8xx3/9313 Actuator Codes & Close-off Tables



Valve Actuator Close-off Operation Table

VB-8xx3 and VB-9313 Close-off Ratings

	Spring Return Electric									
Actuator	Mx41-715x				Mx40-717x				Mx61-720x	M900Ax
Linkage	AV-607-1[d]		AV-609-1[e]		AV-607-1[d]		AV-609-1[e]		Included with actuator	AV-822
No Act	Single	Dual	Single	Dual	Single	Dual	Single	Dual	Single	Single
Pipe Size	VB-82x3[a]									
2 ½"	125/35				125/35				125/35	
3"	125/35				125/35				125/35	
4"	125/35				125/35				125/35	
5"	125/35				125/35				125/35	
6"			125/22	125/35			125/25	125/35		
Pipe Size	VB-8303[a]									
2 ½"	35/35				35/35				35/35	
3"	35/35				35/35				35/35	
4"	35/35				35/35				35/35	
5"	32/28				35/31			35/35	35/35	
6"		35/35	15/11				16/12	35/31		
Pipe Size	VB-9313[b,f]									
2 ½"	33	70			40	84				24
3"	22	48			27	57				16
4"	12	27			15	33				9
5"				9				10		
6"				6				7		

	Non-Spring Return Electric						Pneumatic Spring Return @15psi air (with 5 to 10 psi spring)			
Actuator	Mx41-6153		Mx41-6343		M800A	M1500A	MK-6811	MK-8811	MK-6911	MK-8911
Linkage	AV-607-1[d]		AV-609-1[e]		AV-822	AV-822	AV-497[c]	AV-496	AV-497	AV-496
No Act	Single	Dual	Single	Dual	Single	Single	Single	Single	Single	Single
Pipe Size	VB-82x3[a]									
2 ½"						125/35	125/35			
3"						125/35	125/35			
4"						125/35	125/35			
5"						125/35	125/35			
6"			125/25	125/35		125/35			125/35	
Pipe Size	VB-8303[a]									
2 ½"						125/35	35/35			
3"						125/35	35/35			
4"						125/35	35/35			
5"						125/35	35/35			
6"						35/35			35/35	
Pipe Size	VB-9313[b,f]									
2 ½"	33	70	46	96	29	61	40d/30u*	91d/60u*		
3"	22	48	31	66	19	42	27d/20u*	62d/40u*		
4"	12	27	18	38	10	22	14d/10u*	33d/25u*		
5"		9		24		14				20d/15u*
6"		6		17		9				13d/10u*

[a] VB-8xxx - First value = maximum close off pressure, Second value = maximum operating differential. (Example: 125/35).
[b] VB-9213/VB-9223 2-Way valves have the same close offs as VB-9313 valves.
[c] VB-8xx3 valves use AV-497 linkage, VB-9313 valves use AV-495 linkage.
[d] AV-607-1 (2 ½" - 5" VB-8000 valves or 2 ½" - 4" VB-9313 valves), the Mx41-634x actuator is not compatible with the AV-607-1 linkage.
[e] AV-609-1 (6" VB-8000 valves or 5" - 6" VB-9313 valves), the AV-609-1 linkage can be used with the Mx41-634x actuator on 2 ½" - 5" VB-8000 valves or 2- ½" - 4" VB-9313 valves, but the valve will stroke over a shorter portion of the control input signal
[f] Stem up (B to AB flow, A port closed. stem down (A to AB flow, B port closed)
*d and u indicate d (stem down) u (stem up)

MORE INFO VB-8303
Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/3fMhfY

MORE INFO VB-8213
Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/VEAV7e

2-Way and 3-Way Valves

2½"…6" Flanged
2-Way Stem Up Open
2-Way Stem Up Closed
3-Way Mixing/Diverting
Electric/Electronic/Pneumatic
Globe Valve Assemblies

Vx-8xx3 Series Balanced Plug Valve Assemblies

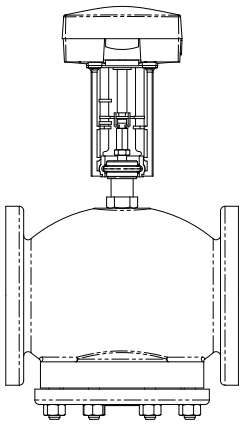
Schneider Electric VA, VF, VK, VK4, VS and VU-8xx3-xxx-5-P series valve assemblies are complete actuator/valve assemblies that accept two-position, floating, and proportional electric/electronic and proportional pneumatic control signals, for control of chilled water, hot water, or low pressure steam. These valve assemblies consist of pneumatic, electric, or electronic valve actuators either direct-coupled or linked to a 2½"…6" 2-Way or 3-Way valve body with ASA flanged end connections.

VB-8xx3 Series Valve Bodies

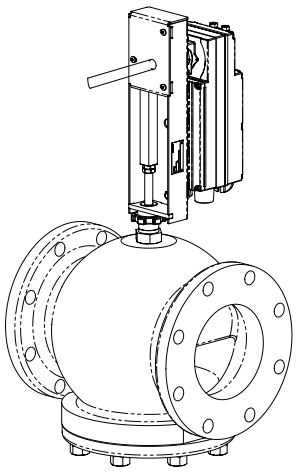
VB-8xx3-0-5-P valve bodies are also available separately to allow field mounting of a variety of Forta, Schneider Electric SmartX or pneumatic actuators using the appropriate linkage.

Features

- Balanced plug design provides high close-offs using economical actuation
- Up to 125 psi (856 kPa) close-off on 2-Way models, 35 psi (240 kPa) on 3-Way models
- Universal 3-Way valve can be piped in either mixing or diverting configurations
- Valve sizes 2½"…6", ASA 125 flanged
- A variety of Forta, Schneider Electric SmartX and pneumatic actuators are available, either as factory assemblies or for field assembly
- ANSI IV shutoff (0.01% of Cv) on 2-Way models, ANSI III (0.1% of Cv) on 3-Way models
- Self-adjusting spring loaded TFE/EPDM packing
- Normally open,normally closed, and non-spring return models available
- Expanded temperature range of 20° to 281°F
- ISO 9001:2000 Certified Quality Management System
- Vx-9313 3-Way mixing valves offer many of the same features as the VB-8xx3 vales and a conventional mixing valve flow pattern.

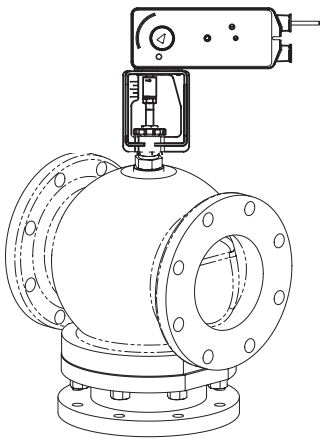


VB-8213 with M1500A Actuator



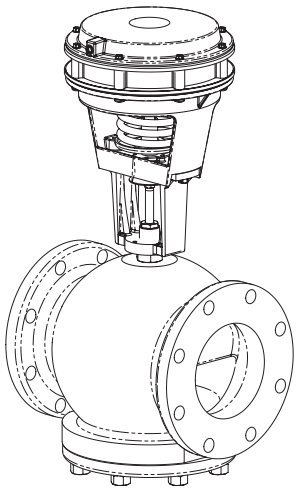
Vx-82x3 with Mx4x-6343

(2½" – 5" with AV-607-1
6" with AV-609-1)



Vx-8303/Vx-9313 with Mx61-720x

Direct-Mounted Actuator



VK-82xx with MK-6911

Globe Valve Assembly Selection Procedure

When selecting a globe valve assembly, you must determine the applicable codes for the control signal type, valve body configuration, end connection, port size and actuator. Select a globe valve assembly part number as follows:

1. Control Signal Type, Valve Body Configuration and End Connection

Referring to the "Part Numbering System" (previously), select the appropriate codes for the part-number fields.

2. Valve Size (Flow Coefficient)

If the required flow coefficient (Cv) has not been determined, do so as follows:

a. Refer to Sizing and Selection to calculate the required Cv.

b. Select the nearest available Cv value and corresponding valve body port code from the "Part Numbering System."

3. Actuator

Select the appropriate actuator and code, according to the "Part Numbering System" based on the control signal type, required valve normal position, and voltage requirements. For detailed actuator information, refer to the applicable actuator specifications on subsequent pages.

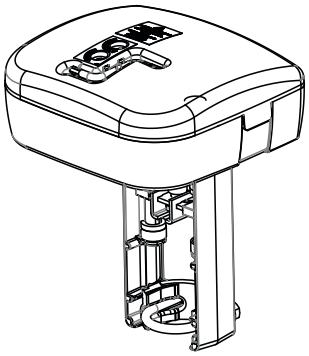
4. Close-off Pressure

Confirm that the selected actuator and valve body combination provides sufficient close-off pressure. If no close-off pressure is shown, the valve body/actuator combination is not valid.

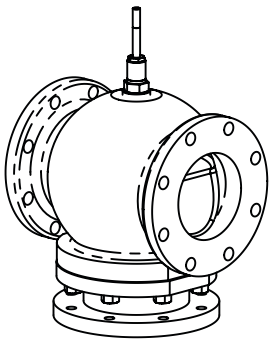
5. Available Space

If available space is a consideration, check the appropriate dimensional figure in the Dimensions section and its accompanying table for any potential fit issues.

VB-9313 Valves with Forta M900A Actuators & Linkage Assemblies



Assemblies with
VB-9313 Valves and Forta M900A



VB-9313

Applications

Schneider Electric Forta M900Axx Series Spring Return Actuators mount directly with AV-822 onto 2½…4"" VB-9313 Series flanged globe valve bodies. Applications include chilled or hot water and steam NEMA 1 or 2 (M900Ax) or NEMA 4 (M900AxW) models. Field selectable input signals include reverse and direct acting, floating or proportional 0…10 Vdc, 2…10 Vdc or 4…20 mA, and proportional sequencing input signal ranges.

Applicable Literature

- Forta M900 Datasheet, F-27682
- Forta M900 Installation Instructions, F-27683
- AV-822 Installation Instructions, F-27702
- CA-28 Control Valve Sizing, F-13755

Valve and Actuator Selection Procedure

1. Determine the required flow coefficient (Cv/kvs).

Using the required flow and pressure drop for the application, determine the required flow coefficient (consult CA28, F-13755 if necessary).

2. Determine valve body part number.

Select a flanged VB-9313 valve body having the required flow coefficient, size, body pattern, end connection, and temperature/pressure ratings appropriate for the application. Determine the desired loss of power position of the valve.

3. Select the Forta Actuator

Using the required close-off pressure for the application and the appropriate spring return action and select a Forta actuator having sufficient close-off pressure on the valve body selected in step 2. For valve/actuator combinations using VB-9313 valve bodies, also consult the tables in this section for maximum operating pressure differential limitations.

If necessary, use the dimensional information on the VB-9000 Series With M900A Series of the Dimensions section to confirm that the valve-actuator assembly will fit in the available space.

4. Determine the Assembly Part Number

If a complete factory valve and actuator assembly is required, consult the tables in this section for the actuator code of the Forta actuator selected in Step 3. For the complete assembly part number:

Change the valve body part number prefix from VB to VU. Insert the actuator code in the third field of the part number. Confirm the factory assembly is available in iPortal.

Example:

Valve body: VB-9313-0-5-14

Actuator: M900AR (actuator code 650 from tables in this section)

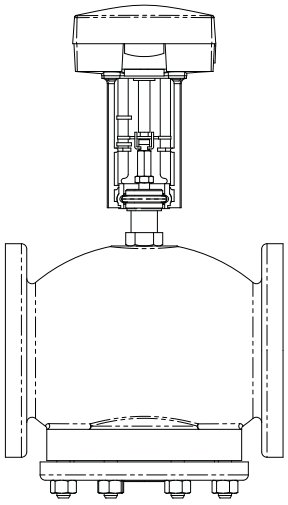
Complete assembly: VU-9313-650-5-14

Forta actuators are field configured for the desired control signal type and range plus the desired action. Consult the appropriate Forta Installation Instructions for further information (see Applicable Literature).

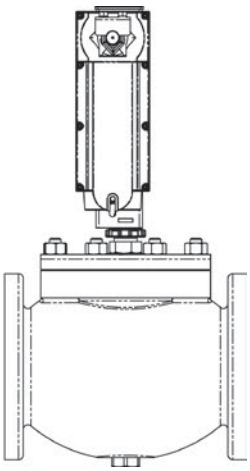
Balanced VB-82x3 Flanged Bodies with NSR Electric Actuators

Valve/Actuator Combinations and Operating Pressure Differentials

Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult section 9 for close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.



VB-8213 with
M1500A Actuator



VB-8223 with
Mx41-634x Actuator

2-Way Globe Valve Assemblies with Electric Non-Spring Return Actuators

Non-Spring Return (NSR) 2-Way Globe Valve Assemblies					M1500A	Mx41-634x
					Actuator Output Rating (Minimum)	
					337 lbf (1500 N)	300 lb-in (34 N-m)
					Actuator Model (Actuator Code)	
					Floating/ Proportional M1500A (686)	Floating MF41-6343 Proportional MS41-6340 (512) MS41-6341 (514) MS41-6343
					Linkage Kit Part Number	
					AV-822 (2½"…6")	AV-609-1 (6")
Close-off Pressure (psi)					125	
Valve Assembly Part Number[a]	P Code	Valve Size in.	C_v[b]	k_{vs}[b]	Maximum Allowable Operating Differential[c]	
						Single Actuator / Dual Actuator[d]
Vx-8213-xxx-5-P Vx-8223-xxx-5-P	12	2½	56	48	35 (240)	— / —
	13	3	85	74		— / —
	14	4	145	125		— / —
	15	5	240	208		— / —
	16	6	370	320		35 (240) / 35 (240)

[a] See "Assembly Ordering" for the relevant part series to determine a specific part number.

[b] $k_{vs} = m^3/h$ (ΔP = 100 kPa) $k_{vs} = C_v / 1.156$ C_v = gpm /√ΔP (in psi).

[c] Maximum allowable differential across the valve in any open position. Less than 20 psi recommended for quieter service. Consult section 9 for close-off pressure ratings.

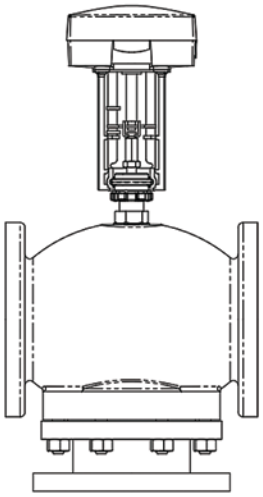
[d] Dual actuators are not available as a factory assembly.

Balanced VB-8303 Flanged Bodies with NSR Electric Actuators

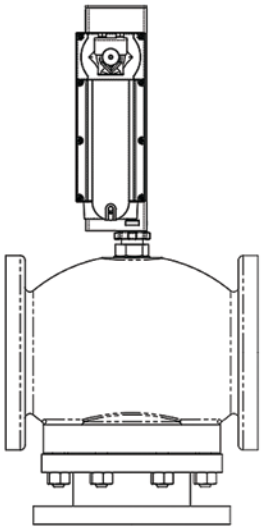
Valve/Actuator Combinations and Operating Pressure Differentials

2-Way and 3-Way Globe Valve Assemblies

Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult section 9 for close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

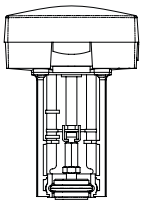


Vx-8303 with M1500A Actuator



Vx-8303 with Mx41-634x Actuator

3-Way Globe Valve Assemblies with Electric Non-Spring Return (NSR) Actuators

Non-Spring Return (NSR) 3-Way Globe Valve Assemblies					M1500A	Mx41-634x	
							
					Actuator Output Rating (Minimum)		
					337 lbf (1500 N)	300 lb-in (34 N-m)	
					Actuator Model (Actuator Code)		
					Floating/ Proportional M1500A (686)	Floating MF41-6343 (516) Proportional MS41-6340 (512) MS41-6341 (514) MS41-6343 (516)	
					Linkage Kit Part Number		
					AV-822 (2½"…6")	AV-609-1 (6")	
Close-off Pressure (psi)					35		
Valve Assembly Part Number[a]	P Code	Valve Size in.	C_v[b]	k_{vs}[b]	Maximum Allowable Operating Differential Pressure[c] psi (kPa) (Mixing/Diverting)		
						Single Actuator	Dual Actuator[d]
Vx-8303-xxx-5-P	12	2½	80e	69e	35 (240)/ 35 (240)	—	—
			95f	82f			
			115g	99g			
	13	3	110e	95e		—	—
			120f	104f			
			120g	104g			
	14	4	190h	164h		—	—
	15	5	290h	251h		—	—
	16	6	500h	433h		32 (219) 28 (192)	35 (240)

[a] See "Assembly Ordering" for the relevant part series to determine a specific part number.

[b] k_{vs} = m³/h (ΔP = 100 kPa) $k_{vs} = C_v / 1.156$ C_v = gpm /√ΔP (in psi).

[c] Maximum allowable differential across the valve in any open position. Recommend less than 20 psi for quieter service. Consult Table-1 for close-off pressure ratings.

[d] Dual actuators are not available as a factory assembly.

[e] Mixing configuration, ports A and B are inlets, AB port is outlet.

[f] Diverting configuration, flow AB to A port.

[g] Diverting configuration, flow AB to B port.

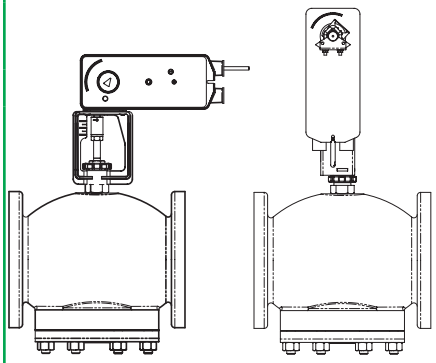
[h] All flow configurations, mixing or diverting.

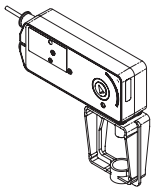
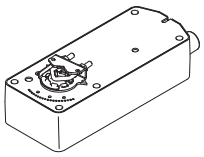
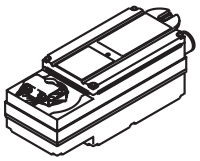
2-Way Electric Spring Return Models

Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult section 9 for close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

2-Way Globe Valve Assemblies with Electric Spring Return Actuators

Spring Return
2-Way Globe Valve Assemblies



					Mx61-720x	Mx41-715x	Mx40-717x
							
					Actuator Output Rating (minimum)		
					220 lbf (979 N)	133 lb-in (15 N-m)	150 lb-in (17 N-m)
					Actuator Models (Actuator Codes)		
					Two-Position MA61-7200 MA61-7201 MA61-7203 (596) Floating MF61-7203 (596) Proportional MS61-7203 (596)	Two-Position MA41-7150 MA41-7151 MA41-7153 (556) Floating MF41-7153 (556) Proportional MS41-7153 (556)	Two-Position MA40-7170 MA40-7171 MA40-7173 (576) Floating MF40-7173 (576) Proportional MS40-7170 MS40-7171 MS40-7173 (576)
					Linkage Kit Part Number		
					None (Part of Actuator)	AV-607-1 (2½" to 5") AV-609-1 (6")	AV-607-1 (2½" to 5") AV-609-1 (6")
Close-off Pressure (psi)					125		
Valve Assembly Part Number[a]	**P Code**	**Valve Size in.**	**C_v[b]**	**k_{vs}[a,b]**	**Maximum Allowable Operating Differential Pressure[c], psi (kPa)**		
						Single Actuator	**Dual Actuator[d]**	**Single Actuator**	**Dual Actuator[d]**
Vx-8213-5xx-5-P Vx-8223-5xx-5-P	12	2½	56	48	35 (240)	35 (240)	—	35 (240)	—
	13	3	85	74					
	14	4	145	125					
	15	5	240	208					
	16	6	370	320	—	22 (151)	35 (240)	25 (171)	35 (240)

[a] See "Assembly Ordering" for the relevant part series to determine a specific part number.

[b] $k_{VS} = m^3/h$ (ΔP = 100 kPa) $k_{VS} = C_V / 1.156$ C_V = gpm /ΔP (in psi).

[c] Maximum allowable differential across the valve in any open position. Less than 20 psi recommended for quieter service. Consult section 9 for close-off pressure ratings.

[d] Dual actuators are not available as factory assemblies.

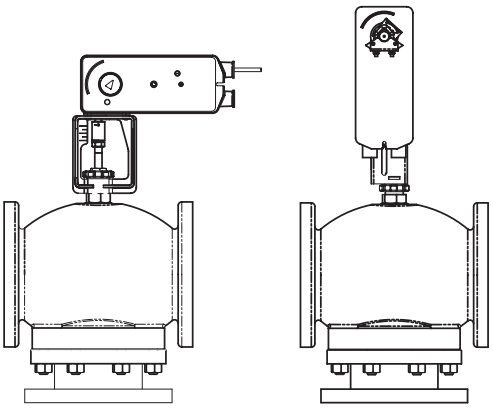
Balanced VB-8303 Flanged Bodies with SR Electric Actuators

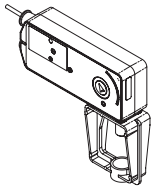
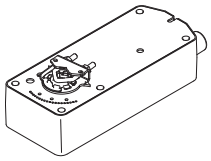
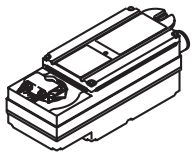
Valve/Actuator Combinations and Operating Pressure Differentials

Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult section 9 for close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

3-Way Globe Valve Assemblies with Electric Spring Return (SR) Actuators

Spring Return (SR)
3-Way Globe Valve Assemblies



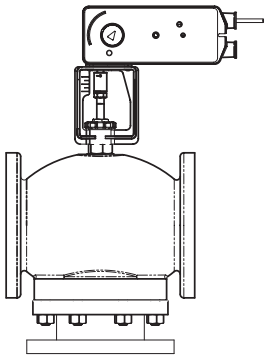
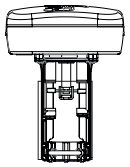
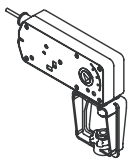
Valve Assembly Part Number[a]	P Code	Valve Size in.	C_v[b]	k_{vs}[b]	Mx61-720x	Mx41-715x		Mx40-717x	
									
					Actuator Output Rating (minimum)				
					220 lbf (979 N)	133 lb-in (15 N-m)		150 lb-in (17 N-m)	
					Actuator Models (Actuator Codes)				
					Two-Position MA61-7200 MA61-7201 MA61-7203 (596) Floating MF61-7203 (596 Proportional MS61-7203 (596)	Two-Position MA41-7150 MA41-7151 MA41-7153 (556) Floating MF41-7153 Proportional MS41-7153 (556)		Two-Position MA40-7170 MA40-7171 MA40-7173 (576) Floating MF40-7173 (576) Proportional MS40-7170 MS40-7171 MS40-7173 (576)	
					Linkage Kit Part Number				
					None (Part of Actuator)	AV-607-1 (2½" to 5") AV-609-1 (6")		AV-607-1 (2½" to 5") AV-609-1 (6")	
Close-off Pressure (psi)					35				
					Maximum Allowable Operating Differential Pressure[c], psi (kPa) (Mixing/Diverting)				
						Single Actuator	Dual Actuator[d]	Single Actuator	Dual Actuator[d]
Vx-8303-5xx-5-P	12	2½	80e	69e	35 (240) / 35 (240)	35 (240) / 35 (240)	—	35 (240) / 35 (240)	—
			95f	82f					
			115g	99g					
	13	3	110e	95e					
			120f	104f					
			120g	104g					
	14	4	190h	164h					
	15	5	290h	251h		32 (219) / 28 (192)	35 (240) / 35 (240)	35 (240) / 31 (212)	35 (240) / 35 (240)
	16	6	500h	433h	—	15 (103) / 11 (75)	—	16 (110) / 12 (82)	35 (240) / 31 (214)

[a] See "Assembly Ordering" for the relevant part series to determine a specific part number.
[b] k_{vs} = m^3/h (ΔP = 100 kPa) $k_{vs} = C_v / 1.156$ C_v = gpm /$\sqrt{\Delta P}$ (in psi).
[c] Maximum allowable differential across the valve in any open position. Recommend less than 20 psi for quieter service. Consult Table-1 for close-off pressures.
[d] Dual actuators are not available as factory assemblies.
[e] Mixing configuration, ports A and B are inlets, AB port is outlet.
[f] Diverting configuration, flow AB to A port.
[g] Diverting configuration, flow AB to B port.
[h] All flow configurations, mixing or diverting.

3-Way Linked Globe Valve Assemblies with Linear Series Actuators

Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult section 9 for close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

3-Way Linked Globe Valve Assemblies with Linear Series Spring Return Actuators

3-Way Linked Globe Valve Assemblies[a]						
						
					Actuator Force Rating	
					157 lbf (700 N)	220 lbf (979 N)
					Actuator Model (Actuator Code)	
					Floating/Proportional (Universal) M900AR (650) Linkage AV-822	Two-Position MA61-720x (595) (596) Floating MF61-7203 (596) Proportional MS61-7203 (596)
Valve Assembly Part Number[b]	P Code	Valve Size in. (mm)	C_v[c]	k_{vs}[c]	Actuator Close-off Pressure (psi)[ad]	
Vx-9313-xxx-5-P	12	2½ (65)	74.0	64	24	33
	13	3 (80)	101.0	87	16	22
Vx-9313-xxx-5-P	14	4 (N/A)	145.0	125	9	12

[a] Refer to the Piping chapter diagrams for 3-Way linked globe valve assemblies.

[b] To determine a specific part number, see "Assembly Ordering" for the relevant part series.

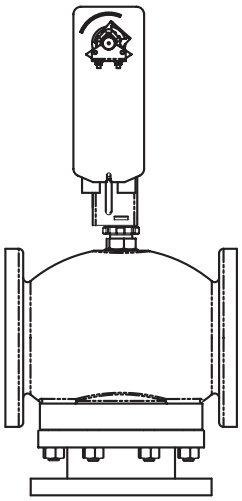
[c] $C_v = \frac{gpm}{\sqrt{\Delta P}}$ (where ΔP is measured in psi) $k_{vs} = C_v / 1.156$ $k_{vs} = \frac{m^3/h}{\sqrt{\Delta P}}$ (where ΔP is measured in bar; 1 bar = 100 kPa).

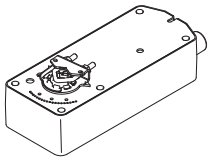
[d] Close-off pressure ratings describe only the differential pressure which the actuator can close-off with adequate seating force. Consult valve body specifications for other limitations. The rating value is the pressure difference between the inlet and outlet ports.

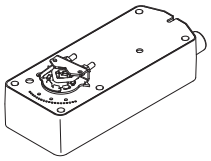
Vx-9313 Valve Bodies with Spring Return Actuators

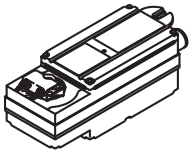
3-Way Linked Globe Valve Assemblies with Spring Return Actuators

Spring Return
3-Way Linked Globe Valve Assemblies[a]









Valve Assembly Part Number [b]	P Code	Valve Size in. (mm)	C_v [c]	k_{vs} [c]	Actuator Torque Rating (minimum)					
					60 lb-in (7 N-m)		133 lb-in (15 N-m)		150 lb-in (17 N-m)	
					Actuator Model (Actuator Code)					
					Two-Position MA41-707x (544) Floating MF41-7073 Proportional MS41-7073		Two-Position MA41-715x Floating MF41-7153 Proportional MS41-7153		Two-Position MA40-717x Floating MF40-7173 Proportional MS40-717x (576)	
					Linkage Kit Part Number					
					AV-607-1 (2½" to 4")		AV-607-1 (2½" to 4") AV-609-1 (5" and 6")		AV-607-1 (2½" to 4") AV-609-1 (5" and 6")	
					Actuator Close-off Pressure (psig)[d]					
					Single Actuator	Dual Actuator[e]	Single Actuator	Dual Actuator[e]	Single Actuator	Dual Actuator[e]
Vx-9313-xxx-5-P	12	2½ (65)	74.0	64	24	52	33	70	40	84
	13	3 (80)	101.0	87	16	35	22	48	27	57
	14	4 (N/A)	145.0	125	9	20	12	27	15	33
	15	5 (N/A)	235.0	203	—	—	—	9	—	10
	16	6 (N/A)	350.0	303	—	—	—	6	—	7

[a]Refer to the Piping chapter for 3-Way linked globe valve assemblies.

[b]To determine a specific part number, see "Assembly Ordering" for the relevant part series.

[c] $k_{vs} = m^3/h$ ($\Delta P = 100$ kPa) $k_{vs} = C_v / 1.156$ $C_v = k_{vs} \times 1.156$

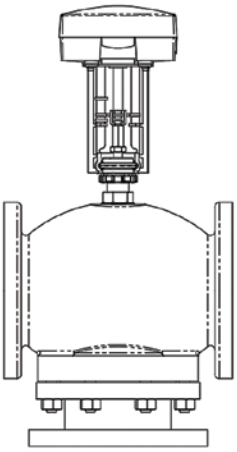
[d]Close-off ANSI III (0.1%) for metal-to-metal seats with pressure at inlet (port A).

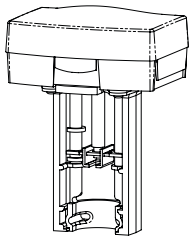
[e]Dual actuators are not available as factory assemblies.

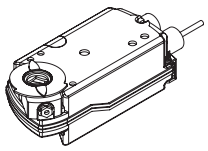
Vx-9313 Valve Bodies with NSR Actuators

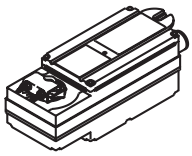
3-Way Linked Globe Valve Assemblies with Non-Spring Return Actuators

Non-Spring Return 3-Way Linked Globe Valve Assemblies[a]









Valve Assembly Part Number[b]	P Code	Valve Size in. (mm)	C_v[c]	k_{vs}[c]	Actuator Torque Rating (minimum)					
					180 lb-in (800 N-m)	337 lb-in (1500 N-m)	133 lb-in (15 N-m)		300 lb-in. (34 N-m)	
					Actuator Model (Actuator Code)					
					Universal M800A (680)	Universal M1500A (686)	Floating MF41-6153 Proportional MS41-6153		Floating MF41-6343 Proportional MS41-6343	
					Linkage Kit Part Number					
					AV-822	AV-822	AV-607-1 (2½" to 4")		AV-609-1[f] (2½"…6")	
					Actuator Close-off Pressure psia[d]					
							Single Actuator	Dual Actuator[e]	Single Actuator	Dual Actuator[e]
Vx-9313-xxx-5-P[f]	12	2½ (65)	74.0	64	29	61	33	70	46	96
	13	3 (80)	101.0	87	19	42	22	48	31	66
	14	4 (N/A)	145.0	125	10	22	12	27	18	38
	15	5 (N/A)	235.0	203	—	14	—	9	—	24
	16	6 (N/A)	350.0	303	—	9	—	6	—	17

[a]Refer to the Piping chapter for 3-way linked globe valve assemblies.

[b]To determine a specific part number, see "Assembly Ordering" for the relevant part series.

[c] $k_{vs} = m^3/h$ (ΔP = 100 kPa) $k_{vs} = C_v / 1.156$ $C_v = k_{vs} \times 1.156$

[d]Close-off ANSI III (0.1%) for metal-to-metal seats with pressure at inlet (port A).

[e] Dual actuators are not available as factory assemblies.

[f]Mx41-634x actuators used on 2½" to 4" Vx-9313 will stroke over a shorter portion of the control input signal.

Balanced Vx-82x3, VB-8303 & VB-9313 Flanged Bodies with Electric Actuators

Floating and Proportional Non-Spring Return Electric, Schneider Electric Forta and Schneider Electric SmartX Actuators										
Actuator Part Number	Actuator Code	Control Signal Type	Power Input @ 50/60 Hz				Timing, sec.[a]		Output Force or Torque	Manual Override
			Voltage	VA		Watts	50 HZ	60 HZ		
				Running	Holding					
M1500A[b]	686	Floating (SPDT) / Proportional (Vdc or mAdc)	24 Vac ±10% 20-30 Vdc	24c	—	—	60 or 300 adj.d / 20 sece 1" of stroke		337 lb-in (1500 N)	Yes
MF41-6343	516	Floating (SPDT)	24 Vac ±20%	5.7	4.1	3.9	162	162	300 lb-in (34 N-m)	
			22-30 Vdc	4.1	3.0	4.1				
MS41-6341	514	Proportional (Vdc or mAdc)	240 Vac ±10%	9.0	8.1	5.0	148	148	300 lb-in (34 N-m)	
MS41-6340	512	Proportional (Vdc or mAdc)	120 Vac ±10%	7.5	6.2	4.7	148	148	300 lb-in (34 N-m)	
MS41-6343	516	Proportional (Vdc or mAdc)	24 Vac ±10%	5.6	4.0	3.6	148	148	300 lb-in (34 N-m)	
			22-30 Vdc	3.4	2.2	3.4				

[a] Approximate timing @ 70°F (21°C) with no load.

[b] Requires AV-822 linkage, if field assembled.

[c] Requires a 50 VA transformer for sizing.

[d] For the floating control signal only.

[e] Proportional control.

Two-Position, Floating, and Proportional Spring Return Electric 220 lbf Schneider Electric SmartX Linear Actuators													
Actuator Part Number	Actuator Code	Control Signal Type	Power Input							Timing, Sec.[a]		Output Force, lbf (N)	Manual Override
			Voltage 50/60 Hz	Running				DC Amp	Holding				
				50 Hz		60 Hz			50 Hz	60 Hz	Powered	Spring Return	
				VA	W	VA	W		W	W			
MA61-7200		2-Position (SPST or Triac)	120 Vac ±10%	11.7	8.8	10.0	8.4	-	3.6	5.0	<190	<40	220 (979) minimum 495 (2202) max. stall
MA61-7201			230 Vac ±10%	15.5	9.5	10.6	8.5	-	4.6	3.3			
MA61-7203	596		24 Vac ±20% 22-30 Vdc	9.8	7.5	9.7	7.5	0.29	2.8	2.8			Yes
MF61-7203	596	Floating (SPDT)	24 Vac ±20% 22-30 Vdc	9.8	7.7	9.7	7.7	0.3	3.3	3.3			
MS61-7203	596	Proportional (Vdc or mAdc)	24 Vac ±20% 22-30 Vdc	9.8	7.4	9.7	7.4	0.28	2.9	2.9			

[a]Approximate timing @ 70°F (21°C) with no load.

Balanced Vx-82x3, Vx-8303 & VB-9313 Bodies with SR Actuators

Two-Position, Floating and Proportional Spring Return Electric 133 lb-in Schneider Electric SmartX Actuators

Actuator Part Number	Actuator Code	Control Signal Type	Power Input								Timing, Seconds[a]		Torque, lb-in (N-m)[b]	Manual Override
			Voltage 50/60 Hz	Running				DC Amp	Holding		Powered	Spring Return		
				50 Hz		60 Hz			50 Hz	60 Hz				
				VA	W	VA	W		W	W				
MA41-7150		2-Position (SPST)	120 Vac ±10%	11.7	8.8	10.0	8.4	-	3.6	5.0	<190	<30	33 (15)	Yes
MA41-7151			230 Vac ±10%	15.5	9.5	10.6	8.5	-	4.6	3.3				
MA41-7153	556		24 Vac ±20% 22-30 Vdc	9.8	7.5	9.7	7.5	0.29	2.8	2.8				
MF41-7153		Floating (SPDT)	24 Vac ±20% 22-30 Vdc	9.8	7.7	9.7	7.7	0.3	3.3	3.3				
MS41-7153	556	Proportional (Vdc or mAdc)	24 Vac ±20% 22-30 Vdc	9.8	7.4	9.7	7.4	0.3	2.9	2.9				

[a]Approximate timing @ 70°F (21°C) with no load.

[b]De-rating required for spring return actuators at low temperatures.

Linkage Kits and Actuator/Linkage Assemblies

Application	Actuator	Linkage Kit[a]
2½" to 5" 2-Way & 3-Way	MK-6811b	AV-497 (VB-8000 only) AV-495 (VB-9313 up to 4" only)
6" 2-Way & 3-Way	MK-6911b	AV-497 (VB-8000 only)
2½" to 4" 3-Way	MK-8811	AV-496 (VB-9313 only)
5"- 6" 3-Way	MK-8911	AV-496 (VB-9313 only)
2½" to 5" 2-Way and 3-Way (1" nominal stroke)	MA41-7150 MA41-7151 MA41-7153 MA40-7170 MA40-7171 MA40-7173 MF41-6343a MF41-7153 MF40-7173 MS41-6340a MS41-6341a MS41-6343a MS41-7153 MS40-7170 MS40-7171 MS40-7173	AV-607-1c
6" 2-Way & 3-Way (1¾" nominal stroke)		AV-609-1d
2½"…6" 2-Way & 3-Way (1" nominal stroke)	M1500A	AV-822

[a]Mx61-720x Actuators require no separate linkage. Mx41-634x is not compatible with AV-607-1. The AV-609-1 linkage can be used with the Mx41-634x actuator on 2½" to 5" VB-8000 valves or 2½" to 4" VB-9313 valves, but the valve will stroke over a shorter portion of the control input signal.

[b]AK-42309-500 (order separately) optional for 2½" to 5" valve, required for 6" valve. VK4 valve assemblies include positive positioner.

[c]2½" to 5" VB-8000 valves or 2½" to 4" VB-9313 valves.

[d]6" VB-8000 valves or 5" - 6" VB-9313 valves.

Balanced Vx-82x3 & Vx-8303 Bodies with Spring Return Actuators

Two Position, Floating, and Proportional Spring Return Electric 150 lb-in Schneider Electric SmartX Actuators										
Actuator Part Number	Actuator Code	Control Signal Type	Power Input				Approximate Timing, Seconds at 70°F (21°C with no load)		Actuator Output Torque Rating, lb-in (N-m)[a]	Manual Override
			Voltage	VA		Running Watts	Powered	Spring Return		
				Running	Holding					
MA40-7170	572	2-Position (SPST)	120 Vac ±10%	8.4	6.6	6.2	162	72	150 (17)	No
MA40-7171	574		240 Vac ±10%	9.8	8.5	6.5				
MA40-7173	576		24 Vac ±20%	7.4	5.1	5.3				
			22-30 Vdc	5.0	3.0	5.0				
MF40-7173	576	Floating	24 Vac ±20%	8.1	5.3	5.8				
			22-30 Vdc	5.7	3.6	5.7				
MS40-7170	572	Proportional (Vdc or mAdc)	120 Vac ±10%	8.5	5.2	6.4	147	65		
MS40-7171	574		240 Vac ±10%	10.8	9.0	7.2				
MS40-7173	576		24 Vac ±20%	7.8	4.7	5.5				
			22-30 Vdc	5.6	2.5	5.0				

[a] De-rating required for spring return actuators at low temperatures.

VB-8xx3 & VB-9313 with Forta Spring & NSR Actuators

Easily Assembled with VB-8000/9000 Series Globe Valves

The VB-8000/9313 2½" to 6" series are available with cast iron flanged stem-up open and stem-up closed 2-Way units and 3-Way mixing and diverting units. All valves are designed for easy field installation with Forta actuators. For your convenience, popular valve and actuator combinations are available as factory Forta valve and actuator assemblies.

U-Bolt Mount

VB-8000/VB-9313 Forta Actuator Application

Valve Size	M800A-VB* (180 lbf)	M1500A-VB (337 lbf) Size	M900Ax* (157 lbf) Spring Return
2½”	•	•	•
3”	•	•	•
4”	•	•	•
5”		•	
6”		•	

*VB-9313 valves only.

Forta Actuator Specifications

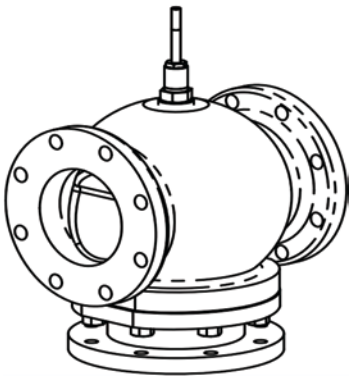
Actuator Mounting	Part Number	Power	Input Signal	Spring Return Action	Feedback	Force	Auxiliary Switch	NEMA 4
U-Bolt	**M800A***	24 vac 50-60 Hz	Two-Position Floating	N/A	2…10 vdc	180 lbf	None	
	M800A-S2*						2-SPDT	
	M1500A					337 lbf	None	
	M1500A-S2		Proportional				2-SPDT	
	M900AR*			Retract Up	0-5 or 2…10 vdc	157 lbf	None	
	M900ARW*		0…10, 2…10 vdc, or 4…20 ma	Retract Up			None	Yes
	M900ARW-S2*			Retract Up			2 SPDT	
	M900AE*			Extend Down			None	
	M900AEW-S2*			Extend Down			2 SPDT	Yes

*VB-9313 valves only.

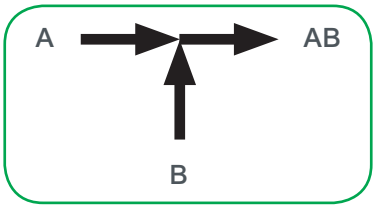
VB-9313 Mixing Valves with M900Axx SR Actuators

3-Way Valves

3-Way mixing
ANSI 125 Flanged
Cast Iron Body
ASA Flanged



VB-9313



VB-9313 3-Way
Mixing Flow Pattern

Schneider Electric VB-9313 Valve Bodies		
Application		Chilled or Hot Water
Size		2½" to 4"
Valve Body Part Number		VB-9313-0-5-P
Linkage Kit Part Number		AV-822
Material	Flow Characteristic	Nominally Linear
	Body	Cast Iron
	Seat	Bronze
	Stem	Stainless Steel
	Plug	Brass
	Packing	Spring Loaded TFE/EPDM
	Disc	None
ANSI Pressure Class, psig		125
Allowable Control Media Temperature, °F (°C)		40°F…300°F (4°C…149°C)
Allowable Differential Pressure, Water, psi (kPa)[a]		35 psi (241 kPa) Max.
P Code	Valve Size, In.	C_v (k_{vs}) Rating[b]
12	2½	74 (64)
13	3	101 (87)
14	4	170 (147)

[a]Maximum recommended differential pressure in open position. Do not exceed the recommended differential pressure (pressure drop) or integrity of parts may be affected.
Exceeding maximum recommended differential pressure voids the product warranty.

[b]k_{vs}= m^3/h (ΔP = 100 kPa) $k_{vs} = C_v / 1.156$ C_v = gpm / ΔP (in psi).

Schneider Electric Forta Actuator Model Table											
Model	Act Code	Force	Power	Running Watts	Transformer Size	Floating Control[a,b]	Proportional Control[b]	Feedback[a]	(2) SPDT Aux Switches[e]	Linkage[c]	Spring Return Action
M900AR	650	157 lbf (700 N)	24 Vac 50/60 Hz	21 W	50 Va	Yes	0…10 Vdc, 2…10 Vdc, 4…20 Ma	2…10 Vdc or 0-5 Vdc	No	AV-822	Return
M900AE[d]	—										Extend
M900ARW	660										Return
M900ARW-S2[d]	—								24 Vac 4a		Return
M900AEW-S2[d]	—										Extend

[a]Dip switch selectable.
[b]0-5, 2-6 or 5-10, 6-10 also selectable by dip switch.
[c]Order separately.
[d]Factory assemblies not offered.
[e]S2 auxiliary switches may be added in the field. Order 880 0104 000

Ambient Temperature Restrictions for Forta Valve Actuators	
Fluid Temperature in Valve Body	Maximum Allowable Ambient Temperature[a]
Chilled Water	122°F (50°C)
281°F (138°C)	113°F (45°C)
300°F (149°C)	107°F (42°C)
340°F (171°C)	100°F (38°C)
366°F (186°C)	90°F (32°C)

[a]Minimum allowable ambient operating temperature 14°F (-10°C).

Select Valve/Actuator Combination Having Sufficient close-off for Application						
Valve Body	Valve Action	P Code	Cv	Size	Close-off Ratings PSI	Maximum Operating Pressure Differential
					M900Axxa	
VB-9313-0-5-P	3 Way	12	67 (58)	2 ½"	29	35
		13	91 (79)	3"	19	35
		14	170 (147)	4"	10	35

[a]Requires AV-822 Linkage Order Separately.

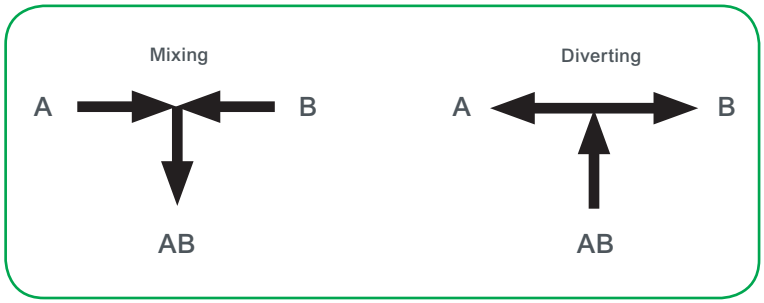
Factory Valve and Actuator Assemblies				
VB-9313 Series Valve Assembly Part Numbers[a]	P Code	Size	Valve Action Stem UP	M900AR (650) or M900ARW (660) Action on Power Loss
VU-9313-6x0-5-P (Mixing)	12	2 ½"	Flow B to AB	Flow B to AB
	13	3"		
	14	4"		

[a] 650 = M900AR, 660 = M900ARW.

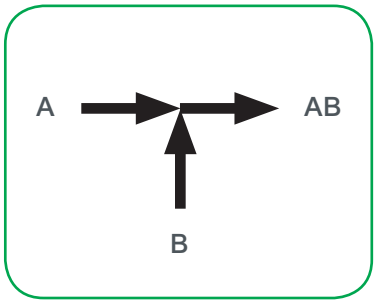
VB-9313 Valve Body and M900Axx Spring Return Actuator Actions								
			M900ARx			M900AEx		
Valve Body Part Number	Valve Body Description	Valve Body Stem Up Water Flow	Unpowered Valve Assembly Water Flow	Switch 7 off, Loss of Control Signal Only	Switch 7 on, Loss of Control Signal Only	Unpowered Valve Assembly Water Flow	Switch 7 off, Loss of Control Signal Only	Switch 7 on, Loss of Control Signal Only
VB-9313-0-5-P	3-Way Mixing	Flow B to AB	Flow B to AB	Flow B to AB	Flow A to AB	Flow A to AB	Flow A to AB	Flow B to AB

[a]Flow is out AB for Mixing application and in AB for Diverting applications.

3-Way Flanged Valve Body Flow Patterns



VB-8303 3-Way Flow Patterns



VB-9313 3-Way Mixing Flow Patterns

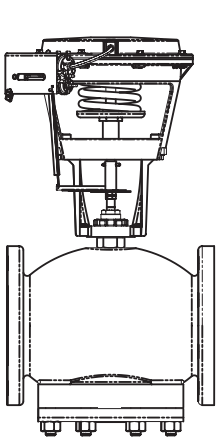
Balanced Vx-82x3-xxx-5-x 2-Way Flanged Valves with Pneumatic Actuators

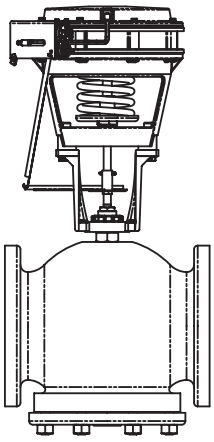
Valve/Actuator Combinations and Operating Pressure Differentials

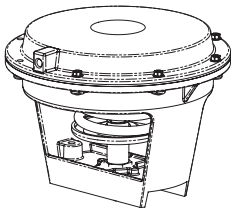
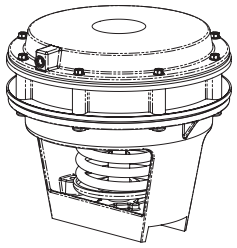
Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult the table below for close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

2-Way Globe Valve Assemblies with Pneumatic Spring Return Actuators

Pneumatic Spring Return
2-Way Globe Valve Assemblies
(shown with Positive Positioner)





					MK-6811[b]	MK-6911[b]
						
					Actuator Models (Actuator Codes)	
					MK-6811 (602)	MK-6911 (652)
					Linkage Kit Part Number	
					AV-497	AV-497
					Spring Range, psig (kPa)	
					5 to 10 (34 to 69)[a]	5 to 10 (34 to 69)[a]
Close-off Pressure (psi)					125	
Valve Assembly Part Number[b]	P Code	Valve Size in.	C_v[b]	k_{vs}[b]	Maximum Allowable Operating Differential Pressure[d], psi (kPa)	
VK-8213-602-5-12 VK-8223-602-5-12 VK4-8213-602-5-12 VK4-8223-602-5-12	12	2½	56	48	35 (240)	—
VK-8213-602-5-13 VK-8223-602-5-13 VK4-8213-602-5-13 VK4-8223-602-5-13	13	3	85	74		—
VK-8213-602-5-14 VK-8223-602-5-14 VK4-8213-602-5-14 VK4-8223-602-5-14	14	4	145	125		—
VK-8213-602-5-15 VK-8223-602-5-15 VK4-8213-602-5-15 VK4-8223-602-5-15	15	5	240	208		—
VK4-8213-652-5-16 VK4-8223-652-5-16	16	6	370	320	—	35 (240)

[a]Spring range field adjustable with positive positioner.

[b]AK-42309-500 positive positioner optional for 2½" to 5" valve, required for 6" valve. Supplied as standard on VK4 factory valve assemblies. See "Assembly Ordering" for the relevant part series to determine a specific part number.

[c]$k_{VS} = m^3/h$ (ΔP = 100 kPa) $k_{VS} = C_V / 1.156$ C_V = gpm /$\sqrt{\Delta P}$ (in psi).

[d]Maximum allowable differential across the valve in any open position. Less than 20 psi recommended for quieter service. Consult section 9 for close-off pressure ratings.

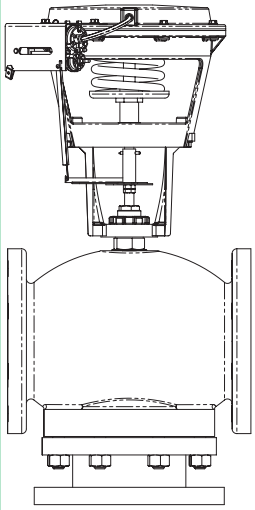
Balanced Vx-8303-xxx-5-x 3-Way Flanged Valves with Pneumatic Actuators

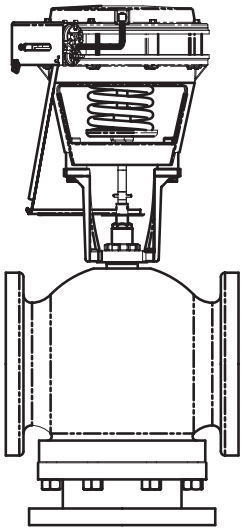
Valve/Actuator Combinations and Operating Pressure Differentials

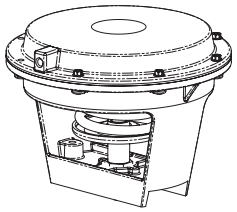
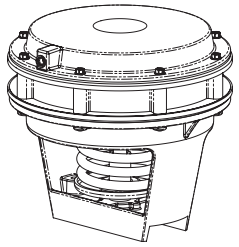
Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. See section 8 for close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

3-Way Globe Valve Assemblies with Pneumatic Spring Return Actuators

Spring Return
3-Way Globe Valve Assemblies
(shown with Positive Positioner)





Valve Assembly Part Number[b]	P Code	Valve Size in.	C_v[c]	k_{vs}[c]	MK-6811[b]	MK-6911[b]
						
					Actuator Models (Actuator Codes)	
					MK-6811 (602)	MK-6911 (652)
					Linkage Kit Part Number	
					AV-497	AV-497
					Spring Range, psig (kPa)	
					5 to 10 (34 to 69)[a]	5 to 10 (34 to 69)[a]
Close-off Pressure (psi)					35	
					Maximum Allowable Operating Differential Pressure[d], psi (kPa) (Mixing/Diverting)	
VK-8303-602-5-12	12	2½	80e	69e	35 (240) / 35 (240)	—
			95f	82f		
			115g	99g		
VK-8303-602-5-13	13	3	110e	95e		
			120f	104f		
			120g	104g		
VK-8303-602-5-14	14	4	190h	164h		
VK-8303-602-5-15 VK4-8303-602-5-15	15	5	290h	251h		—
VK4-8303-652-5-16	16	6	500h	433h	—	35 (240) / 35 (240)

[a]Spring range field adjustable with positive positioner.

[b]AK-42309-500 positive positioner optional for 2½" to 5" valve, required for 6" valve. Supplied as standard on VK4 factory valve assemblies. See "Assembly Ordering" for the relevant part series to determine a specific part number.

[c]k_{vs} = m^3/h (ΔP = 100 kPa) $k_{vs} = C_v / 1.156$ C_v = gpm /$\sqrt{\Delta P}$ (in psi).

[d] Maximum allowable differential across the valve in any open position. Less than 20 psi recommended for quieter service. Consult section 9 for close-off pressure ratings.

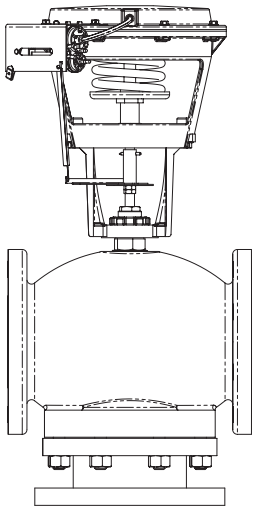
[e]Mixing configuration, ports A and B are inlets, AB port is outlet.

[f]Diverting configuration, flow AB to A port.

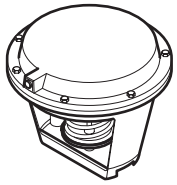
[g]Diverting configuration, flow AB to B port.

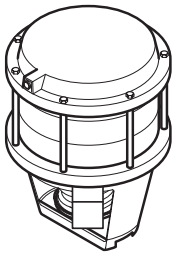
[h] All flow configurations, mixing or diverting.

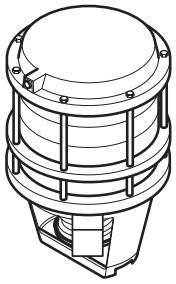
VB-9313 Flanged 3-Way Mixing Valves with Pneumatic Actuators



VK-9313 with MK-6811 Pneumatic Actuator







Select Actuator or Actuator Code (xxx) having sufficient close-off for the application. If selecting component parts, select Positive Positioner, if required. NOTE: For higher close-offs, use VB-8303 balanced valves with common bottom port.

2½"…6" Flanged Globe Valves with Pneumatic Actuators

Actuator	MK-6811	MK-8811	MK-8911
Effective Area (stroke)	50 Sq. In. (1 In. Stroke)	100 Sq. In. (1 In. Stroke)	100 Sq. In. (2 in. Stroke)
Positive Positioner	AK-42309-500		
Factory Assembly with Positive Positioner	Yes	Yes	Yes
Actuator Code (xxx)	602f	802e	812e
Spring Range (psig)	5 to 10	5 to 10	5 to 10

ACTUATOR CLOSE-OFF PRESSURE RATING (psi)ab

Supply Air Pressure (psig)				15/20	15	20	15/20	15	20	15/20	15	20
Stem Positionc				SU	SD	SD	SU	SD	SD	SU	SD	SD
Valve Assembly	Valve Body	P Code	Size in.									
VK4-9313-xx2-5-Pd	VB-9313-0-5-P	-12	2½	30	40	91	60	91	125	—	—	—
		-13	3	20	27	62	40	62		—	—	—
		-14	4	10	14	33	25	33	73	—	—	—
VK4-9313-812-5-Pd	VB-9313-0-5-P	-15	5	—	—	—	—	—	—	15	20	45
		-16	6	—	—	—	—	—	—	10	13	30

[a]Close-off ratings for mixing or sequencing valves: (SU = "A", SD = "B" port). "A" port (SU) ratings equal pressure at port "A" minus pressure at port "B". "B" port (SD) ratings equal pressure at port "B" minus pressure at port "A". Close-off ratings in the table are true only when the indicated supply air pressure is applied to the actuator. A change in air pressure at the actuator alters the actual close-off pressure.

[b]Close-off pressure ratings describe only the differential pressure which the actuator can close-off to standards with adequate seating force. Consult valve body specifications for other limitations.

[c]SU - Stem Up; SD - Stem Down. Refer to the Piping chapter for flow pattern.

[d] Factory valve assemblies are available only with positive positioner.

[e]Includes AV-496 linkage.

[f]Includes AV-495 linkage.

Optional Input Signal Interface to Pneumatic Actuator

Input Signal Type	Interface Module Required
Two-Position, SPST (Electric)	AL-1xx
Two-Position, SPDT Snap Acting (Electric)	AL-1xx

10. 2½”…6” Actuators for VB-8000 & VB-9000 Flanged Valves

VB-8000/9313 Globe Valve Electric Actuators

133 in-lb Spring Return Actuators

Mx41-7153 Series SmartX Actuator
(Code 556)
24 Vac
(Linkage not shown.)

Specifications	
Connection	3 ft. (0.9 m) Appliance cable
Housing	Aluminum die-cast, NEMA 2 with conduit connector down
Dimensions	10½ x 4 x 3½ (267 x 110 x 89 mm)
Linkage	AV-607-1 (2½" - 5" VB-8000 valves or 2½" - 4" VB-9313 valves) or AV-609-1 (6" VB-8000 valves or 5" - 6" VB-9313 valves)
Position Indicator	Visual indicator
Override	Manual
Motor Type	Brushless
Rotation	0…90°
Control Signal	MA41-7153: 2-position SPST MF41-7153: Floating MS41-7153: 2…10 Vdc The 2…10 Vdc control signal is factory set for direct action. It can be changed in the field to reverse action.
Voltage	24 Vac ± 20%, 22-30 Vdc
VA@60 HZ	9.7
Feedback	MA41 and MF41: None MS41: 2…10 Vdc
Auxiliary Switch	None
Timing (seconds)	Powered <190 Spring return <30
General Instructions	F-26642

Note: Single mount actuators may be factory assembled, dual mount are field assembled.

Mx41-7150 Series SmartX Actuator
(Code 552)
120 Vac
(Linkage not shown.)

Specifications	
Connection	3 ft. (0.9 m) Appliance cable
Housing	Aluminum die-cast, NEMA 2 with conduit connector in the down position
Dimensions	10½ x 4 x 3½ (267 x 110 x 89 mm)
Linkage	AV-607-1 (2½" - 5" VB-8000 valves or 2½" - 4" VB-9313 valves) or AV-609-1 (6" VB-8000 valves or 5" - 6" VB-9313 valves)
Position Indicator	Visual indicator
Override	Manual
Motor Type	Brushless
Rotation	0…90°
Control Signal	MA41-7150: 2-position SPST
Voltage	120 Vac ± 10%
VA@60 HZ	10.0
Feedback	None
Auxiliary Switch	None
Timing (seconds)	Powered <190 Spring return <30
General Instructions	F-26642

Flanged Valve Close-off
2-Way ratings are better than ANSI IV (0.01% leakage) with EPDM seating. 3-Way ratings are better than ANSI III (0.1% leakage) with metal seating.

VB-8000/9313 Globe Valve Electric Actuators

150 in-lb Spring Return Actuators

Mx40-7173 Series SmartX Actuator (Code 576) 24 Vac

Specifications	
Connection	3 ft. (0.9 m) Appliance cable
Housing	Aluminum die-cast, NEMA 1, NEMA 4 with customer supplied water tight connector
Dimensions	10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage	AV-607-1 (2½" - 5" VB-8000 valves or 2½" - 4" VB-9313 valves) or AV-609-1 (6" VB-8000 valves or 5" - 6" VB-9313 valves)
Position Indicator	Visual indicator
Override	None
Motor Type	Brushless
Rotation	0…90° CW
Control Signal	MA41-7173: 2-position SPST MF41-7173: Floating MS41-7173: 2…10 Vdc/4…20 mA
Voltage	24 Vac ± 20%, 22-30 Vdc
VA@60 HZ	MA40-7173: 7.4 (AC) MF40-7173: 8.1 (AC) MS40-7173: 7.8 (AC)
Watts @ 60 Hz	MA40-7173: 5.3 (AC) MF40-7173: 5.8 (AC) MS40-7173: 5.5 (AC)
Feedback	2…10 Vdc
Auxiliary Switch	None
Timing (seconds)	Powered 147 Spring return 65
General Instructions	MA40-7173: F-26742 MF40-7173: F-26749 MS40-7173: F-26748

Mx40-7170 Series SmartX Actuator 120 Vac

Specifications	
Connection	3 ft. (0.9 m) Appliance cable
Housing	Aluminum die-cast, NEMA 1, NEMA 4 with customer supplied water tight connector
Dimensions	10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage	AV-607-1 (2½" - 5" VB-8000 valves or 2½" - 4" VB-9313 valves) or AV-609-1 (6" VB-8000 valves or 5" - 6" VB-9313 valves)
Position Indicator	Visual indicator
Override	None
Rotation	0…90° CW
Control Signal	MA40-7170: 2-position SPST MS40-7170: 2…10 Vdc/4…20 mA
Voltage	120 Vac ± 10%
VA@60 HZ	MA40-7170: 8.4 MS40-7170: 8.5
Watts @ 60 Hz	MA40-7170: 6.2 MS40-7170: 6.4
Feedback	None 2…10 Vdc (MS only)
Auxiliary Switch	None
Timing (seconds)	Powered 162 Spring return 82
General Instructions	MA40-7170: F-26742 MS40-7170: F-26748

Note: Single mount actuators may be factory assembled, dual mount are field assembled.

VB-8000/9313 Globe Valve Linear Electric Actuators

220 lbf Spring Return Actuators

Mx61-7203 Series SmartX Actuator (Code 596) 24 Vac

Specifications	
Connection	3 ft. (0.9 m) Plenum cable
Housing	Die-cast, NEMA 1
Dimensions	9-9/16 x 10-5/8 x 2-9/16 (243 x 270 x 65 mm)
Linkage	(included)
Position Indicator	Visual indicator
Override	Manual
Control Signal	MA61-7203: 2-position SPST MF61-7203: Floating MS61-7203: 2…10 Vdc The 2…10 Vdc control signal is factory set for direct action. It can be changed in the field to reverse action.
Voltage	24 Vac ± 20%, 22-30 Vdc
VA@60 HZ	9.7
Watts @ 60 Hz	7.7
Feedback	MA61 and MF61: None MS61: 2…10 Vdc only
Auxiliary Switch	None
Timing (seconds)	Powered <190 Spring return <40
General Instructions	F-27120

MA61-7200 Series SmartX Actuator 120

Specifications	
Connection	3 ft. (0.9 m) Plenum cable
Housing	Die-cast, NEMA 1
Dimensions	9-9/16 x 10-5/8 x 2-9/16 (243 x 270 x 65 mm)
Linkage	(included)
Position Indicator	Visual indicator
Override	Manual
Control Signal	2-position SPST
Voltage	120 Vac ± 10%
VA@60 HZ	10.0
Watts @ 60 Hz	8.4
Feedback	None
Auxiliary Switch	None
Timing (seconds)	Powered <190 Spring return <40
General Instructions	F-27120

MORE INFO

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/dJri2c

VB-8000/9313 Globe Valve Electric Actuators

300 in-lb Single Non-Spring Return Actuators

Mx41-6343 Series SmartX Actuator (Code 516) 24 Vac

Specifications	
Connection	24-inch (61 cm) Color-coded wires
Housing	Aluminum die-cast, NEMA 4 with customer supplied water tight connector or plug
Dimensions	10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage	AV-609-1 (6" VB-8000 or 5" - 6" VB-9313 valves), the AV-609-1 linkage can be used with the Mx41-634x actuator on 2½"-5" VB-8000 valves or 2½"-4" VB-9313 valves but the valve strokes over a shorter portion of the control input signal.
Position Indicator	Visual indicator
Override	Manual
Rotation	0…90° CW
Control Signal	MF41-6343: Floating MS41-6343: 2…10 Vdc
Voltage	24 Vac ± 20%
VA@60 HZ	MF41-6343: 7.1 MS41-6343: 8
Watts @ 60 Hz	MF41-6343: 3.8 MS41-6343: 8
Feedback	None
Auxiliary Switch	None
Timing (seconds)	<145
General Instructions	F-26744 F-26745

MS41-6340 Series SmartX Actuator (Code 512) 120 Vac

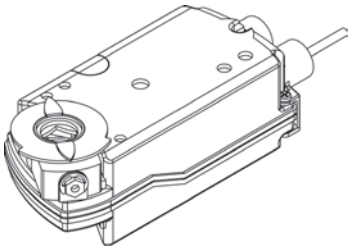
Specifications	
Connection	3 ft. (91 cm) Color-coded wires
Housing	Aluminum die-cast, NEMA 4 with customer supplied water tight connector or plug
Dimensions	10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage	AV-609-1 (6" VB-8000 or 5"-6" VB-9313 valves), the AV-609-1 linkage can be used with the Mx41-634x actuator on 2½"-5" VB-8000 valves or 2½"-4" VB-9313 valves but the valve strokes over a shorter portion of the control input signal.
Position Indicator	Visual indicator
Override	Manual
Rotation	0…90° CW
Control Signal	MS41-6340: 2…10 Vdc
Voltage	120 Vac ± 10%
VA@60 HZ	7.5
Watts @ 60 Hz	4.7
Feedback	2…10 Vdc
Auxiliary Switch	None
Timing (seconds)	148
General Instructions	F-26745

Note: Single mount actuators may be factory assembled, dual mount are field assembled.

NSR Actuators for VB-9313 Globe Valves

133 in-lb Non-Spring Return Actuators

Mx41-6153 Series
SmartX Actuator
(Code 512)
120 Vac



Specifications	
Torque	133 lb-in. (15 Nm).
Connections	3 ft. (0.9 m) long, 18 AWG leads
Rotation	CW / CCW
Shaft Size	1/4 to ¾-in. (6.4 to 19 mm) dia., 1/4 to ½-in. (6.4 to 13 mm) sq.
Housing	NEMA Type 1, IP54 according to EN 60 529.
Dimensions	8-3/8 H x 3¼ W x 2-2/3 D in. (210 x 80 x 70 mm)
Overload Protection	Throughout rotation.
Angle of Rotation	90° nominal (field adjustable to limit travel on either end of stroke).
Position Indication	Adjustable pointer.
Built-in Auxiliary Switches	Dual SPDT auxiliary switches available on MS41-6153-502 only.
Operating Temperature Limits	-25 to 130°F (-32 to 55°C).
Override	Manual.
Linkage	AV-607-1 (2½" to 4" VB-9313 valves)
General Instructions	Refer to F-27215.
Wiring Diagrams	MF41-6153 MS41-6153
Agency Listing	UL-873. EMC Directive (89/336/EEC). Emissions (EN50081-1). Immunity (EN61000-6-2). UL tested for Canadian Standards C22.2 No. 24-93.

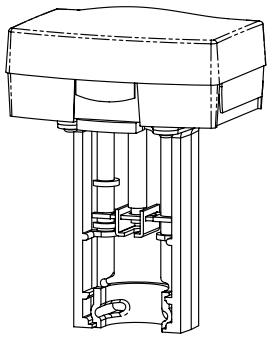
Specifications - Electrical & Timing

Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	
MF41-6153	Floating	24 Vac + 20% - 15%	3.0	None	No	<125 (60 Hz)	2.2 (1)
MS41-6153	0…10 Vdc			0…10 Vdc			
MS41-6153-502					2		

VB-8000/Vx-9313 Globe Valve
Electric NSR Actuators

180 & 337 lbf Non-Spring Return Actuators

Forta
M800A & M1500A Actuators
24 Vac - 20-29 Vdc



Specifications	
Stroke (M800, M1500)	U-Bolt style: >3/8" to 2" (9-52mm)
Stroke Timing	Floating: 60 or 300 sec selectable, Proportional: 15 sec @½" stroke
Linkage	AV-822
Feedback AO	2…10 Vdc
Power Supply Type	Half Wave
Motor Type	Brushless DC
Enclosure	NEMA 2 (IP 54, vertical mount only) with both conduit connectors used. NEMA 1 IP40 with one connector used.
Sound Power Level	Maximum 32 dba
Ambient Temperature Storage	-13 °F to 149 °F (-25 to 65 °C) ambient
Ambient Temperature Operational	122 °F (50 °C) For chilled water applications 113 °F (45°C) ambient at 281 °F (138°C) fluid temperature 107 °F (42 °C) ambient at 300 °F (149 °C) fluid temperature 100 °F (38 °C) ambient at 340 °F (171°C) fluid temperature 90°F (32°C) ambient at 366 °F (186 °C) fluid temperature
Minimum Operating Temperature	14 ° to 150 ° F (-10 ° to 50 ° C)
Ambient Humidity	15…95 % RH non-condensing
Housing Material	Die-Cast Aluminum
Cover Material	UL94 plenum rated plastic
Agency Certifications	UL873, cULus, RCM, CE

Specifications - Electrical & Control				
Model	M800A	M800A-S2	M1500A	M1500A-S2
AC Power	24 Vac +- 10% 50-60 Hz			
DC Power	20 - 29 Vdc 20 W		20 - 29 Vdc 30 W	
Running VA	15		24	
Transformer Size VA	50		50	
Floating Control	Yes			
Proportional Control	0…10 Vdc, 2…10 Vdc or 4…20mA with 500 ohm resistor			
Feedback	2…10 Vdc			
Force	180 lbf (800 N)		337 lbf (1500 N)	
2-SPDT Aux Switch	No	24 Vac 4a res	No	24 Vac 4a res

VB-9313 Globe Valve Electric SR Actuators

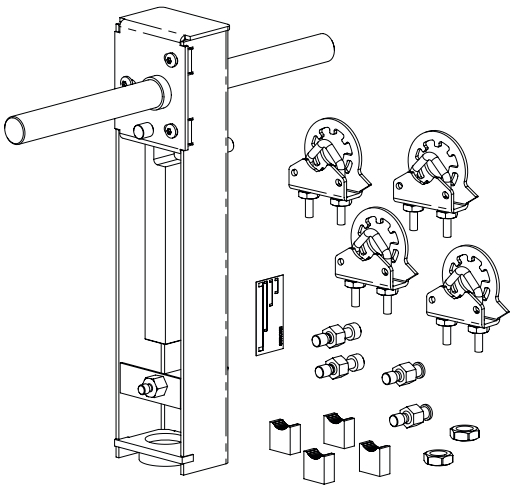
157 lbf Spring Return Actuators

NEMA 1 & 2

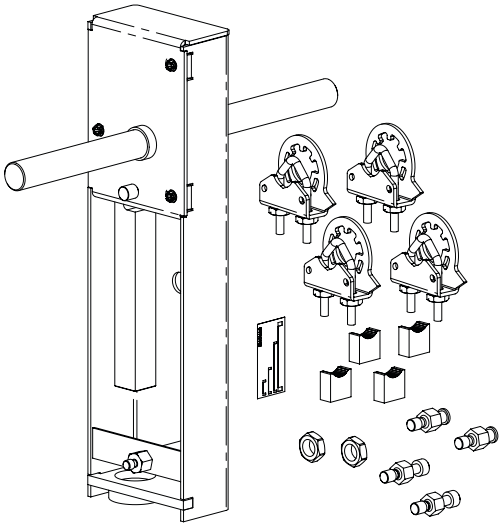
Forta
M900A Actuators
24 Vac - 20-29 Vdc

Specifications	
AC Power	24 Vac +/- 10%, 50-60 Hz
DC Power	20 - 29 Vdc 30 W
Running / Resting W	21 / 7
Running Time	Modulating (0.98 - 1.2" (25 - 30 mm): 20 sec. Floating: 60/300 sec. (selectable) Spring Return (0.98 - 1.2" (25 - 30 mm): 18 sec.
Transformer Size VA	50
Proportional Control	0…10 Vdc, 2…10 Vdc or 4…20mA with 500 ohm resistor
Feedback	2…10 Vdc
2-SPDT Aux Switch	24 Vac 4a res
Stroke Range	0.35”…1.2” (9-30 mm) - Factory-set at 0.8" (20 mm)
Output Force	157 lbs (700 N)
Linkage	AV-822
Duty Cycle	20%/60 mins. (Full-load, high ambient: 80%/60 mins.) (half load, room tempertaure)
Analog Input Signals	Voltage: 0…1 Vdc - impedance min 100 k ohms (range: 0…1/ 2…10 / 0…5 / 2…6 / 5…10 / 6…10) Vdc, 4…20 mA, with a 500 ohm resistor (included) Floating Input Signal: Voltage cross open input, 24 Vac - Current through closed input 5 mA, Pulse time min. 20 ms.
Aux. DC Power Supply Output	16 Vdc , 10.3 Vdc, Load 25 mA, short-circuit proof
Position Feedback	2…10 Vdc or 0…5 Vdc (0…10%) - Load 2 mA
Electrical Connections	Screw Terminals 18 gauge
Max. Ambient Temperature	122 °F (50 °C) For Chilled water applications 113 °F (45 °C) at 281°F (138 °C) Fluid temperature 107 °F (42 °C) at 300 °F (149 °C) Fluid temperature 100 °F (38 °C) at 340 °F (171 °C) Fluid temperature 90 °F (32 °C) at 366 °F (186 °C) Fluid temperature
Min. Ambient Temperature	14 °F (-10 °C)
Ambient Temperature Storage	-13…149 °F (-25…65 °C)
Ambient Humidity Range	15…95 % RH non-condensing
Available Valve Yoke Attachments	Tall U-Bolt Style for use with VB-9000 Series Globe Valves using AV-82x Linkages
Enclosure Rating for M900AR-xx-xx and M900AE-xx-xx Models	With one conduit connector used: NEMA 1 (IP40) With both conduit connectors used: NEMA 2 (IP54)
Enclosure Rating for M900ARW-xx-xx and M900AEW-xx-xx Models…	NEMA 4 (IP65)
Sound Power Level	43 dBa
Materials	Housing: Aluminum; Cover for M900AR-xx-xx and M900AE-xx-xx Models: ABS UL94 plenum-rated plastic, black. Cover for M900ARW-xx-xx and M900AEW-xx-xx Models: Aluminum die cast. Conduit Connection: North American ½ in conduit connectors, two on the side, two on the bottom.
S2 Auxiliary Switch Relays (optional)	(AEW- & ARW- only) SPDT, 24 Vac, 4a resistive (contacts made at 5% & 95% of end stroke)
Weight	5.07 lb (2.8 Kg)
Agency Certifications	UL873, cULus, RCM, CE
Environmental	RoHS, REACH

Rack & Pinion Linkages AV-607-1 & AV-609-1 for 2½”…6” Globe Valves



AV-607-1



AV-609-1

Application

The AV-607-1 and AV-609-11 linkages are designed to link single or dual Schneider Electric SmartX spring return and non-spring return actuators to 1½”…6” VB-9313 and 2½”…6” VB-8xx3 globe valves.

Features

- Allows mounting of single or dual actuators Schneider Electric SmartX actuators
- AV-607-1 is compatible with Schneider Electric (Siebe, Barber-Colman, INVENSYS) 2½” to 5” VB-8xx3, 2½” to 4” VB-9313 and discontinued 2” to 4” VB-9xxx valves and Schneider Electric SmartX actuators2
- AV-609-1 is compatible with Schneider Electric (Siebe, Barber-Colman, INVENSYS) 6” VB-8xx3, 5"…6” VB-9313 and 5” and 6” VB-92xx valves and Schneider Electric SmartX actuators2
- 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

- EN-205 Water System Guidelines, F-26080
- AV-608 Linkage Adapter Kit General Instructions, F-27253
- MA40-704x, MA4x-707x, MA4x-715x SmartX Series Spring Return Two-Position Actuators General Instructions, F-26642
- MA40-717x SmartX Series Spring Return Two-Position Actuators General Instructions, F-26742
- MF4x-7xx3 SmartX Series Spring Return Floating Actuator General Instructions, F-26644
- MF40-7173 SmartX Series Spring Return Floating Actuator General Instructions, F-26749
- MF41-6153,/MS41-6153 Series Non-Spring Return Rotary Electronic Damper Actuator General Instructions, F-27215
- MS4x-7xx3 SmartX Series Spring Return Proportional Actuator General Instructions, F-26645
- MS40-717x SmartX Series Spring Return Proportional Actuator General Instructions, F-26748
- Vx-7000 Series and Vx-9000 Series Mx4x-6xxx and Mx4x-7xxx Series Linked Globe Valve Assemblies with SmartX Actuators Selection Guide, F-26752
- VB-8xx3 Series Balanced Plug Valve Selection Guide, F-27199

Note: Do not install a 300 lb-in Mx41-634-x actuator on the AV-607-1 linkage as equipment damage may occur.

[1]AV-607-1 and AV-609-1 replace AV-607 and AV-609 respectively

[2]Check the appropriate valve selection guide for close-offs for your application

MORE INFO

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/372hEJ

Forta Actuators for VB-8000 VB-9313 Valves

Non Spring Return M800A, M1500A	NEMA ½ (IP40 / IP54) or NEMA4 (IP65)
 Tall Forta U-Bolt	 Tall Forta U-Bolt

Valve Series	Mounting
VB-8000	Mount with AV-822 Linkage (M1500A Only)
VB-9000	Mount with AV-822 Linkage (M800A / M900Ax / M1500A)

FORTA actuators are the perfect complement to the renowned performance you’ve already come to expect from your Venta VB-7000, VB-8000 and VB-9000 globe valves.

Fast, Flexible, Reliable, Precision Control

FORTA Globe Valve Actuators are designed to mount on our complete line of 2- and 3-Way globe valves as well as our major competitors’ globe valves. A tested and proven advanced technology design makes FORTA one of the industry’s best built, most application-flexible actuator solutions. They are designed to work with 2- and 3-Way globe valves for chilled water, hot water, and steam HVAC applications.

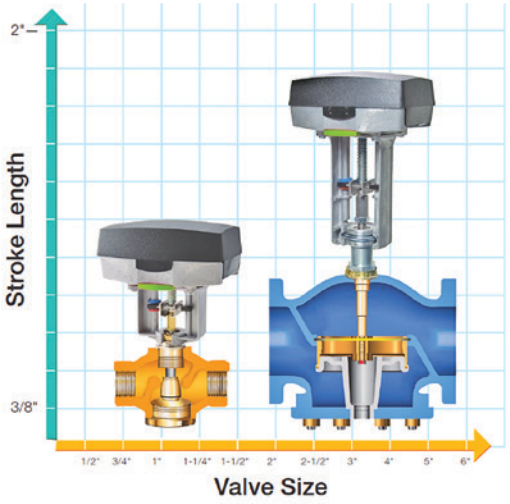
Features

- Mountings available: U-Bolt style connections.
- Built-in Universal Control Signal (no tools required); all models can be easily field-configured
- Floating control, controlled by SPDT center-off or two Triacs
- Proportional control 0…1, 2…10 Vdc or 4…20 ma
- Sequence configuration control 0…5/5…10 or 2…6/6…10 Vdc
- Position feedback: M900A: 2…10 Vdc or 0…5 Vdc
  M800A (VB-9313 only) and M1500A: 2…10 Vdc
- 24 Vac/dc powered
- Die-Cast housing and cover or with UL Plenum rated plastic cover
- Manual override
- Electronic flow curve selection
- Easy ‘One Touch’ input signal/stroke calibration
- Optional auxiliary switches
- Stroke >3/8”…2” for U-Bolt Style
- Stroke Timing
- Floating 60 or 300 sec selectable
- Proportional 15 sec @ ½ stroke
- Power Supply Type Half Wave
- Motor Brushless DC
- M900AxW models available with NEMA 4 (IP65) enclosures
- Sound Power Level Max 32 dba for the nonspring return M800A (VB-9313 only), and M1500A units,43 dba for the spring return M900A units (VB-9313 only)
- Agency Certifications UL873, cULus, RCM

MORE INFO
Scan the QR code or visit the link below for more information.

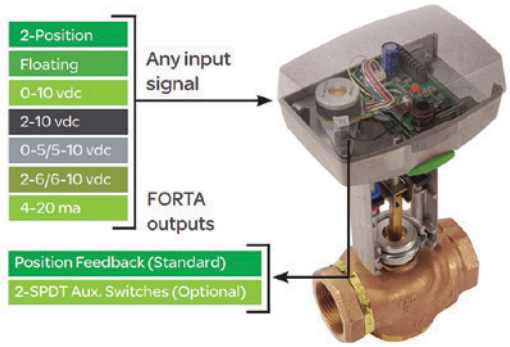
Visit:
http://goo.gl/D0THpd

Now one model does it all, with one-touch switching.



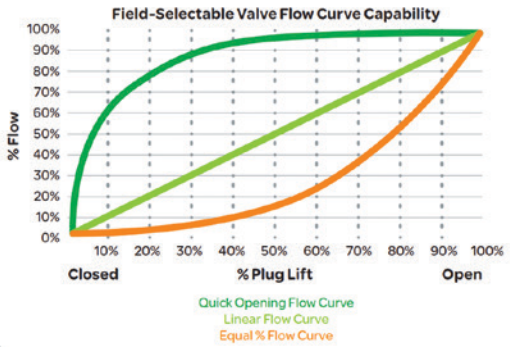
Sets up automatically

Smart move… setting up for different globe valve stroke lengths used to be a tedious and time-consuming process. Not anymore. FORTA's 'One Touch' automatic input scaling allows the actuator to actually learn the valve stem's travel and scale its input signal to match. It can easily accommodate stroke lengths of between 3/8" and 2", and globe valve sizes from ½"…6" – and learn any stroke in seconds with just the flip of a switch.



'Synchs' to any input signal

Brilliant…the only thing easier than setting up FORTA is configuring it. That's because one model handles any input signal. Need floating control instead of a 0…10 Vdc input signal? No problem. Going from proportional to floating is as easy as flipping Switch #2. In fact, FORTA can be configured to any common input signal in just seconds, making product selection and inventory as easy as point…and switch.



Optimal valve performance

Intelligent...not all applications are created equal. That's why the FORTA actuators are designed to help optimize valve performance for every application. FORTA's field-selectable valve flow curve capability enables you to convert an equal percentage curve to be more linear – or convert a linear flow curve to be quick opening – with just the flip of a switch. The bottom line? FORTA always gives you the most energy-saving and efficient operation.

M1500A Forta NSR Actuator for VB-8000/VB-9313 Valves

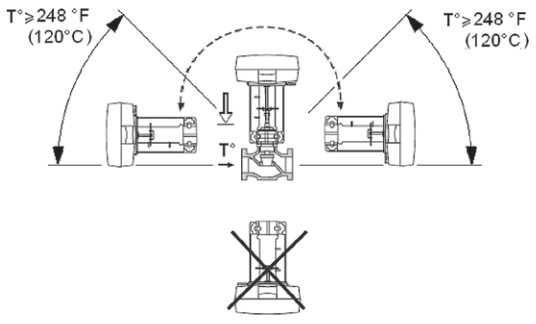
M1500A Specifications	
Stroke	U-Bolt style: >3/8” up to 2” (9-52mm)
Stroke Timing	Floating: 60 or 300 sec selectable, Proportional: 15 sec @½” stroke
Feedback AO	2…10 Vdc
Power Supply Type	Half Wave
Motor Type	Brushless DC
Enclosure	NEMA 2 (IP 54, vertical mount only) with both conduit connectors used. NEMA 1 IP40 with one connector used.
Sound Power Level	Maximum 32 dba
Ambient Temperature Storage	-13 °F to 149 °F (-25 to 65 °C) ambient
Ambient Temperature Operational	122 °F (50 °C) For chilled water applications 113 °F (45°C) ambient at 281 °F (138°C) fluid temperature 107 °F (42 °C) ambient at 300 °F (149 °C) fluid temperature 100 °F (38 °C) ambient at 340 °F (171°C) fluid temperature 90°F (32°C) ambient at 366 °F (186 °C) fluid temperature
Minimum Operating Temperature	14 ° to 150 ° F (-10 ° to 50 ° C)
Ambient Humidity	15…95 % RH non-condensing
Housing Material	Die-Cast Aluminum

Dimensions

Refer to the Dimensions section of this catalog.

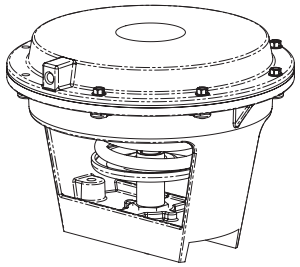
Mounting

The actuator may be mounted horizontally, vertically and in any position in between, but not upside down. Note that to maintain NEMA 2(IP54) rating the actuator must be mounted vertically.

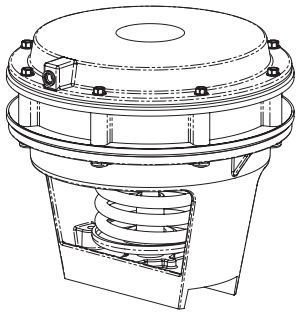


Pneumatic SR Actuators for VB-8000/VB-9313 Valves

MK-6811 MK-6911



MK-6811 Actuator



MK-6911 Actuator

Actuator Specifications	
Inputs	
Control Signal	5…10 psig (34…69 kPa). Positive positioner start point adjustable 1…12 psi (7…83 kPa). Positive positioner span adjustable 2…13 psi (14…89 kPa)
Supply Pressure	15…20 psig (103…137 kPa) nominal 30 psig (205 kPa) maximum
Air Connections	1/8 in FNPT
Effective Area	50 sq. in. (323 cm2)
Outputs	
MK-6811	1” (25 mm) nominal stroke
MK-6911	1¾” (45 mm) nominal stroke
Environment	
Temperature Limits	Shipping / storage: -40…220°F (-40…104°C) ambient. Operating: -20°F…220°F (-29°C…104°C). Maximum allowable ambient: 220°F (104°C) at maximum valve fluid temperature of 281°F (138°C). Minimum allowable valve fluid temperature: 20°F (-7°C).
Positive Positioner	AK-42309-500 recommended for 5” valve, required for 6” valve. Order separately. Supplied as standard on VK4 factory valve assemblies.

MORE INFO

Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/6OaOs6

Pneumatic Actuators for VB-8000 & VB-9000 Flanged Valves

MK-8xxx Series Actuator
with 3-Way Valve Assembly

Application

MK-8800 series actuators are used to control 2½"…4" VB-9000 series valves.
MK-8900 series actuators are used to control 5" and 6" VB-9000 series valves.

Actuator Specifications	
Effective Area	100 sq. in. (645 cm2)
Construction	Housing: Die cast aluminum. Diaphragms: Replaceable beaded molded neoprene.
Stroke	See table below.
Spring	Retracts actuator shaft and raises valve stem on loss of air pressure.
Nominal Range	See table below.
Starting Point	Adjustable ± 1 psi (7 kPa). Maximum Air Pressure: 30 psig (207 kPa).
Ambient Temperature Limits	Shipping: -40…220 °F (-40…104 °C). Operating: -20…220 °F (-29…104 °C).
Air Connection	1/8" FNPT
Valve Linkage	Order separately AV-496.
Valve Stroke Position Indication	1/8" (3 mm) increments
Mounting	In any upright position with actuator head above 45° of the center line of the valve body. Actuator head may be swiveled to any convenient position.
Dimensions	See table below.

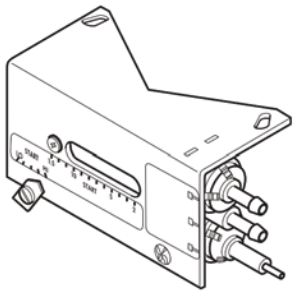
Accessories

AK-52309-500	Positive positioner with linkage
Tool-95	Pneumatic calibration tool kit

Table Specifications							
Part Number	Nominal Spring Range[a]		Nominal Stroke		Dimensions		For Use With Valve Bodies
	psig	kPa	in.	mm	in.	mm	
MK-8811	5-10	34-69	1	25.4	11¾ high x 10½ wide x 10½ deep	298 high x 267 wide x 267 deep	VB-9313 2½ – 4"
MK-8911	5-10	34-69	2	50.8	12¾ high x 10½ wide x 10½ deep	324 high x 267 wide x 267 deep	VB-9313 5 & 6"

[a]Nominal (no load) spring ranges are based on maximum 1" (25.4 mm) or 2" (50.8 mm) stroke.

Pneumatic Positive Positioning Relay for VB-7/8/9xxx



Positive Positioning Relay

Positive positioner pneumatic relay is used to accurately position an actuator stroke with respect to signal pressure from the controller. It can also be used to change the effective spring range of an actuator and increase the capacity of a controller.

Features

For accurate positioning of valve and damper actuators, this positioner utilizes a pilot-operated, relay-type position-sensing mechanism, much more sensitive to actuator position changes than some competitive“force-balance” positioners.

Model Number	Description
AK-42309-500	Positive Positioning Relay with Mounting Linkage.

Note: This model cannot be used with M556, M572, M573, M574, and MK-12000 Series actuators. Use N800-0555 positioner with M556, M573, and M574.

Specifications	
Action	Direct (increase in output pressure to actuator with an increase in pilot pressure from controller).
Pilot input	0 to main air pressure, psig.
Output	0 to main air pressure, psig.
Construction	
Housing	Polysulfone
Diaphragm	Neoprene
Start point	Adjustable 1…12 psig (7…83 kPa).
Span	Adjustable 2…13 psi (14…90 kPa); factory set: 5 psig.
Stroke	Adjustable 2…13 psi (14 to 90 kPa); factory set: 5 psig with feedback spring for 7/16 to 5 in. stroke.
Supply air pressure	Clean, oil free, dry air required (refer to EN-123).
Maximum	30 psig (207 kPa).
Nominal supply	15…20 psig (103…138 kPa)
Environment	
Ambient temperature limits	Shipping: -40…160°F (-40…71°C). Operating: 32…140°F (0…60°C).
Humidity	5…95% R.H., non-condensing.
Locations	NEMA Type 1 (IP10).
Air connections	
“M” and “B”	Barbed for 1/4 in. O.D. plastic tubing.
“P”	Dual-contoured for 1/4 in. O.D. and 5/32 in. O.D. tubing.
Air consumption (air compressor sizing)	19 scim(5.2 mL/s) at 20 psig (138 kPa) supply.
Air capacity for sizing air mains	20 scim (5.5 mL/s).
Flow capacity	860 scim (235 mL/s) at 20 psig (138 kPa) supply.
Mounting linkage	All necessary linkage provided to assemble AK-42309-500 to the following actuator series; MK-6600, MK-6800, MK-6900, MK-8800 and MK-8900.
Dimensions	2½ H x 4½ W x 3 D in. (64 x 114 x 76 mm).

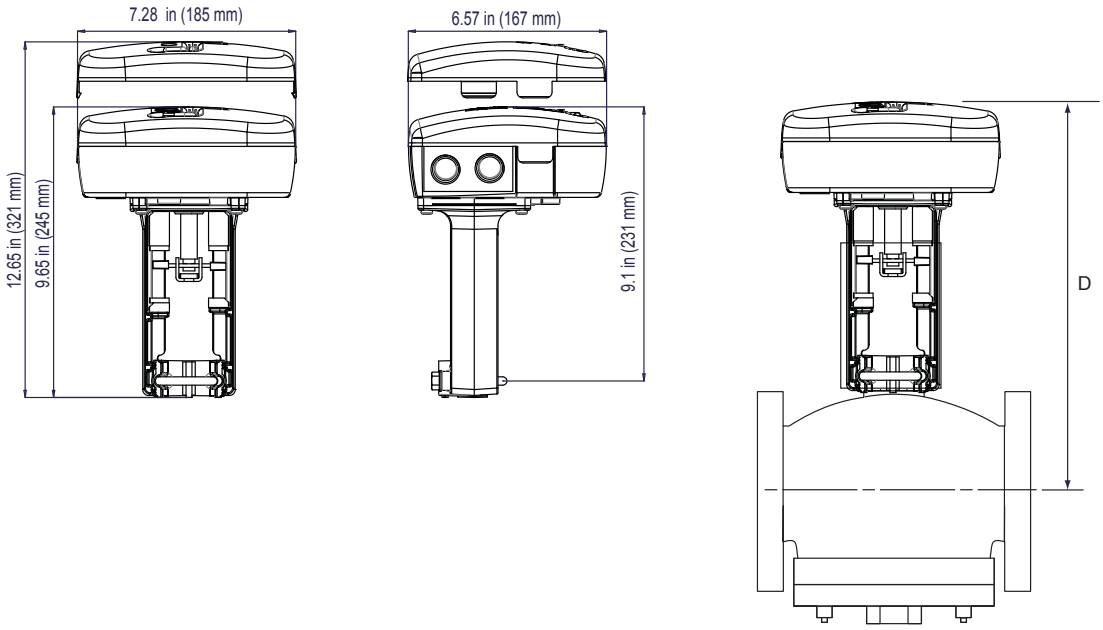
MORE INFO
Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/LJCLEb

Notes

11. 2½”… 6” Dimensions VB 8000/9000 Flanged Valves

VB-9000 with M900A U-Bolt-Style SR Actuator

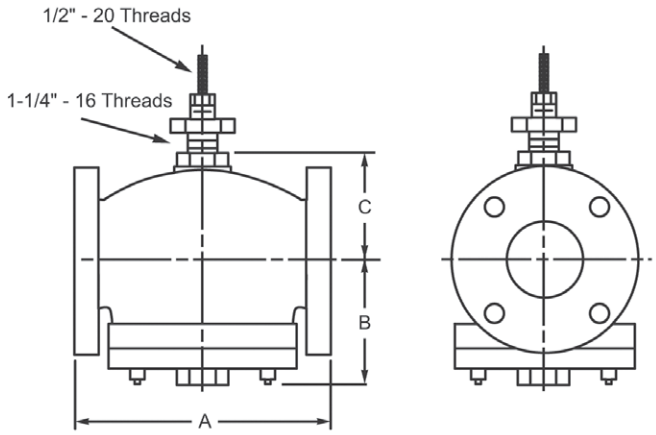


Forta M900 Dimensions

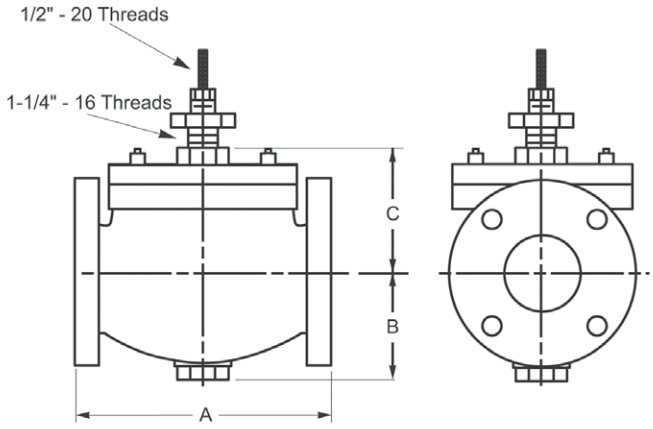
VB-9313 Dimensions					
Valve Body Part Number	Size, Inches	Dimensions inches (mm)[a]			
		A	B	C	D[b]
VB-9313-0-5-P	2½	8-9/16 (217)	5-3/8 (137)	3½ (89)	14-7/32 (361)
	3	9½ (241)	6-3/8 (162)	3¾ (95)	14-15/32 (368)
	4	11½ (292)	8½ (216)	4½ (114)	15-7/32 (388)

[a]See next page for flange dimensions.

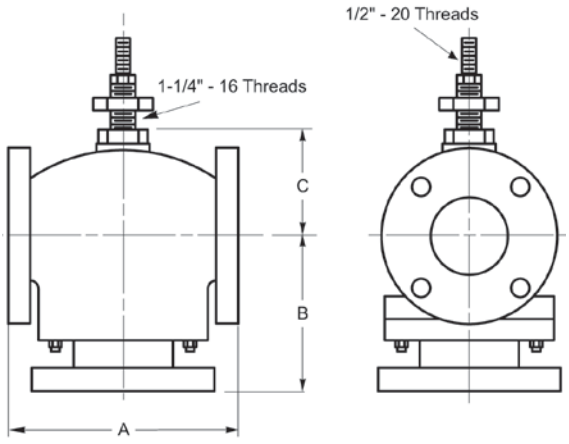
[b]Assembly height, centerline of valve body to top of actuator (see above). For M900Ax leave an additional 3” (76mm) clearance for cover removal, for M900AxW, leave an additional 5” (127mm) clearance for cover removal.



VB-9223-0-5-P



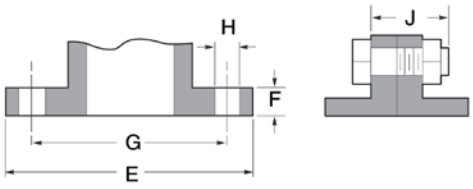
VB-9213-0-5-P



VB-9313-0-5-P

VB-9313

Valve Body and Flange Dimensions



Nominal Pipe Size	Flanges		Drilling		Bolting		Length of Machine Bolts J
	Flange Diameter E	Flange Thickness F	Diameter of Bolt Circle G	Diameter of Bolt Holes H	Number of Bolts	Diameter of Bolts	
2-1/2	7”	11/16”	5-1/2”	3/4”	4	5/8”	2-1/2”
3	7-1/2”	3/4”	6”				
4	9”	15/16”	7-1/2”		8		3”

VB-8xx3 2 & 3-Way Flanged Globe Valves with Mx41-634x NSR Actuators

Dimensions - 6” Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size	Valve Dimensions in inches (millimeters)											
		2-Way (Refer to Figure-1)						3-Way (Refer to Figure-2)					
		A	C	E	F	G	H	A	C	E	F	G	H
2-Way Vx-8213-51x-5-16 3-Way Vx-8303-51x-5-16	6”	14 (356)	7½ (190)	19-15/16 (507)	11 (280)	9½ (241)	12 (305)	14 (356)	9¾ (248)	20¼ (515)	11 (280)	9½ (241)	12 (305)
2-Way Vx-8223-516-5-16	6”	14 (356)	6¼ (159)	21-3/8 (543)	11 (280)	9½ (241)	12 (305)	—	—	—	—	—	—

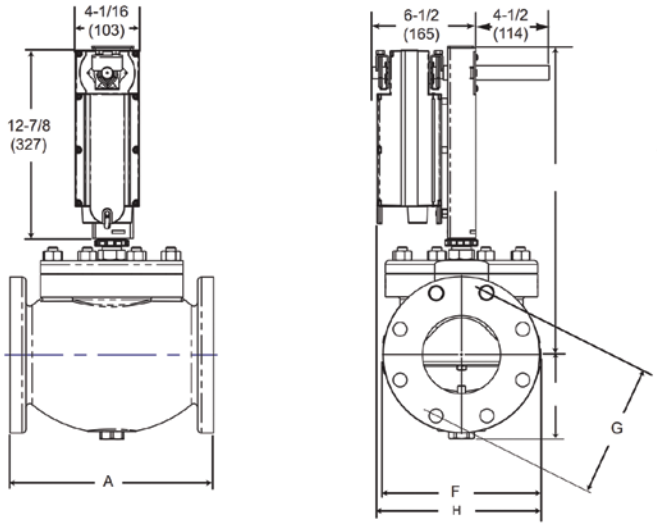


Figure-1 Mx41-634x with 6" VB-82x3 Flanged 2-Way Globe Valves

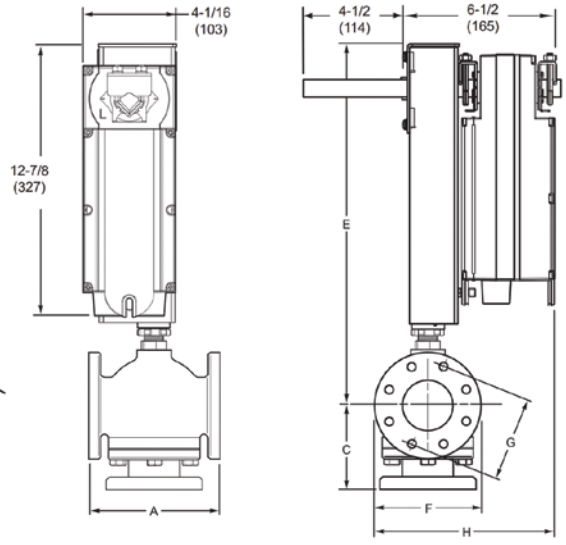


Figure-2 Mx41-634x with 6" VB-8303 Flanged 3-Way Globe Valves

Mx41-634x & AV-609-1 Actuator/Linkage Assembly

VB-8000 With M1500A NSR U-Bolt-Style Actuator

Dimensions - 2½”…6” Flanged Globe Valve Assemblies												
Valve Assembly Part Number	Valve Size	p Code	Valve Dimensions inches (millimeters)									
			2-Way (Refer to Figure-3)					3-Way (Refer to Figure-4)				
			A	C	E[a]	F	G	A	C	E[a]	F	G
VU-8213-686-5-P	2½”	12	8-9/16 (217)	4 (102)	12-29/32 (328)	7 (178)	5½ (140)					
	3”	13	9½ (241)	4-5/8 (117)	12-5/8 (320)	7½ (191)	6 (152)					
	4”	14	11½ (292)	5-1/12 (140)	13-3/8 (339)	9 (229)	7½ (191)					
	5”	15	13 (330)	6-15/16 (176)	14-15/16 (379)	10 (254)	8½ (216)					
	6”	16	14 (356)	7½ (191)	18-23/32 (475)	11 (279)	9½ (241)					
VU-8303-686-5-P	2½”	12						8-9/16 (217)	5-7/16 (138)	12-19/32 (320)	7 (178)	5½ (140)
	3”	13						9½ (241)	6-3/8 (162)	12-25/32 (325)	7½ (191)	6 (152)
	4”	14						11½ (292	8-7/16 (214)	13-27/32 (352)	9 (229)	7-15 (191)
	5”	15						13 (330)	8 13/16 (224)	15-5/32 (385)	10 (254)	8½ (216)
	6	16						14 (356)	7½ (191)	18-17/32 (471)	11 (279)	9½ (241)
VU-8223-686-5-P	2½”	12	8-9/16 (217)	4 (102)	13-7/32 (336)	7 (178)	5½ (140)					
	3”	13	9½ (241)	4¼ (108)	13-9/32 (345)	7½ (191)	6 (152)					
	4”	14	11½ (292)	4-15/16 (125)	14-27/32 (377)	9 (229)	7½ (191)					
	5”	15	13 (330)	5-7/16 (138)	16-7/32 (412	10 (254)	8½ (216)					
	6	16	14 (356)	7½ (191)	19-29/32 (506)	11 (279)	9½ (241)					

[a]Allow an additional 3” (76 mm) of height for cover removal.

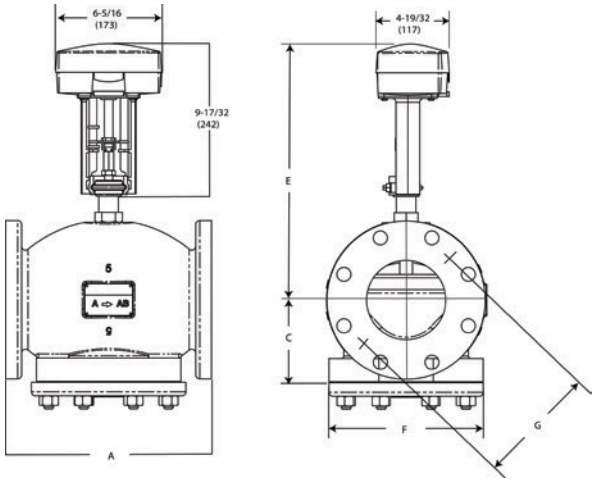


Figure-3 M1500A Series U-Bolt-style with VB-82x3 Flanged 2-Way Globe Valves

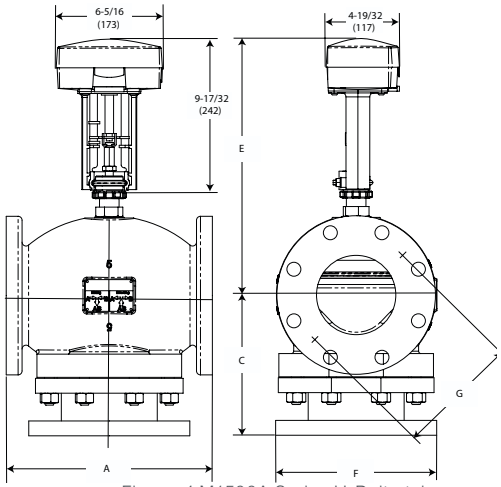


Figure-4 M1500A Series U-Bolt-style with VB-8303 Flanged 3-Way Globe Valves

VB-8000/9000 2½”…5” with Mx61-720x SR Actuators

Dimensions - 2½” to 5” Flanged Globe Valve Assemblies

Valve Assembly Part Number	Valve Size	P Code	Valve Dimensions inches (millimeters)									
			2-Way (Refer to Figure-5)					3-Way (Refer to Figure-6)				
			A	C	E	F	G	A	C	E	F	G
2-Way **Vx-8213-59x-5-P** 3-Way **Vx-8303-59x-5-P**	2½”	12	8-9/16 (217)	4 (102)	12-3/8 (314)	7 (178)	5½ (140)	8-9/16 (217)	5-7/16 (138)	13¾ (349)	7 (178)	5½ (140)
	3”	13	9½ (241)	4-5/8 (117)	12-5/8 (320)	7½ (191)	6 (152	9½ (241)	6-3/8 (162)	14 (356)	7½ (191)	6 (152
	4”	14	11½ (292)	5½ (140)	13-3/8 (340)	9 (229)	7½ (191)	11½ (292)	8-7/16 (214)	14¾ (375)	9 (229)	7½ (191)
	5”	15	13 (330)	6-15/16 (176)	15-1/8 (384)	10 (254)	8½ (216)	13 (330)	8-13/16 (224)	15-1/8 (384)	10 (254)	8½ (216)
2-Way **Vx-8223-59x-5-P**	2½”	12	8-9/16 (217)	4 (102)	13 (330)	7 (178)	5½ (140)	—	—	—	—	—
	3”	13	9½ (241)	4¼ (108)	14½ (368)	7½ (191)	6 (152)	—	—	—	—	—
	4”	14	11½ (292)	4-15/16 (125)	15-3/8 (391)	9 (229)	7½ (191)	—	—	—	—	—
	5”	15	13 (330)	5-7/16 (138)	16-5/16 (415)	10 (254)	8½ (216)	—	—	—	—	—

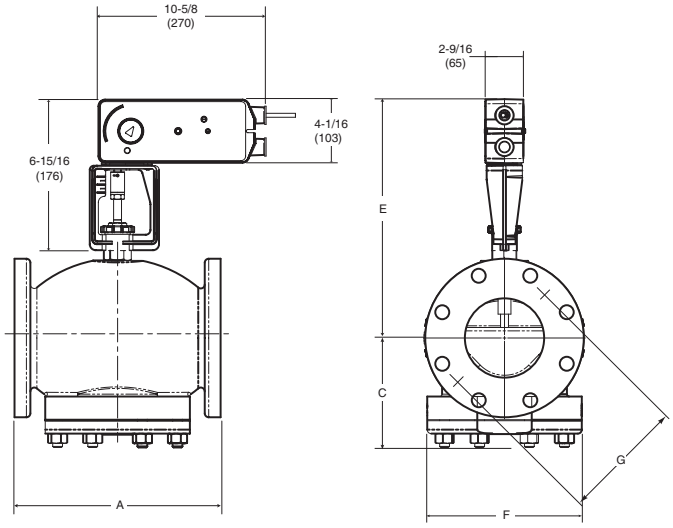


Figure-5 Mx61-720x with 2½” to 5” VB-82x3 Flanged 2-Way Globe Valves

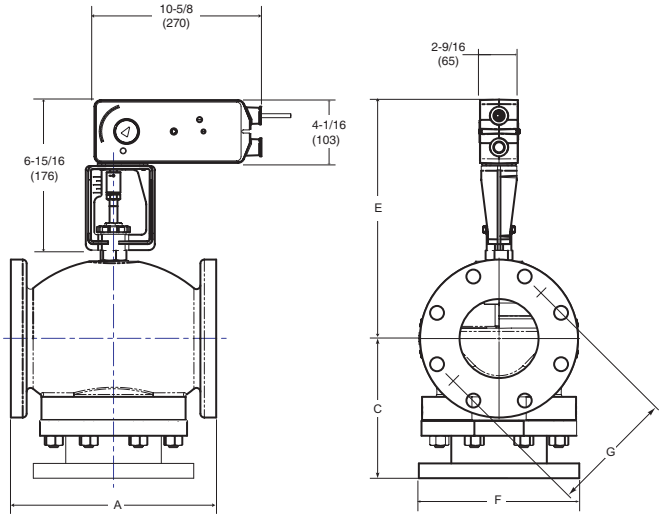


Figure-6 Mx61-720x with 2½” to 5” VB-8303 Flanged 3-Way Globe Valves

VB-8xx3 2 & 3-Way Flanged Globe Valves with Mx40-717x SR Actuators

Dimensions - 2½”…6” Flanged Globe Valve Assemblies														
Valve Assembly Part Number	Valve Size	P Code	Valve Dimensions in inches (millimeters)											
			2-Way (Refer to Figure-7)						3-Way (Refer to Figure-8)					
			A	C	E	F	G	H	A	C	E	F	G	H
2-Way Vx-8213-57x-5-P 3-Way Vx-8303-57x-5-P	2½”	12	8-9/16 (217)	4 (102)	17¼ (438)	7 (178)	5½ (140)	8¾ (222)	8-9/16 (217)	5-7/16 (138)	17¼ (438)	7 (178)	5½ (140)	8¾ (222)
	3”	13	9½ (241)	4-5/8 (117)	17 (432)	7½ (191)	6 (152)	9 (229)	9½ (241)	6-3/8 (162)	17 (432)	7½ (191)	6 (152)	9 (229)
	4”	14	11½ (292)	5½ (140)	18¼ (464)	9 (229)	7½ (191)	9¾ (248)	11½ (292)	8-7/16 (214)	18¼ (464)	9 (229)	7½ (191)	9¾ (248)
	5”	15	13 (330)	6-15/16 (176)	18-3/16 (462)	10 (254)	8½ (216)	10-1/16 (256)	13 (330)	8-13/16 (224)	17¼ (464)	10 (254)	8½ (216)	10-1/16 (256)
	6”	16	14 (356)	7½ (190)	19-15/16 (507)	11 (280)	9½ (241)	12 (305)	14 (356)	9¾ (248)	20¼ (515)	11 (280)	9½ (241)	12 (305)
2-Way Vx-8223-57x-5-P	2½”	12	8-9/16 (217)	4 (102)	16-5/8 (422)	7 (178)	5½ (140)	8¾ (222)	—	—	—	—	—	—
	3”	13	9½ (241)	4¼ (108)	17¼ (438)	7½ (191)	6 (152	9 (229)	—	—	—	—	—	—
	4”	14	11½ (292)	4-15/16 (125)	18¼ (464)	9 (229)	7½ (191)	9¾ (248)	—	—	—	—	—	—
	5”	15	13 (330)	5-7/16 (138)	19-3/8 (492)	10 (254)	8½ (216)	10-1/16 (256)	—	—	—	—	—	—
	6”	16	14 (356)	6¼ (159)	21-3/8 (543)	11 (280)	9½ (241)	12 (305)	—	—	—	—	—	—

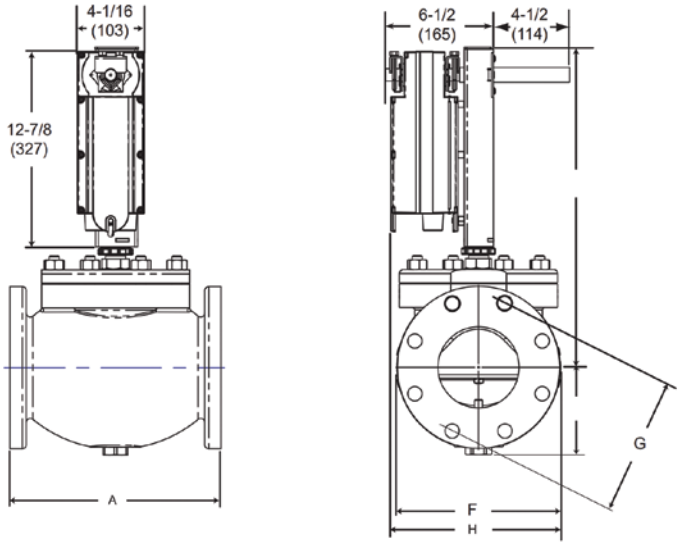


Figure-7 Mx40-717x with VB-82x3 Flanged 2-Way Globe Valves

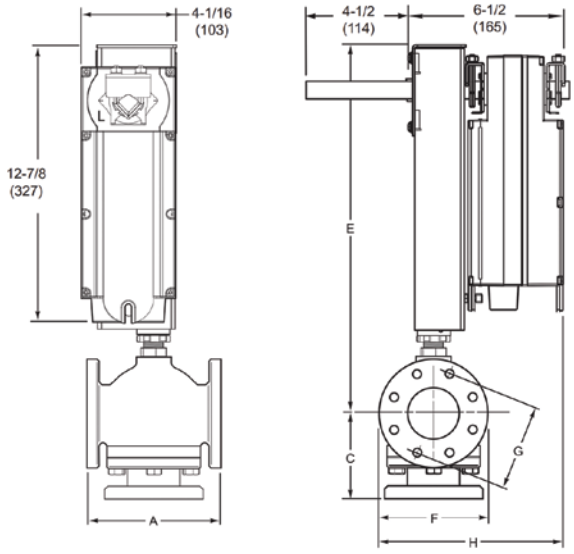
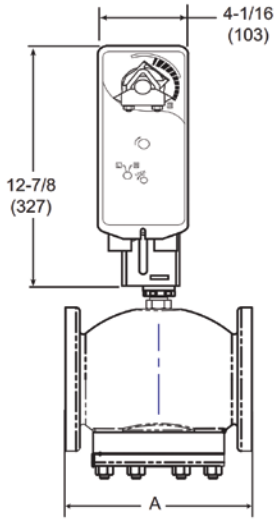


Figure-8 Mx40-717x with VB-8303 Flanged 3-Way Globe Valves

Mx40-717x Actuators/AV-607-1/AV-609-1 Linkage

2½”…6” VB-8xx3 Valves with Mx41-715x SR Actuators

Dimensions - 2-1/’2” to 6” Flanged Globe Valve Assemblies														
Valve Assembly Part Number	Valve Size	P Code	Valve Dimensions in inches (millimeters)											
			2-Way (Refer to Figure-9)						3-Way (Refer to Figure-10)					
			A	C	E	F	G	H	A	C	E	F	G	H
2-Way Vx-8213-55x-5-P 3-Way Vx-8303-55x-5-P	2½”	12	8-9/16 (217)	4 (102)	17-5/8 (448)	7 (178)	5½ (140)	8-3/8 (213)	8-9/16 (217)	5-7/16 (138)	17-5/8 (448)	7 (178)	5½ (140)	8-3/8 (213)
	3”	13	9½ (241)	4-5/8 (117)	17½ (444)	7½ (191)	6 (152)	8¾ (222)	9½ (241)	6-3/8 (162)	17½ (444)	7½ (191)	6 (152)	8¾ (222)
	4”	14	11½ (292)	5½ (140)	18-5/8 (473)	9 (229)	7½ (191)	9-3/8 (238)	11½ (292)	8-7/16 (214)	18-5/8 (473)	9 (229)	7½ (191)	9-3/8 (238)
	5”	15	13 (330)	6-15/16 (176)	18-9/16 (472)	10 (254)	8½ (216)	10-1/16 (256)	13 (330)	8-13/16 (224)	18-5/8 (473)	10 (254)	8½ (216)	10-1/16 (256)
	6”	16	14 (356)	7½ (190)	19-15/16 (507)	11 (280)	9½ (241)	12 (305)	14 (356)	9¾ (248)	20-9/16 (522)	11 (280)	9½ (241)	12 (305)
2-Way Vx-8223-55x-5-P	2½”	12	8-9/16 (217)	4 (102)	16½ (419)	7 (178)	5½ (140)	8-3/8 (213)	—	—	—	—	—	—
	3”	13	9½ (241)	4¼ (108)	17-5/8 (448)	7½ (191)	6 (152)	8¾ (222)	—	—	—	—	—	—
	4”	14	11½ (292)	4-15/16 (125)	18½ (470)	9 (229)	7½ (191)	9-3/8 (238)	—	—	—	—	—	—
	5”	15	13 (330)	5-7/16 (138)	19¾ (502)	10 (254)	8½ (216)	10-1/16 (256)	—	—	—	—	—	—
	6”	16	14 (356)	6¼ (159)	21-3/8 (543)	11 (280)	9½ (241)	12 (305)	—	—	—	—	—	—



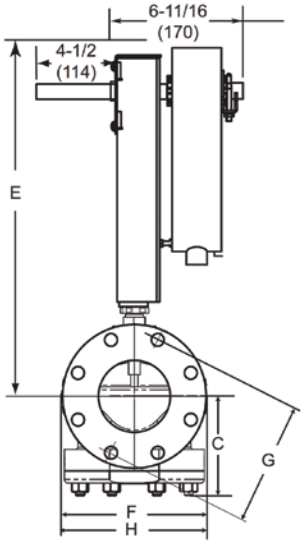
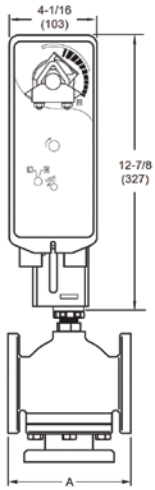


Figure-9 Mx41-715x with VB-82x3 Flanged 2-Way Globe Valves



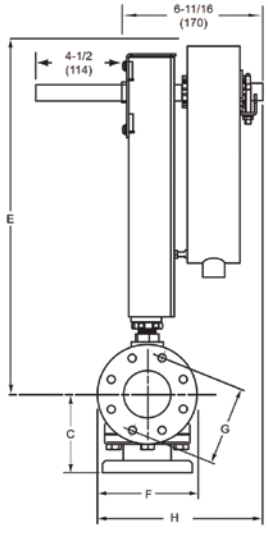


Figure-10 Mx41-715x with VB-8303 Flanged 3-Way Globe Valves

Mx41-715x Actuators/AV-607-1/AV-609-1 Linkage

VB-9313 Valves 2½”…6” with SR & NSR Actuators and AV-60x Linkages

Dimensions - 5” to 6” Flanged Globe Valve Assemblies

Valve Assembly Part Numbera	Valve Size in.	Valve Dimensions inches (millimeters)											
		2-Way (Refer to Figure-11)						3-Way (Refer to Figure-12, Figure-13)					
		A	C	E	F	G	H	A	C	E	F	G	H
ASA Flanged 2-Way Vx-9213-516-5-P 3-Way Vx-9313-512-5-P Vx-9313-514-5-P Vx-9313-516-5-P	5	13 (330)	5 (127)	20¼ (514)	10 (254)	8½ (216)	10¼ (260)	13 (330)	8¾ (222)	20 (508)	10 (254)	8½ (216)	10¼ (260)
	6	14 (356)	5½ (140)	21 (533)	11 (280)	9½ (241)	10¾ (273)	14 (356)	9¾ (248)	20-7/8 (530)	11 (280)	9½ (241)	10¾ (273)
ASA Flanged 2-Way Vx-9223-516-5-P	5	13 (330)	6¾ (171)	20 (508)	10 (254)	8½ (216)	10¼ (260)	—					
	6	14 (356)	7-3/8 (187)	20-7/8 (530)	11 (280)	9½ (241)	10¾ (273)						

[a] Mx41-6343 actuators for 5” and 6” valves dimensions only, not for availability.

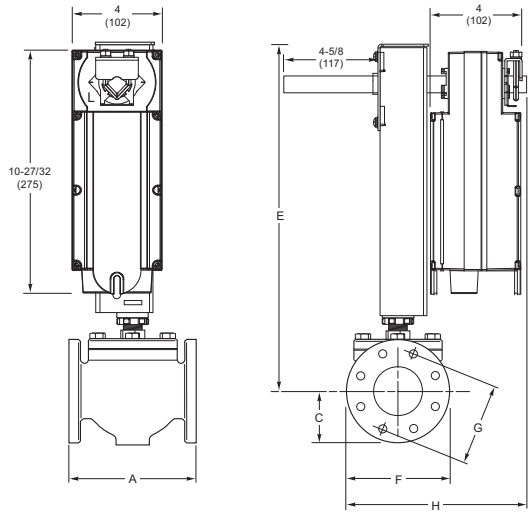


Figure-11 Mx41-6343 with VB-92x3 Flanged 2-Way Globe Valve With AV-609-1 Linkage.

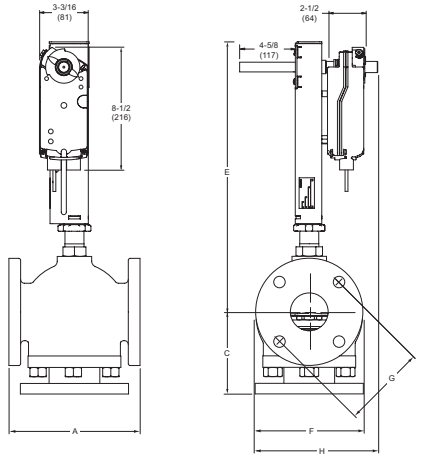


Figure-12 Mx41-6153 with 2½” to 4” VB-9313 Flanged 3-Way Globe Valve With AV-607-1 Linkage.

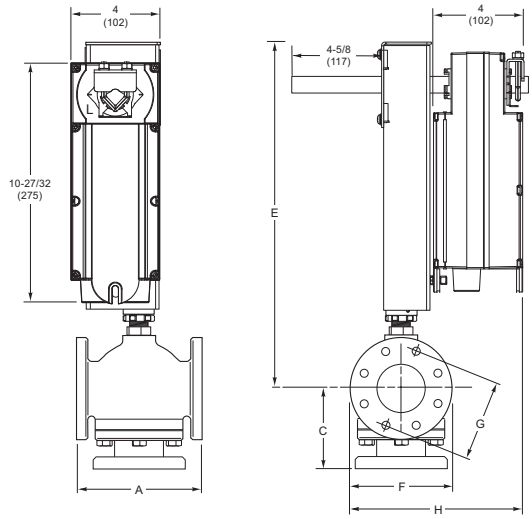


Figure-13 Mx41-6343 with VB-9313 Flanged 3-Way Globe Valve With AV-609-1 Linkage.

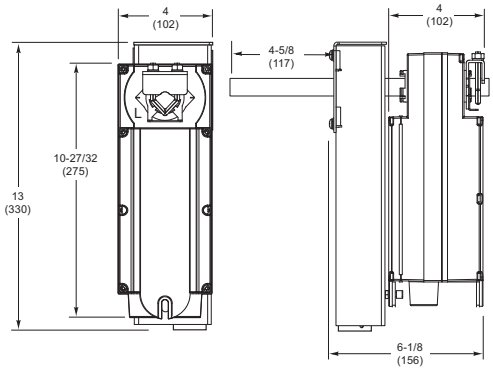


Figure-14 Mx41-6343 Actuator/Linkage Assembly With AV-609-1 Linkage.

VB-9313 Valves 2½”…6” With SR & NSR Actuators & AV-60x Linkages

Dimensions - 2½”…6” Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)											
		2-Way (Refer to Figure-15)						3-Way (Refer to Figure-16)					
		A	C	E	F	G	H	A	C	E	F	G	H
ASA Flanged 2-Way (N.O.) Vx-9213-xxx-5-P 3-Way Vx-9313-xxx-5-P	2½	8½ (216)	3½ (89)	16-5/8 (422)	7 (178)	5½ (140)	8¾ (222)	8½ (216)	5-3/8 (136)	17¼ (438)	7 (178)	5½ (140)	8¾ (222)
	3	9½ (241)	3¾ (95)	17¼ (438)	7½ (190)	6 (152)	9 (229)	9½ (241)	6-3/8 (162)	17 (432)	7½ (190)	6 (152)	9 (229)
	4	11½ (292)	4½ (114)	18¼ (464)	9 (229)	7½ (190)	9¾ (248)	11½ (292)	8½ (276)	18¼ (464)	9 (229)	7½ (190)	9¾ (248)
	5	13 (330)	6¾ (171)	19¼ (489)	10 (254)	8½ (216)	10¼ (260)	13 (330)	8¾ (222)	19 (485)	10 (254)	8½ (216)	10¼ (260)
	6	14 (356)	7-3/8 (187)	20 (508)	11 (280)	9½ (241)	10¾ (273)	14 (356)	9¾ (248)	19-7/8 (505)	11 (280)	9½ (241)	10¾ (273)
ASA Flanged 2-Way (N.C.) Vx-9223-xxx-5-P	2½	8½ (216)	4 (107)	17¼ (438)	7 (178)	5½ (140)	8¾ (222)	—					
	3	9½ (241)	5 (127)	17 (432)	7½ (190)	6 (152)	9 (229)						
	4	11½ (292)	7-1/8 (181)	18¼ (464)	9 (229)	7½ (190)	9¾ (248)						

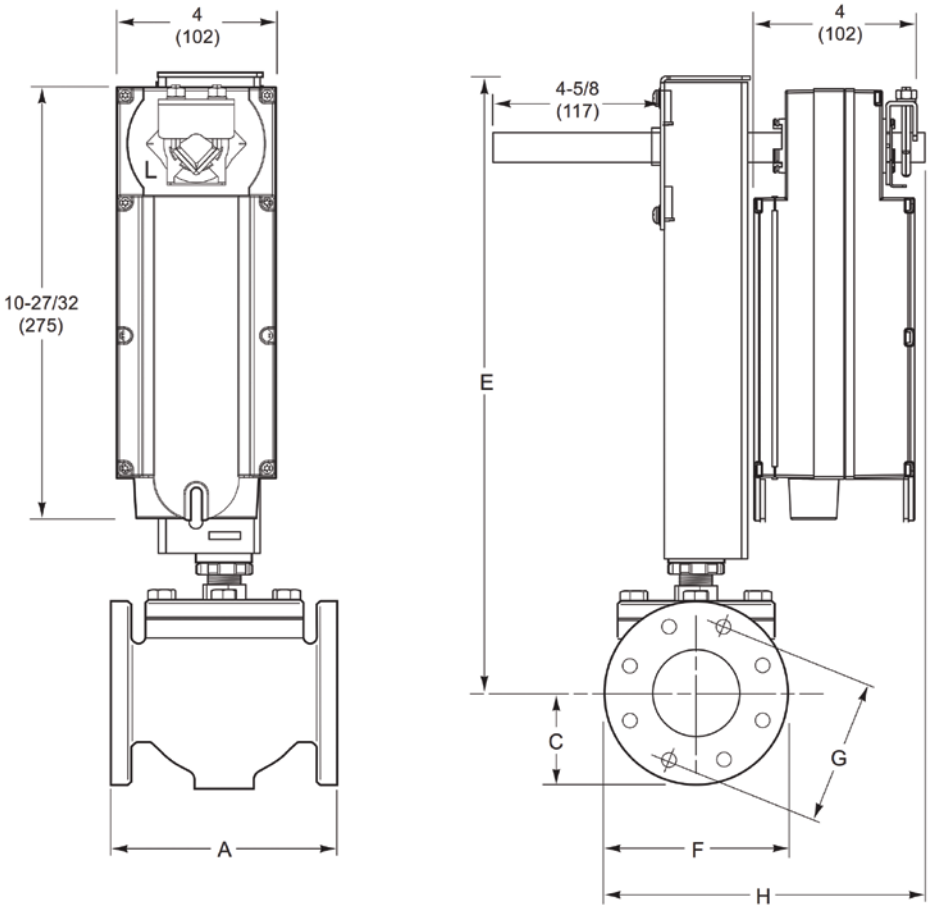


Figure-15 Mx40-717x with 2½” to 4” 2-Way VB-9313 Flanged Globe Valve With AV-607-1 Linkage.
Mx40-717X with 5” and 6” 2-Way VB-92x3 Flanged Globe Valve with AV-609-1 linkage

Mx40-717x Actuators/AV-607-1 or AV-609-1 Linkage

VB-9313 Valves 2½”…6” with SR & NSR Actuators & AV-60x Linkages

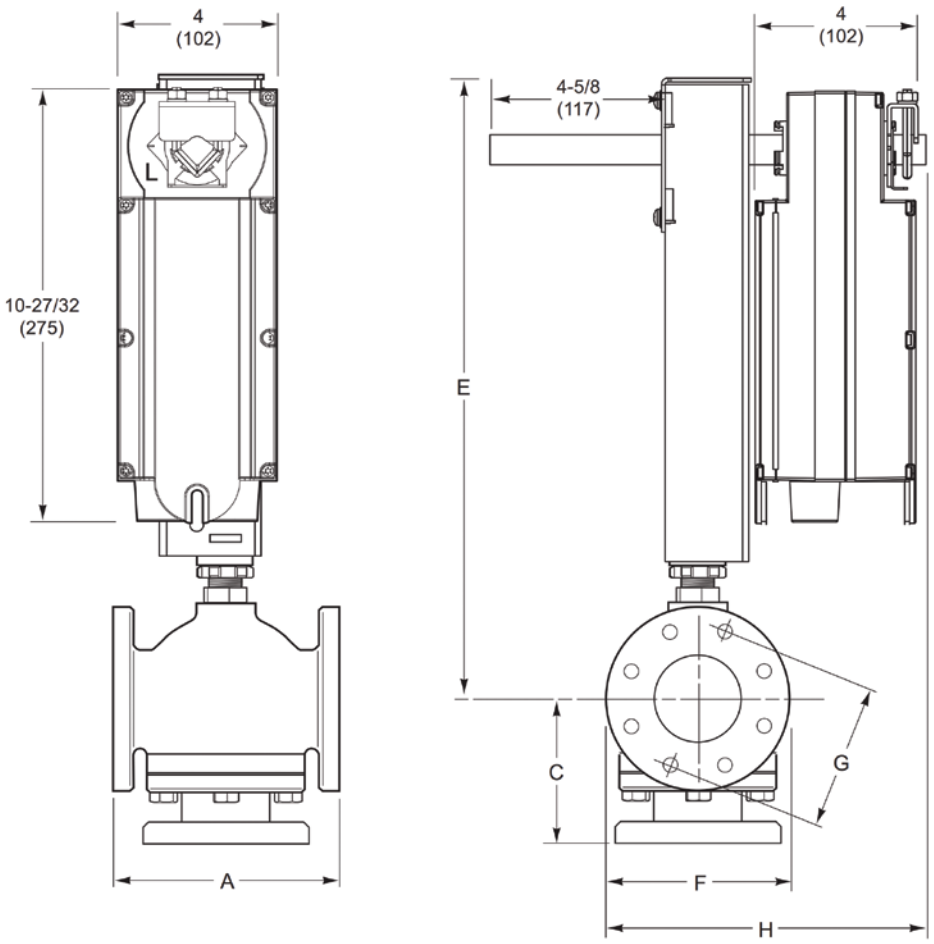


Figure-16 Mx40-717x-2xx with 2½” to 4” 3-Way VB-9313 Flanged Globe Valve With AV-607-1 Linkage.
Mx40-717x with 5" and 6" 2-Way VB-9313 Flanged Globe Valve with AV-609-1 linkage

VB-9313 2½”…4” Flanged Valve Assembly with SR Mx61-720x Actuator

Dimensions - 2½” to 4” Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)											
		2-Way (Refer to Figure-17)						3-Way (Refer to Figure-19)					
		A	C	E	F	G	J	A	C	E	F	G	J
ASA Flanged 2-Way (N.O.) Vx-9213-59x-5-P 3-Way Vx-9313-59x-5-P	2½	8½ (216)	3½ (89)	13 (330)	7 (178)	5½ (140)	13-5/8 (346)	8½ (216)	5-3/8 (137)	13¾ (349)	7 (178)	5½ (140)	13-5/8 (346)
	3	9½ (241)	3¾ (95)	14½ (368)	7½ (191)	6 (152)	14-1/8 (359)	9½ (241)	6-3/8 (162)	14 (356)	7½ (191)	6 (152)	14-1/8 (359)
	4	11½ (292)	4½ (114)	15-3/8 (391)	9 (229)	7½ (191)	15-1/8 (384)	11½ (292)	8½ (216)	14¾ (375)	9 (229)	7½ (191)	15-1/8 (384)
ASA Flanged 2-Way (N.C.) Vx-9223-59x-5-P	2½	8½ (216)	4 (107)	12-3/8 (314)	7 (178)	5½ (140)	13-5/8 (346)	—					
	3	9½ (241)	5 (127)	12-5/8 (320)	7½ (191)	6 (152)	14-1/8 (359)						
	4	11½ (292)	7-1/8 (181)	13-3/8 (340)	9 (229)	7½ (191)	15-1/8 (384)						

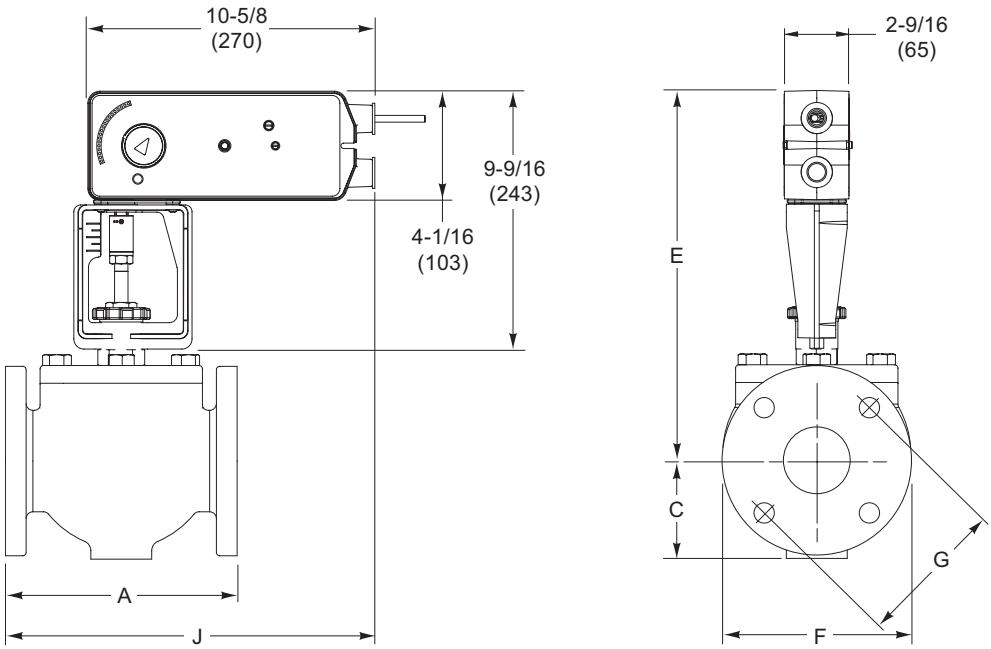


Figure-17 Mx61-720x with 2½” to 4” N.O. 2-Way VB-9213 Flanged Globe Valve.

VB-9313 2½”…4” Flanged Valve Assembly with SR Mx61-720x Actuator

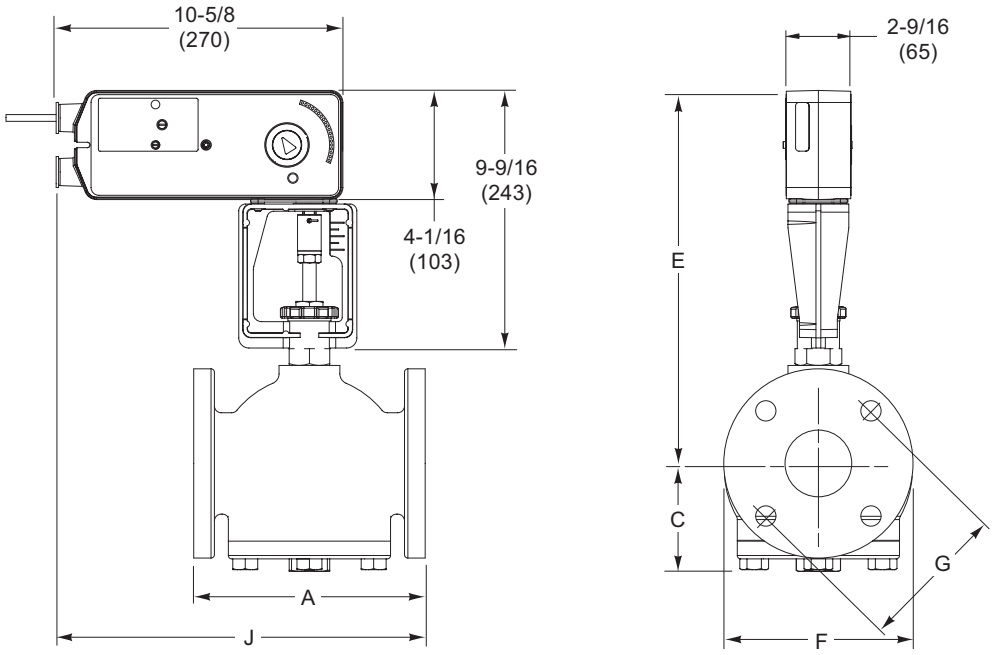


Figure-18 Mx61-720x with 2½” to 4” N.C. 2-Way VB-9313 Flanged Globe Valve.

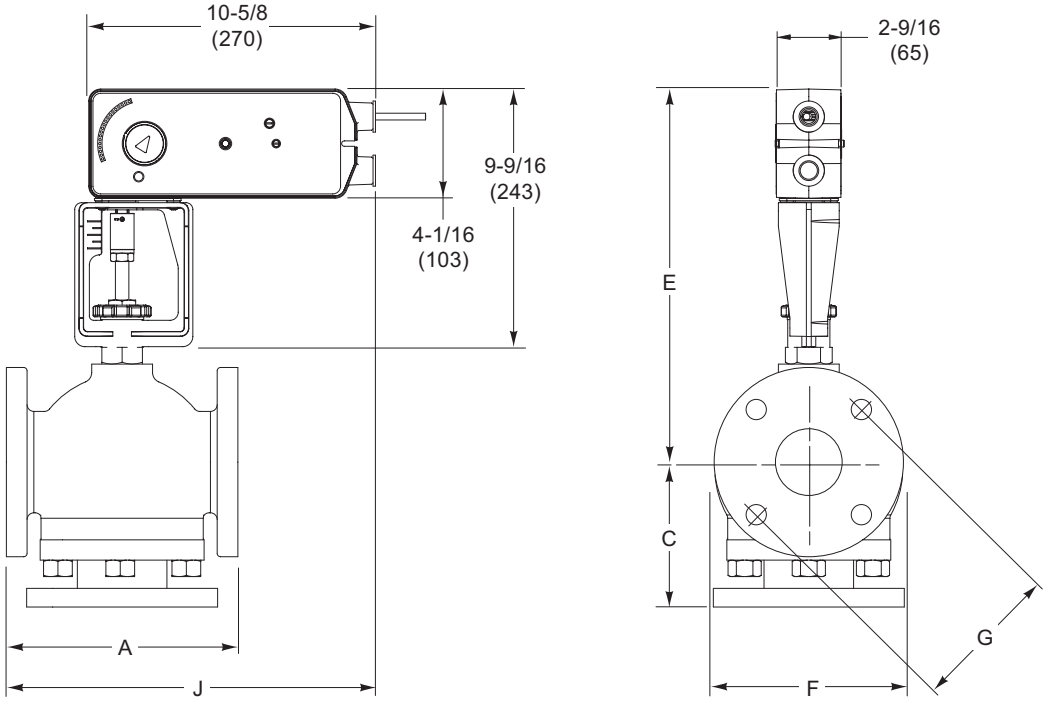


Figure-19 Mx61-720x with 2½” to 4” 3-Way VB-9313 Flanged Globe Valve.

VB-9313 2½”…4” Flanged Valve Assembly with NSR Mx41-6153 Actuator

Dimensions - 2½” to 4” Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)											
		2-Way (Refer to Figure-20)						3-Way (Refer to Figure-21)					
		A	C	E	F	G	J	A	C	E	F	G	J
ASA Flanged 2-Way (N.O.) Vx-9213-59x-5-P 3-Way Vx-9313-59x-5-P	2½	8½ (216)	3½ (89)	13 (330)	7 (178)	5½ (140)	13-5/8 (346)	8½ (216)	5-3/8 (137)	13¾ (349)	7 (178)	5½ (140)	13-5/8 (346)
	3	9½ (241)	3¾ (95)	14½ (368)	7½ (191)	6 (152)	14-1/8 (359)	9½ (241)	6-3/8 (162)	14 (356)	7½ (191)	6 (152)	14-1/8 (359)
	4	11½ (292)	4½ (114)	15-3/8 (391)	9 (229)	7½ (191)	15-1/8 (384)	11½ (292)	8½ (216)	14¾ (375)	9 (229)	7½ (191)	15-1/8 (384)
ASA Flanged 2-Way (N.C.) Vx-9223-59x-5-P	2½	8½ (216)	4 (107)	12-3/8 (314)	7 (178)	5½ (140)	13-5/8 (346)	—					
	3	9½ (241)	5 (127)	12-5/8 (320)	7½ (191)	6 (152)	14-1/8 (359)						
	4	11½ (292)	7-1/8 (181)	13-3/8 (340)	9 (229)	7½ (191)	15-1/8 (384)						

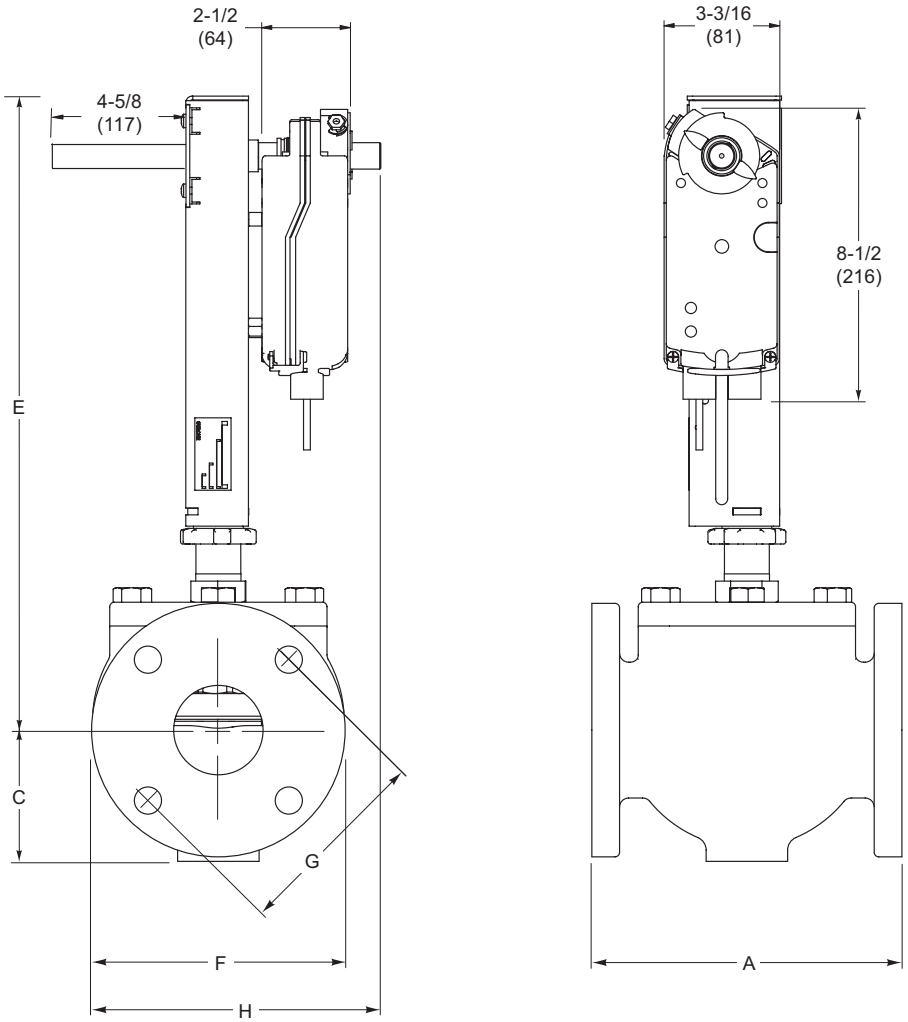


Figure-20 Mx41-6153 with 2½” to 4” VB-92x3 Flanged 2-Way Globe Valve With AV-607-1 Linkage.

Mx41-6153 Actuators/AV-607-1 Linkage

VB-9313 2½”…4” Flanged Valve Assembly with NSR Mx41-6153 Actuator

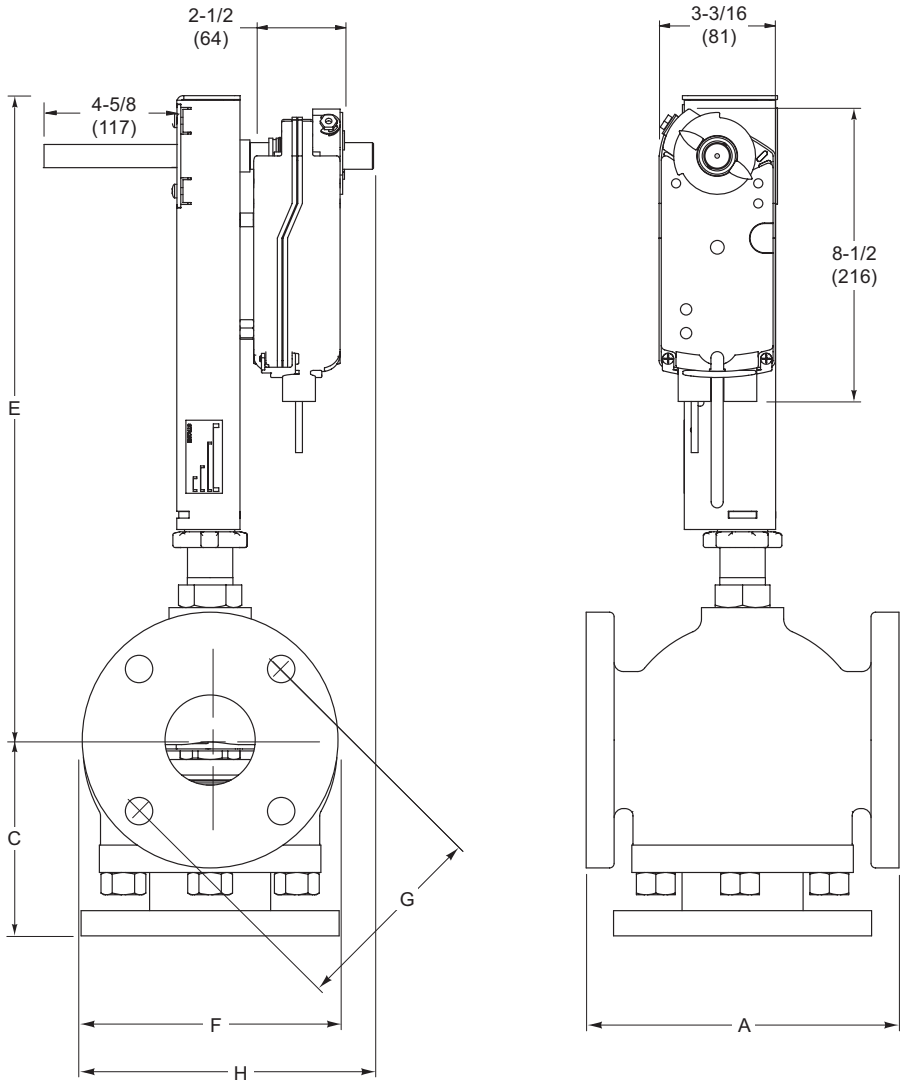


Figure-21 Mx41-6153 with 2½” to 4” VB-9313 Flanged 3-Way Globe Valve With AV-607-1 Linkage.

VB-9313 Globe Valves with Mx41-715x SR Actuators & AV-607-1 & AV-609-1 Linkages

Dimensions - 2½”…6” Flanged Globe Valve Assemblies

Valve Assembly Part Numberb	Valve Size in.	Valve Dimensions inches (millimeters)											
		2-Way (Refer to Figure-22 below.)						3-Way (Refer to Figure-23 below.)					
		A	C	E	F	G	H	A	C	E	F	G	H
ASA Flanged 2-Way (N.O.) Vx-9213-xxx-5-P 3-Way Vx-9313-xxx-5-P	2½	8½ (216)	3½ (89)	16½ (419)	7 (178)	5½ (140)	8-3/8 (213)	8½ (216)	5-3/8 (136)	17-5/8 (448)	7 (178)	5½ (140)	8-3/8 (213)
	3	9½ (241)	3¾ (95)	17-5/8 (448)	7½ (190)	6 (152)	8¾ (222)	9½ (241)	6-3/8 (162)	17½ (444)	7½ (190)	6 (152)	8¾ (222)
	4	11½ (292)	4½ (114)	18½ (470)	9 (229)	7½ (190)	9-3/8 (238)	11½ (292)	8½ (276)	18-5/8 (473)	9 (229)	7½ (190)	9-3/8 (238)
	5a	13 (330)	6¾ (171)	19-5/8 (498)	10 (254)	8½ (216)	9-5/8 (244)	13 (330)	8¾ (222)	19½ (445)	10 (254)	8½ (216)	9-5/8 (244)
	6a	14 (356)	7-3/8 (187)	20½ (521)	11 (280)	9½ (241)	10-1/8 (257)	14 (356)	9¾ (248)	20¼ (514)	11 (280)	9½ (241)	10-1/8 (257)
ASA Flanged 2-Way (N.C.) Vx-9223-xxx-5-P	2½	8½ (216)	4 (107)	17-5/8 (448)	7 (178)	5½ (140)	8-3/8 (213)	—					
	3	9½ (241)	5 (127)	17½ (444)	7½ (190)	6 (152)	8¾ (222)						
	4	11½ (292)	7-1/8 (181)	18-5/8 (473)	9 (229)	7½ (190)	9-3/8 (238)						

[a]Mx41-707x actuators are not used with 5” and 6” VB-9313 valves.
[b]These are shown for dimensions only, not for availability.

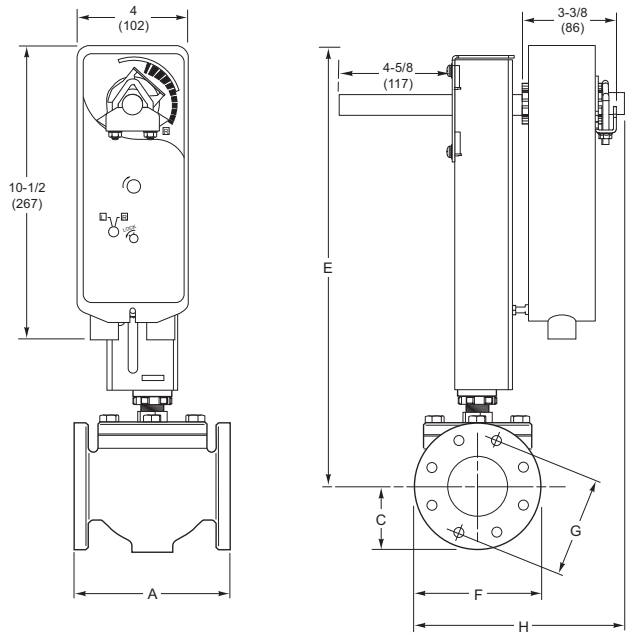


Figure-22 Mx41-715x or Mx41-707x with 2½” to 4” 2-Way VB-92x3 Flanged Globe Valve with AV-607-1 Linkage.

Mx41-715x with 5” and 6” 2-Way VB-92x3 Flanged Globe Valve with AV-609-1 linkage

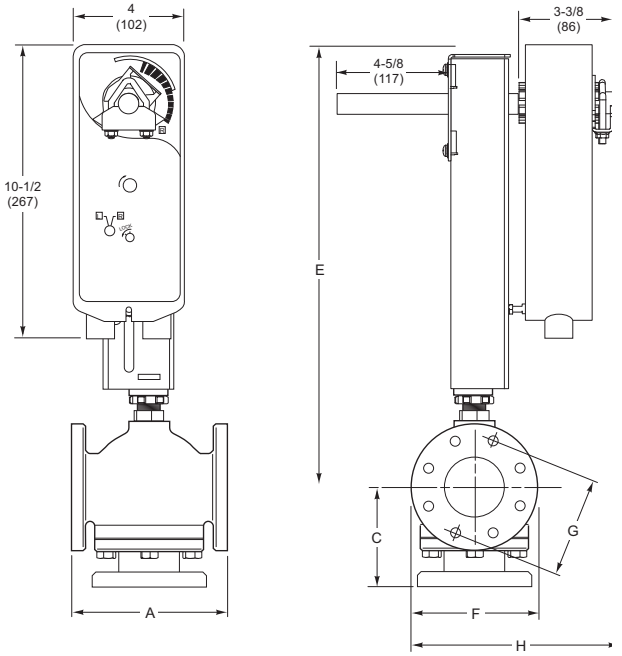


Figure-23 Mx41-715x or Mx41-707x with 2½” to 4” 3-Way VB-9313 Flanged Globe Valve With AV-607-1 Linkage.

Mx41-715x with 5” and 6” 3-Way VB-9313 Flanged Globe Valve with AV-609-1 linkage

VB-9313 Globe Valves with Mx40-717x Actuators & AV-607-1/609-1 Linkages

Dimensions - 2½”…6” Flanged Globe Valve Assemblies

Valve Assembly Part Numbera	Valve Size in.	Valve Dimensions inches (millimeters)											
		2-Way						3-Way					
		A	C	E	F	G	H	A	C	E	F	G	H
ASA Flanged 2-Way (N.O.) Vx-9213-xxx-5-P 3-Way Vx-9313-xxx-5-P	2½	8½ (216)	3½ (89)	16-5/8 (422)	7 (178)	5½ (140)	8¾ (222)	8½ (216)	5-3/8 (136)	17¼ (438)	7 (178)	5½ (140)	8¾ (222)
	3	9½ (241)	3¾ (95)	17¼ (438)	7½ (190)	6 (152)	9 (229)	9½ (241)	6-3/8 (162)	17 (432)	7½ (190)	6 (152)	9 (229)
	4	11½ (292)	4½ (114)	18¼ (464)	9 (229)	7½ (190)	9¾ (248)	11½ (292)	8½ (276)	18¼ (464)	9 (229)	7½ (190)	9¾ (248)
	5	13 (330)	6¾ (171)	19¼ (489)	10 (254)	8½ (216)	10¼ (260)	13 (330)	8¾ (222)	19 (485)	10 (254)	8½ (216)	10¼ (260)
	6	14 (356)	7-3/8 (187)	20 (508)	11 (280)	9½ (241)	10¾ (273)	14 (356)	9¾ (248)	19-7/8 (505)	11 (280)	9½ (241)	10¾ (273)
ASA Flanged 2-Way (N.C.) Vx-9223-xxx-5-P	2½	8½ (216)	4 (107)	17¼ (438)	7 (178)	5½ (140)	8¾ (222)						
	3	9½ (241)	5 (127)	17 (432)	7½ (190)	6 (152)	9 (229)						
	4	11½ (292)	7-1/8 (181)	18¼ (464)	9 (229)	7½ (190)	9¾ (248)						

[a]These are shown for dimensions only, not for availability.

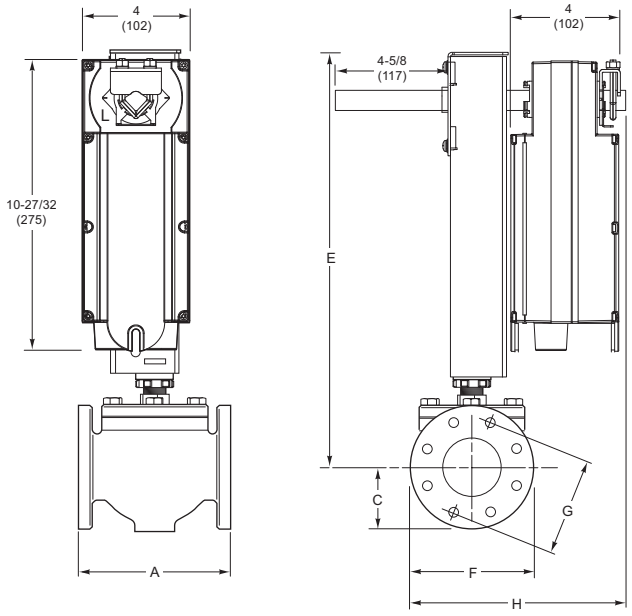


Figure-24 Mx40-717x with 2½” to 4” 2-Way VB-92x3 Flanged Globe Valve With AV-607-1 Linkage.
Mx40-717x with 5” and 6” 2-Way VB-9213 Flanged Globe Valve with AV-609-1 linkage

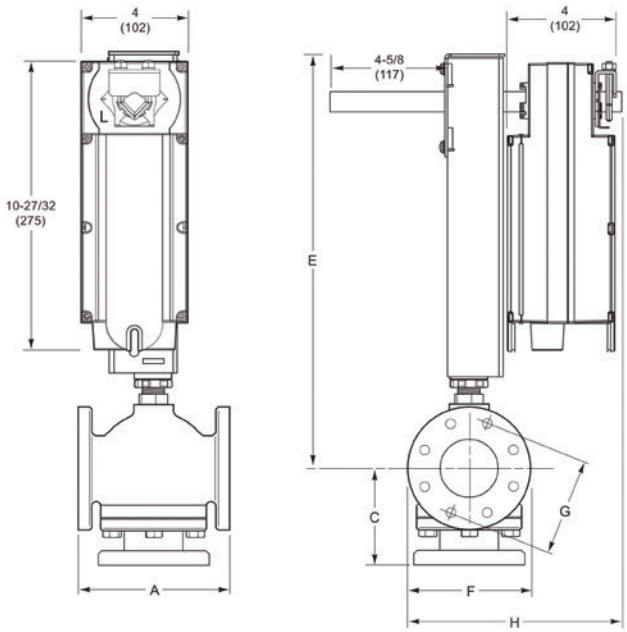


Figure-25 Mx40-717x-2xx with 2½” to 4” 3-Way VB-9313 Flanged Globe Valve With AV-607-1 Linkage.
Mx40-717x with 5" and 6" 2-Way VB-9313 Flanged Globe Valve with AV-609-1 linkage

VB-8xx3 Globe Valves with MK-6811 & MK-6911 Pneumatic Actuators

Dimensions - 2½”…6” Flanged Globe Valve Assemblies

Valve Assembly Part Number[a]	Valve Size In.	P Code	Valve Dimensions inches (millimeters)									
			2-Way (Refer to Figures below)					3-Way (Refer to Figures below)				
			A	C	E	F	G	A	C	E	F	G
2-Way VK-8213-602-5-P VK4-8213-6x2-5-P 3-Way VK-8303-602-5-15 VK4-8303-6x2-5-P	2½”	12	8-9/16 (217)	4 (102)	15-7/8 (403)	7 (178)	5½ (140)	8-9/16 (217)	5-7/16 (138)	15-5/8 (397)	7 (178)	5½ (140)
	3”	13	9½ (241)	4-5/8 (117)	16¼ (413)	7½ (191)	6 (152)	9½ (241)	6-3/8 (162)	16¼ (413)	7½ (191)	6 (152)
	4”	14	11½ (292)	5½ (140)	16-7/8 (429)	9 (229)	7½ (191)	11½ (292)	8-7/16 (214)	16-7/8 (429)	9 (229)	7½ (191)
	5”	15	13 (330)	6-15/16 (176)	18-3/16 (462)	10 (254)	8½ (216)	13 (330)	8-13/16 (224)	18-3/16 (462)	10 (254)	8½ (216)
	6”	16	14 (356)	7½ (190)	21-9/16 (548)	11 (280)	9½ (241)	14 (356)	9¾ (248)	21-9/16 (548)	11 (280)	9½ (241)
2-Way VK-8223-602-5-P VK4-8223-6x2-5-P	2½”	12	8-9/16 (217)	4 (102)	16¼ (413)	7 (178)	5½ (140)	—	—	—	—	—
	3”	13	9½ (241)	4¼ (108)	16-5/8 (422)	7½ (191)	6 (152)	—	—	—	—	—
	4”	14	11½ (292)	4-15/16 (125)	17-7/8 (454)	9 (229)	7½ (191)	—	—	—	—	—
	5”	15	13 (330)	5-7/16 (138)	19-3/8 (492)	10 (254)	8½ (216)	—	—	—	—	—
	6”	16	14 (356)	6¼ (159)	22-15/16 (583)	11 (280)	9½ (241)	—	—	—	—	—

aVK4 factory assemblies include AK-42309-500 positive positioner. Positive positioner optional for 2½” to 5”, required for 6”.

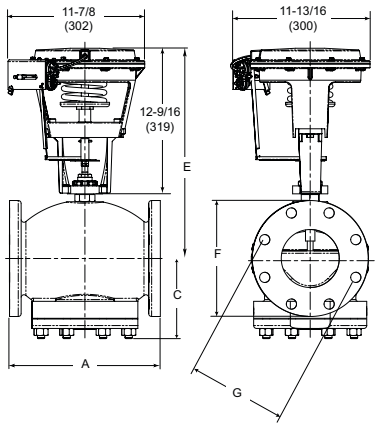


Figure 26. MK-6811 with VB-8213 Flanged 2-Way Globe Valves [a]

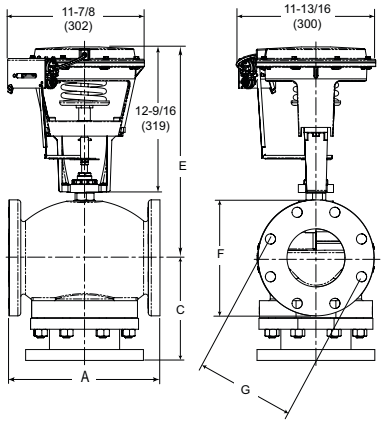


Figure 27. MK-6811 with VB-8303 Flanged 3-Way Globe Valves [a]

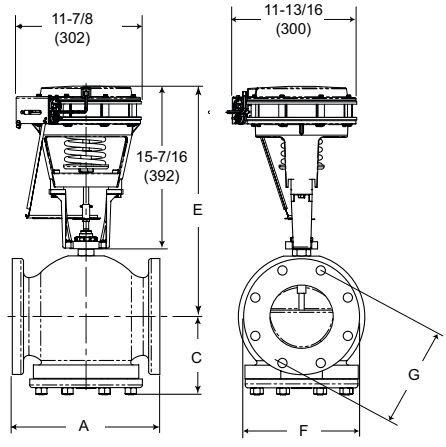


Figure 28. MK-6911 with VB-8213 Flanged 2-Way Globe Valves [a]

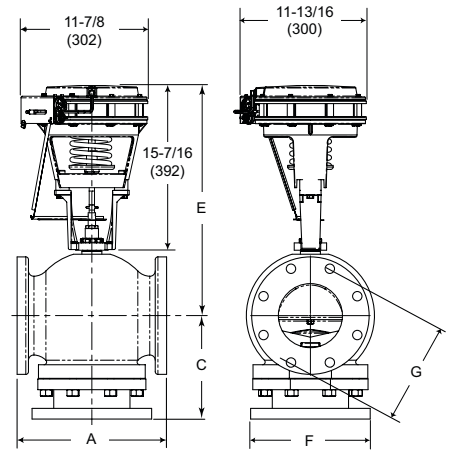
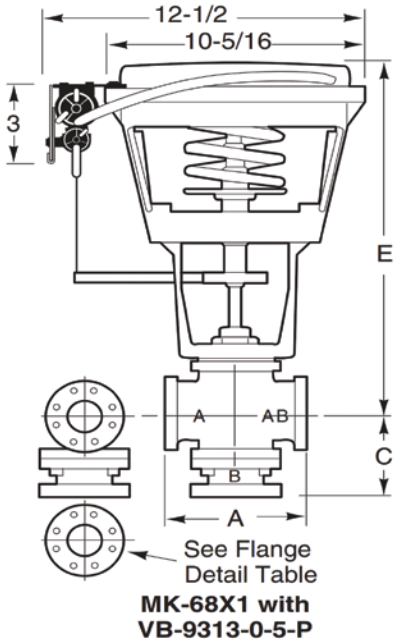


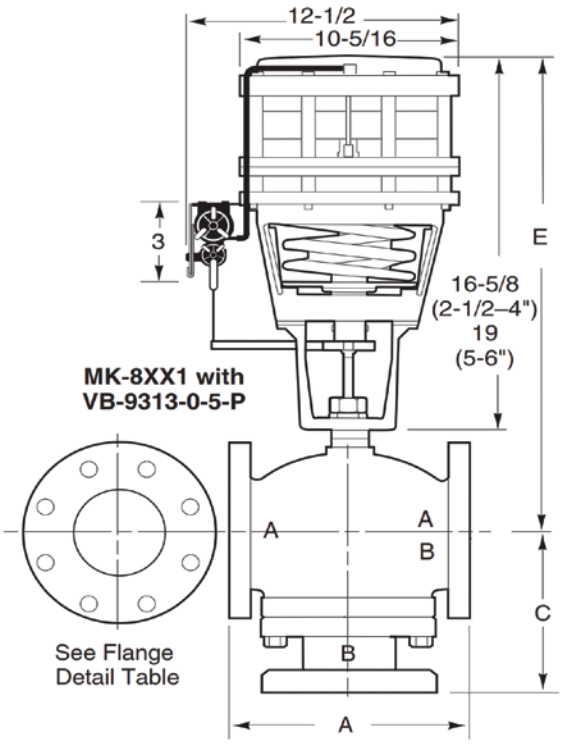
Figure 29. MK-6911 with VB-8303 Flanged 3-Way Globe Valves [a]

Life Is On Schneider Electric

VB-9313 Valve Assemblies with MK-68xx/MK-8xx1 Pneumatic Actuators

Dimensions - 2½"…6" Flanged Globe Valve Assemblies - in Inches (Millimeters)					
Valve Body				Actuator Code (XXX) (Actuator)	
				6XX (MK-6XX1)	81X (MK-8XX1)
Part Number	Size in.	A	C	E	E
VB-9313-0-5-P	2½	8½ (216)	5-3/8 (136)	15-5/8 (397)	20¾ (527)
	3	9½ (241)	6-3/8 (162)	16¼ (413)	21 (533)
	4	11½ (292)	8½ (216)	16-7/8 (429)	21-5/8 (549)
	5	13 (330)	8¾ (222)	—	24½ (622)
	6	14 (356)	9¾ (248)	—	25½ (648)



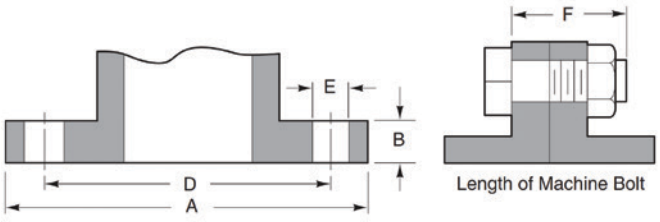


Flow Pattern.					
Body Part Number	Flow Type	Stem Up (SU) (Normal Position)		Stem Down (SD)	
		Flow	Closed Port	Flow	Closed Port
VB-9313-0-5-P	Mixing	B to AB	A	A to AB	B

Restrictions on Maximum Ambient Temperature for Valve Actuators		
TEMPERATURES °F (°C)		
	Actuators	All
	Maximum Ambient	220 (104)
	Max. Allowable Fluid	250 (121)
VB-9313-0-5-P	Maximum Fluid	300 (149)
	Max. Allowable Ambient	100 (38)

VB-8xx3 & VB-9313 Valve Body Flange Detail

Flange Detail							
	Flanges		Drilling		Bolting		
Nominal Pipe Size	Flange Diameter A	Flange Thickness B	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Bolts	Bolt Diameter	Machine Bolt Length F
2½	7	11/16	5½	¾	4	5/8	2½
3	7½	¾	6				
4	9	15/16	7½		8		3
5	10		8½	7/8		¾	
6	11	1	9½				3¼



American Standard 125 lb. Cast Iron Pipe Flanges

Specification VB-7000 Bronze Body Valves ½" to 2”

VB-7000 Bronze Body Valves ½" to 2”

A. Control Valves: Factory fabricated, with body material, and pressure class based on maximum pressure and temperature rating of piping system with a body rating of not less than 400 psig at 150° F, 321 psig at 281° F per ANSI B16.15.

B. Valve Manufacturer: Must have at least 25 years of valve manufacturing and must meet the provisions of Section 1605 of the American Recovery and Reinvestment Act Buy American Requirements. Manufacturer shall water test all valves prior to shipment.

C. Valves two way NPS 2” and Smaller: Operator, stem and plug assembly, and spring-loaded PTFE/EPDM valve stem packing cartridge must be removable for future replacement to restore the valves back to their original condition. Material grade properties must meet the fluid temperature and pressure requirements:

1. Standard duty bronze body, 316 stainless steel vertical stem, brass plug, soft seal, and bronze seat, renewable packing cartridge, and screwed/sweat/flared ends. Valves shall have allowable media temperature of 20° F to 281° F to assure reliability with dual temperature applications.

2. Heavy duty bronze body, 316 stainless steel vertical stem, 316 stainless steel plug, soft seal, and 316 stainless steel seat, renewable packing cartridge, and screwed ends. Valves shall have allowable media temperature of 20° F to 340° F to assure to assure reliability with dual temperature applications.

3. High temperature bronze body, 316 stainless steel vertical stem, 316 stainless steel plug, and 316 stainless steel seat, renewable packing cartridge, and screwed ends. Valves shall have allowable media temperature of 20° F to 400° F.

D. Two way fluid system globe valves shall have the following characteristics:

1. Rangeability: Greater than 100:1 for all valves with flow coefficients of 0.4 and higher to provide stable control under light load conditions.

2. Maximum Allowable Seat Leakage: Standard and heavy duty valves must be designed to meet ANSI Class V (0.0005 ml per minute per inch of orifice diameter per psi differential) up to 35 psi close off differential pressure and ANSI Class IV seat leakage (maximum 0.01% of full open valve capacity) above 35 psi with appropriate actuator. High temperature valves must meet ANSI Class III seat leakage (maximum 0.1% of full open valve capacity).

3. The valve must be able to operate with a full-open operating differential of no less than 87 psi.

4. Flow Characteristics: Modified equal percentage characteristics for standard duty water applications and modified linear for heavy duty and high temperature steam applications with gradual opening for light loads.

5. Sizing:

   a. Two Position Water: Line size or size using a differential pressure of 1 psi.

   b. Modulating Water: 5 PSI or twice the load pressure drop.

   c. Pressure drop across steam valve at a maximum flow of 80 percent of inlet pressure up to 15 psig and 42% of absolute (gage pressure + 14.7) inlet pressure above 15 psig inlet.

   d. 100 psi saturated steam maximum inlet pressure for heavy duty bronze body globe valves ½” to 2”.

   e. 150 psi saturated steam maximum inlet pressure for high temperature bronze body globe valves ½” to 2”.

   f. 35 psi saturated steam maximum inlet pressure for standard duty bronze body globe valves ½” to 2”.

E. Valves 3-Way mixing (two inlets and one outlet) NPS 2” and Smaller: Operator, stem and plug assembly, and spring-loaded PTFE/EPDM valve stem packing cartridge must be removable for future replacement to restore the valves back to their original condition. Material grade properties must meet the fluid temperature and pressure requirements:

1. Standard duty bronze body, 316 stainless steel vertical stem, brass plug, and bronze seat, renewable packing cartridge, and screwed or sweat ends. Valves shall have allowable media temperature of 20°F to 281°F to assure reliability with dual temperature applications.

2. Heavy duty bronze body, 316 stainless steel vertical stem, 316 stainless steel plug, and 316 stainless steel seat, renewable disc and packing cartridge, and screwed ends. Valves shall have allowable media temperature of 20° F to 340° F to assure to assure reliability with dual temperature applications.

F. 3-Way mixing hydronic system globe valves shall have the following characteristics:

1. Rangeability: Greater than 100:1 for all valves to provide stable control under light load conditions.

2. Maximum Allowable Seat Leakage: A port must be designed to meet ANSI Class V (0.0005 ml per minute per inch of orifice diameter per psi differential) up to 35 psi close off differential pressure and ANSI IV seat leakage (maximum 0.01% of full open valve capacity) above 35 psi with appropriate actuator. B port must meet ANSI Class III seat leakage (maximum 0.1% of full open valve capacity).

Specification VB-7000 Bronze Body Valves ½" to 2”

3. The valve must be able to operate with a full-open operating differential of 87 psi.

4. Flow Characteristics: Modified linear characteristics with gradual opening for light loads.

5. Sizing:

   a. Modulating Water: Minimum 5 psi or at least equal to the load pressure drop.

G. Valves 3-Way diverting (one inlet and two outlets) NPS 2” and Smaller: Operator, stem and plug assembly, and spring-loaded PTFE/EPDM valve stem packing cartridge must be removable for future replacement to restore the valves back to their original condition. Valves must designed specifically for diverting service, and mixing valves designed for mixing service must not be used for diverting applications. Material grade properties must meet the fluid temperature and pressure requirements:

1. Standard duty bronze body, 316 stainless steel vertical stem, brass plug, and bronze seat, renewable disc and packing cartridge, and screwed ends. Valves shall have allowable media temperature of 20° F to 281° F to assure reliability with dual temperature applications.

H. 3-Way diverting hydronic system globe valves shall have the following characteristics:

1. Rangeability: Greater than 100:1 for all valves to provide stable control under light load conditions.

2. Maximum Allowable Seat Leakage: ANSI Class III seat leakage (maximum 0.1% of full open valve capacity).

3. Maximum Allowable Pressure Differential: 35 psi in an open position.

4. Flow Characteristics: Modified linear characteristics with gradual opening for light loads.

5. Sizing:

   a. Modulating Water: Minimum 5 psi or at least equal to the load pressure drop.

I. Required Certifications: Pressure Equipment Directive (PED 97/23/EC), RoHS (Restriction of Hazardous Substances) and REACH (Regulation, Evaluation, Authorisation, and Restriction of Chemicals), Canadian Registration Number.

J. Valve and Operator: To assure maximum performance and operation of the valve assembly both the valve and the actuator must be tested and approved by the valve manufacturer to assure compatibility of all components and performance to the specifications.

VB-8xxx & VB-9xxx Flanged Cast Iron Valves 2½” to 6”

Body

Shall be American Factory fabricated with ASTM A 126 Class B cast iron body material with the pressure class within the maximum pressure and temperature rating of the piping system. (125 body rating with not less than 200 psig at 150° F, decreasing to 169 psig at 281F per ANSA B16.1)

Manufacturer

Shall have at least 25 years of valve manufacturing and meet the provisions of Section 1605 of the American Recovery and Reinvestment Act, buy American, requirements. All valves shall be water tested by manufacturer prior to shipment.

Serviceability

2-Way valve operators, stem and plug assemblies and spring-loaded PTFE/EPDM valve stem packing cartridges must be removable for future replacement to restore the valves back to their original condition.

Construction

Material grades must meet the fluid temperature and pressure requirement temperatures of 20° F to 281° F to assure reliability throughout all application temperature ranges.

Packings

Shall be cartridges suitable for replacement as units withstanding the full operating temperature ranges, including daily and seasonal fluctuations of water, 60% glycol and steam fluids.

Characteristics

Rangeability: Two way,100:1 and greater for stable control under light load.

Shutoff, 2-Way: Leakage allowed: ANSI Class IV (0.01% of max flow)

3-Way: Leakage allowed: ANSI Class III (0.1% of max flow)

Flow curves: 2-Way modified equal percentage characteristic.

Mixing and Diverting: Linear, modified with gradual opening for light loads.

Piping

Diverting valves, with the common port at the bottom can be used for mixing.

Mixing valves with the common port at the end must not be used for diverting applications.

Sizing

Two Position Water: Line size or size using a differential pressure of 1 psi.

Modulating Water: 5 PSI or twice the load pressure drop

Steam, 2-Way: maximum pressure drop across the valve at a maximum flow of 80 percent of inlet pressure up to 15 psig. Above 15 psig inlet, 42% of absolute (gage pressure + 14.7) inlet pressure.

Certifications for All Models

Pressure Equipment Directive (PED 97/23/EC), RoHS (Restriction of Hazardous Substances) and REACH (Regulation, Evaluation, Authorization, and Restriction of Chemicals Directive), Canadian Registration compliance.

Globe Valve Piping

When possible on water systems, install valves downstream after the outlet from the coil.
Chilled-water valves downstream of the coil have the least condensation and corrosion.
Hot water valves downstream of the coil are where the temperatures are lowest, avoiding high temperatures on electric/electronic actuators.

2-Way Straight Valves

Always follow the flow arrows on the body.
Backward piping:
Causes water hammer, noise and damage on VB-7000 and VB-9000 valves.
On VB-8200 valves, differential pressure reduces close off ability and aids in opening.

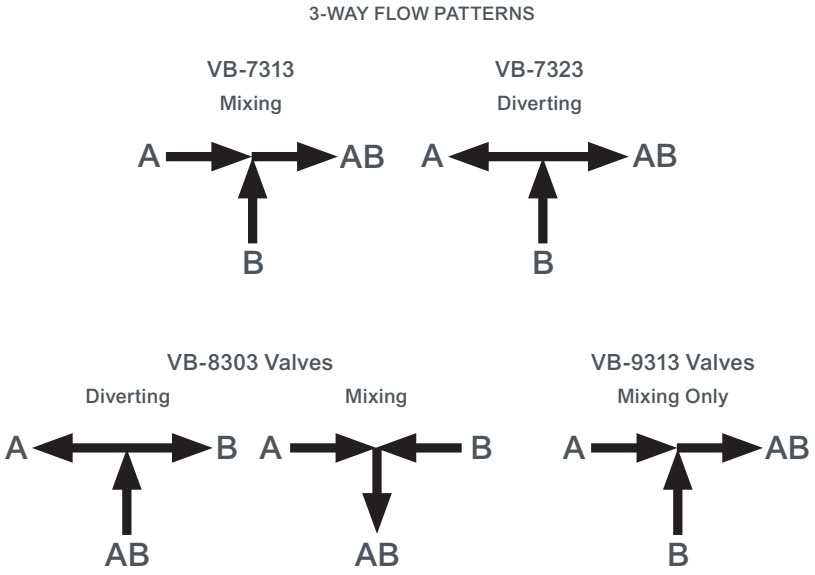
2-Way Angle Valves

VB-7200: Use cataloged bodies
VB-8200: Use 3-Way and block off the "A" port.
Flow can be in either direction. "B" port is totally balanced.

3-Way Valves

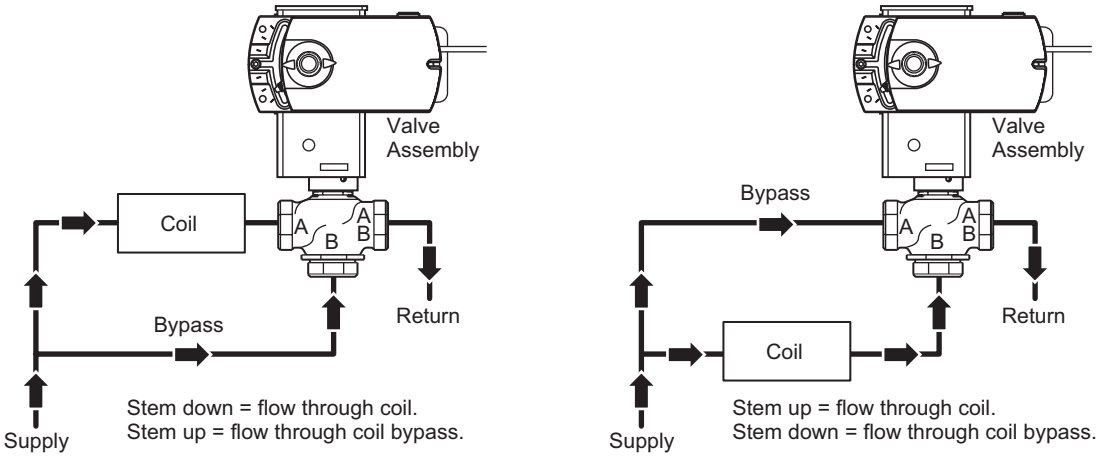
VB-7300 and VB-9300: Always follow the mixing arrows on the body. Backwards flow causes water hammer and damage.
VB-732x Diverting valves and V8-83xx balanced valves can be piped with flow reversed.
VB-830x Mixing valves are piped with two inlet ports "A" and "B" and the outlet port is AB at the bottom of the valve. You may also use a VB-8303 as a angle valve if you cap off either port A or port B.

3-Way Piping



3-Way Proportional Mixing Valves Used to Bypass Flow (VB-7313 Example Shown)

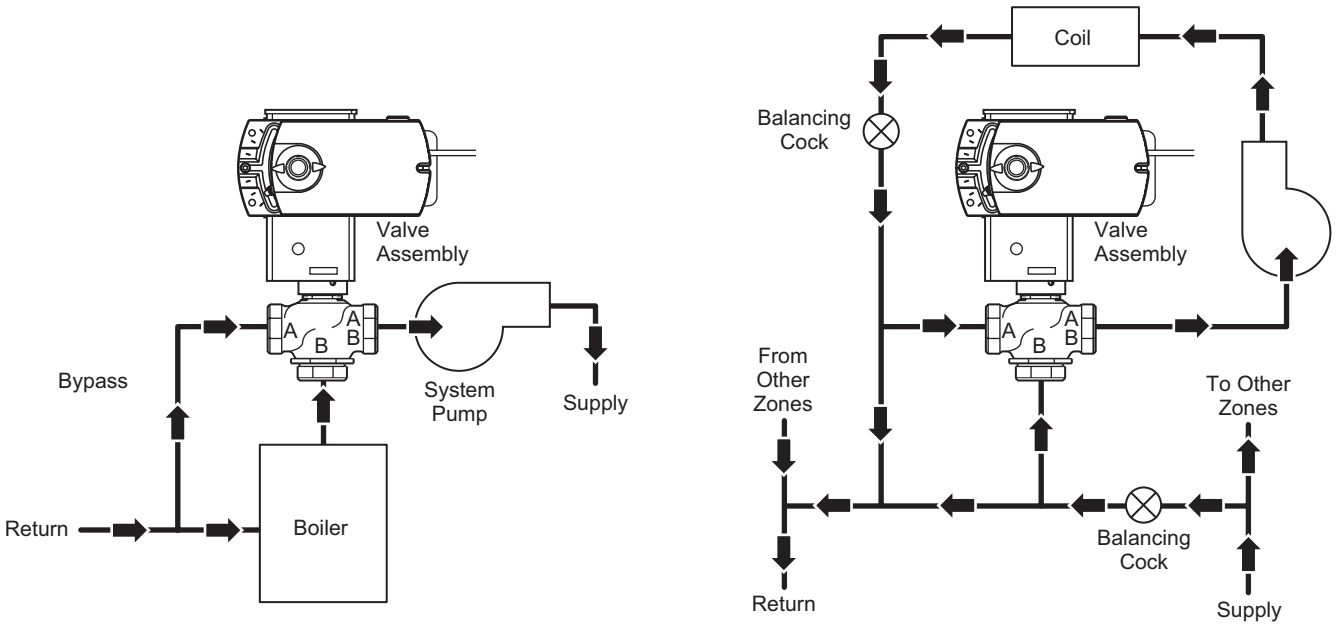
When 3-Way proportional linked globe valve assemblies are used to control flow through a heating or cooling coil, the valve assembly is piped on the outlet side of the load to throttle the water flow through the load, and therefore control the heat output of the load as diagramed below.



Typical Piping of 3-Way Mixing Valve for Control of Heating or Cooling Coil.

3-Way Proportional Mixing Valves Used to Blend Water Flows (VB-7313 Example Shown)

Proportional 3-Way mixing valves used to blend two water flows, diagramed below, control the heat output by varying the water temperature to the load at constant flow. These valves do not require high pressure drops for good control results. They can be sized for a pressure drop of 20% of the "available pressure" or equal to 25% of the pressure drop through the load at full flow.



Typical Boiler Hot Water Reset

Typical Primary-Secondary Piping

Typical 3-Way Mixing Valve Piping for Proportional Control Used to Blend Two Water Flows.

System Sustainability

Introduction

All heating and cooling systems are susceptible to valve and system problems caused by improper fluid treatment and system storage problems. These guidelines are provided to help avoid valve and water system problems from improperly treated water or storage procedures in cooling, hot water and steam systems; and to obtain maximum life from Schneider Electric valves.

While all cooling and heating systems are susceptible to problems, closed chilled-water systems, including those containing brine or glycol, are especially prone to system and valve problems. The best preventative is to follow the advice of professional water treatment and control specialists.

Leak Prevention

Durability of valve stems and packing is dependent on maintaining non-damaging fluid conditions. Inadequate treatment or filtration not in accordance with the recommendations of a qualified treatment specialist or the ASHRAE handbook recommended condition, can result in corrosion, scaling or abrasive particle formation. Scale and corrosion products can migrate from pipe walls to control valves, resulting in stem and packing scratches; and can adversely affect packing life and other parts of the hydronic system. This condition can be avoided by the use of proper cleaning treatment chemicals and storage procedures.

Water must be treated and soft. Trace leaks of hard water result in hard calcium carbonate particles on the outside of the valve, which after time will scratch the sealing members creating leak potential.

To maintain non-damaging conditions, the system should be cleaned prior to start-up. Filtration equipment should be used where needed and a regularly scheduled program of water condition monitoring and/or treatment should be followed.

Control valve operation should be stable and not hunt at any time. Excessive stroking of the valve due to improper system setup-can result in premature wear.

System Commissioning and Storage

Cleaning

New systems usually contain dirt, solder flux and weld and pipe scale. Thorough flushing with a 1% to 2% solution of trisodium phosphate and thorough rinsing is necessary.

Wet Storage

If the system is stored wet. it should be completely filled with properly treated water and isolated to avoid slow leaks, which can contribute to serious corrosion problems.

Dry Storage

If drained, the system should be air dried, sealed and treated with a desiccant to prevent “atmospheric corrosion” of pipes, a major source of “pipe scale.” Pipe scale is dried rust which will slough off the pipe walls as abrasive particles and migrate throughout the system.

Strainers and Filters

Many closed water systems have slow leaks or seepage, resulting in water loss without particulate removal. Consequently, particulate solids often build up in closed systems, resulting in deposits. In open systems like cooling towers, particulate solid build up is not as common because continuous “blow down” is used to remove solids from the system.

Side stream water filtration is often needed in closed systems because there is no regular blow down to remove pipe scale, sand, grit, and other abrasive or sticky particulate matter. Abrasive particles must not be allowed to circulate through the system.

To determine whether a filtration system is required, perform a visual inspection of the water. Flush a line with turbulence to assure that a representative water sample is collected and observe the turbidity. Let the water settle for 5 minutes and inspect for particulate that has dropped out.

If chip scale and particulate are found in circulation, install some type of filtration device such as a “Y” strainer, a cartridge filter, an automatic backwashing side stream sand filter, or a “chemical pot feeder” packed with cheesecloth that can replaced periodically. Backwashing sand filters (sized at ½% to 3% of system circulation rate) are often a good choice, because they are simple, inexpensive, and effective.

Lines carrying water to and from the filtration system should be sized for high flow rates to make sure the particulate matter is carried into the filtration system.

Filtration is often necessary when chemical treatment is started in a system which has not previously been chemically treated. The treatment often dislodges old deposits, which then migrate to heat exchangers and valves unless removed by filtration.

Before installing a sophisticated filtration system, make sure strainer baskets are emptied regularly. Also make sure the baskets have not been permanently removed — a common practice when they “fill up” quickly and too much work is required to keep them clean.

Before installing filters or strainers in systems containing glycol, consult the glycol vendor for the proper type.

Chemical Water Treatment

If the make-up water hardness is greater than 50 ppm (3 grains per gallon) as calcium carbonate, the water should be softened or a treatment should be used that contains a polymeric “dispersant” material which forms a soft sludge not allowing the formation of hard scale or gritty residue.

Make-up water iron should be less than about 1.0 ppm. Manganese should be less than 0.1 ppm (0.05 ppm if the system has significant leakage). If not, an iron/manganese removal system or a new water source should be used.

Water treatment control addresses four problem areas: corrosion, scale, deposition, and bacteria. For control, a nitrite or molybdate based program is typically used in conjunction with testing and monitoring. The corrosion control program most commonly used is 600…1200 ppm sodium nitrite or 100…300 ppm molybdate, at a pH of 9.5 to 10.5. Include a copper corrosion inhibitor such as Tolytriazol (TTA) or Benzotriazole (BZT) since uncontrolled copper corrosion can lead to corrosion of steel.

Glycol, Bacteria and Chemical Treatments

The addition of glycol, especially automotive antifreeze, does not assure corrosion protection. Specify industrially inhibited ethylene glycol (phosphate based) without silicates to ASTM D1384. Refer to the manufacturer's literature for specific requirements, including concentrations and materials of construction.

Control of bacteria is important because bacteria can break down the nitrites. The level of bacteria should be kept at less than 10,000 CFUs (colony forming units) per ml of water. Follow your supplier's instructions for bacterial control.

Operate your chemical treatment program within the guidelines set by your water treatment supplier. Monitor results monthly, switching to weekly if problem resolution is necessary.

Boiler water treatment for steam systems should be continuous. Follow industry guidelines such as "Marks Standard Handbook for Mechanical Engineers." For oxygen removal, catalyzed sodium sulfate is usually recommended.

Using Hydrazine that results in Ammonia

Be careful using hydrazine that results in ammonia: it must be controlled to prevent stress corrosion and embrittlement leading to fracture of certain brass alloys.

Control Loop Operation

Valves should not be oversized. Refer to CA-28, Control Valve Sizing, F-13755, for information on proper valve sizing and selection. Set the control system operating parameters so that hunting does not occur, even at light load conditions such as fall, spring, and morning operation. Valves which cycle often or continuously require a preventative maintenance program to replace worn parts.

Discontinued Assemblies

ELECTRIC/ELECTRONIC LINKAGES											
If body part number is not listed, linkage may not be known.											
Part Number	**Pipe Sizes**	**MA-3x8-xxx MA-416-xxx MA-4x8-xxx MA-4x9-xxx**	**MA-521x-xxx**	**MC-31x MC-32x MC-41x MC-41x1**	**All MC-3xx, 4xx, 4xxx Except Those in Preceding Column**	**MF-631x3**	**MP-32x, 33x, 36x, 37x, 42xx, 43xx, 46xx, 47xx, 21xx C180x Models Only**	**MP-34x, 35x, 38x, 44xx, 45xx, 48xx C180x Models Only**	**MP-503 MP-513 MU-503 MU-504 MU-506**	**MF-5x1x, MP-54xx, MP-55xx**	**MU-4610x MU-4710x**
VB-111 to 151	½…1¼ in.		AV-600						AV-308	AV-600a	
VB-202-0-1-x & 2-x	½…2" in.	AV-300, AV-21		AV-300, AV-21	AV-300, AV-30		AV-300, AV-21	AV-300, AV-30b			AV-300 & AV-21
VB-202-0-2-x	5 & 6 in.				AV-352			AV-352			
VB-212-0-1-x	½…2" in.	AV-300, AV-21		AV-300, AV-21	AV-300, AV-30		AV-300, AV-21	AV-300, AV-30b			AV-300 & AV-21
VB-260-0-1-x	½ & ¾ in.				AV-333						
VB-260-0-1-x	1 to 1½ in.				AV-300, AV-30						
VB-262-0-1-x	½…1½ in.				AV-300, AV-30			AV-300, AV-30			
VB-314 to 3x4	½…1 in.		AV-600						AV-308	AV-600a	
VB-804-0-1-x, -2x	½…2" in.	AV-300, AV-21		AV-300, AV-21	AV-300, AV-30		AV-300, AV-21	AV-300, AV-30b00			AV-300 & AV-21
VB-804-0-2-x	5 & 6 in.				AV-352			AV-352			
VB-807-0-1-x, 817*	½…2" in.	AV-300, AV-21		AV-300, AV-21	AV-300, AV-30		AV-300, AV-21	AV-300, AV-30			AV-300 & AV-21
VB-817-0-x-x	4 to 6 in.				AV-352		AV-352	AV-352			
VB-7211-0-4-x, 7212	½…1¼ in.		AV-7600-1			AV-671			AV-308-0-0-1	AV-7600-1a	
VB-7213-0-4-x, 7215	½…2" in.	AV-391	AV-7600-1	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7214-0-4-x, 7215	½…2" in.	AV-391	AV-7600-1	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7221-0-4-x, 22,23.24	½…1¼ in.		AV-7600-1						AV-308-0-0-1	AV-7600-1a	
VB-7253-0-4-x	½…2" in.	AV-391	AV-7600-1	AV-391	AV-393	AV-671	AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7263-0-4-x	½…2" in.		AV-7600-1						AV-308-0-0-1	AV-7600-1a	
VB-7273-0-4-x	½…2" in.	AV-391	AV-7600-1	AV-391	AV-393	AV-671	AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7283-0-4-x, 7312	½…2" in.		AV-7600-1						AV-308-0-0-1	AV-7600-1a	
VB-7313-0-4-x	½…2" in.	AV-391	AV-7600-1	AV-391	AV-393	AV-671	AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7314-0-4-x	½…2" in.	AV-391	AV-7600-1	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7315-0-4-x	15 to 50 mm	AV-391	AV-7600-1	AV-391	AV-393	AV-671	AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7323-0-4-x	½…2" in.	AV-391	AV-7600-1	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7332-0-4-x	5/8 in. O.D.								AV-308-0-0-1	AV-7600-1a	
VB-9211-0-4-x, 9212	½…1¼ in.		AV-600-0-0-1			AV-671			AV-308-0-0-1	AV-600-0-0-1a	
VB-9213-0-4-x	½…1¼ in.	AV-391	AV-600-0-0-1	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-600-0-0-1a	AV-391

Discontinued Assemblies

ELECTRIC/ELECTRONIC LINKAGES (CONT.)											
Part Number	Pipe Sizes	MA-3x8-xxx MA-416-xxx MA-4x8-xxx MA-4x9-xxx	MA-521x-xxx	MC-31x MC-32x MC-41x MC-41x1	All MC-3xx, 4xx, 4xxx Except Those in Preceding Column	MF-631x3 (See footnote d)	MP-32x, 33x, 36x, 37x, 42xx, 43xx, 46xx, 47xx, 21xx C180x Models Only	MP-34x, 35x, 38x, 44xx, 45xx, 48xx C180x Models Only	MP-503 MP-513 MU-503 MU-504 MU-506 (See footnote d)	MF-5x1x, MP-54xx, MP-55xx	MU-4610x MU-4710x
VB-9213-0-4-x	1½ & 2 in.	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9213-0-4-x, -5-x	2½ & 3 in.	AV-395		AV-395	AV-396, AV-352	AV-672	AV-395	AV-396, AV-352			AV-395
VB-9213-0-5-x	5 & 6 in.				AV-352			AV-352			
VB-9214-0-4-x	½…1¼ in.	AV-391	AV-600	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-600a	AV-391
VB-9214-0-4-x	1½ & 2 in.	AV-392		AV-392	AV-394		AV-392	AV-394			AV-392
VB-9215-0-4-x	15 to 32 mm	AV-391	AV-600	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-600a	AV-391
VB-9215-0-4-x	40 to 50 mm	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9215-0-4-x	65 to 80 mm	AV-395		AV-395	AV-396, AV-352	AV-672	AV-395	AV-396, V-352			AV-395
VB-9221-0-4-x, 9222	½…1¼ in.		AV-600						AV-308-0-0-1	AV-600a	
VB-9223-0-5-4	5 to 6 in.				AV-352			AV-352			
VB-9224-0-4-x	½…1¼ in.		AV-600						AV-308-0-0-1	AV-600a	
VB-9253-0-4-x	½…1¼ in.	AV-391	AV-600	AV-391	AV-393	AV-671	AV-391	AV-393	AV-308-0-0-1	AV-600a	AV-391
VB-9253-0-4-x	1½ & 2 in.	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9263-0-4-x	½…1¼ in.		AV-600						AV-308-0-0-1	AV-600a	
VB-9273-0-4-x	½…1¼ in.	AV-391	AV-600	AV-391	AV-393	AV-671	AV-391	AV-393	AV-308-0-0-1	AV-600a	AV-391
VB-9273-0-4-x	1½ & 2 in.	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9283-0-4-x, 9312-0-4-x	½…1¼ in.		AV-600						AV-308-0-0-1	AV-600a	
VB-9313-0-4-x	½…1¼ in.	AV-391	AV-600	AV-391	AV-393	AV-671	AV-391	AV-393	AV-308-0-0-1	AV-600a	AV-391
VB-9313-0-4-x	1½ & 2 in.	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9313-0-4,5-x	2½…4" in.	AV-395		AV-395	AV-396, AV-352	AV-672	AV-395	AV-396, AV-352			AV-395
VB-9313-0-5-x	5 to 6 in.				AV-352			AV-352			
VB-9314-0-4-x	½…1¼ in.	AV-391	AV-600	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-600a	AV-391
VB-9314-0-4-x	1½ & 2 in.	AV-392		AV-392	AV-394		AV-392	AV-394			AV-392
VB-9315-0-4-x	15 to 32 mm	AV-391	AV-600	AV-391	AV-393	AV-671	AV-391	AV-393	AV-308-0-0-1	AV-600a	AV-391
VB-9315-0-4-x	40 to 50 mm	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9315-0-4-x	65 to 80 mm	AV-395		AV-395	AV-396, AV-352	AV-672	AV-395	AV-396, AV-352			AV-395
VB-9323-0-4-x	½…1¼ in.	AV-391	AV-600	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-600a	AV-391
VB-9323-0-4-x	1½ & 2 in.	AV-392		AV-392	AV-394		AV-392	AV-394			AV-392

Discontinued Assemblies

ELECTRIC/ELECTRONIC LINKAGES (CONT.)											
Part Number	**Pipe Sizes**	**MA-3x8-xxx MA-416-xxx MA-4x8-xxx MA-4x9-xxx**	**MA-521x-xxx**	**MC-31x MC-32x MC-41x MC-41x1**	**All MC-3xx, 4xx, 4xxx Except Those in Preceding Column**	**MF-631x3**	**MP-32x, 33x, 36x, 37x, 42xx, 43xx, 46xx, 47xx, 21xx C180x Models Only**	**MP-34x, 35x, 38x, 44xx, 45xx, 48xx C180x Models Only**	**MP-503 MP-513 MU-503 MU-504 MU-506** See foot-note d)	**MF-5x1x, MP-54xx, MP-55xx**	**MU-4610x MU-4710x**
VB-9323-0-5-x	2½ & 3 in.	AV-300, AV-29		AV-300, AV-29	AV-300, AV-29		AV-300, AV-29	AV-300, AV-29			AV-300, AV-29
VB-9323-0-5-x	4 to 6 in.				AV-352		AV-352	AV-352			
VB-9332-0-4-x	5/8 in. O.D.								AV-308-0-0-1	AV-600a	
OYBB-233	½ & ¾ in.		AV-600						AV-308	AV-600a	

[a]Use AV-601 for high fluid temperature applications. See specific valve/actuator for limitations.

[b]Some valves use AV-327 neutral band linkages and require it with cams marked “49.” These were used on heating valves with auxillary switch control of “DX” compressors.

[c]Direct mount, no separate linkage.

[d]AV-308-0-0-1, AV-671 and AV-672 are obsolete.

Discontinued Assemblies

ELECTRIC/ELECTRONIC LINKAGES (Up to VB-9xxx)										
Part Number	Pipe Sizes	MU-4810x	MUP-4610x MUP-4710x	MUP-4820x	Mx40-6043 6083 704x	Mx40-6153 707x 715x 717x	Forta M400Axx-VB No Link needed	Forta[b] M400A	Forta[b] M800A M900A	Forta[b] M1500A
VB-7xxx-0-4-x	½…2" in.				AV-611	AV-602		AV-821	AV-821	
VB-9xxx-0-4-x	½…1¼ in.				AV-611			AV-821	AV-821	
VB-111-0-x-x	½…1¼ in.				AV-611			AV-821	AV-821	
VB-121-0-x-x	½ in. O.D.				AV-611			AV-821	AV-821	
VB-131-x-x-x	5/8 or 7/8" O.D.				AV-611			AV-821	AV-821	
VB-151-0-1-x	½…1¼ in.				AV-611			AV-821	AV-821	
VB-202-0-1-x	½…2" in.	AV-300, AV-30a	AV-300, AV-21	AV-300, AV-30a	AV-611			AV-821	AV-821	
VB-202-0-2-x	2½…4" in.	AV-300, AV-30	AV-300, AV-29	AV-300, AV-30		AV-607-1				AV-822
VB-202-0-2-x	5 & 6 in.	AV-352		AV-352		AV-609-1				AV-822
VB-212-0-1-x	½…2" in.	AV-300, AV-30	AV-300, AV-21	AV-300, AV-30	AV-611			AV-821	AV-821	
VB-252-0-1-x	½…2" in.				AV-611			AV-821	AV-821	
VB-252-0-2-x	2½…4" in.					AV-607-1		AV-821	AV-821	
VB-260-0-1-x	½ & ¾ in.				AV-611			AV-821	AV-821	
VB-260-0-1-x	1 to 1½ in.				AV-611			AV-821	AV-821	
VB-262-0-1-x	½…1½ in.	AV-300, AV-30		AV-300, AV-30	AV-611			AV-821	AV-821	
VB-314-0-1-x	½…1 in.				AV-611			AV-821	AV-821	
VB-324-0-5-4	½ in. O.D.				AV-611			AV-821	AV-821	
VB-334-0-5-4	½ in. O.D.				AV-611			AV-821	AV-821	
VB-354-0-5-x	5/8 or 7/8" O.D				AV-611			AV-821	AV-821	
VB-804-0-1-x	½…2" in.	AV-300, AV-30a	AV-300, AV-21	AV-300, AV-30a	AV-611			AV-821	AV-821	
VB-804-0-2-x	2½…4" in.	AV-300, AV-30	AV-300, AV-29	AV-300, AV-30		AV-607-1				AV-822
VB-804-0-2-x	5 & 6 in.	AV-352		AV-352		AV-609-1				AV-822
VB-807-0-1-x	½…2" in.	AV-300, AV-30	AV-300, AV-21	AV-300, AV-30	AV-611			AV-821	AV-821	
VB-817-0-x-x	½ to 3 in.	AV-300, AV-30	AV-300, AV-29	AV-300, AV-30				AV-821	AV-821	
VB-817-0-x-x	4 to 6 in.	AV-352		AV-352		AV-609-1				AV-822
VB-8213-0-5-x	2½…5 in.					AV-607-1				AV-822
VB-8213-0-5-x	6 in.					AV-609-1				AV-822
VB-8223-0-5-x	2½…5 in.					AV-607-1				AV-822
VB-8223-0-5-4	6 in.					AV-609-1				AV-822
VB-8313-0-5-x	2½…5 in.					AV-607-1				AV-822
VB-8313-0-5-x	6 in.					AV-609-1				AV-822
VB-9211-0-4-x	½…1¼ in.	AV-430	AV-401		AV-611			AV-821	AV-821	
VB-7222-0-4-x	5/8 in. O.D.				AV-611	AV-602		AV-821	AV-821	
VB-7223-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7224-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7253-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7263-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7273-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7283-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7312-0-4-x	5/8 in. O.D.				AV-611	AV-602		AV-821	AV-821	
VB-7313-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7314-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7315-0-4-x	15…50 mm	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7323-0-4-x	½…2" in.	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7332-0-4-x	5/8 in. O.D.				AV-611	AV-602		AV-821	AV-821	

[a]Some valves use AV-327 neutral band linkages and require it with cams marked "49." These were used on heating valves with auxillary switch control of "DX" compressors.

[b]VB prefix indicates that the actuator fits directly onto VB-7xxx valve bodies.

Discontinued Assemblies

ELECTRIC/ELECTRONIC LINKAGES (VB-92xx & VB-93xx)										
Part Number	Pipe Sizes	MU-4810x	MUP-4610x MUP-4710x	MUP-4820x	Mx40-6043 6083 704x	Mx40-6153 707x 715x 717x	Forta M400Axx-VB No Link needed	Forta[a] M400A	Forta[a] M800A M900A	Forta[a] M1500A
VB-9211-0-4-x	½…1¼ in.				AV-611			AV-821	AV-821	
VB-9212-0-4-x	5/8 in. O.D.				AV-611			AV-821	AV-821	
VB-9213-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9213-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9213-0-4-x	2½ & 3 in.	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9213-0-5-x	2½…4" in.	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9213-0-5-x	5 & 6 in.	AV-352		AV-352		AV-609-1				AV-822
VB-9214-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9214-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9215-0-4-x	15 to 32 mm	AV-393	AV-391	AV-393		AV-602		AV-821	AV-821	
VB-9215-0-4-x	40 and 50 mm	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9215-0-4-x	65 and 80 mm	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9221-0-4-x	½…1¼ in.				AV-611			AV-821	AV-821	
VB-9222-0-4-x	5/8 in. O.D.				AV-611			AV-821	AV-821	
VB-9223-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9223-0-4-x	1½…2" in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9223-0-4-x	2½ & 3 in.	AV-396	AV-395	AV-396		AV-607-1				AV-822
VB-9223-0-5-x	2½…4" in.	AV-396	AV-395	AV-396		AV-607-1				AV-822
VB-9223-0-5-4	5 to 6 in.	AV-352		AV-352		AV-609-1				AV-822
VB-9224-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9224-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9253-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9253-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9263-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9263-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9273-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9273-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9283-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9283-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9313-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9313-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9313-0-4-x	2½ & 3 in.	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9313-0-5-x	2½…4" in.	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9313-0-5-x	5 to 6 in.	AV-352		AV-352		AV-609-1				AV-822
VB-9314-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9314-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9315-0-4-x	15 to 32 mm	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9315-0-4-x	40 and 50 mm	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9315-0-4-x	65 and 80 mm	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9323-0-4-x	½…1¼ in.	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9323-0-4-x	1½ & 2 in.	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9323-0-5-x	2½ & 3 in.	AV-300, AV-30	AV-300 & AV-29	AV-300 & AV-30		AV-607-1				AV-822
VB-9323-0-5-x	4 to 6 in.	AV-352		AV-352		AV-609-1				AV-822
VB-9332-0-4-x	5/8 in. O.D.				AV-611			AV-821	AV-821	

[a]VB prefix indicates that the actuator fits directly onto VB-7xxx valve bodies.

Discontinued Assemblies

PNEUMATIC LINKAGES (Up to VB-9212)								
Part Number	Pipe Sizes	MK-2690	MK-46x1	MK-47x1 (Obsolete)	MK-48x1 (VB-9xxx only)	MK-66xx (½ in. stroke)	MK-68x1 (MK-69x1 is only used on VB-817 & VB-9323, 4 to 6 in.)	MK-88xx MK-89xx (5 & 6 in.) (2½…4" in.)
VB-111-0-x-x	½…1¼ in.	AV-400	AV-404					
VB-121-0-x-x	½ in. O.D.	AV-400	AV-401					
VB-131-x-x-x	5/8 or 7/8" O.D.	AV-400	AV-401					
VB-151-0-1-x	½…1¼ in.	AV-400	AV-401					
VB-202-0-1-x	½…2" in.			AV-430			AV-430	
VB-202-0-2-x	2½…4" in.						AV-430	AV-496
VB-202-0-2-x	5 & 6 in.							AV-496
VB-212-0-1-x	½…2" in.			AV-430			AV-430	
VB-252-0-1-x	½…2" in.			AV-430			AV-430	
VB-252-0-2-x	2½…4" in.						AV-430	AV-496
VB-314-0-1-x	½…1 in.	AV-400	AV-401					
VB-324-0-5-4	½ in. O.D.	AV-400	AV-401					
VB-334-0-5-4	½ in. O.D.	AV-400	AV-401					
VB-354-0-5-x	5/8 or 7/8" O.D	AV-400	AV-401					
VB-804-0-1-x	½…2" in.			AV-430			AV-430	
VB-804-0-2-x	2½…4" in.						AV-430	AV-496
VB-804-0-2-x	5 & 6 in.							AV-496
VB-807-0-1-x	½…2" in.			AV-430			AV-430	
VB-817-0-x-x	½ to 3 in.						AV-430	
VB-817-0-x-x	4 to 6 in.						AV-430	
VB-7211-0-4-x	½…1¼ in.	AV-7400	AV-401					
VB-7212-0-4-x	5/8 in. O.D.	AV-7400	AV-401					
VB-7213-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7214-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7215-0-4-x	15…50 mm	AV-7400	AV-401			AV-430		
VB-7221-0-4-x	½…1¼ in.	AV-7400	AV-401					
VB-7222-0-4-x	5/8 in. O.D.	AV-7400	AV-401					
VB-7223-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7224-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7253-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7263-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7273-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7283-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7312-0-4-x	5/8 in. O.D.	AV-7400	AV-401					
VB-7313-0-4-x	½…2" in.	AV-7400	AV-401	AV-430				
VB-7314-0-4-x	½…2" in.	AV-7400	AV-401	AV-430				
VB-7315-0-4-x	15…50 mm	AV-7400	AV-401	AV-430				
VB-7323-0-4-x	½…2" in.	AV-7400	AV-401	AV-430				
VB-7332-0-4-x	5/8 in. O.D.	AV-7400	AV-401					
VB-8213-0-5-x	2½…5 in.						AV-495	AV-496
VB-8213-0-5-x	6 in.							AV-496
VB-8223-0-5-x	2½…5 in.						AV-495	AV-496
VB-8223-0-5-4	6 in.							AV-496
VB-8313-0-5-x	2½…5 in.						AV-495	AV-496
VB-8313-0-5-x	6 in.							AV-496
VB-9211-0-4-x	½…1¼ in.	AV-430	AV-401					
VB-9212-0-4-x	5/8 in. O.D.	AV-400	AV-401					

Discontinued Assemblies

PNEUMATIC LINKAGES (Up to VB-9212)								
Part Number	Pipe Sizes	MK-2690	MK-46x1	MK-47x1 (Obsolete)	MK-48x1 (VB-9xxx only)	MK-66xx (½ in. stroke)	MK-68x1 (MK-69x1 is only used on VB-817 & VB-9323, 4 to 6 in.)	MK-88xx MK-89xx (5 & 6 in.) (2½…4" in.)
VB-111-0-x-x	½…1¼ in.	AV-400	AV-404					
VB-121-0-x-x	½ in. O.D.	AV-400	AV-401					
VB-131-x-x-x	5/8 or 7/8" O.D.	AV-400	AV-401					
VB-151-0-1-x	½…1¼ in.	AV-400	AV-401					
VB-202-0-1-x	½…2" in.			AV-430			AV-430	
VB-202-0-2-x	2½…4" in.						AV-430	AV-496
VB-202-0-2-x	5 & 6 in.							AV-496
VB-212-0-1-x	½…2" in.			AV-430			AV-430	
VB-252-0-1-x	½…2" in.			AV-430			AV-430	
VB-252-0-2-x	2½…4" in.						AV-430	AV-496
VB-314-0-1-x	½…1 in.	AV-400	AV-401					
VB-324-0-5-4	½ in. O.D.	AV-400	AV-401					
VB-334-0-5-4	½ in. O.D.	AV-400	AV-401					
VB-354-0-5-x	5/8 or 7/8" O.D	AV-400	AV-401					
VB-804-0-1-x	½…2" in.			AV-430			AV-430	
VB-804-0-2-x	2½…4" in.						AV-430	AV-496
VB-804-0-2-x	5 & 6 in.							AV-496
VB-807-0-1-x	½…2" in.			AV-430			AV-430	
VB-817-0-x-x	½ to 3 in.						AV-430	
VB-817-0-x-x	4 to 6 in.						AV-430	
VB-7211-0-4-x	½…1¼ in.	AV-7400	AV-401					
VB-7212-0-4-x	5/8 in. O.D.	AV-7400	AV-401					
VB-7213-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7214-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7215-0-4-x	15…50 mm	AV-7400	AV-401			AV-430		
VB-7221-0-4-x	½…1¼ in.	AV-7400	AV-401					
VB-7222-0-4-x	5/8 in. O.D.	AV-7400	AV-401					
VB-7223-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7224-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7253-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7263-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7273-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7283-0-4-x	½…2" in.	AV-7400	AV-401			AV-430		
VB-7312-0-4-x	5/8 in. O.D.	AV-7400	AV-401					
VB-7313-0-4-x	½…2" in.	AV-7400	AV-401	AV-430				
VB-7314-0-4-x	½…2" in.	AV-7400	AV-401	AV-430				
VB-7315-0-4-x	15…50 mm	AV-7400	AV-401	AV-430				
VB-7323-0-4-x	½…2" in.	AV-7400	AV-401	AV-430				
VB-7332-0-4-x	5/8 in. O.D.	AV-7400	AV-401					
VB-8213-0-5-x	2½…5 in.						AV-495	AV-496
VB-8213-0-5-x	6 in.							AV-496
VB-8223-0-5-x	2½…5 in.						AV-495	AV-496
VB-8223-0-5-4	6 in.							AV-496
VB-8313-0-5-x	2½…5 in.						AV-495	AV-496
VB-8313-0-5-x	6 in.							AV-496
VB-9211-0-4-x	½…1¼ in.	AV-430	AV-401					
VB-9212-0-4-x	5/8 in. O.D.	AV-400	AV-401					

Discontinued Assemblies

PNEUMATIC LINKAGES (VB-9213 to VB-9332)								
Part Number	Pipe Sizes	MK-2690	MK-46x1	MK-47x1 (Obsolete)	MK-48x1 (VB-9xxx only)	MK-66xx (½ in. stroke)	MK-68x1 (MK-69x1 is used only on VB-817 & VB-9323, 4 to 6 in.)	MK-88xx MK-89xx (5 & 6 in.) (2½…4" in.)
VB-9213-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9213-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9213-0-4-x	2½ & 3 in.						AV-495	AV-496
VB-9213-0-5-x	2½…4" in.						AV-495	AV-496
VB-9213-0-5-x	5 & 6 in.							AV-496
VB-9214-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9214-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9215-0-4-x	15 to 32 mm	AV-400	AV-401			AV-430		
VB-9215-0-4-x	40 and 50 mm			AV-430	AV-420		AV-430	
VB-9215-0-4-x	65 and 80 mm						AV-495	AV-496
VB-9221-0-4-x	½…1¼ in.	AV-400	AV-401					
VB-9222-0-4-x	5/8 in. O.D.	AV-400	AV-401					
VB-9223-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9223-0-4-x	1½…2" in.			AV-430	AV-420		AV-430	
VB-9223-0-4-x	2½ & 3 in.						AV-495	AV-496
VB-9223-0-5-x	2½…4" in.						AV-495	AV-496
VB-9223-0-5-4	5 to 6 in.							AV-496
VB-9224-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9224-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9225-0-4-x	15 to 80 mm.	AV-400	AV-401			AV-430	AV-495	
VB-9253-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9253-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9263-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9263-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9273-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9273-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9283-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9283-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9312-0-4-x	5/8 in. O.D.	AV-400	AV-401					
VB-9313-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9313-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9313-0-4-x	2½ & 3 in.						AV-495	AV-496
VB-9313-0-5-x	2½…4" in.						AV-495	AV-496
VB-9313-0-5-x	5 to 6 in.							AV-496
VB-9314-0-4-x	½…1¼ in.	AV-400	AV-401			AV-430		
VB-9314-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9315-0-4-x	15 to 32 mm	AV-400	AV-401			AV-430		
VB-9315-0-4-x	40 and 50 mm			AV-430	AV-420		AV-430	
VB-9315-0-4-x	65 and 80 mm						AV-495	AV-496
VB-9323-0-4-x	½…1¼ in.	AV-400	AV-401	AV-430				
VB-9323-0-4-x	1½ & 2 in.			AV-430	AV-420		AV-430	
VB-9323-0-5-x	2½ & 3 in.						AV-430	
VB-9323-0-5-x	4 to 6 in.						AV-430	
VB-9332-0-4-x	5/8 in. O.D.	AV-400	AV-401					

Barber-Colman Adapter Application Reference

Recommended Schneider Electric Actuators

Refer to tables below for complete actuator information. Only use the Schneider Electric actuators shown in this selection guide for the specific valve, linkage, and actuator combination.

Actuator, Linkage, and Close-Off Information for Two- and 3-Way Obsoleted VB-9xxx Barber-Colman Valves [Schneider Electric SmartX Actuators (Spring Return)]

Barber-Colman Valve Models[a]	Actuator	Mx51-710x		Mx51-720x		Mx61-720x		Valve Stroke
	Additional Linkage	Included		Included		Included[b]		
	NC or NO	NO	NC	NO	NC	NO	NC	
2-Way VB-92xx 3-Way Mixing VB-9313	½"	250	250	—	—	—	—	2-Way 7/16" 3-Way 3/8"
	¾"	200	200	—	—	—	—	
	1"	150	90	—	—	—	—	
	1¼"	90	60	150	150	—	—	
	1½"	—	—	—	—	100	100	7/8"
	2"	—	—	—	—	65	65	
	2½"	—	—	—	—	33	33	
	3"	—	—	—	—	22	22	
	4"	—	—	—	—	12	12	
3-Way Diverting VB-9323	½"	250		—		—		3/8"
	¾"	250		—		—		
	1"	250		—		—		
	1¼"	250		250		—		
	1½"	—		—		250		7/8"
	2"	—		—		250		

[a]For 3-Way mixing valves, use the lowest published close-off pressure (N.O. or N.C.) for the actuator selected.
[b]Consult F-27203 (AM-73x). Older obsolete 1½" and 2" VB-9xxx Valves will require additional linkage.

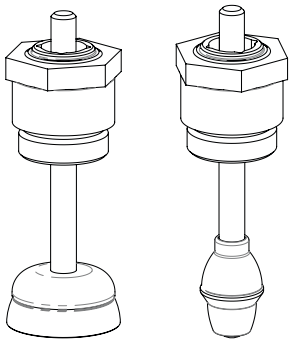
AV-821/AV-822 — Actuator, Linkage, and Close-Off Information for Two- and 3-Way Barber-Colman VB-9xxx Valves (Schneider Electric Forta Non-Spring Return Actuators)

Barber-Colman Valve Models	Actuator	M400A	M400A-VB	M800A	M800A-VB	M1500A	M1500A-VB	Valve Stroke
	Linkage	AV-821	Included	AV-821	Included	AV-821	Included	
2-Way VB-92xx 3-Way Mixing VB-9313	½"	250		250		250		2-Way 7/16" 3-Way 3/8"
	¾"	198		250		250		
	1"	92		207		250		
	1¼"	56		130		250		
	1½"a	37	—	88	—	177	—	7/8"
	2"a	19	—	48	—	98	—	
	Linkage	—	—	AV-822	—	AV-822	—	Valve Stroke
	2½"	—		29	—	61	—	7/8"
	3"	—		19	—	42	—	
	4"	—		10	—	22	—	
	5"	—		—	—	14	—	2"
	6"	—		—	—	9	—	
3-Way Diverting VB-9323	Linkage	AV-821	Included	AV-821	Included	—	—	Valve Stroke
	½"	250		250		—		3/8"
	¾"	250		250		—		
	1"	250		250		—		
	1¼"	250		250		—		
	1½"a	250	—	250	—	—		7/8"
	2"a	250	—	250	—	—		

[a]Additional linkage may be required for older obsolete 1½" and 2" VB-9xxx valves. See F-27234 (AV-608) for further details.

Rebuild Kits for Vx-7xxx Globe Valves

NOTE: This section on rebuild kits is an excerpt from document F-27688 (Rebuild Kits for Vx-7xxx, Vx-8xxx, and Vx-9xxx Globe Valves) which additionally contains diagrams of valve internal components and passages.



Typical 1/2" to 2" 2-Way

Typical 1/2" to 2" 3-Way

Applications

Schneider Electric RYB-7xx, RYB-8xx, and RYB-9xx Globe Valve Rebuild Kits are designed to restore the following valves to their original performance, provided they have undamaged seats: Schneider Electric VB-7000 ½"…2" 2-Way and 3-Way Bronze Valves, VB-8000 2-½"…6" 2-Way and 3-Way Flanged Iron Valves, and VB-9000 2-½"…6" 2-Way and 3-Way Flanged Iron Valves. These Rebuild Kits include the necessary stem and plug assemblies, packing, and related parts.

Applicable Literature

Selection Tables

Each of the selection tables that follow addresses a particular valve type and size. Find the valve's part number and then the corresponding rebuild kit.

Identifying Vx-7xxx Valves

Original-design and enhanced-design Vx-7xxx valves can be identified by the color of their actuator mounting nut. Original-design valves have a silver-colored actuator mounting nut. Enhanced-design valves have a gold-colored actuator mounting nut.

Changing Vx-7xxx Valve Capacity

Within the same pipe size, body type, and trim type, similar plugs are interchangeable. You can change the capacity of an existing Vx-7xxx valve by choosing a different plug having the required Cv.

Rebuild Kits for Vx-7xxx Valves

For a listing of Vx-7xxx series valve kits, refer to the Valve Body Rebuild Kit Table: Vx-7xxx Series Globe Valves ½"…2" (15 mm… 50 mm) in subsequent pages of this chapter.

Rebuild Kits with Two Plug Choices

Some rebuild kits for ½" and ¾" valves include two plug choices, one each for original-design and enhanced-design valves. If your kit includes two plugs, only use an original-design plug in an original-design valve body, or an enhanced-design plug in an enhanced-design valve body.

Installation Information

The selection tables are followed by information you use to install the rebuild kits on the various types of valves.**Warning:** Depressurize the valve to 0 psig before loosening or removing a packing cartridge. Loosening or removing the packing cartridge while the valve is pressurized may cause the valve packing to blow out, thereby inflicting bodily injury or causing hardware damage to the water or steam system.

Tools Required for Valve Rebuild

Vx-7xxx Valves Up to 2"	
Tool Number	**Description**
TOOL-020-1	Packing top wrench
M-370	1-5/8" Narrow open end wrench
N/A	1" Open-end wrench for packing cartridge
N/A	5/16" Open end wrench for stem nuts
N/A	Pipe wrenches for valve installation

Vx-8xxx and Vx-9xxx Valves 2½"…6"	
Tool Number	**Description**
N/A	¾" Open end wrench for stem and cover nuts
N/A	1" Open-end wrench for packing cartridge
N/A	1-1/4" Open end wrench

Rebuild Kits for Vx-7xxx Globe Valves

Vx-7xxx Bronze Globe Valves ½"…2" (15 mm… 50 mm) Rebuild Procedure

IDENTIFICATION NOTE: Original-design Vx-7xxx valves have a silver-colored actuator mounting nut. Enhanced-design Vx-7xxx valves have a gold-colored actuator mounting nut.

Disassembly

Warning: Depressurize the valve to 0 psig before loosening or removing a packing cartridge.Loosening or removing the packing cartridge while the valve is pressurized may cause the valve packing to blow out, thereby inflicting bodily injury or causing hardware damage to the water or steam system.

Disassemble the valve:

1. If the valve is part of a valve assembly (with actuator), remove the actuator and linkage from the valve.
2. Loosen the packing top nut (TOOL-020-1).
3. Remove the packing cartridge, along with the actuator lock nut. Save the actuator lock nut for reuse.
4. On normally open 2-way valves, sizes 1” (25 mm) through 2” (50 mm), remove the bonnet.
5. On normally closed 2-way valves, remove the lower threaded cap.
6. On 3-Way valves, remove the bottom inlet port seat.
7. Remove the valve stem and plug assembly from the valve body.
8. Check the O-ring or seat for any damage:
   Original-design 2-way and 3-way valves – Inspect the seat in the valve body to ensure there are no nicks or damage. On 3-way valves, also inspect the seat in the bottom port. Valves with damaged seats cannot be restored for service using a valve rebuild kit.

   Enhanced-design 2-way and 3-way valves – Inspect the O-ring or seat:

   - On ½” (15 mm) and ¾” (20 mm) valves, check that the internal O-ring is present and free from nicks or other damage. If this O-ring is in good condition, rebuild the valve, using the appropriate rebuild kit. If the O-ring is missing or damaged, do not attempt to rebuild the valve. This O-ring is not field-replaceable.
   - On 1” (25 mm) through 2” (50 mm) valves, check the seat in the valve body for nicks or other damage. On 3-way valves, also inspect the seat in the bottom port. Valves with damaged seats cannot be restored for service using a valve rebuild kit.
9. On original-design 3-way diverting valves, remove the wiper O-ring from the interior of the valve body.

Reassembly

Reassemble the valve, using the rebuild kit:

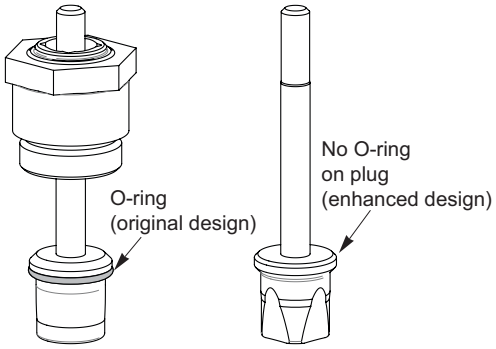
1. On original-design Vx-7323 and Vx-7325 3-way diverting valves, coat a new wiper O-ring with the silicone grease supplied in the rebuild kit and then install the O-ring into the valve body.
2. Install the new stem and plug assembly into the valve body. Be sure to choose the original-design or enhanced-design part, as appropriate for your valve.

   Rebuild kits for 1” (25 mm) through 2” (50 mm) valves contain a single replacement plug that can be used for either original-design or enhanced-design valves.
3. On normally open 1” (25 mm) through 2” (50 mm) valves, apply Loctite pipe sealent #592 or equivalent on the male threads of the bonnet, and then reinstall and tighten the bonnet to the recommended torque. Refer to the applicable Assembly Torques table in the Assembly Information section.
4. On 3-way valves and normally closed 2-way valves, apply Loctite pipe sealent #592 or equivalent to the threads of the bottom inlet port seat (3-Way valves) or the lower threaded cap (2-Way valves), and then reinstall and tighten to the recommended torque. Refer to the Assembly Torques table in the Assembly Information section applicable to the valve size.
5. Reinstall the actuator lock nut (saved at disassembly) and a new packing cartridge onto the valve body. Refer to the YBA-622-2 Valve Packing Kits Installation Instructions, F-17324 (included with the packing kit).
6. If the valve is part of a valve assembly, reinstall the actuator and linkage according to instructions in the applicable literature.
7. Check the valve and actuator for proper operation and then return to service.

Rebuild Kits for Vx-7xxx Globe Valves

Vx-7xxx Bronze Globe Valves – ½" (15 mm) Rebuild Kits

2-Way Normally Open



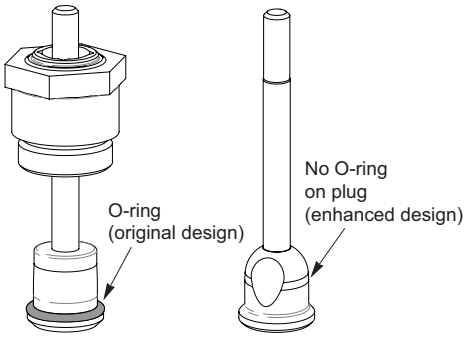
RYB-721 (-1 thru -4)

Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit	Stem and Plug Assy
Vx-721x-0-x-01	0.4	RYB-721-01	2 b
Vx-721x-0-x-02	1.3	RYB-721-02	2 b
Vx-721x-0-x-03	2.2	RYB-721-03	2 b
Vx-7211-0-3-04	5.0	RYB-721-A4	1 a
Vx-721x-0-4-04	4.4	RYB-721-04	2 b

a. These kits consist of one stem and plug assembly.
b. These kits consist of one original-design plug and one enhanced-design plug. Original-design plugs include an O-ring. There is no O-ring on enhanced-design plugs. Enhanced-design valves have an O-ring in the valve seat, which must be intact and functional in order to ensure proper valve performance.
c. Some kits are used in more than one style of valve body. In that case, the Cv capacity is determined by the combination of the plug and the valve body style.

2-Way Normally Closed



RYB-722 (-4)
RYB-726
(-28, -30, -31,-33, -34, -36, -39)

Note: The actual shape of the plug varies with Cv.

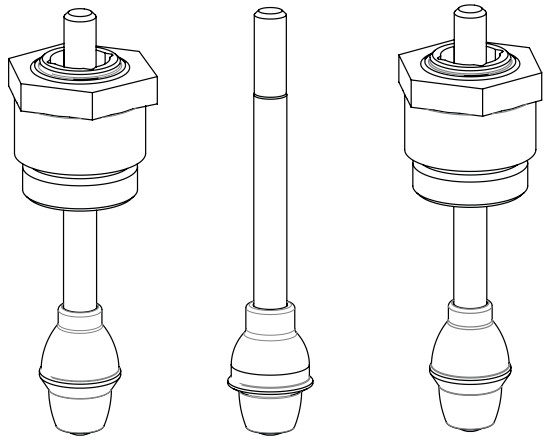
Valve Body	Cv	Rebuild Kit	Stem and Plug Assy
Vx-722x-0-4-02	1.3	RYB-722-02	2 b
Vx-722x-0-4-03	2.2	RYB-722-03	2 b
Vx-722x-0-4-04	4.4	RYB-722-04	2 b
Vx-726x-0-4-01	0.4	RYB-726-01	2 b
Vx-726x-0-4-02	1.3	RYB-726-02	2 b
Vx-726x-0-4-03	2.2	RYB-726-03	2 b
Vx-726x-0-4-04	4.4	RYB-726-04	2 b
Vx-726x-0-4-28 [c]	1.8	RYB-726-28	1 a
Vx-726x-0-4-30 [c]	2.9	RYB-726-30	1 a
Vx-726x-0-4-31 [c]	0.1	RYB-726-31	1 a
Vx-726x-0-4-33 [c]	0.22	RYB-726-33	1 a
Vx-726x-0-4-34 [c]	0.75	RYB-726-34	1 a
Vx-726x-0-4-36 [c]	1.0	RYB-726-36	1 a
Vx-726x-0-4-39 [c]	3.25	RYB-726-39	1 a

a. These kits consist of one stem and plug assembly.
b. These kits consist of one original-design plug and one enhanced-design plug. Original-design plugs include an O-ring. There is no O-ring on enhanced-design plugs. Enhanced-design valves have an O-ring in the valve seat, which must be intact and functional in order to ensure proper valve performance.
c. Rebuild kits are not available for Vx-726x Bronze Valves with part number suffixes above 20 that have silver-colored actuator mounting nuts. These valves cannot be repaired, and must be replaced.

Rebuild Kits for Vx-7xxx Globe Valves

Vx-7xxx Bronze Globe Valves – ½" (15 mm) Rebuild Kits

3-Way



Original Design (Brass) RYB-731 (-2, -4)

Enhanced Design (Stainless Steel)

RYB-736 (-2, -4)

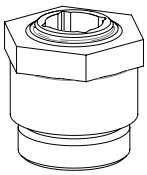
Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit	Stem and Plug Assy
Vx-731x-0-4-02	2.2	RYB-731-02	2 b
Vx-731x-0-4-04	4.4	RYB-731-04	2 b
Vx-736x-0-4-02	2.2	RYB-736-02	1 a
Vx-736x-0-4-04	4.4	RYB-736-04	1 a

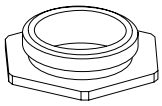
a. These kits consist of one stem and plug assembly.

b. These kits consist of one original-design plug and one enhanced-design plug. The original-design replacement plug is brass. The enhanced-design replacement plug is stainless steel. Enhanced-design ½" and ¾" valves must have an O-ring on the "A" port side that is intact and functional in order to ensure proper valve performance.

Vx-7xxx Accessories



YBA-622-2



YBA-520
YBA-514-1

Part Number	Description
YBA-514-1 [a]	Actuator mounting nut, silver-colored (original-design valves)
YBA-520 [a]	Actuator mounting nut, gold-colored (enhanced-design valves)
NYBA-67 [b]	Grease Kit (included in Rebuild Kit RYB-732)
YBA-622-2 [c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25 [c]	Packing Cartridge, Quantity 25 with TOOL-020-1

a. Replace the actuator mounting nut only with a like-colored nut. Do not interchange silver-colored and gold-colored mounting nuts on the valve.

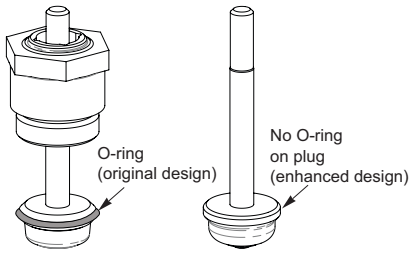
b. The grease kit is included in Plug Rebuild Kit RYB-732-xx but can be ordered separately by the part number listed in this table.

c. The packing cartridge is included in Plug Rebuild Kit RYB-7xx-xx but can be ordered separately by the part numbers listed in this table.

Rebuild Kits for Vx-7xxx Globe Valves

Vx-7xxx Bronze Globe Valves – ¾" (20 mm) Rebuild Kits

2-Way Normally Open



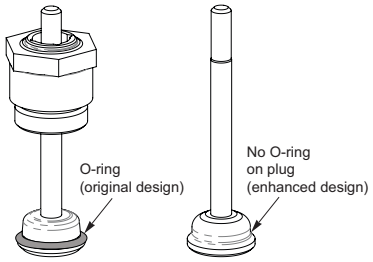
RYB-721 (-5, -6)
RYB-725 (-5, -6)

Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit	Stem and Plug Assy
Vx-721x-0-x-05	5.5	RYB-721-05	2 b
Vx-721x-0-4-06	7.5	RYB-721-06	2 b c
Vx-721x-0-3-06	8.5	RYB-721-06	2 b c

a. These kits consist of one stem and plug assembly.
b. These kits consist of one original-design plug and one enhanced-design plug. Original-design plugs include an O-ring. There is no O-ring on enhanced-design plugs. Enhanced-design valves have an O-ring in the valve seat, which must be intact and functional in order to ensure proper valve performance.
c. Some kits are used in more than one style valve body. In that case, the Cv capacity is determined by the combination of the plug and the valve body style.

2-Way Normally Closed



RYB-722 (-5, -6)

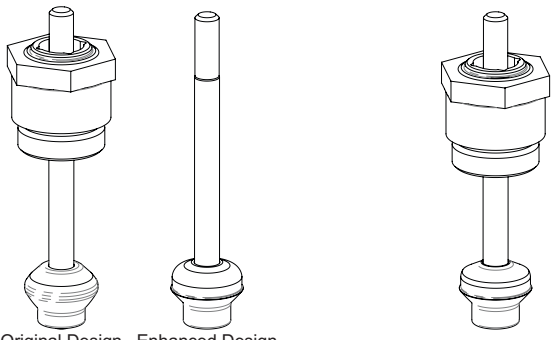
Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit	Stem and Plug Assy
Vx-722x-0-4-05	5.5	RYB-722-05	2 b
Vx-722x-0-4-06	7.5	RYB-722-06	2 b
Vx-726x-0-4-41 [c]	6.3	RYB-726-41	1 a
Vx-726x-0-4-05	5.5	RYB-726-05	2 b
Vx-726x-0-4-06	7.5	RYB-726-06	2 b

a. These kits consist of one stem and plug assembly.
b. These kits consist of one original-design plug and one enhanced-design plug. Original-design plugs include an O-ring. There is no O-ring on enhanced-design plugs. Enhanced-design valves have an O-ring in the valve seat, which must be intact and functional in order to ensure proper valve performance.
c. Rebuild kits are not available for original-design dash 41 valve bodies that have silver colored actuator mounting nuts. These valves cannot be repaired, and must be replaced.

Vx-7xxx Bronze Globe Valves – ¾" (20 mm) Rebuild Kits

3-Way



RYB-731 (-6)

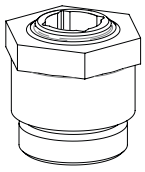
RYB-736 (-6)

Note: The actual shape of the plug varies with Cv.

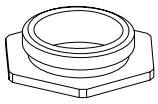
Valve Body	Cv	Rebuild Kit	Stem and Plug Assy
Vx-731x-0-4-06	7.5	RYB-731-06	2 b
Vx-732x-0-4-06	7.5	RYB-732-06	1 a
Vx-736x-0-4-06	7.5	RYB-736-06	1 a

a. These kits consist of one stem and plug assembly.
b. These kits consist of one original-design plug and one enhanced-design plug. The original-design replacement plug is brass. The enhanced-design replacement plug is stainless steel. Enhanced-design ½" and ¾" valves must have an O-ring on the "A" port side that is intact and functional in order to ensure proper valve performance.

Vx-7xxx Accessories



YBA-622-2



YBA-520
YBA-514-1

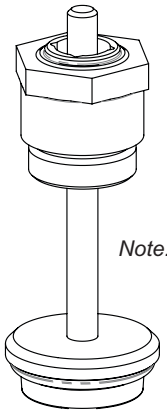
Part Number	Description
YBA-514-1 [a]	Actuator mounting nut, silver-colored (original-design valves)
YBA-520 [a]	Actuator mounting nut, gold-colored (enhanced-design valves)
NYBA-67 [b]	Grease Kit (included in Rebuild Kit RYB-732)
YBA-622-2 [c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25 [c]	Packing Cartridge, Quantity 25 with TOOL-020-1

a. Replace the actuator mounting nut only with a like-colored nut. Do not interchange silver-colored and gold-colored mounting nuts on the valve.
b. The grease kit is included in Plug Rebuild Kit RYB-732-xx but can be ordered separately by the part number listed in this table.
c. The packing cartridge is included in Plug Rebuild Kit RYB-7xx-xx but can be ordered separately by the part numbers listed in this table.

Rebuild Kits for Vx-7xxx Globe Valves

Vx-7xxx Bronze Globe Valves – 1” (25 mm) Rebuild Kits

2-Way Normally Open



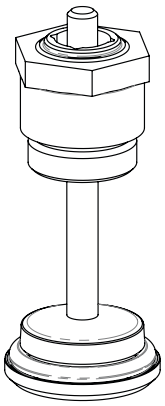
Note: The actual shape of the plug varies with Cv.

RYB-721 (-7, -8)
RYB-725 (-7, -8)

Valve Body	Cv	Rebuild Kit
Vx-7211-0-3-07	14	RYB-721-07 a
Vx-721x-0-4-07	10	RYB-721-07 a
Vx-721x-0-4-08	14	RYB-721-08

a. Some kits are used in more than one style valve body. In that case, the Cv capacity is determined by the combination of the plug and the valve body style.

2-Way Normally Closed

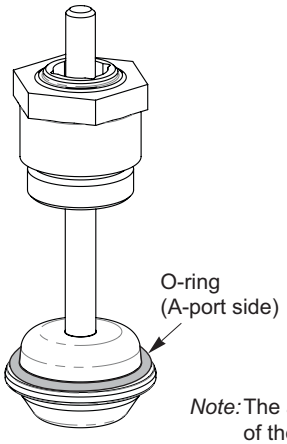


Note: The actual shape of the plug varies with Cv.

RYB-722 (-7, -8 -51, -52)

Valve Body	Cv	Rebuild Kit
Vx-722x-0-4-07	10	RYB-722-07
Vx-722x-0-4-08	14	RYB-722-08
Vx-726x-0-4-51	8.2	RYB-726-51
Vx-726x-0-4-52	9	RYB-726-52
Vx-728x-0-4-08	12	

3-Way



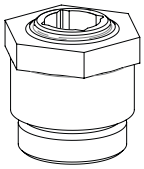
Note: The actual shape of the plug varies with Cv.

RYB-731 (-8)
RYB-736 (-8)

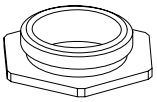
Valve Body	Cv	Rebuild Kit
Vx-731x-0-4-08	14	RYB-731-08 a
Vx-736x-0-4-08	12	RYB-736-08 a

a. 3-Way mixing valve rebuild kits include a plug with an O-ring on the “A” port side.

Vx-7xxx Accessories



YBA-622-2



YBA-520
YBA-514-1

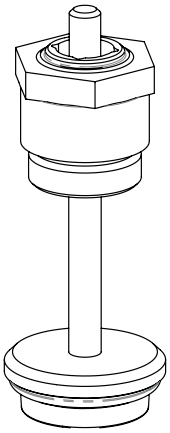
Part Number	Description
YBA-514-1 [a]	Actuator mounting nut, silver-colored
YBA-520 [a]	Actuator mounting nut, gold-colored
NYBA-67 [b]	Grease Kit (included in Rebuild Kit RYB-732)
YBA-622-2 [c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25 [c]	Packing Cartridge, Quantity 25 with TOOL-020-1

a. Replace the actuator mounting nut only with a like-colored nut. Do not interchange silver-colored and gold-colored mounting nuts on the valve.
b. The grease kit is included in Plug Rebuild Kit RYB-732-xx but can be ordered separately by the part number listed in this table.
c. The packing cartridge is included in Plug Rebuild Kit RYB-7xx-xx but can be ordered separately by the part numbers listed in this table.

Rebuild Kits for Vx-7xxx Globe Valves

Vx-7xxx Bronze Globe Valves – 1¼" (32 mm) Rebuild Kits

2-Way Normally Open



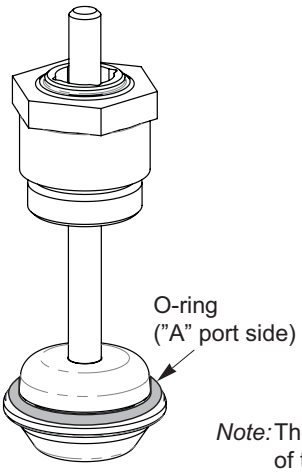
RYB-721 (-9)

Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit
Vx-7211-0-3-09	22	RYB-721-09 a
Vx-721x-0-4-09	20	RYB-721-09 a

a. Some kits are used in more than one style valve body. In that case, the Cv capacity is determined by the combination of the plug and the valve body style.

3-Way



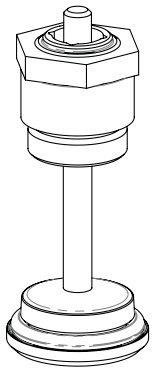
RYB-731 (-9)
RYB-736 (-9)

Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit
Vx-731x-0-4-09	20	RYB-731-09 a
Vx-736x-0-4-09	20	RYB-736-09 a

a. 3-Way mixing valve rebuild kits include a plug with an O-ring on the "A" port side.

2-Way Normally Closed

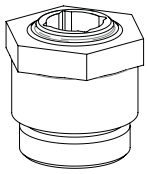


RYB-722 (-9)
RYB-726 (-61, -62, -63)

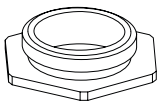
Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit
Vx-722x-0-4-09	20	RYB-722-09
Vx-726x-0-4-61	14	RYB-726-61
Vx-726x-0-4-62	16	RYB-726-62
Vx-726x-0-4-63	18	RYB-726-63

Vx-7xxx Accessories



YBA-622-2



YBA-520
YBA-514-1

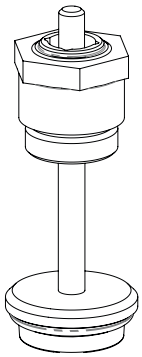
Part Number	Description
YBA-514-1 [a]	Actuator mounting nut, silver-colored
YBA-520 [a]	Actuator mounting nut, gold-colored
NYBA-67 [b]	Grease Kit (included in Rebuild Kit RYB-732)
YBA-622-2 [c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25 [c]	Packing Cartridge, Quantity 25 with TOOL-020-1

a. Replace the actuator mounting nut only with a like-colored nut. Do not interchange silver-colored and gold-colored mounting nuts on the valve.
b. The grease kit is included in Plug Rebuild Kit RYB-732-xx but can be ordered separately by the part number listed in this table.
c. The packing cartridge is included in Plug Rebuild Kit RYB-7xx-xx but can be ordered separately by the part numbers listed in this table.

Rebuild Kits for Vx-7xxx Globe Valves

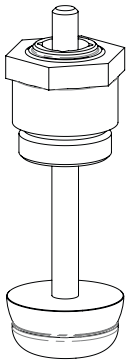
Vx-7xxx Bronze Globe Valves – 1½" (40 mm) Rebuild Kits

2-Way Normally Open



RYB-721 (-10)

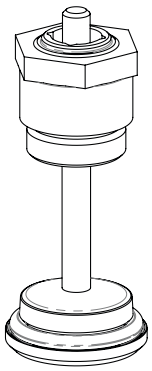
Note: The actual shape of the plug varies with Cv.



RYB-727 (-10)

Valve Body	Cv	Rebuild Kit
Vx-721x-0-4-10	28	RYB-721-10
Vx-727x-0-4-10	28	RYB-727-10

2-Way Normally Closed

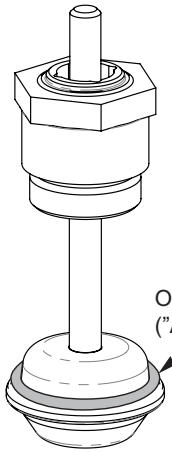


RYB-722 (-10, -71, -72)

Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit
Vx-722x-0-4-10	28	RYB-722-10
Vx-726x-0-4-71	22	RYB-726-71
Vx-726x-0-4-72	24	RYB-726-72

3-Way



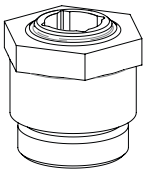
RYB-731 (-10)
RYB-736 (-10)

Note: The actual shape of the plug varies with Cv.

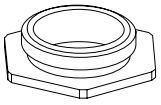
Valve Body	Cv	Rebuild Kit
Vx-731x-0-4-10	28	RYB-731-10 a
Vx-736x-0-4-10	28	RYB-736-10 a

a. 3-Way mixing valve rebuild kits include a plug with an O-ring on the "A" port side.

Vx-7xxx Accessories



YBA-622-2



YBA-520
YBA-514-1

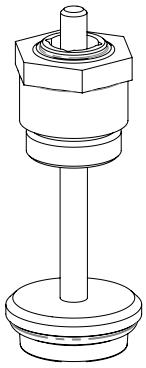
Part Number	Description
YBA-514-1 [a]	Actuator mounting nut, silver-colored
YBA-520 [a]	Actuator mounting nut, gold-colored
NYBA-67 [b]	Grease Kit (included in Rebuild Kit RYB-732)
YBA-622-2 [c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25 [c]	Packing Cartridge, Quantity 25 with TOOL-020-1

a. Replace the actuator mounting nut only with a like-colored nut. Do not interchange silver-colored and gold-colored mounting nuts on the valve.
b. The grease kit is included in Plug Rebuild Kit RYB-732-xx but can be ordered separately by the part number listed in this table.
c. The packing cartridge is included in Plug Rebuild Kit RYB-7xx-xx but can be ordered separately by the part numbers listed in this table.

Rebuild Kits for Vx-7xxx Globe Valves

Vx-7xxx Bronze Globe Valves – 2” (50 mm) Rebuild Kits

2-Way Normally Open

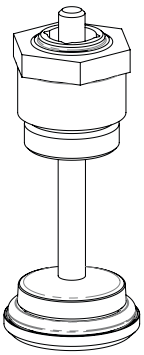


Note: The actual shape of the plug varies with Cv.

RYB-721 (-11)
RYB-725 (-11)

Valve Body	Cv	Rebuild Kit
Vx-721x-0-4-11	40	RYB-721-11
Vx-725x-0-4-11	40	RYB-725-11

2-Way Normally Closed

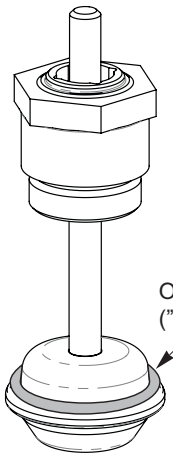


Note: The actual shape of the plug varies with Cv.

RYB-722 (-11)
RYB-726 (-11, -81, -82)

Valve Body	Cv	Rebuild Kit
Vx-722x-0-4-11	40	RYB-722-11
Vx-726x-0-4-81	31	RYB-726-81
Vx-726x-0-4-82	34	RYB-726-82

3-Way



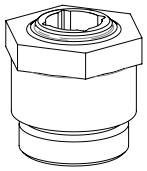
Note: The actual shape of the plug varies with Cv.

RYB-731 (-11)
RYB-736 (-11)

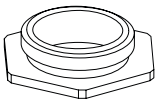
Valve Body	Cv	Rebuild Kit
Vx-731x-0-4-11	41	RYB-731-11 a
Vx-736x-0-4-11	36	RYB-736-11 a

a. 3-Way mixing valve rebuild kits include a plug with an O-ring on the “A” port side.

Vx-7xxx Accessories



YBA-622-2



YBA-520
YBA-514-1

Part Number	Description
YBA-514-1 [a]	Actuator mounting nut, silver-colored
YBA-520 [a]	Actuator mounting nut, gold-colored
NYBA-67 [b]	Grease Kit (included in Rebuild Kit RYB-732)
YBA-622-2 [c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25 [c]	Packing Cartridge, Quantity 25 with TOOL-020-1

a. Replace the actuator mounting nut only with a like-colored nut. Do not interchange silver-colored and gold-colored mounting nuts on the valve.
b. The grease kit is included in Plug Rebuild Kit RYB-732-xx but can be ordered separately by the part number listed in this table.
c. The packing cartridge is included in Plug Rebuild Kit RYB-7xx-xx but can be ordered separately by the part numbers listed in this table.

Rebuild Kits for Vx-7xxx Globe Valves

Valve Body Rebuild Kit Table: Vx-7xxx Series Globe Valves ½"…2" (15 mm… 50 mm)				
Valve Type	Valve Series	Description	Size	RYB Rebuild Kit
2-Way	Vx-7211-0-3-xx	Stem Up Open (N.O.), Union Angled	½"…1-1/4"	RYB-721-xx
	Vx-7211-0-4-xx	Stem Up Open (N.O.), Union NPT	½"…1-1/4"	RYB-721-xx
	Vx-7221-0-4-xx	Stem Up Closed (N.C.), Union NPT	½"…1-1/4"	RYB-722-xx
	Vx-7212-0-4-xx	Stem Up Open (N.O.), SAE Flared	½"	RYB-721-xx
	Vx-7222-0-4-xx	Stem Up Closed (N.C.), SAE Flared	½"	RYB-722-xx
	Vx-7213-0-4-xx	Stem Up Open (N.O.), NPT Threaded	½"…2"	RYB-721-xx
	Vx-7215-0-4-xx	Stem Up Open (N.O.), Metric Threaded	15 mm… 50 mm	RYB-721-xx
	Vx-7223-0-4-xx	Stem Up Closed (N.C.), NPT Threaded	½"…2"	RYB-722-xx
	Vx-7225-0-4-xx	Stem Up Closed (N.C.), Metric Threaded	15 mm… 50 mm	RYB-722-xx
	Vx-7214-0-4-xx	Stem Up Open (N.O.), Union Sweat	½"…2"	RYB-721-xx
	Vx-7224-0-4-xx	Stem Up Closed (N.C.), Union Sweat	½"…2"	RYB-722-xx
	Vx-7263-0-4-xx	Stem Up Closed (N.C.), NPT Threaded, Stainless Steel Trim	½"…2"	RYB-726-xx
	Vx-7265-0-4-xx	Stem Up Closed (N.C.), Metric Threaded, Stainless Steel Trim	15 mm… 50 mm	RYB-726-xx
	Vx-7273-0-4-xx	Stem Up Open (N.O.), NPT Threaded, Stainless Steel Trim, Metal-to-Metal Seats	½"…2"	RYB-727-xx
	Vx-7275-0-4-xx	Stem Up Open (N.O.), Metric Threaded, Stainless Steel Trim, Metal-to-Metal Seats	15 mm… 50 mm	RYB-727-xx
3-Way	Vx-7312-0-4-xx	Stem Up B to AB, Mixing, SAE Flared	½"	RYB-731-xx
	Vx-7332-0-4-xx	Sequencing, SAE Flared	½"	—
	Vx-7313-0-4-xx	Stem Up B to AB, Mixing, NPT Threaded	½"…2"	RYB-731-xx
	Vx-7315-0-4-xx	Stem Up B to AB, Mixing, Metric Threaded	15 mm… 50 mm	RYB-731-xx
	Vx-7314-0-4-xx	Stem Up B to AB, Mixing, Union Sweat	½"…2"	RYB-731-xx
	Vx-7363-0-4-xx	Stem Up B to AB, Mixing, NPT Threaded, Stainless Steel Trim	½"…2"	RYB-736-xx

Rebuild Kit Instructions for Vx-8xxx / 9xxx Globe Valves

Vx-8xx3 & Vx-9xx3 Flanged Body Globe Valves 2½"…6" (64 mm… 152 mm) Rebuild Procedure

Disassembly

Warning: Depressurize the valve to 0 psig before loosening or removing a packing cartridge. Loosening or removing the packing cartridge while the valve is pressurized may cause the valve packing to blow out, thereby inflicting bodily injury or causing hardware damage to the water or steam system.

Disassemble the valve in preparation for rebuild kit installation:

1. If the valve is part of a valve assembly (with actuator), remove the actuator and linkage from the valve.
2. Loosen the packing top nut.
3. Remove the packing cartridge.
4. On Vx-8xx3 valves, remove the valve seat assembly. Check whether a gasket or an O-ring is used to seal the valve seat assembly to the valve body. A gasket is used in original-design valves, while an O-ring is used in enhanced-design valves.
5. On Vx-9xx3 valves, remove the cover plate (2-way valves) or lower port (3-way valves). Check whether a gasket or an O-ring is used to seal the cover plate or lower port to the valve body. A gasket is used in original-design valves, while an O-ring is used in enhanced-design valves.
6. Remove the valve stem and plug assembly from the valve body.
7. Check the O-ring or seat for any damage:

   Vx-8xx3 valves—Inspect the O-ring on the contour seat (part of the valve seat assembly) to ensure there are no nicks or other damage. This O-ring is not field-replaceable. If this O-ring is missing or damaged, replace the valve seat assembly. If this O-ring is in good condition, rebuild the valve, using the appropriate rebuild kit.

   Vx-9xx3 valves—Inspect the valve seat to ensure there are no nicks or other damage. Valves with damaged seats cannot be restored for service using a valve rebuild kit.
8. On Vx-8xx3 valves, remove the wiper O-ring from the interior of the valve body.

Reassembly

Reassemble the valve using the rebuild kit:

1. On Vx-8213, Vx-8223, and Vx-8303 valves, coat a new wiper O-ring with the silicone grease supplied in the rebuild kit and then install the O-ring into the valve body.
2. Install the new stem and plug assembly into the valve body.
3. On Vx-8xx3 valves, use a new valve seat assembly if inspection at disassembly showed damage to the O-ring on the contour seat.
4. Install the new packing cartridge:

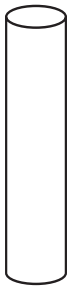
   Refer to the YBA-652-2 Valve Packing Kits Installation Instructions, F-24185 (included with the packing kit).
   Vx-8213 and Vx-8303 valves – Install the new packing cartridge onto the valve body.
   Vx-8223 valves – Install the new packing cartridge onto the cover plate (part of valve seat assembly).
   Vx-9213 valves – Install the new packing cartridge onto the valve body cover plate.
   Vx-9223 and Vx-9313 valves – Install the new packing cartridge onto the valve body.
5. On Vx-8213, Vx-8223, and Vx-8303 valves, install the valve seat assembly, using a new gasket or O-ring to replace the type of seal found during disassembly. Fasten the valve seat assembly to the valve body using the nuts removed at disassembly and then torque 100…140 lb-ft (136 to 190 Nm).
6. On Vx-9213, Vx-9223, and Vx-9313 valves, reinstall the cover plate (2-way valves) or lower port (3-way valves), using a new gasket or O-ring to replace the type of seal found during disassembly. Fasten the cover plate or lower port to the valve body using the bolts or nuts removed at disassembly and then torque 100…140 lb-ft (136 to 190 Nm).
7. If the valve is part of a valve assembly, reinstall the actuator and linkage according to instructions in the applicable literature.
8. Check the valve and actuator for proper operation and then return to service.

Note: Flanged VB-8xxx valves are painted Blue. Flange VB-9xxx valves are painted Black

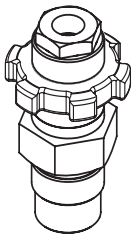
Rebuild Kits for Vx-8xxx / 9xxx Globe Valves

Vx-8xx3 Flanged Body Iron Globe Valves (Blue Finish) – 2½”…6” Rebuild Kits

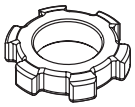
Vx-8xx3 Accessories



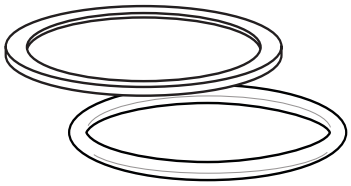
NYBA-67



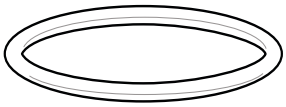
YBA-652-2



OYBB-225



BYRZ-197-1x-KIT



NYBA-8303-104-0-1x

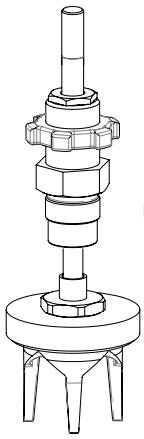
Part Number	Description
NYBA-67 [a]	Grease Kit
YBA-652-2 [a]	Packing Cartridge with 1¼” Bracket Nut
OYBB-225 [a]	Bracket Nut

Part Number	Description
BYRZ-197-1x-KIT [a]	O-ring (Face Seal) and Gasket Kit
NYBA-8303-104-0-1x [a]	O-ring (Internal)

a. Provided with RYB-8xx-xx rebuild kit but may be ordered separately.

Vx-9xx3 Flanged Iron (Black Finish) & Screwed Bronze Globe Valves – 2½”…6” Rebuild Kits

2-Way Stem Up Open



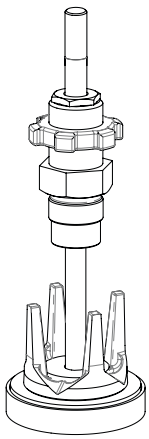
RYB-921 (-12 thru -16)

Note: The actual shape of the plug varies with Cv.

Valve Body	Size	Cv	Rebuild Kit
Vx-9213-0-4-12[b]	2½”	65	RYB-921-12a
Vx-9213-0-4-13[b]	3”	85	RYB-921-13a
Vx-9213-0-5-12	2½”	56	RYB-921-12a
Vx-9213-0-5-13	3”	85	RYB-921-13a
Vx-9213-0-5-14	4”	145	RYB-921-14
Vx-9213-0-5-15	5”	235	RYB-921-15
Vx-9213-0-5-16	6”	350	RYB-921-16

a. Some kits are used in more than one style of valve body. In that case, the Cv capacity is determined by the combination of the plug and the valve body style.
b. Threaded bronze bodies.

2-Way Stem Up Closed



RYB-922 (-12 thru -16)

Note: The actual shape of the plug varies with Cv.

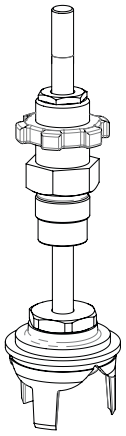
Valve Body	Size	Cv	Rebuild Kit
Vx-9223-0-4-12[b]	2½”	65	RYB-922-12a
Vx-9223-0-4-13[b]	3”	85	RYB-922-13a
Vx-9223-0-5-12	2½”	56	RYB-922-12a
Vx-9223-0-5-13	3”	85	RYB-922-13a
Vx-9223-0-5-14	4”	145	RYB-922-14
Vx-9223-0-5-15	5”	235	RYB-922-15
Vx-9223-0-5-16	6”	350	RYB-922-16

a. Some kits are used in more than one style of valve body. In that case, the Cv capacity is determined by the combination of the plug and the valve body style.
b. Threaded bronze bodies.

Rebuild Kits for Vx-8xxx / 9xxx Globe Valves

Vx-9xx3 Flanged Iron(Black Finish) & Screwed Bronze Globe Valves – 2½”…6” Rebuild Kits

3-Way



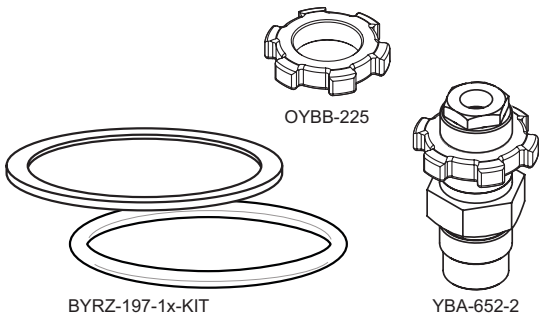
RYB-931 (-12 thru -16)

Note: The actual shape of the plug varies with Cv.

Valve Body	Size	Cv	Rebuild Kit
Vx-9313-0-4-12[b]	2½”	67	RYB-931-12a
Vx-9313-0-4-13[b]	3”	91	RYB-931-13a
Vx-9313-0-5-12	2½”	74	RYB-931-12a
Vx-9313-0-5-13	3”	101	RYB-931-13a
Vx-9313-0-5-14	4”	170	RYB-931-14
Vx-9313-0-5-15	5”	290	RYB-931-15
Vx-9313-0-5-16	6”	390	RYB-931-16

a. Some kits are used in more than one style of valve body. In that case, the Cv capacity is determined by the combination of the plug and the valve body style.
b. Threaded bronze bodies.

Vx-9xx3 Accessories



Part Number	Description
BYRZ-197-1x-KIT[a]	O-ring (Face Seal) and Gasket Kit (only used with valves having flanged cast iron body with black finish)
OYBB-225[b]	Bracket Nut
YBA-652-2[b]	Packing Cartridge with 1¼” Bracket Nut

a. The Flat Gasket or O-ring is provided with RYB-9xx-xx Rebuild Kits. If you need a replacement or additional Flat Gasket or O-ring, order Kit BYRZ-197-1x-KIT. Use either the Flat Gasket or the O-ring, as appropriate for the valve model. Use the Flat Gasket in all Vx-9213 and Vx-9223 valves. In Vx-9313 valves, examine whether a Flat Gasket or an O-ring is used on the Lower Port. Replace this part with the corresponding part from the kit.
b. Provided with the RYB-9xx-xx Rebuild Kit but can be ordered separately.

Flow Terminology

Streamlined flow occurs when water is moving in the direction of its boundaries without cross currents. It does not have changes of direction, pipe size, side entry or exit of portions for a number of pipe diameters up and downstream. Laminar flow only occurs when the "Reynolds number" (See formulas.) is near or below 2,000, which depends on velocity, viscosity, area and density. It has a parabolic velocity profile in a round pipe. Turbulent flow occurs when the "Reynolds number" is near or above 2,000, occurring in most HVAC valves. Velocity is similar across the flow cross section. Much HVAC flow is turbulent and streamlined if there are limited flow path disturbances.

Definitions

Actuator: As it applies to Heating, Ventilating and Air Conditioning (HVAC): A device which is mechanically linked to a damper and positions the damper to regulate the flow of air or is mounted on a valve and repositions the valve to regulate the flow of steam or water. Actuators are sometimes referred to as operators or motors.

Linear: Actuator movement is in a straight line such as a pneumatic actuator or a rotary actuator that uses mechanics to produce a straight line movement. The power is described a "Force."

Rotary: Actuator movement is circular. This rotary motion may be used on a "direct couple" damper actuator or ball valve actuator. The power is described a "Torque."

Spring Return (SR) actuator which returns to fail safe position upon losing power by use of a spring. The movement of an actuator as a result of a decreasing voltage signal and therefore the force is supplied by a coiled or compressed spring. Upon a power interruption the spring will drive the actuator to a known position.

Non Spring Return (NSR) actuator does not have a spring to return the actuator to known position. A NSR actuator typically stays in the last position before loss of input signal or power. Note: Some electrical actuators may use other methods than a spring to return to "known" position.

Controller: All controllers have at least setpoint, sensitivity (typically throttling range or differential) and action. Controllers either have a built in sensor (typically temperature, humidity or pressure) or an external sensor which provide input to the controller. Based on input, the controller has an output signal that typically goes to the actuator. Typically, the controller output signal becomes an input signal to actuator.

Cavitation: The phenomenon occurring in a flowing liquid when the pressure falls below the vapor pressure of the liquid causing the liquid to vaporize and form bubbles. The bubbles in the flowing liquid are carried through the pump or valve inlet to a zone of higher pressure where they suddenly collapse or implode with substantial force.

Close-Off: The maximum allowable pressure drop to which a valve may be subjected while fully closed.

Cv (Flow Coefficient): The flow of water in gallons per minute (at 60°F) that causes a pressure drop of 1 psi across a fully open valve.
Cv: American capacity (GPM @ 1 psi) with valve at full open
Kv: Metric Capacity = Cv/1.156 (xxx)
Kvs: British Capacity = Cv/1.201(xxx)

DIP Switch (Dual In-line Package Switch): An array of switches in a housing attached to a circuit board. Switches can be set to one of two positions usually ON or OFF.

FPM (Feet Per Minute): A unit of measure to quantify the velocity of air flow.

GPM (Gallons Per Minute): A unit of measure to quantify water flow.

Hydronics: The science dealing with the control of and use of water as a heat transfer medium in a HVAC system.

in. W.C. (Inches Water Column): A unit of pressure measurement used to measure and control low differential pressures. These pressures include duct static pressure relative to space static pressure, space statue pressure relative to that of other spaces or outside atmospheric pressure, and the velocity pressure of air flowing in ducts.

Leakage: Fluid loss from body or packing; or percentage of the full flow rating escaping past the seat. Max. Seat Leakage Rating: ANSI 3 is 0.1%, ANSI IV is 0.01% of full open flow. ANSI V is .0005 ml per inch of orifice diameter per psi differential.

Minimum Position: A control sequence in which the controlled device is prevented from moving to the fully closed position even though the signal from the controller is at a value that would cause the controlled device to be fully closed. However, at a total loss of power or signal from the minimum position, the controlled device will typically go to a fail safe position. For example, Minimum Position of the outside air damper, for purposes of ventilation may require that a minimum of X% of outside air be introduced to the building when occupied. However, if there is a loss of power or a low limit that could freeze the coil, the outside dampers will close fully.

Normally Closed (N.C.): Applies to the condition of an actuator or other controlled device which closes when all operating force (control pressure or electric energy) is removed. i.e., power failure.

Normally Open (N.O.): Applies to the condition of an actuator or other controlled device which is open when all operating force is removed.

Basic Schneider-Electric actuator part numbers (there are a few exceptions)

- Mx-xxxx refers to an actuator.
- MA-xxxx is a two-position actuator
- MF-xxxx is an actuator that accepts a floating controller signal.
- MP-xxxx or MS-xxxx is an actuator than accepts a proportional or modulating controller signal.
- MK-xxxx is a pneumatic operated actuator

Some NEMA National Electrical Manufacturers Association Rating Definitions (on housings and enclosures)

NEMA 1 Indoor use primarily to provide a degree of protection against limited amounts of falling dirt.
NEMA 2 Indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.
NEMA 4 Indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed.

Manufactured Parts Numbering System

Primary Designation (First Letter)

A	Accessories
H	Humidity
P	Pressure
S	Switch or Step Controller
V	Valve
C	Controller or Controlled Device
M	Motor (Actuator)
R	Receiver-Controller or P.E. Switch

Alpha Prefix Combinations

AD	accessory, electronic or electronic control package
AE	accessory, electric
AH	accessory, humidity
AK	pneumatic relay or positioner
AKR	accessory, pneumatic replacement
AKS	accessory, pneumatic
AL	accessory, pneumatic or E.P. relays
AM	accessory, motor
AP	accessory, pressure
ASP	accessory, electronic
AT	accessory, thermostat
AV	accessory, valve
C	cover, 2" x 2" pneumatic thermostats
CC	controller/controlled device, electronic
CN	multi-purpose bridge, electronic
CP	controller/controlled device, electronic
CT	cover, 2" x 2" pneumatic thermostats
H	humidistat or humidity transmitter, pneumatic
HC	humidity, two-position (three-wire), electric
HKS	humidity or enthalpy transmitter, pneumatic
HS	humidity sensor, electronic
HSP	humidity transmitter, electronic
HTSP	humidity/temperature transmitter, electronic
M	motor, pneumatic, with or without positioner
MA	motor, two-position, spring return, electric
MC	motor, two-position (three-wire), electric
MCS	accessories, modular control systems
ME	motor
MF	motor, floating, proportional
MK	motor, pneumatic
MK4	motor, pneumatic with positive positioner
MM	motor, modular
MMC	control card, modular motor
MMR	replacement motor, modular
MP	motor, proportional, electric or electronic
MS	motor, proportional, electronic
MU	motor, proportional, temp., electric or electronic
N	thermostat, accessories
P	pressure or differential pressure transmitter, or receiver-controller, pneumatic
PC	pressure, two-position (three-wire), electric
PCP	PNEUMODULAR control panels
PF	pressure, floating, electric
PKSR	differential water pressure or air velocity transmitters, pneumatic
PP	pressure, proportional, electric or pneumatic
R	electric power relays, pneumatic relays, P.E. switches, and VAV controllers
RKS	Receiver-controller, pneumatic
RKSR	receiver-controller, pneumatic replacement
S	switch, pneumatic
SLC	controller, solid-state
T	step controller, proportional, electric, pneumatic, or electronic
TA	thermostat or transmitter, pneumatic
TC	thermostat, two-position, electric
TF	thermostat, two-position, electric
THC	thermostat, floating
THCR	enthalpy controller, electric
TK	thermostat, pneumatic
TKR	thermostat, pneumatic replacement
TKS	temperature transmitters, pneumatic
TOOL	calibration fixtures, kits, and tools
TP	thermostat, proportional, electric or electronic
TR	thermostat, pneumatic replacement
TS	temperature sensor, electronic
TSP	temperature transmitter, electronic
VA	valve, two-position, spring return, electric
VB	valve body
VC	valve, two-position (three-wire), electric
VK	valve, pneumatic
VK4	valve, pneumatic with positive positioner
VM	valve, modular motor
VP	valve, proportional, electric or electronic
VS	valve, electronic

Conversion Factors & Formulas

Factor	Units	Times	Equals	Formula	
Area	in^2	645	mm^2	A =	L x W, Pi x r2
Resistance	Ohms	1	Ohms	R =	V/I
EMF	Volts	1	Volts	V =	I x R
Current	Amps	1	Amps	I =	V/R
VA	V x I	Factor	Watts	P =	I2 x R = V x I
Energy	Kilowatt	3412	Btu/Hr	P =	3412 x (I2 x R)
Water	Gal/min	488	Lb/hour	W =	488 Cv(P1 - P2)^.5
Cooled	1 Lb/Hour@10F	22	Persons	N =	10*W*/500
Power	Horsepower	550	Ft-lb/sec	P =	F x V
Power	Kilowatt	3412	Btu/Hour	P =	3412 x Kw
Seated	People	150	Watts	P =	150 x People (Load)
Force	Pounds	4.45	Newtons	F =	P x A
Length	Inches	25.4	mm	L =	Area/Width
	mm	0.0394	Inches		

Factor	Units	Times	Equals	Formula	
Velocity	Ft/sec	0.305	m/sec	V =	Q/A
Volume	US Gallon	3.785	Liters	V =	L x D
Atmosphere	One BAR	14.696	psia	P	Standard
Torque	Inch-lb.	0.113	Newton-meter	T =	F x L
	Newton-meter	8.85	Inch-lb.	T =	F x L
Frequency	Cycles/sec	1	Hertz	f =	USA=60, EU=50
Pressure	Psi.	6.895	kPa	P =	F/A
	Psi.	2.31	Feet H2O	H =	F/A
Pressure	kPa	.1450	Psi.	P =	F/A
	Pa	0.0147	Psi.	H =	F/A
Net Positive Suction Head		1	Feet H2O	L =	NPSH
Temperature	Fahrenheit	Eq'n	Degrees F	°F =	32 + 9/5 x°C
	Celsius	Eq'n	Degrees C	°C =	(°F - 32) x 5/9
Reynolds #	None	>2000	Turbulence	R =	vdp/u
	L		Diameter	D	Circle
	L		Width	W	Across
	None		Coefficient	C	
	None		Constant	K	

Globe Valve Questions & Answers

Review the list of questions and then refer to the answers provided in the subsequent pages by question number.

1) What materials are used?

2) What are the pressure classes?

3) What media and temperatures can you close off?

4) How controllable are the valves?

5) What are rangeability and turndown?

6) What end fittings are available?

7) What are the steam selection factors?

8) What valve actuation choices are there?

9) What are the benefits of balanced valves?

10) How does seat leakage affect energy cost?

11) How do we prevent and repair stem leakage?

12) Can we replace competitors' actuators?

13) How can we avoid system noise?

14) Are there opportunities for custom valves?

1) What materials are used?

The cast bronze bodies with wall thickness and stem packings to the 250 psi standard are tested to 2000 psi., five times the UL accepted 400 psi maximum application pressure.

- The stainless, spring-loaded, self-adjusting, cartridge-style stem packings are the same for all styles and VB-7000 sizes. No adjustment is ever required.
- Interchangeable packing cartridges are in two sizes, one for 1/4" stems up in up to 2" valves and one for ½" dia. stems in 2½"…6" valves.
- 316 stainless steel cartridges are available up to 2".
- The ½" dia. stem, spring-loaded cartridges are corrosion protected steel for the flanged iron bodies.
- Plugs are brass with 316 stainless for stainless trim. 316 is the most corrosion resistant stainless steel for the long life VB-7000 plugs and stems. It is far superior to free machining stainless often used to lower costs.
- PTFE used in cones, packings and seating for stainless trim is rated to above 400° F.

2) What are the Pressure Classes?

These are official pressure-withstand classes which the piping and all fluid containment walls in the system can hold safely. They determine how much total pressure, from the height of the water column and pump, can be withstood. Standards exist worldwide for wall thickness, burst tests and device designs. Pressures are highest at the lowest levels of piping.

These are the acceptable pressures at maximum temperatures. Higher pressures are allowed at lower temperatures. The equivalent height of water column on class 250 threaded bronze valves is about 40 stories for the hottest water and 70 stories for chilled water. Class 125, flanged iron valves reach about 20 and 35 stories, respectively. Common classes in the building industries are:

- Class 125 (Metric PN 8) VB-8000 & 9000 Flanged Valves
- Class 250 (Metric PN 16) VB-7000 Bronze Valves
- In the metric system, "PN 8" and "PN 16" refer to the number of barometric pressures or BARs.
- Piping systems are rated by the weakest devices or piping in the system.

Our valves are optimized to meet rating classes with materials useful in the USA & internationally:

- Bronze Castings ASTM B584, ANSI B16.15 250
- Stainless steel Castings CF8M, ANSI B16.34 300
- At temperature below 150° F, pressure to 400 psi is allowed.
- Flanged Cast Iron ASTM A126 Class B, ANSI B16.1 Class125
- CE (Europe)
- CRN (Canadian Reference Numbers for the Provinces)

3) What media and temperatures can you close off?

These are the acceptable temperatures and fluids which can be controlled acceptably within these valves. Actuators have separate ambient temperature ratings affected by fluid temperatures.

Usual uses are HVAC hot and chilled water, steam and brine, plus ethylene and propylene glycol to 60%.

High-temperature rated PTFE soft seats provide tight, durable close off to 400° F for water and steam.

- Internal actuator temperatures are affected by high fluid temperature conduction, convection and radiation.
- On steam and hot water valves, heat convection to the actuator is greatest in the upright position.
- From horizontal orientation up to a 45° angle is recommended for actuator cooling.
- Best close-off occurs with soft seats, which may not be rated to as high of a temperature as metal-to-metal.

4) How controllable are the valves? What about 1/3, 2/3 control?

Application

100/1 rangeability enables control down to 1% of full load without hunting or two-positioning or requiring a smaller valve. In a steam or water valve, it controls from minimum (when the valve is first cracked open) to full flow.

When optimized valves can control effectively from 1% to full load with various fluids, systems, actuators and signal variables, there is little need for 1/3, 2/3 control, but use it if specified. Use a positioner with pneumatic actuators.

- Most spaces have excess capacity for "worst case" full load success.
- When the load varies widely, high rangeability is needed to control successfully without two-positioning or hunting when the load is light.
- The same is true with heating when varying outdoor temperatures, affected by solar and occupancy levels, reduce the need for heating to a minimum. Without high rangeability and with time lags, the likelihood of overshooting and hunting is great.
- Stable control is key to the comfort and productivity of the occupants.
- With our precision technology, even low-capacity valves (down to 0.4 Cv) can control down to 1% of full flow.
- Our unique stainless trim valves do not have tight fits between plugs and ports, assuring ongoing reliable control by avoiding

galling and seizing in steam valves.

Only Schneider Electric precision globe valves have overcome all these limitations with patented 100/1 rangeability on sizes from ½"…6"' and as low as 0.4 Cv in brass and stainless trim.

5) What are rangeability and turndown?

Rangeability

- The ratio of total capacity to minimum controllability of a supply valve.
- In an automobile this is the ratio of full speed to idle speed.
- In a chilled water valve, it is the ratio of full flow to minimum controllable flow when the valve is first cracked open.
- If the cooling coil output is 35,000 Btus per hour in a half inch valve capable of cooling one hundred moderately quiet people with a 350 Btu/hour load per person, the capacity is one hundred people cooled adequately.
- With 5/1 rangeability and about 4/1 turndown, it can control without hunting down to a 25-person occupancy.
- With 25/1 rangeability and turndown of about 20/1 turndown, it can control without hunting down to a five-person occupancy.
- At 125/1 rangeability, and about 100/1 turndown, it can control without hunting down to one-person occupancy.
- Hot water valves with low rangeability are likely to overshoot with bad control and energy waste, even with outdoor reset of the hot water.

Over 100/1 rangeability for highest turndown and exact, efficient control with varying pressure drops & light system loads, eliminates unstable hunting and most needs for pressure-independent complexity.

Turndown

The ratio when the valve is installed in a system. It is usually about 70% of rangeability. The two terms are often confused.

- Most spaces have excess capacity for "worst case" full-load success.
- When the load varies widely, high rangeability is needed to control successfully without two-positioning or hunting when the load is light.
- The same is true with heating when varying outdoor temperatures, affected by solar and occupancy levels, reduce the need for heating to a minimum. Without high rangeability and with time lags, the likelihood of overshooting and hunting is great.
- Rangeability is much more than a measure of accuracy. It is a major factor in good control and comfort of the occupants.
- Without our precision technology, good rangeability is especially difficult to obtain on valves with a Cv lower than 5. Competitors lump them all together and claim 25/1 (which is actually an average with their larger valves).
- Competitor steam valves, which have had very close fits between the 303 stainless plugs and ports, have galled and seized permanently, losing all ability to control.

Only Schneider Electric precision globe valves have overcome all these issues. We now have 100/1 rangeability on each size from ½"…6" and as low as 0.4Cv in brass and stainless trim.

Rangeability & Turndown vs. Pressure Independence

- Differential pressure varies in many systems as a result of central system capacity and loads throughout a building. When less flow is required, the thermostat calls for the valve actuator to compensate by partial closing. As the valve begins to close, the differential pressure often increases as a result of the back pressure increase and the valve needs to close an additional amount. This is no problem as long as the control system does not close the valve beyond the controllable range into the inlet jump portion of the valve stroke.
- The inlet jump portion is directly a factor of the rangeability and resulting turndown of the valve and the system.
- If the differential pressure is doubled, the actuator has to reduce the flow by about 30% to compensate. This is no problem as long as the valve rangeability is high enough to allow the actuator to control at low flows.
- One solution was to have two valves in parallel, one for full flow and one for fine tuning at low flow.
- The more recent solution is to have a pressure compensation mechanism called "pressure independent" in the line to adjust for the higher differential pressure. This is a complicated device to compensate for low rangeability (for 2-Way valves only).
- Each pressure-independent valve in a system affects others, including pressure regulators which respond and feedback to the first, resulting in potential for back and forth hunting and oscillation of the group. Dependent on various factors, the hunting may be intermittent or constant.
- It may require selection, labeling, staging and reducers within the ½" and ¾" pipe sizes.

Best Solution for 2- and 3-Way Valves

- Use valves with 100/1 rangeability to control at all flows, a more straightforward means, even with high pressure drops.
- 100/1 rangeability valves can eliminate most control problems with "oversized" valves since they can control as low as 50/1 valves, two pipe sizes smaller or 25/1 valves three pipe sizes smaller.
- Electric actuator accuracy with inherent positive positioning and pneumatic actuators with positioners fully utilize the precision 99% accuracy with 100/1 rangeability.

6) What end fittings are available?

- For most replacements, an exact match exists.
- For inventory and purchasing efficiency, threaded ends to local standards are best, such as English NPT or metric Rp threads.

Available Types

- NPT threaded English ½"…2", 2-Way, mixing & diverting
- Rp threaded metric 15…50 mm, 2-Way, mixing & diverting
- Union straightway ½"…1¼"
- Union angle ½" to1¼"
- Union Sweat ½"…2"
- ½" O.D. tube SAE flared, 2-Way & 3-Way mixing
- 5/8" O.D. SAE 45 deg. flared, 2-Way & 3-Way mixing

7) What are the steam selection factors?

Steam valves are not labeled as a separate category, but are defined by the applications which follow. The basic steam types are:

- Saturated steam occurs in a boiler at the border between liquid and gas and also when condensing, giving off heat.
- Superheated steam occurs when the gas is heated further, but normally when higher pressure and temperature steam from the boiler is regulated to a lower pressure without removing heat (isothermal).

Globe Valve Questions & Answers

Additionally

- Low pressure steam has 15 psi or less gauge (30 psi absolute) pressure.
- Medium and high pressure is above 15 psig (30 psia).

Steam has been a very effective fluid for delivering heat to radiators, air handling units and radiators in service from the early days. All VB-7200 and VB-8200 valves work on steam, subject mostly to temperature limitations.

- Users often misunderstand the real temperature by starting from the pressure and reading temperature from saturated steam charts.
- There is often a pressure regulator after the boiler resulting in temperatures closer to the boiler than the steam table.
- The temperature may be above 281° F, which requires stainless trim with PTFE seats good beyond 300° F.
- Be careful to select the valve trim based on actual fluid temperatures as well as gauge pressure and flow capacity.
- Stainless trim with PTFE seats and proper actuators provide the finest, tight close-off control valves known.

8) What valve actuation choices are there?

Control Signal Types

- Electric, digital and analog
- Pneumatic, One-pipe bleed and two-pipe relay signals
- Positive-positioning electric, hydraulic & pneumatic
- Direct and reverse acting
- 3 - 6, 3 - 7, 3 - 8, 5 - 10, 8 - 13, 10 - 13 psi, pneumatic spring ranges
- 0 - 10, 1 - 5, 2…10, 6 - 9, Volts, control inputs
- 4 - 20 mA, current inputs
- Modulating, floating and time-proportioning (PWM)
- Two-position and three-position (up, down, hold)

Power Supplies Used

- Line and low-voltage AC
- 24, 120, 230 Volts
- 50 and 60 Hertz international
- Transformers & relays
- Pneumatic 15 to 30 psi
- DC Voltage

Available Outputs

- Reversible rack and pinion linear from rotary
- 1/4” to 2” linear, rotary travel
- Spring and non spring return
- Pneumatic with 6, 11, 50 and 100 in.2 diaphragms

You’re covered, whatever your valve and actuator needs!

9) What are the benefits of balanced valves?

In a balanced valve the fluid presses mostly radially rather than axially against the plug, with the pressure having little affect on the amount of force the actuator must provide for movement and close-off.

Since the area against the flow of an unbalanced plug grows with the square of the diameter, plugs and butterfly valves above 2” in diameter require more powerful actuators to provide acceptable operation and close-off. Air handling units and central systems benefit greatly from balanced valves.

Since these blue flanged (VB-8xxx) globe bodies slice through, rather than oppose flow, efficient close-off can be achieved with much smaller actuators.

Benefits

- Close-off of valves above 2” does not require powerful or dual actuators.
- 2-Way valves have equal % flow curves.
- 3-Way valves are modified linear.
- 3-Way valves can be piped for mixing or diverting.
- Pressure aids good close-off on 2-Way balanced valves.
- Piping for VB-8303 mixing is different from tradition, so use for only new construction or direct replacement.
- On mixing, the bottom port is the common port, so the piping must match.
- Select the actuator for adequate opening force against both head and friction.
- Be sure to provide water treatment to avoid corrosion!

10) How does seat leakage affect energy cost?

- When a valve is closed, the leakage of heated fluid wastes energy and pumping energy, and may require extra cooling to offset wasted heat and vice versa.
- This can be a double penalty on both 2-Way and 3-Way valves.
- Tight close-off minimizes energy waste from hot or cool fluid leakage during off periods.
- Every drop of cooling leakage results in a loss of 20 Btu/pound or pint of water or with the double penalty to pay for reheat, 40 Btu/pint cumulative.
- Tight close-off minimizes energy waste from hot or cool fluid leakage during “off” periods, about half of the total time.
- Seat leakage is rarely known or measured.
- Be sure to use durable, soft-seated valves which outlast the system.
- Energy prices climb continuously, accumulating hidden costs.

11) How do we prevent and repair stem leakage?

- Our long-life, self-adjusting, spring-loaded, universal cartridges avoid these difficulties.
- Repair of other packing styles often requires tightening and/or parts and servicing skills.
- Replacement of other single-purpose cartridges may require selection depending on the valve vintage, fluid, temperature and static pressure.

We have used interchangeable packing cartridges for decades whereby:

- Spring loading eliminates tightening.
- No stuffing is required.
- No choices for different temperatures are needed.
- No choices based on date of manufacture in the last 40 years are needed. We have upgraded our packing cartridges over time making them backward compatible.
- On 2” and smaller valves with 1/4” diameter stems, the improved
  YBA-622-2 packing cartridge fits all of our valves.
- Stainless bodies use the same stainless steel version.
- On 2½”…6” flanged valves with a ½” stem, the YBA-652 cartridge fits all of our valves. These cartridges handle water and steam fluids for all temperatures and pressures,

whether high or low.
- Inventory is easy: Stock only one for each of the two sizes; one for ½"…2" pipes and one for 2½"…6" sizes.

12) Can we replace competitors' actuators?

Yes, we can replace failed valve actuators which mount differently from ours as installed by competitors.
Adapters exist for competitor valve bodies so that our actuators fit as though they are on our standard valves.

Reality – Adapter part numbers

- Johnson Controls
  AV- 801, AV-802, ½" & ¾" bodies without packing caps
  AV-803, ½"…2" bodies

- Honeywell
  AV-810 , ½" to 3" bodies

- Siemens
  AV-814, Flowrite
  AV-815, VP658, ½"…1¼"
  AV-816, Siemens, VP-581

- Robertshaw
  AV-817, ½"…2" Bodies

- Barber Colman
  AV-821 to Forta, ½"…2" VB-7000 bodies
  AV-822 to Forta, 2½"…6" VB-8000, VB-9000 bodies

13) How can we avoid system noise?

Noise in systems results from sources of energy, oscillations and resonating material such as:
- Turbulent water.
- Flexible or loose valve parts.
- Tall, unguided valve stems and plugs.
- Pump energy provides water differential pressure dissipated by restricting water flow by turbulence and cavitation across the valve and other components.
- Noise is created based on the square of these pressure drops.

Compact, short stroking stem, plug and linkage valve designs dampen harmonic action for quiet modulation and control.
- Oscillations occur in nature at the throttling point of fluid flow where static pressure is converted into velocity pressure and back to downstream static.
- At this point that the static pressure can fall below the vapor pressure of the liquid resulting in cavitation.
- Air entrainment creates the same effects.
- Resonating bodies are water and piping which have natural frequencies based on length and stiffness.
- Published equations show when differential pressure should not be a problem.
- SHRAE suggests 10 ft./sec. velocity with 20 ft./sec. max.
- Honeywell has more simply published the specification of 20 psi for quiet service and 25 psi for normal valve life.

14) Are there opportunities for custom valves?

Yes, we can make any valve using mostly standard parts in unique or proprietary combinations, optimizing a particular system.
Whereas building applications are often very similar, OEM and industrial needs are often unique and well defined, suggesting specialized opportunities, resulting in proprietary solutions.
Soft seating, metal/metal brass & stainless trim, English & metric fittings, Cvs, actuator mounting, etc. can be combined in many ways. Not all are standard and already priced.
- Bodies can be 2-Way or 3-Way.
- Actuators can be threaded or "U" bolt mounted.
- Seats can be PTFE, EPDM, stainless or brass.
- Plugs can be stainless or brass.
- "A" & "B" ports can be the same or different.
- Reduced Cvs can be provided.
- Actuator and wiring connection choices are myriad.
- Spare parts are optional.

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