Life Is On | Schneider Electric

Valves & Actuators Catalog

North America
EcoBuilding | 2018









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About Schneider Electric

Schneider Electric is leading the Digital Transformation of Energy Management and Automation in Homes, Buildings, Data Centers, Infrastructure and Industries.

With global presence in over 100 countries, Schneider is the undisputable leader in Power Management – Medium Voltage, Low Voltage and Secure Power, and in Automation Systems. We provide integrated efficiency solutions, combining energy, automation and software.

In our global Ecosystem, we collaborate with the largest Partner, Integrator and Developer Community on our Open Platform to deliver real-time control and operational efficiency.

We believe that great people and partners make Schneider a great company and that our commitment to Innovation, Diversity and Sustainability ensures that Life Is On everywhere, for everyone and at every moment.

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About This Catalog and Online Resources

Welcome to the 2018 Schneider Electric Valves and Actuators Catalog

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.

It is recommended to view this catalog in its electronic PDF version (Acrobat Reader required), from the **Exchange Extranet** or from **iPortal.**

At various places throughout the printed catalog, you can take a picture with a Smartphone of the "Quick Response" (QR) code graphics to be taken to an online page describing a product featured.

The Exchange Extranet and iPortal

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iPortal is an important on-line tool and part of our commitment to provide comprehensive information for both internal and sales channels. Visit iPortal at this link:

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Explore the **Exchange Extranet** for quick and easy access to assets; from software and firmware to technical documentation, as well as sales and marketing collateral. Visit the **Exchange Extranet** at this link:

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Online Selection Tool for Schneider Electric Valves/Assemblies & Damper Actuators

Product Selection Tool

In 2017 Schneider Electric launched an online selection tool for Valves/Assemblies and Damper Actuators. This tool quickly and easily puts a wealth of information at the user's fingertips to ensure specification of the optimum Schneider Electric part to fit their application.

Features

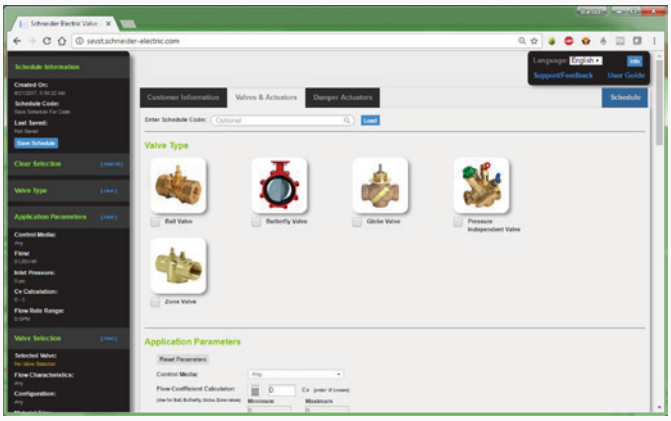
- Part selection based on calculators and drop down menus
- Save and load customer profiles, including customer name, country, contact information, job titles, project names and customer logos.
- Schedule hydronic systems using the Valve Assembly selection feature
- Schedule damper applications using the Damper Actuator selection feature
- View, edit, change and adjust schedules on the Schedule page. Download completed schedules to Excel, pdf, BOM for easy upload to iPortal, or formatted for upload to Schneider Electric's Studio 360 suite.
- Save schedules in progress to be worked on later or for use as a template for future projects.

Browser Compatibility

- Chrome (preferred), Firefox, Safari, Edge, Internet Explorer 11 or greater.

Original Valve Selection Tool

- The new online Valve Selection Tool has all the features of the original Valve Selection Tool plus added features.
- The current version of the Tool, V4.3.90 and all earlier versions will not be updated.



Selection Tool Product Categories

- Ball Valves
- Butterfly Valves
- Damper Actuators
- Globe Valves
- Pressure Independent Balancing Control Valves
- Zone Valves

Key Functions & Benefits

- Web-based Selection Tool (compatible with
- wide screen mobile devices)
- Schedule generation
- Sizing and Cv calculator
- List pricing on all products
- Schedule customization
- Quick access to related product documentation
- Favorite Products List Save Feature
- Schedule download to Excel, PDF, BOM
- Easy iPortal upload, Studio 360 File
- User Preferences and Customization
  - Company Information
  - Address & Logo
  - Favorite Parts List

MyExchange Sales Mobile App

Bring more “wow” to your customer meetings! MyExchange mobile app enables sales teams to share the latest marketing and sales content via their iOS or Android tablet or mobile phone – on- or off-line – to make meetings and follow up more productive.

With the MyExchange app you can:

- Easily access and view the latest assets (e.g. videos, presentations, specification sheets) while online
- Download assets for availability while offline
- Electronically mark up assets (highlight, pen) and save changes
- Manage a personal “channel” with your own presentation content
- Email assets to others (customers, consultants) and manage sharing activities/history
- Receive news and notifications on updates directly on your device
- To download MyExchange for iOS devices, visit the iTunes® App Store (search for “myexchange Schneider Electric”) or link to (in the U.S.):
  - MyExchange Schneider Electric on the App Store on iTunes.
  - For Android devices, access the app in the Google Play store by searching for ‘myexchange Schneider Electric’. See the Play Store for Android system requirements.

You must self-register on The Exchange before using MyExchange. Register at:
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Overview - Actuator Product Range
Spring Return and Non-Spring Return

Spring Return









Range	Mx4D-x033-100 Series	Mx40-7043 Series	Mx41-7073 Series	Mx41-7153 Series	Mx40-7170 Series	Mx40-7173 Series	Mx41-730x Series
in-lb	30 in-lb (3.4 N-m)	35 in-lb (4 N-m)	60 in-lb (7 N-m)	133 in-lb (15 N-m)	150 in-lb (17 N-m)	150 in-lb (17 N-m)	270 in-lb (30 N-m)
Two-Position	MA4D-7033-100 MA4D-8033-100	MA40-7043 MA40-7043-501	MA41-7073 MA41-7073-502	MA41-7153 MA41-7153-502	MA40-7170	MA40-7173	MA41-7303 MA41-7303-502 MA41-7300 MA41-7300-502
Floating Point	MF4D-7033-100 MF4D-8033-100	MF40-7043 MF40-7043-501	MF41-7073 MF41-7073-502	MF41-7153 MF41-7153-502	-	MF40-7173	-
Proportional	MS4D-7033-100 MS4D-7033-150 MS4D-7033-160 MS4D-8033-100 MS4D-8033-150 MS4D-8033-160	MS40-7043 MS40-7043-501	MS41-7073 MS41-7073-502	MS41-7153 MS41-7153-502	MS40-7170	MS40-7173	MS41-7303 MS41-7303-502 MS41-7303-W02 MS41-7303-WH2
Vac	24 Vac ± 20%				120 Vac ± 20%	24 Vac ± 20%	MA41: 24 Vac/Vdc -502: 100…240 Vac MS41: 2…10 Vdc (4…20 mA w/ 500 ohm resistor)

Non-Spring Return







Range	MS4D-60x3-100 Series	Mx41-6043 Series	Mx41-6083 Series	Mx41-6153 Series	Mx41-634x Series
in-lb	35 or 70 in-lb (4 or 8 N-m)	35 in-lb (4 N-m)	70 in-lb (8 N-m)	133 in-lb (15 N-m)	300 in-lb (34 N-m)
Floating Point		MF41-6043 MF41-6043-510 MF41-6043-502	MF41-6083 MF41-6083-510 MF41-6083-502	MF41-6153	MF41-6343
Proportional	MS4D-6043-100 MS4D-6043-120 MS4D-6043-130 MS4D-6043-150 MS4D-6043-160 MS4D-6083-100 MS4D-6083-120 MS4D-6083-130 MS4D-6083-150 MS4D-6083-160	MS41-6043 MS41-6043-520 MS41-6043-522 MS41-6043-502	MS41-6083 MS41-6083-520 MS41-6083-522 MS41-6083-502	MS41-6153 MS41-6153-502	MS41-6343 MS41-6340
Vac	24 Vac ± 20%				

Overview - Valve Product Range







Range	Globe Valves VA Series Two Position VF Series Three-Wire Floating VS Series Proportional	Ball Valves VA Series Two Position VF Series Three-Wire Floating VS Series Proportional VBB Brass Trim VBS Stainless Steel Trim	Erie™ Zone Valves VM Series Modulating VT and VS Series Two Position	Butterfly Valves VA Series Two Position VF Series Three-Wire Floating VS Series Proportional	PIBCV
Two and Three-Way Valves	7000 Valves: ½…2" 8000 Valves: 2½ …6" (shown) 9000 Valves: 2½…4"	Two-Way: ½…3" Three-Way: ½…2"	1/2…1¼"	Two-Way: 2…18" Three-Way: 2…16"	½"…10"
Seat Leakage	ANSI IV (0.01% Leakage)	Two-Way: ANSI IV (0.01% of Cv) Three-Way: ANSI IV (0.01% of Cv) Piped coil-side outlet to A port	Two-Position Valve Close Off Ratings ANSI IV (0.01%) with pressure at inlet (B-port/A-port if 3-way) Modulating ANSI IV (0.01%)	ANSI VI Bubble Tight	(To standard IEC 60534) ½…3/4": Class 4, max. 0.01% of Qnom. 1…4": 0.05% of Qnom 5…10": Class 4, max. 0.01% of Qnom
Materials	Body Cast Iron, Stainless Steel Stems Available as Stem Up Open or Closed, Seat Bronze, Plug Brass, Packing Spring Loaded TFE/ EPDM	Forged Brass body Brass Stems Nickel/ Chromium-Plated Brass Ball VBB valves feature a chrome plated brass ball and nickel plated brass stem. VBS valves feature a stainless steel ball and stem.	Forged brass body. Stem Nickel-plated. Seat Brass, Paddle (VT series) Buna N. Paddle (VS series) Highly saturated nitrile	Polyester-coated cast iron body, rubber lined, ASTM A126 Class B lug Stainless Steel Double "D" stem Seat is EPDM tongue and groove with molded O-ring flange seal, peroxide cured.	½…1¼" : Dezincification Resistant Brass (CuZn36Pb2As - CW 602N) per EN 12420 1½-2": Grey iron EN-GJL-250 (GG 25) per EN 1561 2-10" Grey iron EN-GJL-250 (GG 25)
Typical Applications	Reheat on VAV boxes Fan coil units Hot and chilled water coils Unit ventilators Central systems	Reheat on VAV boxes Fan coil units Hot and chilled water coils Air handling Unit ventilators	Fan coil fluid flow VAV reheat Ventilators Radiant applications Easy replacement of actuators VS series available for low pressure steam	Cooling towers Central system shutoff and bypass piping control Thermal storage Chiller and boiler control	Temperature control of chillers, air handling units, heat exchanges and terminal units such as fan coils, induction units and radiant panels.

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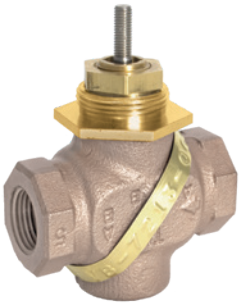
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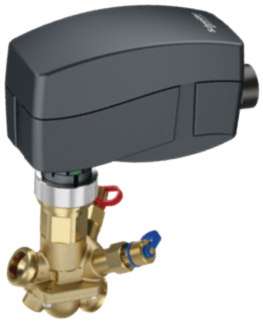
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358 ½"…2" Globe Valve Assemblies
359 2" 2-Way Globe Valve Assemblies
360 1¼"…2" Globe Valve Assemblies
361 5"…6" Flanged Globe Valve Assemblies
362 6" Flanged Globe Valve Assemblies
364 2½"…5" Flanged Globe Valve Assemblies
365 1¼"…3" 2-Way 2000 Series Ball Valve Assemblies
366 ½"…3" 2-Way 2000 Series Ball Valve Assemblies
367 ½"…1" 2-Way 2000 Series Ball Valve Assemblies
368 ½"…1" 3-Way 2000 Series Ball Valve Assemblies
369 ½"…2" 3-Way 2000 Series Ball Valve Assemblies
371 2"…4" 2-Way Butterfly Valve Assemblies
372 2"…4" 3-Way Butterfly Valve Assemblies
373 2"…6" 2-Way Butterfly Valve Assemblies
374 2"…6" 3-Way Butterfly Valve Assemblies
375 2"…18" 2-Way Butterfly Valve Assemblies
376 2"…16" 3-Way Butterfly Valve Assemblies
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SmartX PIBCV MP131-24x and VP228E-1xBQx



SmartX PIBCV MP2000 Series and VP221A-150-CQx

1. Damper Actuators



Overview - Direct Coupled Spring Return Actuators

Schneider Electric offers a complete line of Direct Coupled actuators for all your spring return actuator needs. Direct Coupled easy to install, Spring Return SmartX Actuators are available with torques that range from 30…150 lb-in for two position, floating or proportional control.

Value-Driven General Purpose Applications



Mx4D-703x and Mx4D-803x Series

- Two position models controlled by SPST controller
- Floating models controlled by SPDT floating controllers
- Jumper selectable control function direct/ reverse action

Damp and Harsh Environment Applications



Mx40-717x Series

- Direct mount to round or square damper shaft
- 150 lb-in (17 N-m) torque rating, overload protection throughout rotation
- Oil immersed gear train provides continuous lubrication
- Automatic current sensing motor control provides extended reliability and repeatable timing
- Provides true mechanical clockwise or counterclockwise spring return operation for reliable positive close-off in airtight applications
- 5-year warranty, NEMA 4 housing (IEC IP56)
- Can be double mounted (gang mounting) to accommodate high torque application requirements (2 to 4 actuators)
- MS40-717x models provide position feedback signal

High Performance HVAC Applications



Mx40-704x Series

- Direct mount to round or square damper shaft
- 35 lb-in (4 N-m) torque rating
- Overload protection throughout rotation
- Optional built-in auxiliary switches
- True mechanical clockwise or counterclockwise spring return operation for reliable, positive close-off in airtight applications
- Visual position indicator
- Direct acting or reverse acting control mode available on proportional models
- Rotation limiting available
- Rugged die-cast housing for NEMA 2/IP54 rating



Mx41-7xxx Series

- Direct mount to round or square damper shaft
- 60 lb-in (7 N-m) torque rating
- 133 lb-in (15 N-m) torque rating
- Overload protection throughout rotation
- Optional built-in auxiliary switches
- Provides true mechanical clockwise or counterclockwise spring return operation for reliable positive close-off in airtight applications
- Direct acting or reverse acting control mode available on proportional models
- Rotation limiting available
- Rugged die-cast housing for NEMA 2/IP54 rating
- Manual override

High Torque HVAC Applications



Mx41-730x Series

- 270 lb-in (30 N-m) of torque with mechanical spring return, manual override, and Brushless DC Motor.
- Stall protected throughout rotation and reversible mounting.
- Models for Two Position 24 Vac/Vdc, and Two Position 100…230 Vac applications.
- Models for 2…10 Vdc input signal applications (field configurable for other input signals) with a position feedback signal and direct/reverse acting control mode selection switch on both sides.
- Models for auxiliary switch applications.
- Models for NEMA 4 / IP66 outdoor applications.
- 95° of rotation, adjustable with mechanical end stops and graduated position indicator showing 0°…95°.
- Can be double-mounted (gang mounting) to accommodate high torque application requirements.

Direct Coupled Spring Return Actuator Matrix

Spring Return Electronic Damper Actuators

	Torque lb-in minimum	Control Type							Power				Power Input			Running Time (sec)			
				Proportional										Watts					
		Two-Position	Floating	0…10 VDC	2…10 VDC	4…20 mA	2…10 VDC[a] Feedback	0…10 VDC Feedback	24 VAC, 24 VDC	24 VAC	120 VAC	100…240 VAC 100…125 VDC	VA	Running	Holding	Powered	Spring Return	Auxiliary Switch	Spring Return Position
MA4D-7033-100	30	■							■				5.1			<56	<23		CCW
MA4D-8033-100	30	■							■				5.1			<56	<23		CW
MF4D-7033-100	30		■				■		■				6.8	4.2	1.9	85	21		CCW
MF4D-8033-100	30		■				■		■				6.8	4.2	1.9	85	21		CW
MS4D-7033-100	30				■		■		■				6.1	3.4	1.4	85	21		CCW
MS4D-8033-100	30				■		■		■				6.1	3.4	1.4	85	21		CW
MS4D-7033-150	30			■				■	■				6.1	3.4	1.4	85	21		CCW
MS4D-8033-150	30			■				■	■				6.1	3.4	1.4	85	21		CW
MS4D-7033-160	30					■	■		■				6.1	3.4	1.4	85	21		CCW
MS4D-8033-160	30					■	■		■				6.1	3.4	1.4	85	21		CW
MA40-7043	35	■							■				4.4	2.9	0.8	<50	<28		CW/CCW
MA40-7043-501	35	■							■				4.4	2.9	0.8	<50	<28	1	CW/CCW
MF40-7043	35		■						■				5.9	4.4	2.9	<130	<25		CW/CCW
MF40-7043-501	35		■						■				5.9	4.4	2.9	<130	<25	1	CW/CCW
MS40-7043	35				■	■	■		■				5.6	4.2	2.4	<130	<25		CW/CCW
MS40-7043-501	35				■	■	■		■				5.6	4.2	2.4	<130	<25	1	CW/CCW
MA40-7040	35	■									■		4.3			<50	<28		CW/CCW
MA40-7040-501	35	■									■		4.3			<50	<28	1	CW/CCW
MA41-7070	60	■									■		4.4	2.9	0.8	<50	<28	1	CW/CCW
MA41-7070-502	60	■									■		4.4	2.9	0.8	<50	<28	1	CW/CCW
MA41-7073	60	■							■				4.8	3.2	0.8	<80	<40		CW/CCW
MA41-7073-502	60	■							■				4.8	3.2	0.8	<80	<40	2	CW/CCW
MF41-7073	60		■						■				6.2	4.8	2.8	<195	<30		CW/CCW
MF41-7073-502	60		■						■				6.2	4.8	2.8	<195	<30	2	CW/CCW
MS41-7073	60				■	■	■		■				5.8	4.6	2.3	<195	<30		CW/CCW
MS41-7073-502	60				■	■	■		■				5.8	4.6	2.3	<195	<30	2	CW/CCW
MA41-7153	133	■							■				9.7	7.5	2.8	<190	<30		CW/CCW
MA41-7153-502	133	■							■				9.7	7.5	2.8	<190	<30	2	CW/CCW
MF41-7153	133		■						■				9.7	7.7	3.2	<190	<30		CW/CCW
MF41-7153-502	133		■						■				9.7	7.7	3.2	<190	<30	2	CW/CCW
MS41-7153	133				■	■	■		■				9.7	7.4	2.9	<190	<30		CW/CCW
MS41-7153-502	133				■	■	■		■				9.7	7.4	2.9	<190	<30	2	CW/CCW
MA40-7170	150	■									■		11.4	7.2	9.4	<145	<145		CW/CCW
MS40-7170	150				■	■	■				■		11.1	7.1		<145	<145		CW/CCW
MA40-7173	150	■								■			9.6	5.4	4.1	<145	<145		CW/CCW
MF40-7173	150		■							■			10	5.5		<145	<145		CW/CCW
MS40-7173	150				■	■	■			■			9.4	7.1		<145	<145		CW/CCW
MA41-7303	270	■							■				16 [1]	9.5	4.5	75	<20		CW/CCW
MA41-7303-502	270	■							■				16 [1]	9.5	4.5	75	<20	2	CW/CCW
MA41-7300	270	■										■	21	9.5	4.5	75	<20		CW/CCW
MA41-7300-502	270	■										■	21	9.5	4.5	75	<20	2	CW/CCW
MS41-7303	270				■		■		■				16 [1]	9.5	4.5	150 [4]	<20		CW/CCW
MS41-7303-502	270				■		■		■				16 [1]	9.5	4.5	150 [4]	<20	2	CW/CCW
MS41-7303-W02	270				■		■		■				16 [1]	9.5	4.5	150 [4]	<20	2	CW/CCW
MS41-7303-WH2	270				■		■		■				16 21 w/ heater [1]	9.5 21 w/ heater	4.5	150 [4]	<20	2	CW/CCW

[a] Proportional models with a 2…10 VDC control signal accept a 4…20 mA signal with the use of a 500 ohm resistor.
[1] Class 2 power source.
[2] 2…10 Vdc input signal has 100KΩ input impedance. Also compatible with two-position 24 Vac/Vdc input signals. See MS41-7303-xxx Alternate Input Signals section in this document. Use optional AM-708 500 ohm resistor for 4…20 mA input signal.
[3] Also compatible with floating, pulse width modulating (PWM), and other DC signal inputs with use of the BEL-ZTH US Handheld Interface Module for Field Programming.
[4] Timing field adjustable from 60…150 seconds with use of the BEL-ZTH US Handheld Interface Module for Field Programming.

Mx4D-703x/803x Series
30 lb-in Direct Coupled SR

Mx4D-703x and Mx4D-803x Series
30 lb-in Direct Coupled Damper Actuators

Features

- Two position models controlled by SPST controller
- Floating models controlled by SPDT floating controllers
- Jumper selectable control function direct/reverse action
- Spring return models provide 30 in-lb (3.4 N-m) of torque
- Polymer housing rated for NEMA 2/IP54
- Overload protection throughout stroke
- Floating and proportional models automatically adjust input span to match the damper/valve travel
- Compact size allows installation in limited space
- Manual override allows positioning of dampers and valves
- Directly mounts to 1/2…3" Schneider Electric ball valves
- Polymer housing rated for plenum use



Product Description

Designed for controlling air dampers in building systems that require fail safe return, with two position, floating or proportional control.

Specs	
Control Signal	Refer to the tables for actuator models and control types.
Power Inputs	See table.
Connections	3 ft (91 cm) appliance or plenum cables, enclosure accepts 1/2" (13 mm) conduit connector.
Electrical Outputs	Position Feedback Voltage (proportional or floating only): For voltage ranges, the feedback signal is the same range as the input signal. The 4…20 mA current range and floating actuators have a 2…10 Vdc feedback signal. The feedback signal can supply up to 0.5 mA to operate up to four additional slave actuators.
Mechanical Outputs	Travel: 93° nominal. Manual Override: Allows positioning of damper or valve using manual crank. RA/DA Jumper: Permits reverse acting/direct acting control (MS4D models only).
Ambient Temperature Limits	Shipping & Storage: -40…160°F (-40…71°C). Operating: -22…140°F (-30…60°C). Humidity: 15…95% RH, non-condensing.

Location	NEMA 1. NEMA 2, UL Type 2 (IEC IP54) with customer supplied water tight conduit connectors. Enclosure is air plenum rated.
Agency Listings	UL 873: Underwriters Laboratories (File #E9429 Category Temperature-Indicating and Regulating Equipment). CUL: UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93. This product fits in Installation Category (Overvoltage Category) II per EN 61010-1.
Applicable Literature	F-27170 Selection Guide

Part Number	Torque lb-in (N-m)	Spring Return	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F	
			Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered	Spring Return
MA4D-7033-100	30 (3.4)	CCW	2 Position	24 Vac/dc	5.1	—	No	56	23
MA4D-7030-000	30 (3.4)	CCW	2 Position	120 Vac	7.8	—	No	56	23
MA4D-8033-100	30 (3.4)	CW	2 Position	24 Vac/dc	5.1	—	No	56	23
MA4D-8030-000	30 (3.4)	CW	2 Position	120 Vac	7.8	—	No	56	23
MF4D-7033-100	30 (3.4)	CCW	Floating	24 Vac/dc	6.8	2…10 vdc	No	85	21
MF4D-8033-100	30 (3.4)	CW	Floating	24 Vac/dc	6.8	2…10 vdc	No	85	21
MS4D-7033-100	30 (3.4)	CCW	2…10 vdc	24 Vac/dc	6.1	2…10 vdc	No	85	21
MS4D-7033-150	30 (3.4)	CCW	0…10 vdc	24 Vac/dc	6.1	0…10 vdc	No	85	21
MS4D-7033-160	30 (3.4)	CCW	4…20 ma	24 Vac/dc	6.1	2…10 vdc	No	85	21
MS4D-8033-100	30 (3.4)	CW	2…10 vdc	24 Vac/dc	6.1	2…10 vdc	No	85	21
MS4D-8033-150	30 (3.4)	CW	0…10 vdc	24 Vac/dc	6.1	0…10 vdc	No	85	21
MS4D-8033-160	30 (3.4)	CW	4…20 ma	24 Vac/dc	6.1	2…10 vdc	No	85	21

Mx40-704x Series 35 lb-in Direct Coupled SR

Mx40-704x Series
35 lb-in Direct Coupled Actuators

Features

- Direct mount to round or square damper shaft
- 35 lb-in (4 N-m) torque rating
- Overload protection throughout rotation
- Optional built-in auxiliary switches
- True mechanical clockwise or counterclockwise spring return operation for reliable, positive close-off in airtight applications
- Visual position indicator
- Direct acting or reverse acting control mode available on proportional models
- Rotation limiting available
- Rugged die-cast housing for NEMA 2/IP54 rating



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Product Description

For spring return applications requiring floating, two-position, or proportional modulation control of dampers and valves in HVAC systems. Directly mounts to ½"…3" Schneider Electric ball valves.

Specs	
Control Signal	On-off, SPST control contacts or Triacs (500 mA rated). Floating point control, 24 Vac. Proportional, 2…10 Vdc or 4…20 mA dc with a 500 W resistor.
Power Inputs	See table.
Connections	3 ft. (91 cm) appliance cables, 1/2 in. conduit connector.
Electrical Outputs	Position Feedback Voltage "AO": 2…10 Vdc (maximum 0.5 mA) output signal for position feedback or operation of up to four slave actuators. One auxiliary switch available (select models). SPDT 6a resistive @24 Vac or 250 Vac.
Mechanical Outputs	Travel Rotation is limited to 95° ± 5° maximum, adjustable from 40…95 ° with a mechanical stop. RA/DA Switch: selects direct acting or reverse acting for proportional models. Position Indicator: Visual indicator, 0…1 (0 is the spring-return position).

Ambient Temperature Limits	Shipping & Storage, -40 F…160°F (-40…71°C). Operating, -22…140°F (-30…60°C). Humidity: 5…95% RH, non-condensing.
Location	NEMA 2 (IEC IP54)
Agency Listings	UL 873: Underwriters Laboratories (File # E9429 Category Temperature-Indicating and Regulating Equipment). CUL: UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24.
Applicable Literature	F-26646 Selection Guide

Part Number	Torque lb-in (N-m)	Spring Return	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F	
			Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered	Spring Return
MA40-7040	35 (4)	CW/CCW	2 Position	120 Vac	4.3	—	—	<50	<28
MA40-7040-501	35 (4)	CW/CCW	2 Position	120 Vac	4.3	—	1-SPDT (250 Vac)	<50	<28
MA40-7041	35 (4)	CW/CCW	2 Position	230 Vac	4.6	—	—	<50	<28
MA40-7041-501	35 (4)	CW/CCW	2 Position	230 Vac	4.6	—	1-SPDT (250 Vac)	<50	<28
MA40-7043	35 (4)	CW/CCW	2 Position	24 Vac/dc	4.4	—	—	<50	<28
MA40-7043-501	35 (4)	CW/CCW	2 Position	24 Vac/dc	4.4	—	1-SPDT (24 Vac)	<50	<28
MF40-7043	35 (4)	CW/CCW	Floating	24 Vac/dc	5.9	—	—	<130	<25
MF40-7043-501	35 (4)	CW/CCW	Floating	24 Vac/dc	5.9	—	1-SPDT (24 Vac)	<130	<25
MS40-7043	35 (4)	CW/CCW	2…10 vdc	24 Vac/dc	5.9	2…10 vdc	—	<130	<25
MS40-7043-501	35 (4)	CW/CCW	2…10 vdc	24 Vac/dc	5.9	2…10 vdc	1-SPDT (24 Vac)	<130	<25

Mx41-7xxx Series 60 lb-in/133 lb-in Direct Coupled SR

Mx41-7xxx Series

60 lb-in and 133 lb-in Direct Coupled Damper Actuators



Features

- Direct mount to round or square damper shaft
- 60 lb-in (7 N-m) and 133 lb-in (15 N-m) torque rating
- Overload protection throughout rotation
- Optional built-in auxiliary switches
- Provides true mechanical clockwise or counterclockwise spring return operation for reliable positive close-off in airtight applications
- Direct acting or reverse acting control mode available on proportional models
- Rotation limiting available
- Rugged die-cast housing for NEMA 2/IP54 rating
- Manual override
- 5-year warranty

Product Description

Designed for controlling air dampers in building systems that require fail safe return, with two position, floating or proportional control.

Specs	
Control Signal	On-off, SPST control contacts or Triacs (500 mA rated). Floating point control, 24 Vac. Proportional, 2…10 Vdc or 4…20 mA dc with a 500 W resistor.
Power Inputs	See table.
Connections	3 ft. appliance cables, 1/2 in. conduit connector.
Electrical Outputs	Position Feedback Voltage "AO": 2…10 Vdc (maximum 0.5 mA) output signal for position feedback or operation of up to four slave actuators. Two auxiliary switches available (select models). SPDT 7a resistive @24 Vac or 250 Vac.
Mechanical Outputs	Travel Rotation is limited to 95° ± 5° maximum, adjustable from 30…95 ° with a mechanical stop. Position Indicator: Pointer and scale are provided. Manual Override: manual adjustable rotation -5°…85°.

Ambient Temperature Limits	Shipping & Storage: -40 F…160°F (-40…71°C). Operating: -22…140°F (-30…60°C). Humidity: 5…95% RH, non-condensing.
Location	NEMA 1, NEMA 2 (IEC IP54) with conduit connector in down position.
Agency Listings	UL 873: Underwriters Laboratories (File # E9429 Category Temperature-Indicating and Regulating Equipment). CUL: UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24.
Applicable Literature	F-26646 Selection Guide

Part Number	Torque lb-in (N-m)	Spring Return	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F	
			Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered	Spring Return
MA41-7070	60 (7)	CW/CCW	2 Position	120 Vac	5.6	—	—	<80	<40
MA41-7070-502	60 (7)	CW/CCW	2 Position	120 Vac	5.6	—	2-SPDT (250 Vac)	<80	<40
MA41-7071	60 (7)	CW/CCW	2 Position	230 Vac	8.0	—	—	<80	<40
MA41-7071-502	60 (7)	CW/CCW	2 Position	230 Vac	8.0	—	2-SPDT (250 Vac)	<80	<40
MA41-7073	60 (7)	CW/CCW	2 Position	24 Vac/dc	4.8	—	—	<80	<40
MA41-7073-502	60 (7)	CW/CCW	2 Position	24 Vac/dc	4.8	—	2-SPDT (24 Vac)	<80	<40
MA41-7150	133 (15)	CW/CCW	2 Position	120 Vac	10.0	—	—	<190	<30
MA41-7150-502	133 (15)	CW/CCW	2 Position	120 Vac	10.0	—	2-SPDT (250 Vac)	<190	<30
MA41-7153	133 (15)	CW/CCW	2 Position	24 Vac/dc	9.7	—	—	<190	<30
MA41-7153-502	133 (15)	CW/CCW	2 Position	24 Vac/dc	9.7	—	2-SPDT (24 Vac)	<190	<30
MF41-7073	60 (7)	CW/CCW	Floating	24 Vac/dc	6.2	—	—	<195	<30
MF41-7073-502	60 (7)	CW/CCW	Floating	24 Vac/dc	6.2	—	2-SPDT (24 Vac)	<195	<30
MF41-7153	133 (15)	CW/CCW	Floating	24 Vac/dc	9.7	—	—	<190	<30
MF41-7153-502	133 (15)	CW/CCW	Floating	24 Vac/dc	9.7	—	2-SPDT (24 Vac)	<190	<30
MS41-7073	60 (7)	CW/CCW	2…10vdc	24 Vac/dc	5.8	2…10 vdc	—	<195	<30
MS41-7073-502	60 (7)	CW/CCW	2…10vdc	24 Vac/dc	5.8	2…10 vdc	2-SPDT (24 Vac)	<195	<30
MS41-7153	133 (15)	CW/CCW	2…10vdc	24 Vac/dc	9.7	2…10 vdc		<190	<30
MS41-7153-502	133 (15)	CW/CCW	2…10vdc	24 Vac/dc	9.7	2…10 vdc	2-SPDT (24 Vac)	<190	<30

Mx40-717x Series 150 lb-in Direct Coupled SR

Mx40-717x Series
150 lb-in Direct Coupled Actuators

Features

- Direct mount to round or square damper shaft
- 150 lb-in (17 N-m) torque rating, overload protection throughout rotation
- Oil immersed gear train provides continuous lubrication
- Automatic current sensing motor control provides extended reliability and repeatable timing
- Provides true mechanical clockwise or counterclockwise spring return operation for reliable positive close-off in airtight applications
- NEMA 4 housing (IEC IP56)
- Can be double mounted (gang mounting) to accommodate high torque application requirements (2 to 4 actuators)
- MS40-717x models provide position feedback signal
- Linkage required for Globe Valve Assembly.



Product Description

Designed for controlling air dampers in building systems that require fail safe return, with two position, floating or proportional control.

Specs	
Control Signal	Two wire, SPST or Triacs. SPDT floating control output, Triacs (500 mA rated), or 2 SPST contacts. Proportional, 2…10 Vdc or 4…20 mA dc with the addition of a 500 ohm resistor (not included).
Power Inputs	See table.
Connections	Class 1: 24 inch (61 cm) long appliance cables, 18 AWG color coded leads. 1/2 in. conduit connector. Class 2 Power and Control: 36 inch (91 cm) Long, 22 AWG color coded appliance cable pigtail leads. 1/2 in. conduit connector.
Electrical Outputs	Travel: Electronically limited…92° ±1° (MS). MF-MA Mechanically limited to 101° ±1°.
Mechanical Outputs	Position Indicator: Pointer and scale are provided.

Ambient Temperature Limits	Shipping & Storage: -40 F…160°F (-40…71°C). Operating: -25…140 °F (-32…60 °C). Humidity: 5…95% RH, non-condensing.
Location	NEMA 1 (IEC IP10). NEMA 4 (IEC IP 56) with customer supplied water tight conduit connectors.
Agency Listings	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment). Canadian Standards C22.2 No. 24-93.
Applicable Literature	F-26646 Selection Guide

Part Number	Torque lb-in (N-m)	Spring Return	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F	
			Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered	Spring Return
MA40-7170	150 (17)	CW/CCW		120 Vac	8.4	—	No	162	82
MA40-7173	150 (17)	CW/CCW		24 Vac/dc	7.4	—	No	162	82
MF40-7173	150 (17)	CW/CCW	Floating	24 Vac/dc	8.1	—	No	162	82
MS40-7170	150 (17)	CW/CCW	2…10 vdc	120 Vac	8.5	2…10 vdc	No	147	65
MS40-7173	150 (17)	CW/CCW	2…10 vdc	24 Vac/dc	7.8	2…10 vdc	No	147	65

Mx41-730x Series 270 lb-in SR SmartX Damper Actuators

Mx41-730x Series

270 lb-in Spring Return SmartX Damper Actuators

Features

- 270 lb-in (30 N-m) of torque with mechanical spring return, manual override, and Brushless DC Motor.
- Stall protected throughout rotation and reversible mounting.
- Models for Two Position 24 Vac/Vdc, and Two Position 100…230 Vac applications.
- Models for 2…10 Vdc input signal applications (field configurable for other input signals) with a position feedback signal and direct/reverse acting control mode selection switch on both sides.
- Models for auxiliary switch applications.
- Models for NEMA 4 / IP66 outdoor applications.
- Direct mount to ½"…¾" round or ½"…11/16" square damper shafts or to ¾"…1.05" round with the field removal of a clamp insert.
- 95° of rotation, adjustable with mechanical end stops and graduated position indicator showing 0°…95°.
- Can be double-mounted (gang mounting) to accommodate high torque application requirements.
- 5 Year warranty.





Product Description

Mx41-730x Series Spring Return SmartX Actuators are available with Two Position 24 Vac/Vdc, Two Position 100…230 Vac, and 2…10 Vdc input signal applications. It is possible to field configure the 2…10 Vdc input signal models for other input signals such as floating and pulse width modulating (PWM).

Specs	
Control Signal	Two Position, 2-10 Vdc [1]
Optional Control Signal (MS41 models only)	Floating, Pulse width modulating (PWM), Adjustable start point, and Span DC signal inputs with use of the BEL-ZTH US handheld interface module for field programming
Power Inputs	See table.
Connections	3' appliance cord with 18 Ga. (0.9 mm) conductors and one 1/2" conduit connector -WO2/-WH2 models: Removable terminal blocks
Electrical Outputs	Position Feedback: 2…10 Vdc, 0.5 mA max, adjustable with optional BEL-ZTH US Handheld Interface Module for Field Programming Auxiliary Switch: 2 SPDT 3 A (0.5 A) @ 250 Vac (select models; see table)
Mechanical Outputs	Travel: Angle of rotation 95° max. Position Indicator: Graduated position indicator showing 0° … 95° Manual Override: Actuators provided with 5 mm hex crank
Ambient Temperature Limits	Operating: -22 … 122 °F (-30…50 °C) Shipping & Storage: -40 … 176 °F (-40…80 °C) Operating Humidity: 0 … 95% non-condensing
Location	NEMA 2 and NEMA 4 (select models; see table)
Agency Listings	cULus according to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE according to 2004/108/EC & 2006/95/EC, Rated Impulse Voltage 2.5kV for 100-240 Vac models (800V for 24 Vac models), Type of action 1.AA (1.AA.B for actuators with auxiliary switches)
Applicable Literature	F-27870 Selection Guide

[1] Also compatible with other two position, floating, PWM, and proportional input signals, refer to the SmartX Actuators Spring Return Damper Mx-730x Series General Instructions Sheet, F-27870.

Part Number	Torque lb-in (N-m)	Spring Return	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F			
			Control	Voltage	VA @ 60Hz	Feedback	Aux. Switch	Powered	Spring Return	NEMA 4	Heater
MA41-7303	270 (30)	CW/ CCW	Two Position	24 Vac	16 VA	-	-	75	<20	-	-
MA41-7303-502	270 (30)	CW/ CCW	Two Position	24 Vac	16 VA	-	2	75	<20	-	-
MA41-7300	270 (30)	CW/ CCW	Two Position	100…240 Vac	21 VA at 100 Vac, 29 VA at 240 Vac	-	-	75	<20	-	-
MA41-7300-502	270 (30)	CW/ CCW	Two Position	100…240 Vac	21 VA at 100 Vac, 29 VA at 240 Vac	-	2	75	<20	-	-
MS41-7303	270 (30)	CW/ CCW	2…10 Vdc	24 Vac	16 VA	2…10 Vdc, 0.5 mA	-	150	<20	-	-
MS41-7303-502	270 (30)	CW/ CCW	2…10 Vdc	24 Vac	16 VA	2…10 Vdc, 0.5 mA	2	150	<20	-	-
MS41-7303-W02	270 (30)	CW/ CCW	2…10 Vdc	24 Vac	16 VA	2…10 Vdc, 0.5 mA	2	150	<20	Yes	
MS41-7303-WH2	270 (30)	CW/ CCW	2…10 Vdc	24 Vac	16 VA and 21 W heater	2…10 Vdc, 0.5 mA	2	150	<20	Yes	Yes

Overview - Non-Spring Return Direct Coupled Actuators

Direct coupled easy to install, and available with torque ranges from 35…300 lb-in for floating or proportional control.



Value-Driven General Purpose Applications

Mx4D-60xx series

- 35 in-lb (4 N-m) or 70 in-lb (8 N-m) of torque
- Two position models controlled by SPST controller
- Floating models controlled by SPDT floating controllers
- Proportional models controlled by 0…3 Vdc, 6…9 Vdc, 0…10 Vdc, 2…10 Vdc or 4…20 mAdc with the addition of a 500 ohm resistor. Control function direct/reverse action is jumper selectable
- Polymer housing rated for NEMA 2/IP54
- Overload protection throughout stroke
- Floating and proportional models automatically adjust the input span to match the damper/valve travel
- Compact size to allow installation in limited space
- Manual override to allow positioning of dampers and valves
- Directly mounts to 1/2…3" Schneider Electric ball valves
- Polymer housing rated for plenum use



High Performance HVAC Applications

Mx41-60xx series

- 44 lb-in (5 N-m) and 88 lb-in (10 N-m) torque
- Compact, lightweight design.
- Easy-to-see position indicator.
- Self-adapting capability for maximum flexibility in damper positioning.
- Quiet, low-power operation.
- Manual Override.
- Plenum cable standard.
- Independently adjustable dual auxiliary switches option available (MX41-6043-5X2).
- Feedback potentiometer option available (MF41-6043-510).
- Feedback position output signal available (MS41-6043 Series).
- Adjustable start/span option available (MS41-6043-52X).



Mx41-6153 series

- Synchronous motor technology with stall protection
- Unique self-centering shaft coupling
- Manual override
- 133 lb-in (15 N-m) torque
- 5° preload as shipped from factory
- Mechanical range adjustment capabilities
- Offset and span adjustment models available
- Models with independently adjustable, dual auxiliary switches available
- Built-in ½" conduit connection
- UL and cUL listed, CE certified



Damp and Harsh Environment Applications

Mx41-63xx series

- 300 lb-in (34 N-m) torque
- NEMA Type 4 housing (IEC IP56)
- Custom automatic current sensing motor control provides extended reliability and repeatable timing
- Direct coupled to the damper shaft with dual industrial hardened universal mounting clamps
- Integral wiring for proportional control by 2…10 Vdc or 4…20 mA dc[1]
- Clockwise or counterclockwise rotation is determined by actuator mounting position
- Manual override for ease of installation and manual operation of damper
- Accurate 92° travel digitally controlled
- Integral position indication scale
- Rugged die-cast housing
- Oil immersed gear train provides continuous lubrication
- Rated for operating temperatures up to 140 °F (60 °C)
- Five year warranty
- MS41-634x SmartX Actuators can be double mounted (gang mounting) to accommodate high torque application requirements (2 to 4 actuators)
- Position feedback signal

Non-Spring Return Direct Coupled Actuators Matrix

Non-Spring Return Electronic Damper Actuators

	Output Torque lb-in		Type of Control				Feedback			Power				Power Input			Running Time (sec)	Auxiliary Switch	
				Proportional											Running	Holding			
	Min	Max Stall	Floating	0...10 VDC	2...10 VDC[a]	4...20 mA	2...10 VDC	0...10 VDC	0...1000 Ohm < 10 mA	24 VAC ± 20% or 20-30 VDC	24 VAC + 20% -15 %	24 VAC ± 20%	120 VAC ± 10%	VA	W	W	Powered	SPDT, 6A, Resistive, 24 VAC	24 VAC 4A Resistive
MF4D-6043-100	35		■				■			■				4.4	2.7	1.7	85		
MS4D-6043-100					■		■			■				4.2	2.2	1.2			
MS4D-6043-150				■				■			■								
MS4D-6043-160						■	■			■									
MF41-6043	44		■								■			2.3			90		
MS41-6043				■		■		■			■			3.3			90		
MF4D-6083-100	70		■				■			■				5.9	3.6	1.6	85		
MS4D-6083-100					■		■			■				5.2	2.7	1.4			
MS4D-6083-150				■				■			■								
MS4D-6083-160						■	■			■									
MF41-6083	88		■								■			2.3					
MF41-6083-502			■								■								2
MS41-6083				■		■		■			■			3.3					
MS41-6083-502				■		■		■			■								2
MF41-6153	133		■								■			3					
MS41-6153				■		■		■			■			5	4	4			
MS41-6153-502				■		■		■			■					1		2	
MF41-6343	300	600	■									■		7.1	3.8	3.6	<145		
MS41-6343					■	■	■					■		8	10				
MS41-6340					■	■	■						■						

[a] Proportional models with a 2...10 VDC control signal accept a 4...20 mA signal with the use of a 500 ohm resistor.

Mx4D-60x3 Series 35 lb-in/70 lb-in Direct Coupled NSR

Mx4D-60x3 Series
35 lb-in and 70 lb-in Direct Coupled Damper Actuators

Features

- Two position models controlled by SPST controller
- Floating models controlled by SPDT floating controllers
- Proportional models controlled by 0…3 Vdc, 6…9 Vdc, 0…10 Vdc, 2…10 Vdc or 4…20 mAdc with the addition of a 500 ohm resistor. Control function direct/reverse action is jumper selectable
- 35 in-lb (4 N-m) or 70 in-lb (8 N-m) of torque
- Polymer housing rated for NEMA 2/IP54
- Overload protection throughout stroke
- Floating and proportional models automatically adjust the input span to match the damper/valve travel
- Compact size to allow installation in limited space
- Manual override to allow positioning of dampers and valves
- Directly mounts to 1/2…3" Schneider Electric ball valves
- Polymer housing rated for plenum use



Product Description

Rotary overshaft SmartX Actuators provide an economical and reliable solution for many overshaft damper and Schneider Electric ball valve requirements. All products accommodate shaft sizes up to 1/2" (13 mm) in diameter.

Specs	
Control Signal	Two position: SPST controller Floating: SPDT floating controllers Proportional: 0…3 Vdc, 6…9 Vdc, 0…10 Vdc, 2…10 Vdc or 4…20 mAdc with the addition of a 500 ohm resistor. Control function direct/reverse action is jumper selectable
Power Inputs	See table.
Connections	3 ft (91 cm) appliance or plenum cables, enclosure accepts 1/2" (13 mm) conduit connector. For M20 Metric conduit, use AM-756 adaptor.
Electrical Outputs	Position Feedback Voltage (proportional or floating only), For voltage ranges, the feedback signal is the same range as the input signal. The 4…20 mA current range and floating actuators have a 2…10 Vdc feedback signal. The feedback signal can supply up to 0.5 mA to operate up to four additional slave actuators.

Mechanical Outputs	Timing: 85 seconds @ 70°F Travel: 93° nominal. Manual Override allows positioning of damper or valve using manual crank. RA/DA Jumper, Permits reverse acting/direct acting control (MS4D models only).
Ambient Temperature Limits	Shipping & Storage, -40…160°F (-40…71°C). Operating, -22…140°F (-30…60°C). Humidity: 15…95% RH, non-condensing.
Location	NEMA 1. NEMA 2, UL Type 2 (IEC IP54) with customer supplied water tight conduit connectors. Enclosure is air plenum rated.
Agency Listings	UL 873: Underwriters Laboratories (File #E9429 Category Temperature-Indicating and Regulating Equipment). CUL: UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93.
Applicable Literature	F-27170 Selection Guide

Part Number	Torque lb-in (N-m)	Actuator Inputs			Outputs		Approximate Timing in sec. @ 70°F
		Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered
MF4D-6043-100	35 (4)	Floating	24 Vac/dc	4.4	2…10 vdc	No	85
MF4D-6083-100	70 (8)	Floating	24 Vac/dc	5.9	2…10 vdc	No	85
MS4D-6043-100	35 (4)	2…10 vdc	24 Vac/dc	4.2	2…10 vdc	No	85
MS4D-6043-150	35 (4)	0…10 vdc	24 Vac/dc	4.2	0…10 vdc	No	85
MS4D-6043-160	35 (4)	4…20 ma	24 Vac/dc	4.2	2…10 vdc	No	85
MS4D-6083-100	70 (8)	2…10 vdc	24 Vac/dc	5.2	2…10 vdc	No	85
MS4D-6083-150	70 (8)	0…10 vdc	24 Vac/dc	5.2	0…10 vdc	No	85
MS4D-6083-160	70 (8)	4…20 ma	24 Vac/dc	5.2	2…10 vdc	No	85

Mx41-60x3 Series 44/88 lb-in Direct Coupled NSR

Mx41-60x3 Series

44 lb-in and 88 lb-in Direct Coupled Damper Actuators

Features

- Compact, lightweight design.
- Easy-to-see position indicator.
- Self-adapting capability for maximum flexibility in damper positioning.
- Quiet, low-power operation.
- Manual Override.
- Plenum cable standard.
- Independently adjustable dual auxiliary switches option available (MX41-6043-5X2).
- Feedback position output signal available (MS41-6043 Series).



Product Description

These direct coupled 24 Vac Non-Spring Return rotary electric SmartX Actuators are designed for three position (floating) control of dampers.

Specs	
Control Signal	Floating: 24 Vac Proportional: 0…10 Vdc
Power Inputs	See Table.
Connections	3 ft. (0.9 m) long, 18 AWG plenum-rated leads
Electrical Outputs	Feedback potentiometer available for MF41-6043: 0…1000 ohms < 10 mA Position feedback voltage for MS41-6043/6083: 0…10 Vdc, 1 mA Auxiliary Switches: Dual auxiliary switches available with MF41-6043/6083-502, MS41-6043/6083-502, and MS41-6083-522 when these actuators are ordered as separate units. Auxiliary switches are not offered with factory ball valve assemblies.
Mechanical Outputs	Travel: Normal angle of rotation is 90°, limited to a maximum of 95°. Field adjustable to limit travel on either end of stroke.

Ambient Temperature Limits	Shipping and storage: -40…158 °F (-40…70 °C) ambient. Operating: -25…130 °F (-32…55 °C) ambient. NOTE: Check the valve operating temperature limit. The minimum valve temperature limit is 20 °F (6.7 °C) 5…95% RH, non-condensing.
Location	NEMA Type 2 (IEC IP54)
Agency Listings	UL 873 cUL certified to Canadian Standard C22.2 No. 24-93
Applicable Literature	F-26646 Selection Guide

Part Number	Torque lb-in (N-m)	Actuator Inputs			Outputs		Approximate Timing in sec. @ 70°F
		Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered
MF41-6043	44 (5)	Floating	24 Vac	2.3	—	—	90
MF41-6083	88 (10)	Floating	24 Vac	2.3	—	—	125
MF41-6083-502	88 (10)	Floating	24 Vac	2.3	—	2-SPDT	125
MS41-6043	44 (5)	0…10 vdc	24 Vac	3.3	0…10 vdc	—	90
MS41-6083	88 (10)	0…10 vdc	24 Vac	3.3	0…10 vdc	—	125
MS41-6083-502	88 (10)	0…10 vdc	24 Vac	3.3	0…10 vdc	2-SPDT	125

Mx41-6153 Series 133 lb-in Direct Coupled NSR

Mx41-6153 Series
133 lb-in Direct Coupled Damper Actuators

Features

- Synchronous motor technology with stall protection
- Unique self-centering shaft coupling
- Manual override
- 133 lb-in (15 N-m) torque
- 5° preload as shipped from factory
- Mechanical range adjustment capabilities
- Offset and span adjustment models available
- Models with independently adjustable, dual auxiliary switches available
- Built-in ½" conduit connection
- UL and cUL listed, CE certified



Product Description

The direct-coupled, 24 Vac, non-spring return electronic SmartX actuator is designed for modulating and three-position control of building HVAC dampers requiring up to 133 lb-in (15 N-m) torque.

Specs	
Control Signal	Floating: 24 Vac Proportional: 0…10 Vdc
Power Inputs	See Table.
Connections	3 ft. (0.9 m) long, 18 AWG leads
Electrical Outputs	Position output signal (wires 9-2) MS41-6153 Series Voltage-output 0…10 Vdc Maximum output current ±1 mA Dual SPDT auxiliary switches available on MS41-6153-502 only.
Mechanical Outputs	Nominal angle of rotation 90° Maximum angular rotation 95°

Ambient Temperature Limits	Operating temperature: –25°F…130°F (–32°C…55°C) Storage temperature: –40°F…158°F (–40°C…70°C) Ambient humidity: 95% rh (non-condensing)
Location	NEMA 1/IP54 according to EN 60 529
Agency Listings	UL 873; cUL C22.2 No. 24-93 Electromagnetic compatibility (EMC) 89/336/EEC Emissions Standards EN 50 081-1 Immunity Standards EN 61 000-6-2
Applicable Literature	F-26646 Selection Guide

Part Number	Torque lb-in (N-m)	Actuator Inputs			Outputs		Approximate Timing in sec. @ 70°F
		Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered
MF41-6153	133 (15)	Floating	24 Vac	3	—	—	125
MS41-6153	133 (15)	0…10 vdc	24 Vac	5	0…10 vdc	—	125
MS41-6153-502	133 (15)	0…10 vdc	24 Vac	5	0…10 vdc	2-SPDT	125

Mx41-634x Series 300 lb-in Direct Coupled NSR

Mx41-634x Series
300 lb-in Direct Coupled Damper Actuators

Features

- 300 lb-in (34 N-m) rated torque
- NEMA Type 4 housing (IEC IP56)
- Custom automatic current sensing motor control provides extended reliability and repeatable timing
- Direct coupled to the damper shaft with dual industrial hardened universal mounting clamps
- Integral wiring for proportional control by 2…10 Vdc or 4…20 mA dc[1]
- Clockwise or counterclockwise rotation is determined by actuator mounting position
- Manual override for ease of installation and manual operation of damper
- Accurate 92° travel digitally controlled
- Integral position indication scale
- Rugged die-cast housing
- Oil immersed gear train provides continuous lubrication
- Rated for operating temperatures up to 140 °F (60 °C)
- Five year warranty
- MS41-634x SmartX Actuators can be double mounted (gang mounting) to accommodate high torque application requirements (2 to 4 actuators)
- Position feedback signal



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Product Description

Direct Coupled SmartX Actuators are designed to be used in both damper and valve control applications. The MS41-634x series actuators are over the shaft non-spring return actuators compatible with 2…10 Vdc or 4…20 mA dc[1] control signals.

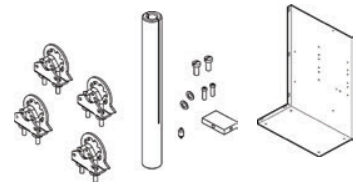
Specs	
Control Signal	SPDT floating control input; Triacs (500 mA rated) or 2 SPST contacts Floating: 24 Vac ± 20% Proportional: 2-10 Vdc 4-20 mAdc[a]
Power Inputs	See table.
Connections	3 ft. (91 cm) Appliance cable, ½" conduit connectors
Electrical Outputs	Travel: Mechanically limited to 101° ±1°
Mechanical Outputs	Overload Protection: Throughout rotation. Angle of Rotation: 93° nominal. Position Indication: Scale numbered from 0…95° Manual Override: Allows manual positioning.
Ambient Temperature Limits	Shipping & Storage, -40…160°F (-40…71°C). Operating, -25…140°F (-32…60°C). Humidity 5…95% non-condensing

Location	NEMA Type 1. NEMA Type 4 (IEC IP56) with customer supplied water tight conduit connectors
Agency Listings	UL-873. EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No. 24-93.
Applicable Literature	F-26646 Selection Guide

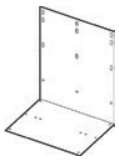
[a] With the addition of a 500 ohm resistor (AM-708).

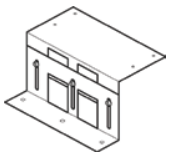
Part Number	Torque lb-in (N-m)	Actuator Inputs			Outputs		Approximate Timing in sec. @ 70°F
		Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered
MF41-6343	300 (34)	Floating	24 Vac/dc	5.7	—	No	162
MS41-6343	300 (34)	2…10 vdc	24 Vac/dc	5.6	2…10 vdc	No	148
MS41-6340	300 (34)	2…10 vdc	120 Vac	7.5	2…10 vdc	No	148

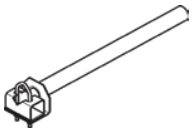
Damper Accessories


AM-621

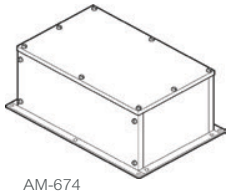
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AM-672


AM-673


AM-676

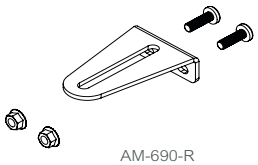

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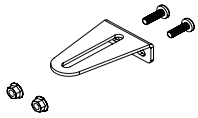

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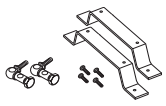

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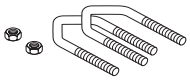

AM-688


AM-689


AM-690-R


AM-693-R

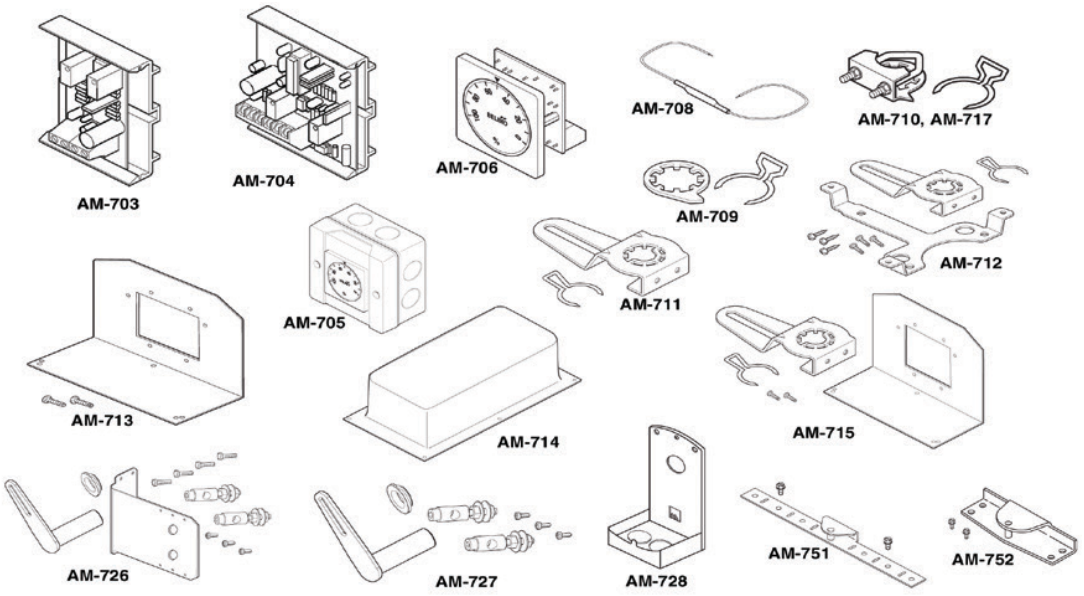



AM-692

Part Number	Description	Spring Return Actuators									Non Spring Return Actuators							
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717x MF40-7173	MS40-7173	MS4D-x033	MF41-6043 MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	MS4D-60x3-1xx
AM-621	Round Shaft Extension					■	■	■	■							■	■	
AM-671[abcd]	Mounting Bracket	■	■	■	■	■	■											
AM-672[abcd]		■	■	■	■	■	■											
AM-673[c]		■	■	■	■	■	■											
AM-674	Weather Shield & Base	■	■	■	■	■	■	■	■							■	■	
AM-675		■	■	■	■	■	■											
AM-676	Shaft Extension	■	■	■	■	■	■	■	■							■	■	
AM-686	Position Indicator			■	■	■	■											
AM-687[e]	V-clamp			■	■	■	■											
AM-688	Replacement Universal Clamp			■	■	■	■											
AM-689	Rotation Limiter			■	■	■	■											
AM-690-R[i]	Crank Arm			■	■	■	■											
AM-691				■	■	■	■											
AM-692[f]	V-bolt			■	■	■	■											
AM-693-R[gh]	Crank Arm Kit			■	■	■	■											

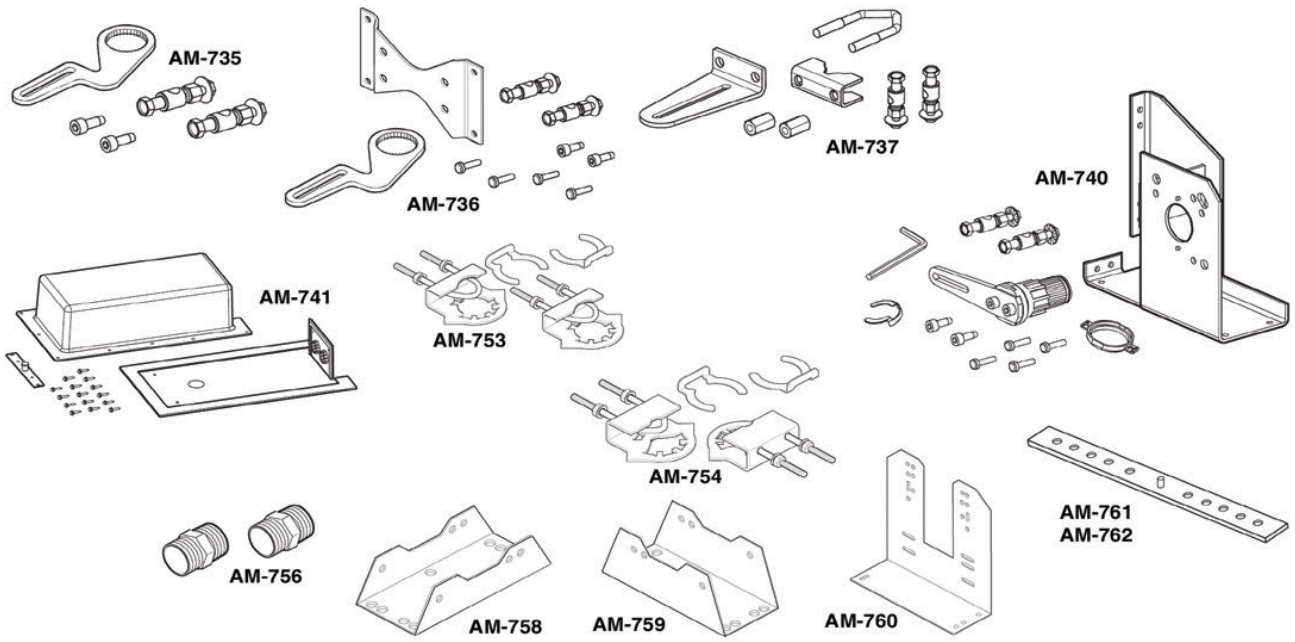
[a] AM-693 crank arm kit required.
[b] Cannot be used with Mx41-634x or Mx40-717x series actuators.
[c] Drill appropriate mounting holes where needed.
[d] The large "C"-shaped clamps included in AM-693 crank arm kit are required for mounting the actuator. Drill appropriate mounting holes where needed.
[e] For shafts to 1.05" diameter or 5/8" square.
[f] For shafts to 3/4" and 1.05" diameter (with AM-690 and AM-691, respectively).
[g] Use the self-tapping screws and flat washers provided in kit to mount actuator.
[h] AM-692 V-bolt kit required. The AM-693-R damper linkage kit is used in conjunction with the AM-687 or AM-688 universal clamps to provide a mechanical linkage between the damper actuator and the damper shaft when a direct coupling is not possible.
[i] Used in conjunction with the AM-687 or AM-688 universal clamps for crankarm functionality in non-direct mounting applications.

Damper Accessories



Part Number	Description	Spring Return Actuators									Non Spring Return Actuators								
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717x MF40-7173	MS40-7173	MS4D-x033	MF41-6043	MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	MS4D-60x3-1xx	Mx41-730x
AM-703	Span Adjustment		■		■		■		■				■		■		■	■		
AM-704	Modulation Interface		■		■		■		■				■		■		■	■		
AM-705	Positioner		■		■		■		■			■	■	■	■	■	■	■	■	
AM-706			■		■		■		■			■	■	■	■	■	■	■	■	
AM-708	500 Ω Resistor		■		■		■					■		■		■			■	
AM-709	Position Indicator & Stroke Limiter	■	■																	
AM-710[a]	V-clamp	■	■																	
AM-711	Crank Arm Adaptor Kit	■	■																	
AM-712		■	■																	
AM-713	Bracket	■	■																■	
AM-714	Weather Shield	■	■	■	■	■	■			■										
AM-715	Crank Arm Adaptor Kit	■	■																	
AM-717	Replacement Universal Clamp	■	■																	
AM-726	Crank Arm Adaptor		■								■	■	■	■						
AM-727			■								■	■	■	■						
AM-728[b]	Conduit Adaptor		■								■	■	■	■						
AM-751	Anti-rotation Bracket		■					■	■								■	■		
AM-752			■					■	■								■	■		
AM-801	Mx41-730x-xxx Actuator Crank Arm Kit																			■
AM-802	Mx41-730x-xxx Actuator Crank Arm Kit with Actuator Mounting Bracket and Two Ball Joints																			■
AM-803	9-3/4" damper Shaft Extension for 5/16"…1" Diameter Round Shafts		■	■	■	■	■	■	■								■	■		
AM-804	Jackshaft Linkage (requires AM-805 Support Plate for Mx41-73xx Actuators)		■	■	■	■	■	■	■								■	■		
AM-805	Support Plate for Mx41-73xx Actuators																			■
BEL-ZTH	US Handheld Interface Module for Field Programming of the MS41-7303-xxx Models																			■

a For shafts up to ¾" (19 mm) diameter round up to ½" (13 mm).
b Cannot be used when creating a linked valve/actuator assembly.



Part Number	Description	Spring Return Actuators									Non Spring Return Actuators							
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717x MF40-7173	MS40-7173	MS4D-x033	MF41-6043 MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	MS4D-60x3-1xx
AM-735	Crank Arm Kit													■	■			
AM-736	Crank Arm Kit with Bracket													■	■			
AM-737	Universal Crank Arm[a]													■	■			
AM-470	Replacement Kit													■	■			
AM-741	Weather Shield										■	■	■	■	■			
AM-753[b]	Mounting Clamp							■	■							■	■	
AM-754[c]								■	■							■	■	
AM-755	Manual Override Crank															■	■	
AM-756	Metric Conduit Adaptor	■	■	■	■	■	■	■	■	■						■	■	■
AM-758	Short "U" Mounting Bracket			■	■	■	■											
AM-759	Tall "U" Mounting Bracket			■	■	■	■											
AM-760	Slotted "L" Mounting Bracket			■	■	■	■											
AM-761	7-inch Anti-rotation Bracket	■	■															
AM-762	9-inch Anti-rotation Bracket	■	■	■	■	■	■	■	■							■	■	
AM-763	Manual Override Crank			[d]	[d]	[d]	[d]											■
TF-711-02	Seallight Conduit Connector							■	■								■	■
TF-713-02								■	■								■	■
TF-5521	Pipe Plug							■	■								■	■

[a] For Honeywell Floor Mount Mod. Motor.
[b] For shafts ¾" (19 mm) round and 5/8" (15.9 mm) square.
[c] For shafts 3/8"…½" (10…13 mm) round and square.
[d] Only used on Mx41-707x-xxx, Mx41-715x-xxx.

Notes

2. VB-7xxx Series Globe Valves ½" to 2"



Globe Valve Actuator Ranges and Valve Body Families

Range Name	Description	Family	Electric Non Spring Return Operation				Electric Spring Return Operation			Pneumatic Spring Return Operation	
			Proportional	Floating	Pulse Width Modulated	Two Position	Proportional	Floating	Two Position	Proportional: Two Position	Proportional with Positive positioner
SmartX	Originally developed by Schneider Electric in the United States under the DuraDrive brand. Upgraded in 2015 to SmartX with new features.	Mx51-710x					●	●	●		
		Mx51-720x, Mx61-720x [1]					●	●	●		
		MG350V	● New	● New	● New	● New					
Forta	Developed by Schneider Electric in Europe. Introduced to North America in 2008 because of its flexibility and ease of setup. [2]	M400, M800, M1500	●			● 3-Wire					
		M900					● Coming Soon		● Coming Soon		
Legacy	Earlier North American actuators developed by Schneider Electric; (Barber Colman, Siebe, Invensys). still popular because of their value and reliability.	MK-2690, MK-4xxx, MK-6xxx, MK-8xxx								●	●
		MA-521x, MP-521x, MP-541x, MP-5513, MPR-5613					●		●		

[1] The Mx51-720x, Mx61-720x actuator are higher force versions of the Mx51-710x for large valves and high close-off applications.
[2] Forta actuators have universal inputs for proportional and floating operation. The new M900 Forta actuator will have both spring return up and down and NEMA 4 options.

Valve Body Families

Valve Size	VB-7xxx (two way NC, two way NO, three way mixing, three way Diverting)	VB-8xxx (two way NC, two way NO, three way Diverting/mixing)	VB-9313 (three way mixing)
1/2"	●		
3/4"	●		
1"	●		
1-1/4"	●		
1-1/2"	●		
2"	●		
2-1/2"		●	●
3"		●	●
4"		●	●
5"		●	●
6"		●	●

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 or visit the link below for more information.

Visit:
http://goo.gl/TxiYpO

How to Select and Order a Unique Valve & Actuator Combination

Valve and Actuator Selection Procedure

Globe Valve Assembly Selection Procedure

When selecting a globe valve assembly, first 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

Refer to the Assembly Ordering to 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 Assembly Ordering.

3. Actuator

Select the appropriate actuator and code, according to Assembly Ordering based on the control signal type, required valve normal position, and voltage requirements. For detailed actuator information, refer to *Pg. 73, 5. VB-7xxx Series Globe Valves Actuators & Linkages* for applicable actuator specifications.

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

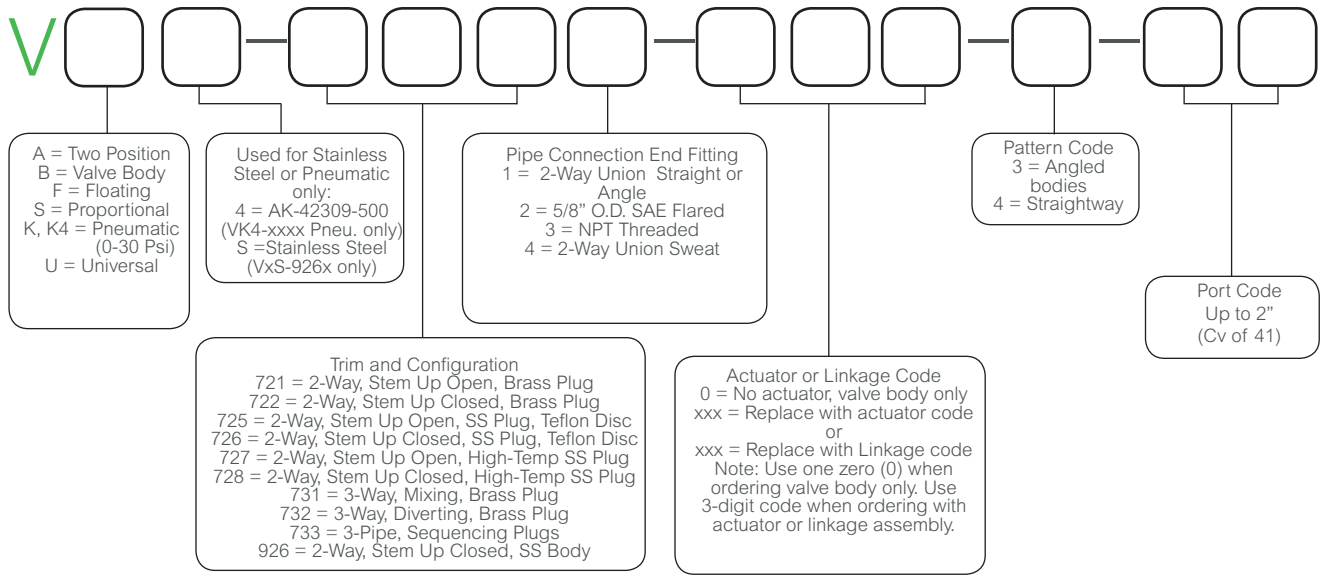
If available space is a consideration, check the appropriate figure in the section starting on *Pg. 355, 16. Assembly Dimensions* for any potential fit issues.

Assembly Ordering VB-7000 Series

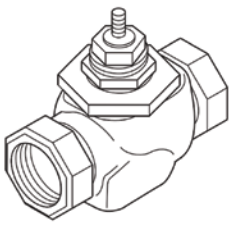
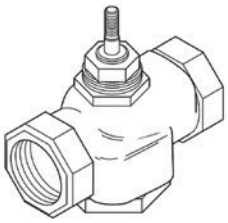
Determine a Part Number of a Selected Valve or Valve/Actuator Assembly by Specifying Six Part Number Fields

1) Control Signal	2) Trim and Valve Configuration	3) Pipe End Connections	4) Actuator or Linkage	5) Pattern Code	6) Port Code Cv Value
V□□ –	□□□	□ –	□□□	– □ –	□□
	Refer to the guide below.		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.	Refer to the guide below.	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 
Series Part Number				VB-7213-0-4-	VB-7223-0-4-
Pipe Sizes				½"…2"	
Stem Action				Up Open	Up Closed
ANSI Pressure Class				250 psi (up to 400 psi below 150°F)	
ANSI Seat Leakage[b]				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 life[a]	
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
	1.3	1.1	100:1	VB-7213-0-4-02	VB-7223-0-4-02
	2.2	1.9	100:1	VB-7213-0-4-03	VB-7223-0-4-03
	4.4	3.8	100:1	VB-7213-0-4-04	VB-7223-0-4-04
¾"	5.5	4.8	100:1	VB-7213-0-4-05	VB-7223-0-4-05
	7.5	6.5	100:1	VB-7213-0-4-06	VB-7223-0-4-06
1"	10	8.7	100:1	VB-7213-0-4-07	VB-7223-0-4-07
	14	12.1	100:1	VB-7213-0-4-08	VB-7223-0-4-08
1¼"	20	17.3	100:1	VB-7213-0-4-09	VB-7223-0-4-09
1½"	28	24.2	100:1	VB-7213-0-4-10	VB-7223-0-4-10
2"	40	34.6	100:1	VB-7213-0-4-11	VB-7223-0-4-11

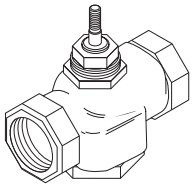
a To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation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

2-Way Stainless Trim Threaded with Soft Seats

Stainless Steel Trim Threaded with Soft Seats

2-Way Stainless Trim (Soft Seal) Body Type				Threaded NPT 	
Series Part Number				VB-7253-0-4-	VB-7263-0-4-
Pipe Sizes				½"…2"	½"…2"
Stem Action				Up Open	Up Closed
ANSI Pressure Class				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 life[a]	
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
	0.22	0.2	18:1	-	VB-7263-0-4-33
	0.4	0.3	100:1	VB-7253-0-4-01	VB-7263-0-4-01
	0.75	0.6	100:1	-	VB-7263-0-4-34
	1.0	0.9	100:1	-	VB-7263-0-4-36
	1.3	1.1	100:1	VB-7253-0-4-02	VB-7263-0-4-02
	1.8	1.6	100:1	-	VB-7263-0-4-28
	2.2	1.9	100:1	VB-7253-0-4-03	VB-7263-0-4-03
	2.9	2.5	100:1	-	VB-7263-0-4-30
	3.25	2.8	100:1	-	VB-7263-0-4-39
	4.4	3.8	100:1	VB-7253-0-4-04	VB-7263-0-4-04
¾"	5.5	4.8	100:1	VB-7253-0-4-05	VB-7263-0-4-05
	6.3	5.4	100:1	-	VB-7263-0-4-41
	7.5	6.5	100:1	VB-7253-0-4-06	VB-7263-0-4-06
1"	8.2	7.1	100:1	-	VB-7263-0-4-51
	9.0	7.8	100:1	-	VB-7263-0-4-52
	10	8.7	100:1	VB-7253-0-4-07	VB-7263-0-4-07
	12	10.4	100:1	VB-7253-0-4-08	VB-7263-0-4-08
1¼"	14	12.1	100:1	-	VB-7263-0-4-61
	16	13.8	100:1	-	VB-7263-0-4-62
	18	15.6	100:1	-	VB-7263-0-4-63
	20	17.3	100:1	VB-7253-0-4-09	VB-7263-0-4-09
1½"	22	19.0	100:1	-	VB-7263-0-4-71
	24	20.8	100:1	-	VB-7263-0-4-72
	28	24.2	100:1	VB-7253-0-4-10	VB-7263-0-4-10
2"	31	26.8	100:1	-	VB-7263-0-4-81
	34	29.4	100:1	-	VB-7263-0-4-82
	40	34.6	100:1	VB-7253-0-4-11	VB-7263-0-4-11

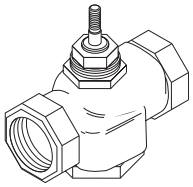
[a] To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation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

2-Way Stainless Trim Threaded with Metal Seats

Stainless Steel Trim Threaded with Metal to Metal Seats

2-Way Stainless Trim (Metal to Metal) Body Type				Threaded NPT 	
Series Part Number				**VB-7273-0-4-**	**VB-7283-0-4-**
Pipe Sizes				½"…2"	
Stem Action				Up Open	Up Closed
ANSI Pressure Class				250 psi (up to 400 psig 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
	1.3	1.1	15:1	VB-7273-0-4-02	VB-7283-0-4-02
	2.2	1.9	25:1	VB-7273-0-4-03	VB-7283-0-4-03
	4.4	3.8	40:1	VB-7273-0-4-04	VB-7283-0-4-04
¾"	5.5	4.8	50:1	VB-7273-0-4-05	VB-7283-0-4-05
	7.5	6.5	60:1	VB-7273-0-4-06	VB-7283-0-4-06
1"	10	8.7	60:1	VB-7273-0-4-07	VB-7283-0-4-07
	12	10.4	75:1	VB-7273-0-4-08	VB-7283-0-4-08
1¼"	20	17.3	75:1	VB-7273-0-4-09	VB-7283-0-4-09
1½"	28	24.2	75:1	VB-7273-0-4-10	VB-7283-0-4-10
2"	40	34.6	75:1	VB-7273-0-4-11	VB-7283-0-4-11

[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

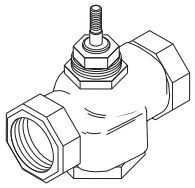
MORE INFO

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http://goo.gl/pdruzA

VBS-9263 ½" & ¾" 2-Way Stainless Bodies with Soft Seats

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 life[a]
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	

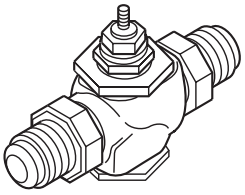
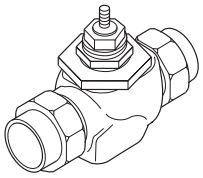
[a] Operating within the cavitation zone or an operating differential pressure above 35 psi (241 kPa) may result in noise and internal valve damage.

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

VB-7200 ½"…2" 2-Way Brass Trim Copper Connection with Soft Seats

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 life[a]		87 psi (600 kPa) Max. for normal life[e]	
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,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.

[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.

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

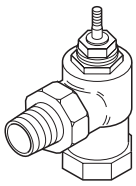
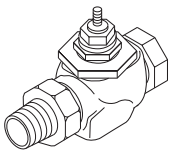
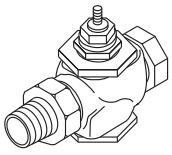
MORE INFO

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

Visit:
http://goo.gl/oYPchT

VB-7200 ½"…2" 2-Way Brass & SS Trim Soft Seat Union for Radiators and Other Applications

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 
Series Part Number				VB-7211-0-3-	VB-7211-0-4-	VB-7221-0-4-
Pipe Sizes				½"…1¼"		
Stem Action				Up Open	Up Open	Up Closed
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.	
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 life[a]	87 psi (600 kPa) Max. for normal life[d]	
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-7211-0-4-01[c]	VB-7221-0-4-01[c]
	1.3	1.1	15:1	VB-7211-0-3-02	VB-7211-0-4-02[c]	VB-7221-0-4-02[c]
	2.2	1.9	25:1	VB-7211-0-3-03	VB-7211-0-4-03[c]	VB-7221-0-4-03[c]
	4.4	3.8	40:1	–	VB-7211-0-4-04[c]	VB-7221-0-4-04[c]
	5.0	4.3	40:1	VB-7211-0-3-04	–	–
¾"	5.5	4.8	50:1	VB-7211-0-3-05	VB-7211-0-4-05 [c]	VB-7221-0-4-05[c]
	7.5	6.5	60:1	–	VB-7211-0-4-06[c]	VB-7221-0-4-06[c]
	8.5	7.4	50:1	VB-7211-0-3-06	–	–
1"	10	8.7	60:1	–	VB-7211-0-4-07[c]	VB-7221-0-4-07[c]
	14	12.1	60:1	VB-7211-0-3-07	VB-7211-0-4-08[c]	VB-7221-0-4-08[c]
	16	13.8	75:1	VB-7211-0-3-08	–	–
1¼"	20	17.3	75:1	–	VB-7211-0-4-09[c]	VB-7221-0-4-09[c]
	22	19	75:1	VB-7211-0-3-09	–	–

[a,d] 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.

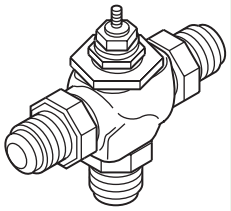
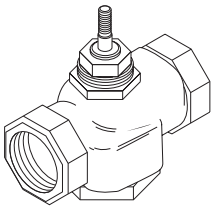
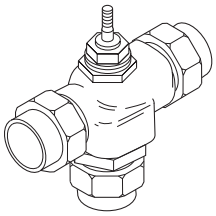
[b] Maximum recommended differential pressure in open position. Do not exceed recommended differential pressure (pressure drop), as integrity of parts may be affected. Exceeding maximum recommended differential pressure voids product warranty.

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

[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 
Series Part Numbers			VB-7312-0-4-	VB-7313-0-4-	VB-7314-0-4-
Pipe Size			½" I.D.	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)		
ANSI A Port Seat Leakage			ANSI Class III[a]	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)		
Water Flow Curve			Modified Linear		
Allowable ΔP for water			35 psi (241 kPa)[a]	87 psi (600 kPa) Max. for normal life[d]	
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
	4.4	3.8	VB-7312-0-4-04	VB-7313-0-4-04	VB-7314-0-4-04
¾"	7.5	6.5	–	VB-7313-0-4-06	VB-7314-0-4-06
1"	12	10.4	–	–	–
	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
1½"	28	24.2	–	VB-7313-0-4-10	VB-7314-0-4-10c
2"	36	31.3	–	–	–
	41	35.5	–	VB-7313-0-4-11	VB-7314-0-4-11c

[a,d] 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 additional noise but is acceptable up to 87 psi (600 kPa).

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

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

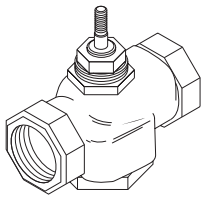
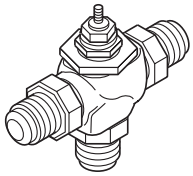
MORE INFO - VB-7313

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

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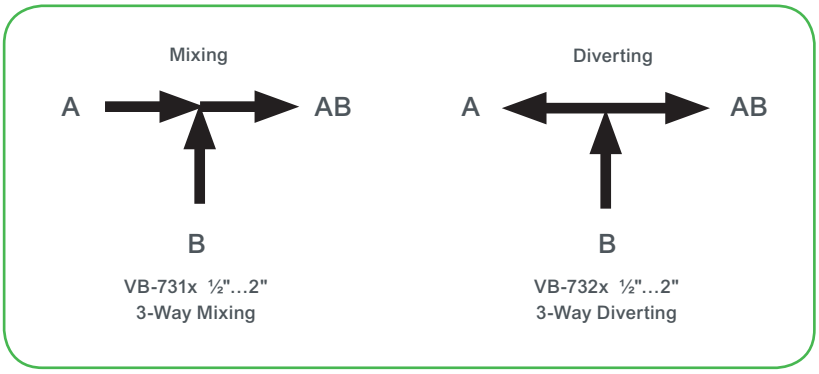
VB-7300 ½"…2" 3-Way Diverting & Sequencing

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**	
½"	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

3. VB-7xxx Series Globe Valves Sizing & Selection



VB-7000 ½"…2" 2 & 3-Way Valves Sizing for Water

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.

3.1 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

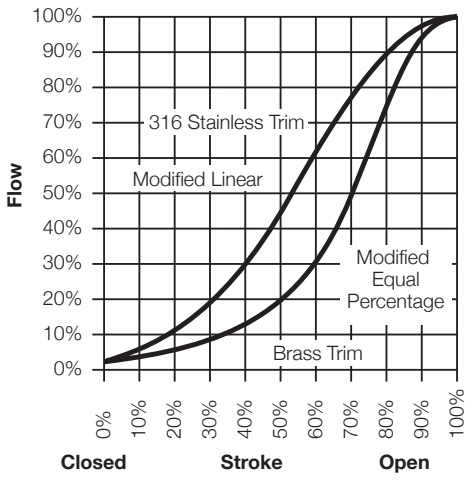
For more information, download these documents from our website.

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

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

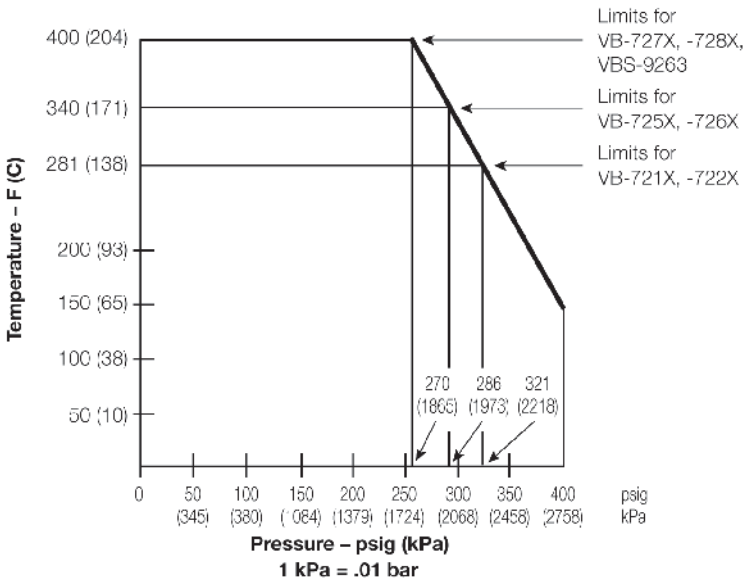
3.2 Flow Characteristics

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.



3.3 Temperature Pressure Ratings

Consult the appropriate valve linkage installation instructions 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.

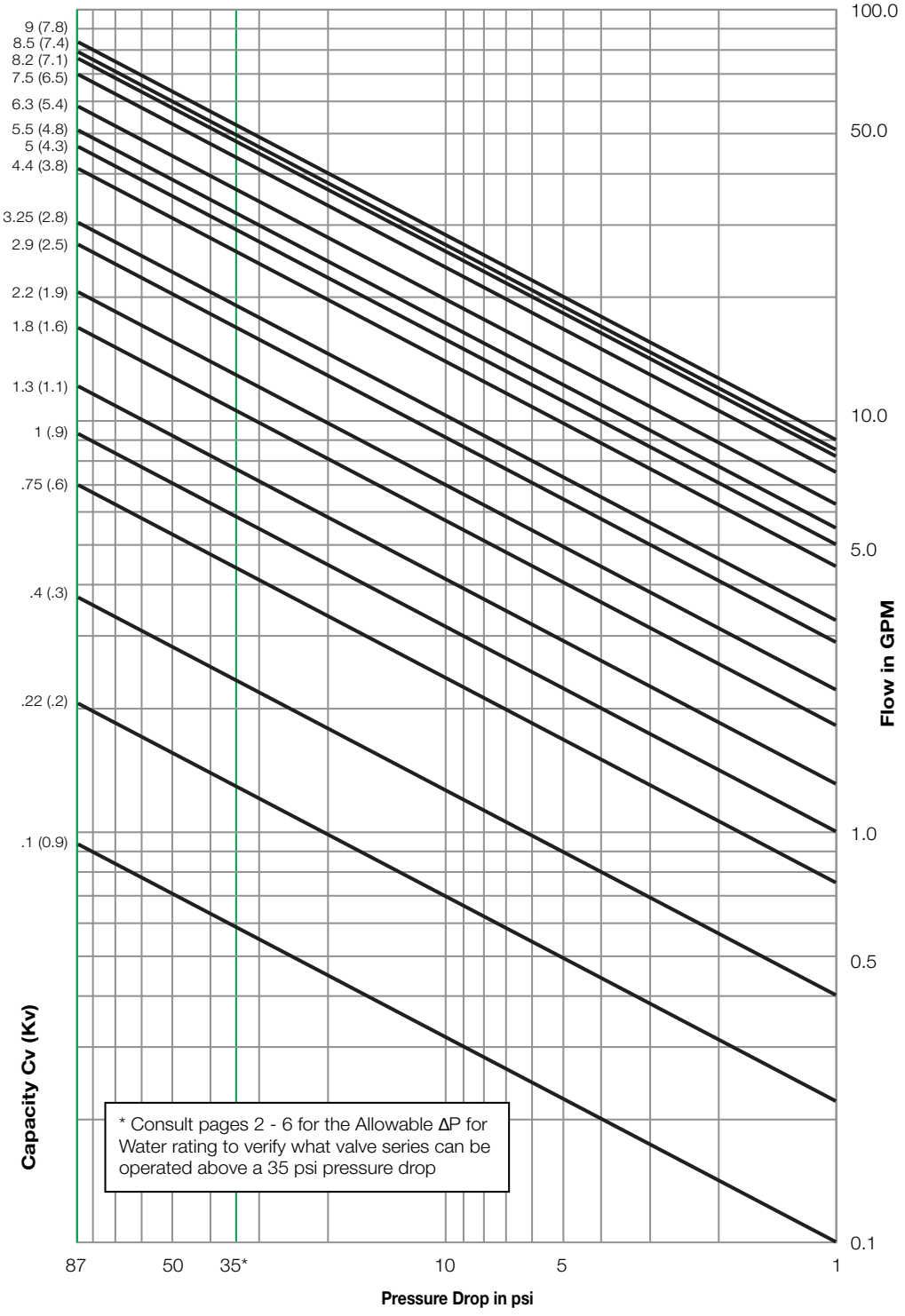
3.4 VB-7200 2-Way Globe Valves Material Specifications

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-7211-0-3 (½"…1¼"), VB-7212 (½"), VB-7222 (½")		VB-7253, VB-7263	VB-7273, VB-7283	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)

Water Capacity for 0.1…9.0 Cv Valves

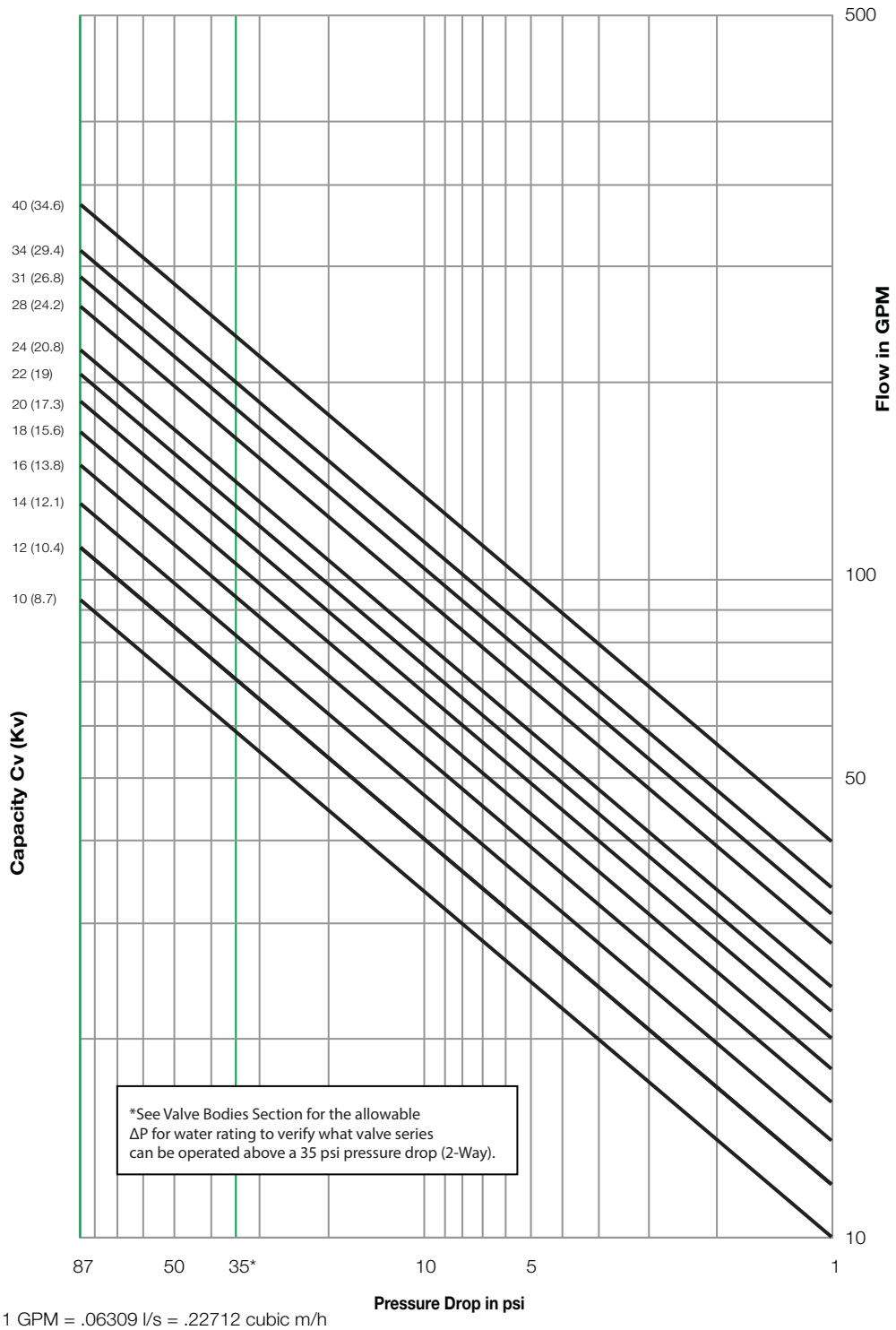
3.5 Water Capacity for 0.1 to 9.0 Cv Valves



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

Water Capacity for 10…40 Cv Valves

3.6 Water Capacity for 10 to 40 Cv Valves



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

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

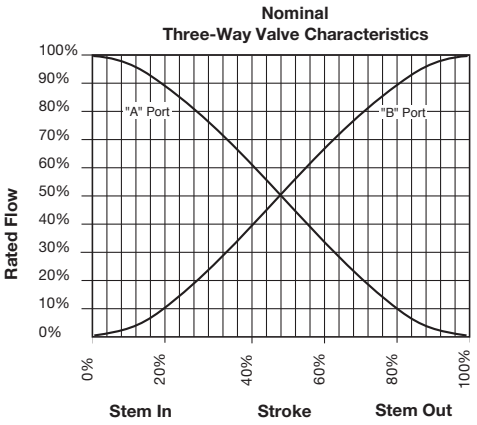
3.7 Flow Characteristics

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

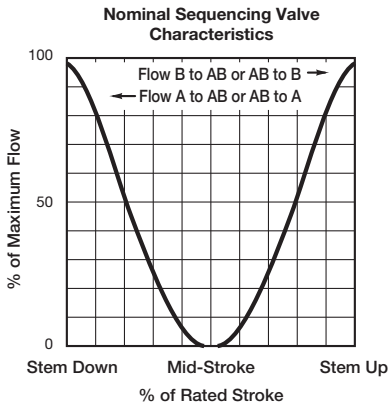
3-Way Diverting valves are designed so that the flow from the inlet port (B) to the outlet ports (A and AB) is modified linear.

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

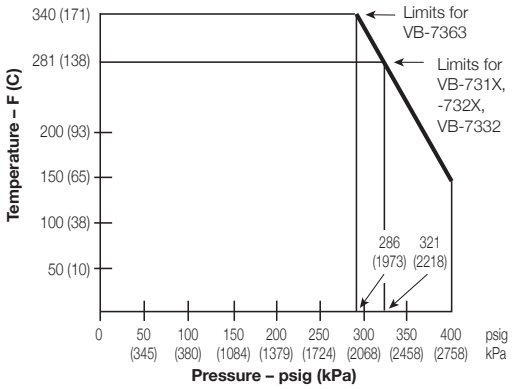
3.8 Temperature Pressure Ratings

Consult the appropriate valve linkage Installation Instructions 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.

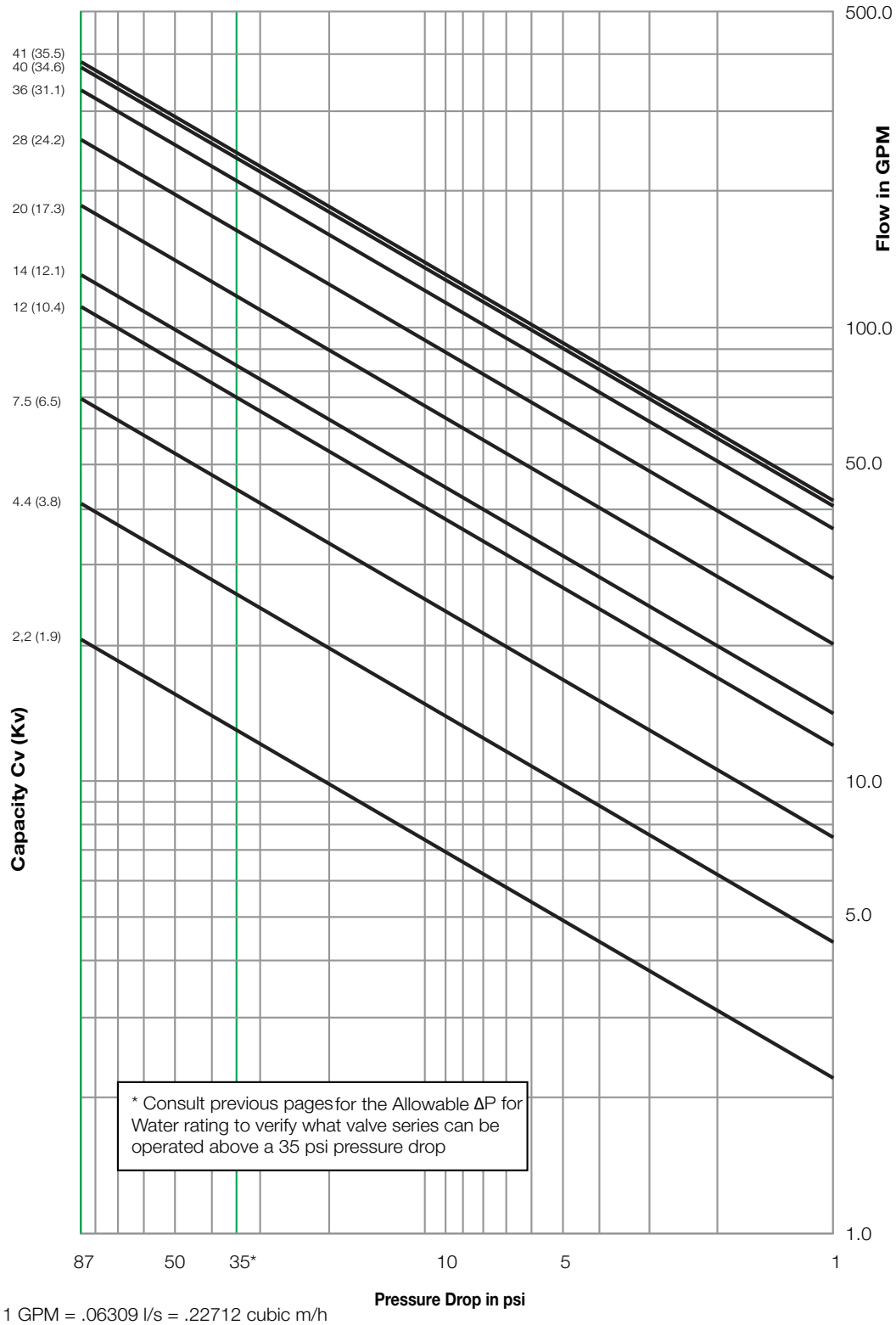


3.9 VB-7300 3-Way Globe Valves Material Specifications

Material		VB-7313, VB-7314	VB-7312, VB-7332, VB-7323	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)

3.10 Water Capacity



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

Cavitation Limitations on Valve Pressure Drop

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, 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)

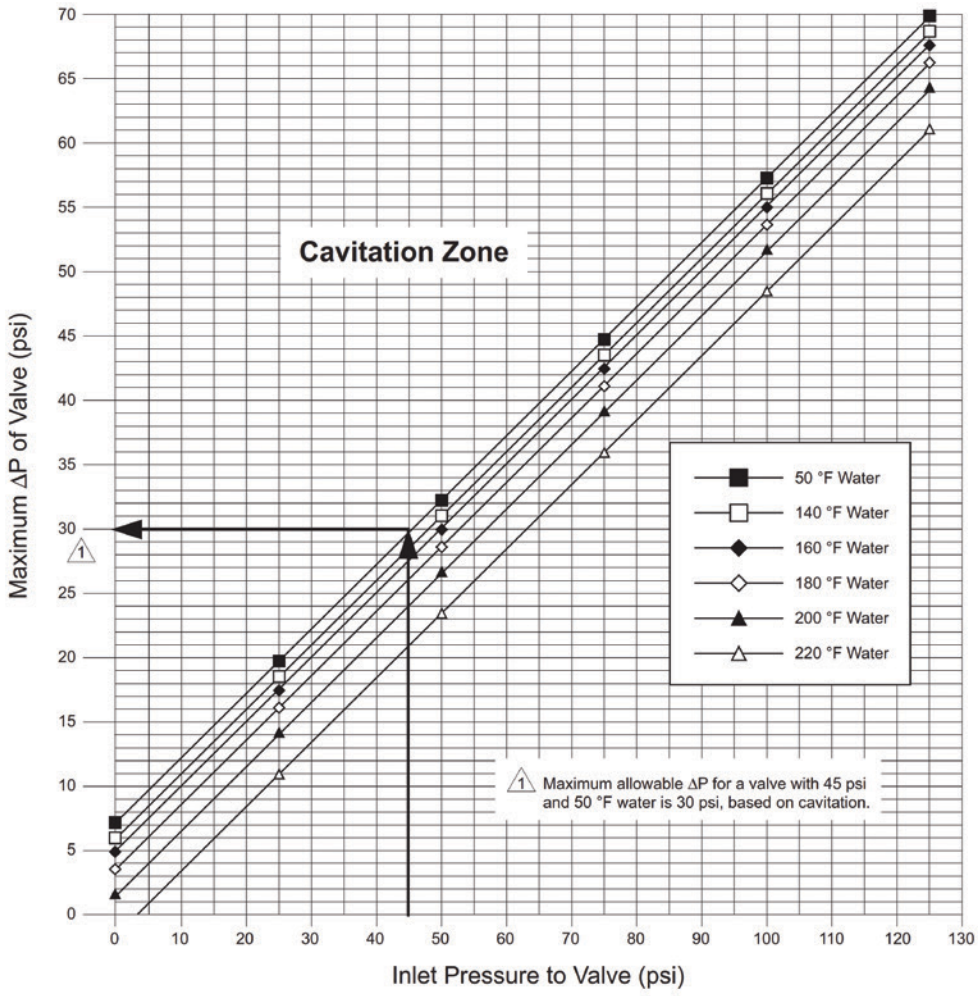
Systems where cavitation is shown to be a problem can sometimes be adjusted to provide higher downstream back pressures. Valves having harder seat materials should be furnished if velocities are excessive.

3.11 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

Cavitation Limitations on Valve Pressure Drop

3.12 Cavitation Limitations on Valve Pressure Drop



Maximum Allowable Differential Pressure (ΔP)for Water Valves.

Saturated Steam Valve Selection ½"…6" Valves (2-Way only)

3.13 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)

VB-7000 & VBS 9263 Hydraulic & Electric Close-Off ½"…2"

Note: The following tables offer a quick guide to valve actuator combination / close-off ratings. Please refer to Pg. 55, 4. VB-7xxx Series Valve/Actuator Assemblies

3.14 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.

3.15 Electric Spring Return (SR)

VB-7000 & VBS-9263 Hydraulic & Electric Close-Off (psi)
Stem Up Open, Closed & Mixing
All are 250 psi. close-off. VB-7323 Diverting: Bottom port is the common.

	MP/MPR-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		AV-602	
Actuator Code	Choose code from assembly and actuator sections.											
Pipe Size	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
												Do not use.

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.

3.16 Electric Non-Spring Return (NSR)

VB-7000 & VBS-9263 Electric Close-Off (psi)
Stem Up Open, Closed & Mixing. VB-7323 Diverting: Bottom port is the common. All are 250 psi. close-off

	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 Size	250	225	250	250	250	250
½"						
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

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.

VB-7000 ½"…2" Pneumatic Close-Off Ratings

3.17 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.

3.18 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 Position[a]	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.

3.19 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 Position[a]	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.										

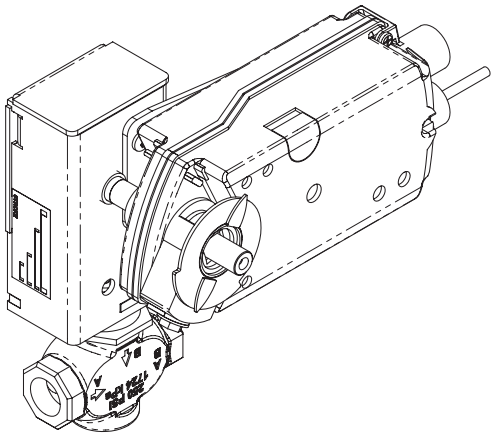
[a]In two- or 3-Way mixing "A" port valves, Up N.C. is normally closed in up position. Down closes a N.O. valve or 3-Way mixing "B" port.

4. VB-7xxx Series Valve/ Actuator Assemblies

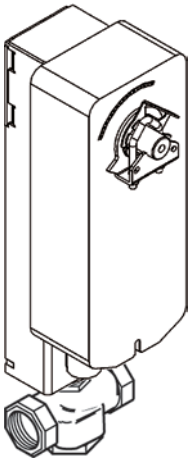


VB-7000 ½"…2" Valve/ Actuator Assemblies

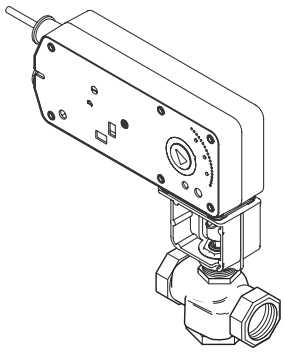
Mx4x-6xxx and Mx4x-7xxx Series Spring and Non-Spring Return Actuator/Linkage Assemblies with SmartX actuators.



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



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

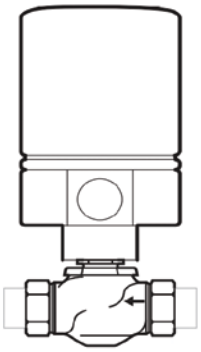


VB-73xx Series ½"…2" 3-Way Assembly
with SmartX Linear SR Actuators

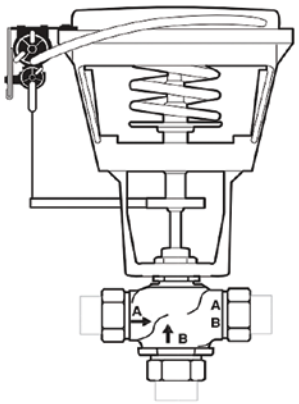
Globe Valve Assemblies

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

Life Is On Schneider Electric

Globe Valve Assembly Selection Procedure

Globe Valve Assembly Selection Procedure

When selecting a globe valve assembly, first 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

Refer to Assembly Ordering and 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 Assembly Ordering.

3. Actuator

Select the appropriate actuator and code, according to Assembly Ordering based on the control signal type, required valve normal position, and voltage requirements. For detailed actuator information, refer to *Pg. 73, 5. VB-7xxx Series Globe Valves Actuators & Linkages* for applicable actuator specifications.

4. Close-off Pressure

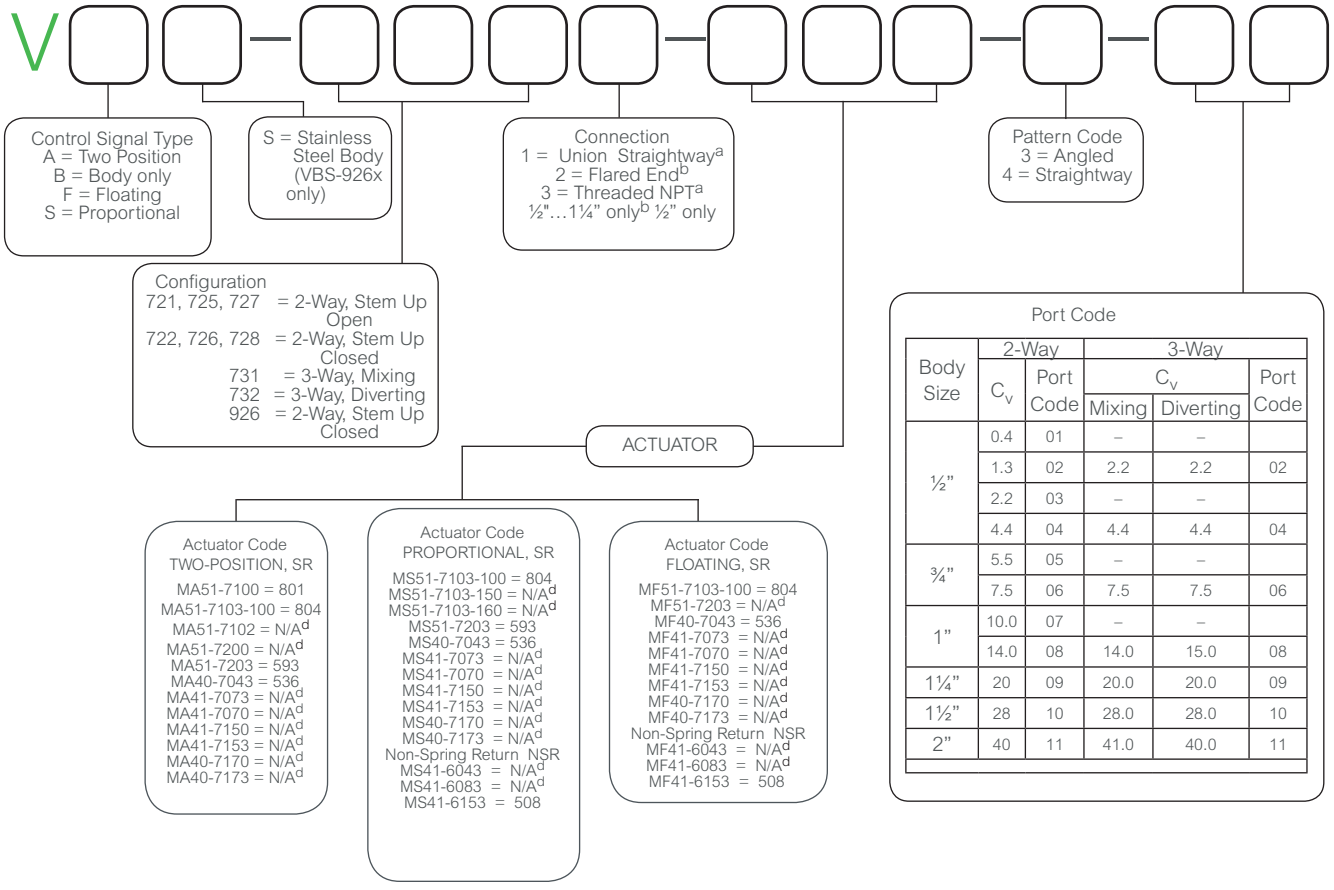
Confirm, with respect to Actuator Close-Off Capacity, that the selected actuator and valve body combination provides sufficient close-off pressure. If no close-off pressure is shown, the valve body/actuator combination is not valid.

5. Available Space

If available space is a consideration, check the appropriate figure in the section starting on *Pg. 355, 16. Assembly Dimensions* for any potential fit issues.

Assembly Ordering Linked VB-7000 SmartX Globe Valves

Assembly Ordering Linked VB-7000 SmartX Globe Valves



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

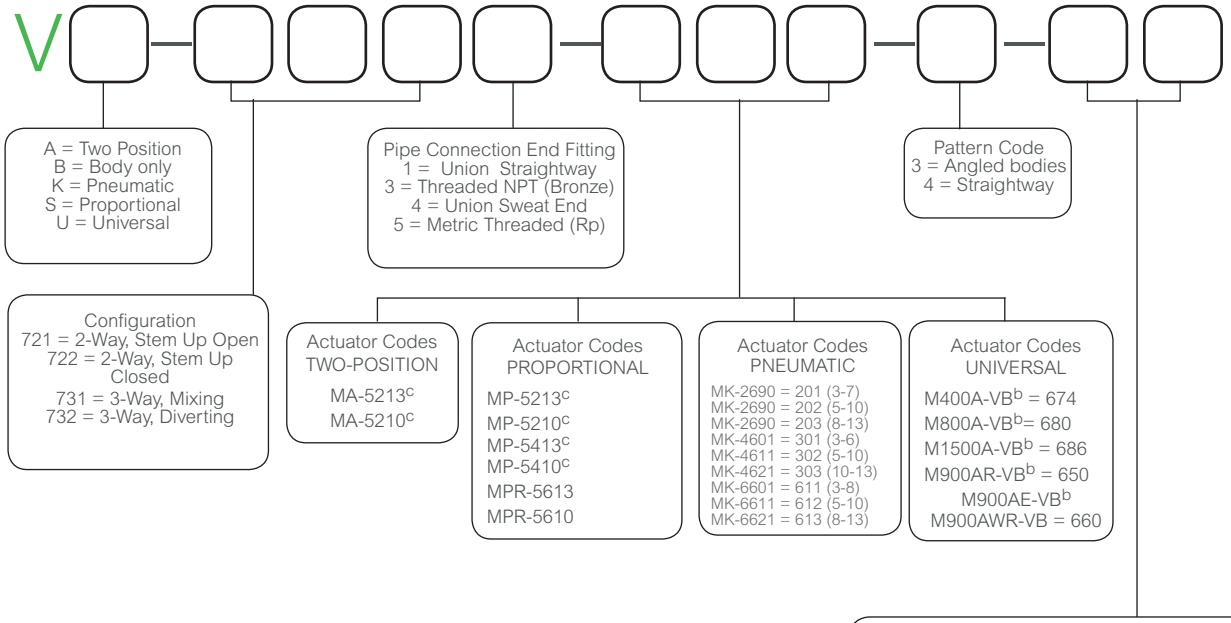
[d] Factory assemblies not available. Purchase actuator and valve body separately and field assemble.

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

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

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.

[a] Includes AV-601.

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

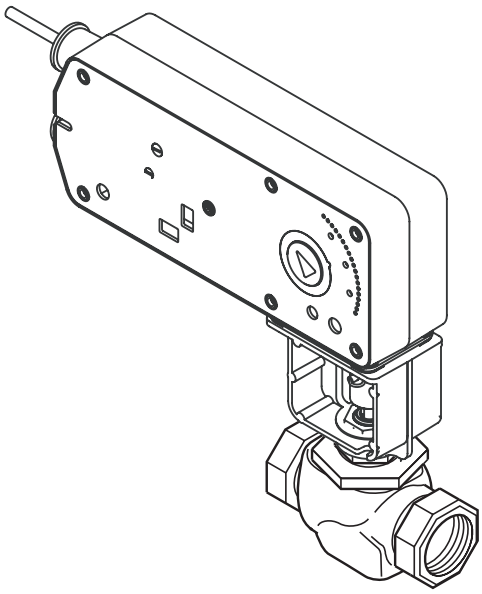
[c] Add -500 for auxillary switch. Only available as a field assembly.

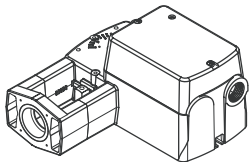
½"…2" 2-Way Assemblies with SmartX Linear SR Actuators

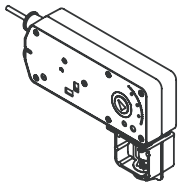
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

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

2-Way Linked Globe Valve Assemblies







Valve Assembly Part Number [bj]	P Code	Valve Size " (mm)	Cv[c]	kvs[b]	Actuator Force Rating / Actuator Model (Actuator Code)[a]		
						105 lbf (467 N)	220 lbf (979 N)
						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)**
					Actuator Close-off Pressure psi[de]		
					N.O.[f, j]	N.C.[g, j]	
Vx-72x1-xxx-4-P **Vx-72x2-xxx-4-P** **Vx-72x3-xxx-4-P** **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	10	1½ (40)	28.0	24	60	35	100
Vx-72x3-xxx-4-P	11	2 (50)	28.0	24	60	35	100

[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 *Pg. 58, Assembly Ordering Linked VB-7000 SmartX Globe Valves* for the relevant part series.

[c] C_V = gpm /√ΔP (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.

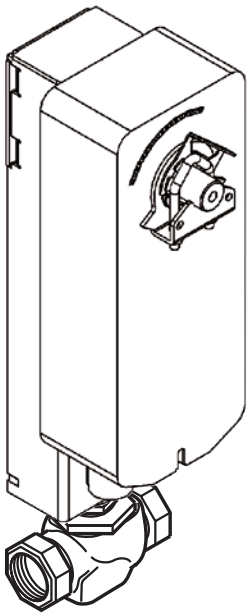
[j] Valve body and actuator size determine the close-off capabilities. Example: All ½", 2-Way globe valves will make the same close-off regardless of the C_V rating for a given actuator.

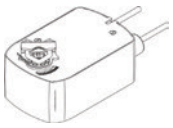
½"…2" 2-Way Assemblies with SmartX SR Actuators

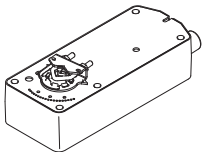
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application.

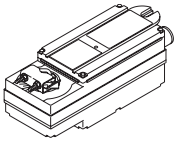
Selection Table – 2-Way Linked Globe Valve Assemblies with Spring Return Actuators

2-Way Spring Return Linked Globe Valve Assemblies









Valve Assembly Part Number [a]	P Code	Valve Size " (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 Vx-7211-xxx-4-P Vx-7213-xxx-4-P Vx-7221-xxx-4-P Vx-7223-xxx-4-P 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	01	½ (15)	0.4	0.3	250	—	—	—
	02		1.3	1.1	250	—	—	
	03		2.2	1.9	250	—	—	
	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 Vx-7223-xxx-4-P	10	1½ (40)	28.0	24	50	80	140	160
	11	2 (50)	40.0	35	25	40	80	120

[a] To determine a specific part number, see *Pg. 58, Assembly Ordering Linked VB-7000 SmartX Globe Valves* 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).

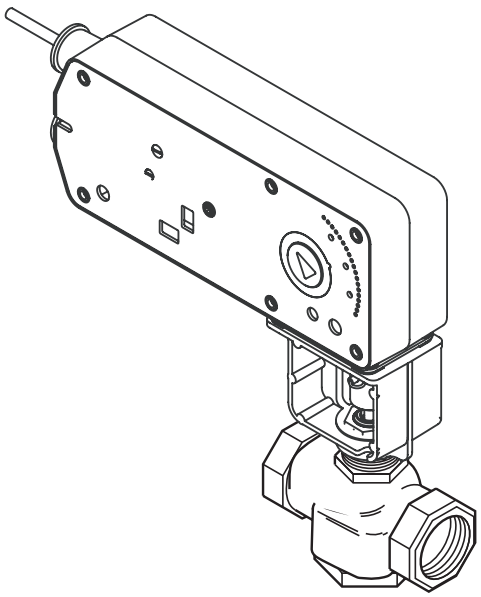
[d] For seat leakage ratings, refer to Seat Leakage Classes.

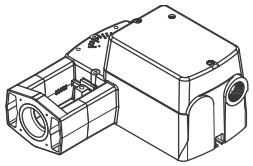
½"…2" 3-Way Assemblies with SmartX Linear SR Actuators

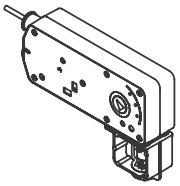
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

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 " (mm)	Cv[d]	kvs[c]	Actuator Close-off Pressure psia[e]	
Mixing Vx-7313-xxx-4-P	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		

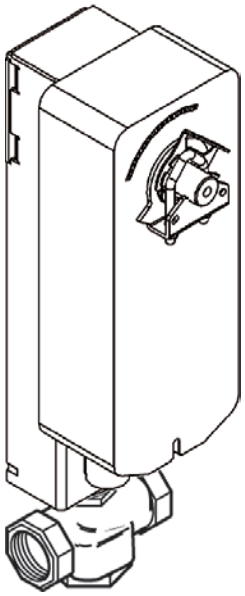
[a] Refer to 3-Way flow patterns.
[b] Models without actuator codes are not offered as factory assemblies. Purchase the actuator and the valve body separately and field assemble. For available factory assemblies, consult the price schedule.
[c] To determine a specific part number, see *Pg. 58, Assembly Ordering Linked VB-7000 SmartX Globe Valves* for the relevant part series.
[d] C_v = gpm /√ΔP (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.

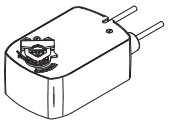
½"…2" 3-Way Assemblies with SmartX SR Actuators

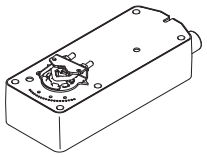
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

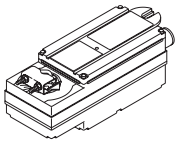
Selection Table – 3-Way Linked Globe Valve Assemblies with Spring Return Actuators

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









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

Valve Assembly Part Number[b]	P Code	Valve Size in. (mm)	Cvc	kvs[c]	Actuator Close-off Pressure psi[gd]			
						Single Actuator	Single Actuator	Single Actuator
Vx-7313-xxx-4-P	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 *Pg. 58, Assembly Ordering Linked VB-7000 SmartX Globe Valves* 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.

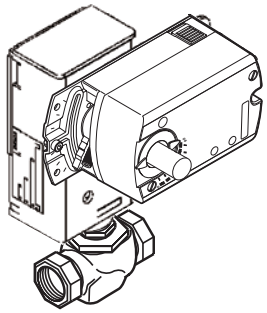
[e] For field assembly, factory actuator, linkage and valve assembly may be offered.

½"…2" Linked 2-Way Assemblies with NSR Actuators

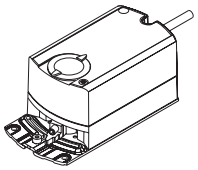
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

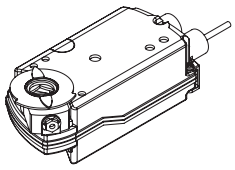
Selection Table – 2-Way Linked Globe Valve Assemblies with Non-Spring Return Actuators

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 Close-off Pressure psi[cd]		
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 Proportional MS41-6153
Note: Not all factory actuator codes are available.[f]							
Linkage Kit Part Number					AV-611		
Vx-7211-xxx-4-P Vx-7213-xxx-4-P Vx-7214-xxx-4-P Vx-7221-xxx-4-P Vx-7223-xxx-4-P Vx-7224-xxx-4-P Vx-7253-xxx-4-P Vx-7263-xxx-4-P Vx-7273-xxx-4-P Vx-7283-xxx-4-P	01	½ (15)	0.4	0.3	225	—	—
	02		1.3	1.1			
	03		2.2	1.9			
	04		4.4	3.8			
	05	¾ (20)	5.5	4.8			
	06		7.5	6.5			
	07	1 (25)	10.0	8.7	100	130	—
	08		14.0	12			
	09	1¼ (32)	20.0	17	60	100	—
Vx-7213-xxx-4-P Vx-7223-xxx-4-P	10	1½ (40)	28.0	24	40	70	140
	11	2 (50)	40.0	35	20	40	80

[a] To determine a specific part number, see *Pg. 58, Assembly Ordering Linked VB-7000 SmartX Globe Valves* 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 35 psi and ANSI IV above 35 psi; 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. The rating value is the pressure difference between the inlet and outlet ports.

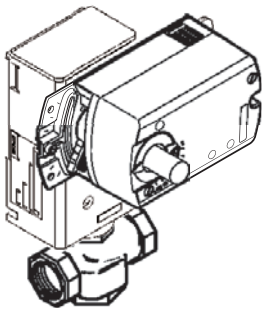
[f] Shown for field assembly.

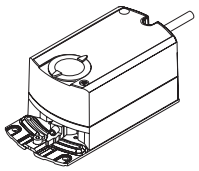
½"…2" Linked 3-Way Assemblies with NSR Actuators

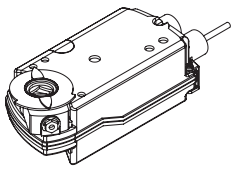
Note: Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

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

3-Way Non-Spring Return Linked Globe Valve Assemblies







Valve Assembly Part Number[a]	P Code	Valve Size in. (mm)	Cv[b]	kvs[b]	Actuator Close-off Pressure psi[ce]		
					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** **Proportional MS41- 6153**
					Note: Not all factory actuator codes are available.		
					Linkage Kit Part Number		
					AV-611		
Vx-7313-xxx-4-P	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	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 *Pg. 58, Assembly Ordering Linked VB-7000 SmartX Globe Valves* 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.

[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

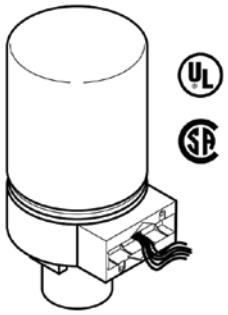
½"…2" Valve Selection for Hydraulic SR Actuators

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.



MORE INFO

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

Visit:
http://goo.gl/EpcPNP

3-Way Hydraulic Valve/Actuator Close-Off Ratings

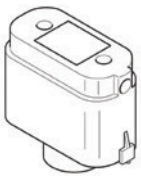
Valve Linkage (½…2")				AV-7600-1[a]		AV-7600-1	
Input Signal				Electronic Vdc & 4…20 mA		SPDT Floating & 2-Position	
Actuator Code (XXX)				2XX		2XX	
Actuator Type				MP-5X1X-XXXb MPR-561X		MA-521X	
Factory Available Valve Assemblies	Valve Body	P Code	Size (in.)	ACTUATOR CLOSE-OFF PRESSURE RATINGS (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

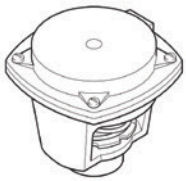
[a] MP-541X, MPR-5XXX use AV-7600-1 or AV-600 and AV-601.
[b] Factory shipments have unpainted large springs. For 0…10 volt and 4…20 mA controllers, use blue and booster springs.
[c] Close-off ratings for mixing or sequencing valves: (SU = "A" port, SD = "B" port). "A" port (SU) ratings equal pressure at port "A" minus pressure at port "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.
[e] Diverting valves may be used in mixing applications with minor affects on flow.
[f] SU— Stem Up; SD—Stem Down.

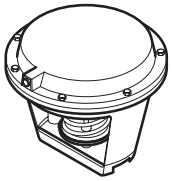
½"…2" 2-Way and 5/8" 3-Way with Pneumatic Actuators

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	SU	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.

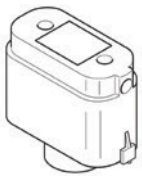
[b] Close-off pressure ratings describe only the differential pressure which the actuator can close off to standards with adequate seating force. Consult valve body specifications.

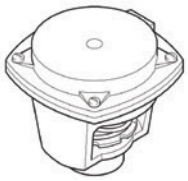
[c] SU – Stem Up (Flow "B" to "AB"); SD – Stem Down (Flow "A" to "AB"); Normal Position Stem Up (Flow "B" to "AB").

[d] NP = Normal Position.

½"…2" 3-Way Mixing & Diverting/ Sequencing 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.

[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 *Pg. 29, 2. VB-7xxx Series Globe Valves ½" to 2"* for flow pattern, port designations and normal position.

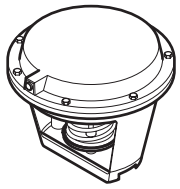
MORE INFO

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

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

1½"…2" 3-Way Mixing & Diverting/ Sequencing 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.

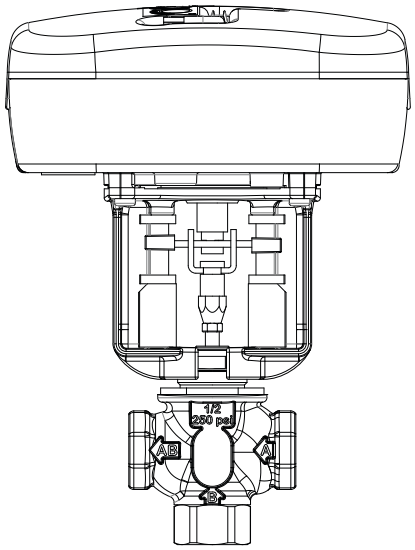
[c] Mixing valve are not to be used in Diverting applications. Diverting valves may be used in mixing applications with minor affects on flow.

[d] SU—Stem Up; SD—Stem Down. Refer to *Pg. 29, 2. VB-7xxx Series Globe Valves ½" to 2"* for flow pattern, port designations and normal position.

Forta M900Axx-VB SR and Non-SR Actuators

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, 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 Actuators and Linkages.

4. Determine the Assembly Part Number

If a complete factory valve and actuator assembly is required, consult 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.

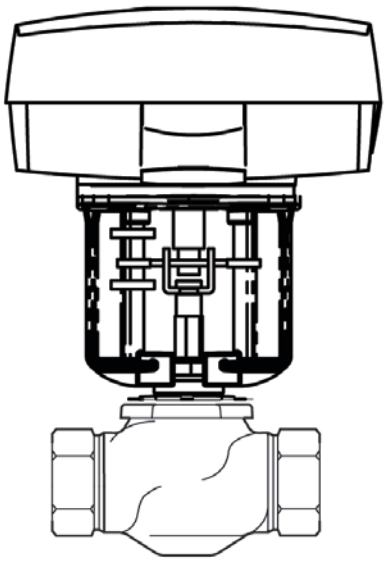
Example

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.

Forta NSR Actuator/Valve Selection



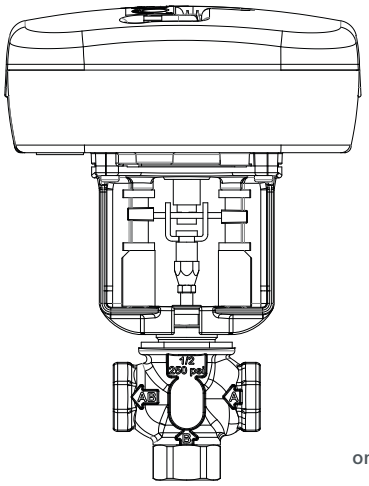
Forta Mx00A-VB Valve Actuator Mounted on a 2-Way VB-7000 Series Valve

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-7221-0-4-P VB-7222-0-4-P VB-7223-0-4-P VB-7224-0-4-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	-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.

Forta M900Axx(-VB) SR & VB-7xxx Valve Selection



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

Select VB-7xxx Valve/ M900Axx(-VB)[a] Spring Return Actuator				
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-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-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	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	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	1-7, 31-39	½"	250
		5, 6, 45	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-7xxx Series Globe Valves Actuators & Linkages



Forta NSR M4xx, M8xx and M15xx A-VB Actuators

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	30[d]	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	50[d]				No
M800A-S2-VB	- [b]								24 Vac, 4a res
M1500A-VBc	686	337 (1500)		24	50[d]				No
M1500A-S2-VBc	- [b]								24 Vac, 4a res

[a] DIP switch selectable.

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

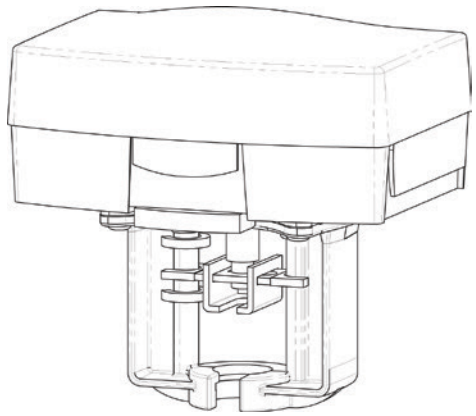
[c] Do not use M1500 actuators on VB-7323 3-Way Diverting valves.

[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)

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

Forta NSR M4xx, M8xx and M15xx A-VB Actuators



Screw Mount Style Forta

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

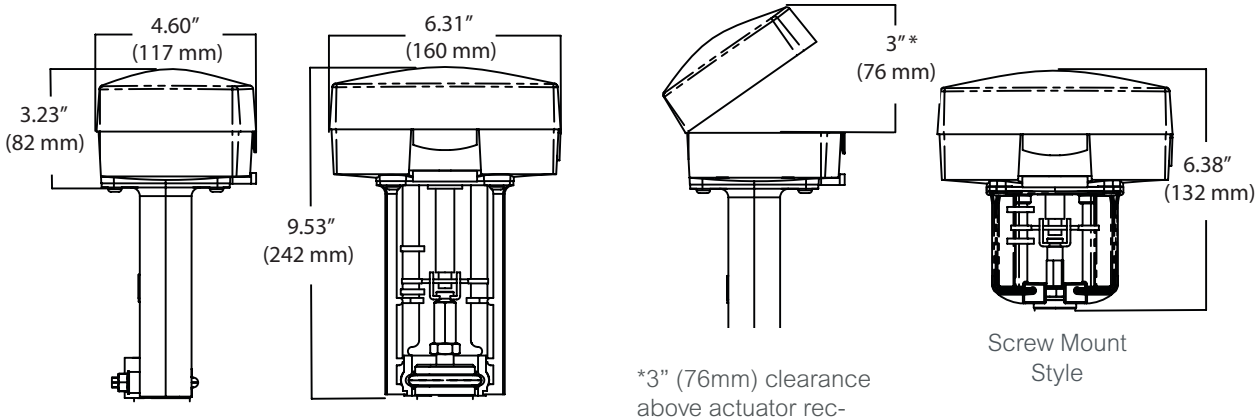
- Schneider Electric Forta M400A (VB) Series, M800A (VB) Series, and M1500A (VB) Series Installation Instructions, (F-27599)
- Forta/VB-7xxx Selection Guide, F-27490
- Forta/VB-8xxx, VB-9xxx Selection Guide, F-27491
- AV-800 Series Linkage Adapters for Competitors Valves, F-27470
- AV-821 Linkage VB-7xxx, 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

Forta NSR 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

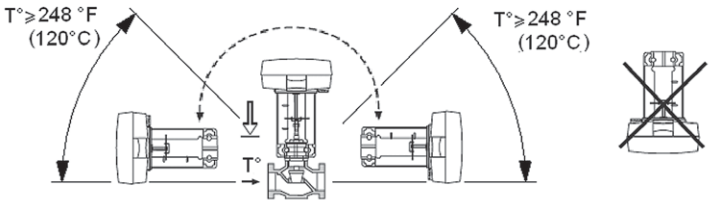


*3" (76mm) clearance above actuator recommended to remove actuator

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.



Forta SR Factory Assembly Models & Field Assembly

Spring Return Forta Factory Assemblies Model Table										
Model	Actuator Code	Force	Power	Running Watts	Transformer Size	Floating Control[a]	Proportional Control[b]	Feedback Voltage[a]	(2) SPDT Aux Switches[c]	Spring Return Action
M900 AR-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
M900 ARW-VB	660									

a Dip switch selectable.
b 0-5, 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

Spring Return Forta Actuators for Field Assembly										
Model	VB-7000 Mounting Kit Required	Force	Power	Running Watts	Transformer Size	Floating Control[a]	Proportional Control[b]	Feedback Voltage[a]	(2) SPDT Aux Switches[c]	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.
b 0-5, 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

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

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).

SmartX Linear Electric Actuators

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 MS51-7103-150: 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
Scan the QR code or visit the link below for more information.

Visit:
http://goo.gl/amkgWe

Spring Return Actuators

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



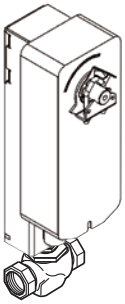
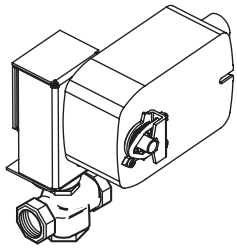
Specifications	
Connection	3 ft. (0.9 m) Plenum cable
Housing	Aluminum die-cast, NEMA 2
Dimensions	7 x 10-5/8 x 2-9/16 (178 x 270 x 65 mm)
Position Indicator	Visual indicator
Override	Manual
Control Signal	MA51-7203: 2-position SPST MF51-7203: Floating MS51-7203: 2…10 Vdc MS51-7203-40: 6-9 Vdc MS51-7203-50: 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)



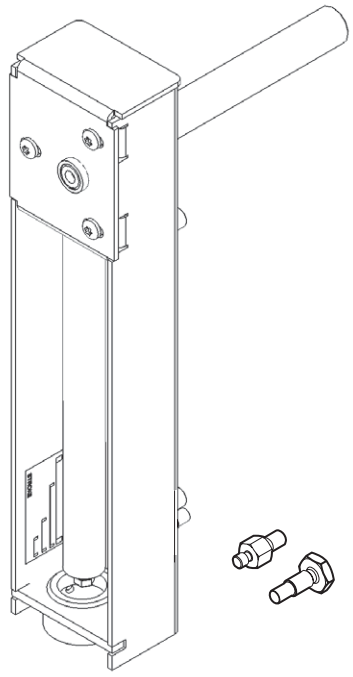
Specifications	
Connection	3 ft. (0.9 m) Plenum cable
Housing	Aluminum die-cast, NEMA 2
Dimensions	7 x 10-5/8 x 2-9/16 (178 x 270 x 65 mm)
Position Indicator	Visual indicator
Override	Manual
Control Signal	MA51-7200: 2-position SPST
Voltage	120 Vac ± 10%
VA@60 HZ	MA51-7200: 10
Watts @ 60 Hz	MA51-7200: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

½"…2" SmartX Linked SR Assemblies

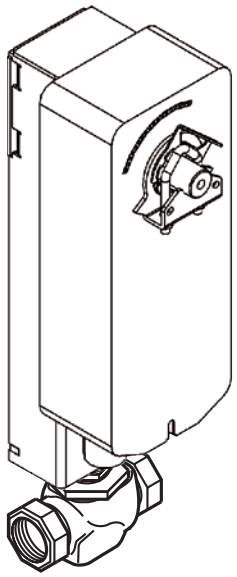
Specifications ½"…2" Vx-7xxx-5xx-4-P Series Linked Globe Valve Assemblies			
		2-Way	3-Way
Linked Globe Valve Assemblies		½" through 2" Valve Assemblies 	½" through 2" Valve Assemblies 
Applications		Chilled or Hot Water, or Steam	Chilled or Hot Water
Type of End Fitting		NPT Union Straightway (up to 1¼")	NPT
Size		Vx-7xxx-5xx-4-P ½" through 2"	
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 Percentage[b]	Modified Linear[b]
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		Refer to *Pg. 29, 2. VB-7xxx Series Globe Valves ½" to 2"*	500:1
Seat Leakage			ANSI Class III (0.1%)
STEAM			
Inlet Pressure — Maximum		35 psig (241 kPa)	—
Fluid Temperature — Maximum		Refer to *Pg. 29, 2. VB-7xxx Series Globe Valves ½" to 2"*	—
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 *Pg. 149, Cavitation Limitations on Valve Pressure Drop*)	

[a] To determine a specific part number, see *Pg. 58, Assembly Ordering Linked VB-7000 SmartX Globe Valves* for the relevant part series.
[b] For a detailed description of the flow, see the sections for Sizing & Selection and *Pg. 390, Piping ½"…6" Valves* .
[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



Typical Actuator/Linkage Mounting

Application

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

AV-602 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"	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
Mx41-707x	1…2"	SR (Spring Return)
Mx41-715x	1¼"…2"	
Mx40-717x	1½…2"	

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				DC Amps	Holding			Powered	Spring Return			
		50 Hz		60 Hz			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	
MF40-7043b	24 Vac ± 20% 22-30 Vdc	5.9	4.4	5.9	4.4	0.17	2.9	2.9	No	<130	<25		No	
MF40-7043-501b									One[a]				No	
MS40-7043b	24 Vac ± 20% 22-30 Vdc	5.6	4.2	5.6	4.2	0.15	2.4	2.4	No				No	
MS40-7043-501b									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

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				DC Amps	Holding			Powered	Spring Return			
		50 Hz		60 Hz			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									Two[c]					
MF41-7153	24 Vac ± 20% 22-30 Vdc	9.8	7.7	9.7	7.7	0.30	3.3	3.3	No					
MF41-7153-502									Two[c]					
MS41-7153	24 Vac ± 20% 22-30 Vdc	9.8	7.4	9.7	7.4	0.28	2.9	2.9	No					
MS41-7153-502									Two[c]					

[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)	Manual Override	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)	Yes	AV-602
		5.0	3.0	5.0	No					
MA40-7170	120 Vac ± 10%	8.4	6.6	6.2	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
SmartX Actuator

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



Spring Return Actuator

Specifications

Connection	3 ft. (0.9 m) cable, ½" conduit connectors
Rotation	CW or CCW spring return using reverse mounting
Control Action	Direct/reverse signal selection MS40- only
Shaft Size	5/8" (15.9 mm) diameter, ½" (13 mm) square
Housing	NEMA 2 (IEC IP54) with conduit connector in the down position
Dimensions	6-51/64 x 4 x 3½" (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
Installation 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 RSM

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 Spring Return 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

[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 N-m) minimum
Connection	3 ft. (0.9 m) cable, ½" conduit connectors
Rotation	CW or CCW spring return using reverse mounting
Control Action	Direct/reverse signal selection (MS41- only)
Shaft Size	¾" (19 mm) diameter, ½" (13 mm) square
Housing	NEMA 1, NEMA 2 (IEC IP54) with conduit connector in the down position
Dimensions	10½ x 4 x 3½" (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
Installation 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 RSM

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
60/133 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 N-m)



Spring Return Actuator

Specifications	
Connection	2 ft. (61 cm) Applicance cable, ½" conduit connectors
Rotation	CW or CCW spring return using reverse mounting
Shaft Size	Standard: 3/8 to ½" (10…13 mm) round or square Optional: 1.05" (25.1 mm) diameter, 5/8" (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" (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
Installation 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 RSM

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					
MS40-7170a	2…10 Vdc 4…20 mA[b]	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.

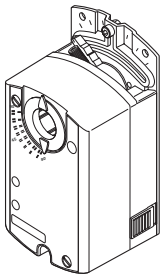
Application
The AM-708 500 ohm resistor converts a 4…20 mA signal to a 2…10 Vdc signal.
Specifications
- Actuators: MS40-7043, MS41-7073, MS41-7153, MS40-717x, MS41-6083, MS41-6153 and MS41-6343.
- Wire leads.

AM-708
500 Ohm
Resistor



Mx41-6043 SmartX Actuator Specifications

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



Non-Spring Return Actuator

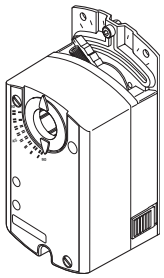
Specifications	
Connection	3 ft. (0.9 m) 18 AWG leads, Plenum rated
Rotation	90° CW or CCW field selectable
Shaft Size	3/8 …5/8" (10…15.9 mm) diameter, 1/4 to ½" (6.4 to 13 mm) square, 9/16" (14.3 mm) hex
Housing	NEMA 2, (IP54 to EN60529) with conduit in the down position
Dimensions	5-7/16 x 2¾ x 3-3/8" (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
Installation 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 N-m)



Non-Spring Return Actuator

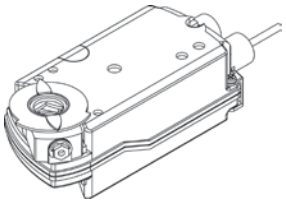
Specifications	
Connection	3 ft. (0.9 m) 18 AWG leads, Plenum rated
Rotation	90° CW or CCW field selectable
Shaft Size	3/8…5/8" (10…15.9 mm) diameter, 1/4 to ½" (6.4 to 13 mm) square, 9/16" (14.3 mm) hex
Housing	NEMA 2, (IP54 to EN60529) with conduit in the down position
Dimensions	5-7/16 x 2¾ x 3-3/8" (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
Installation 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)
MF41-6083-502				None	Two		
MS41-6083	0…10 Vdc		3.3	0…10 Vdc	No		
MS41-6083-502	0…10 Vdc				Two		

Mx41-6153 SmartX Actuator Specifications

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



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" (6.4 to 19 mm) diameter, 1/4 to ½" (6.4 to 13 mm) square
Housing	NEMA 1, (IP54 to EN60529)
Dimensions	8-3/8 x 3¼ x 2-2/3" (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
Installation 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		

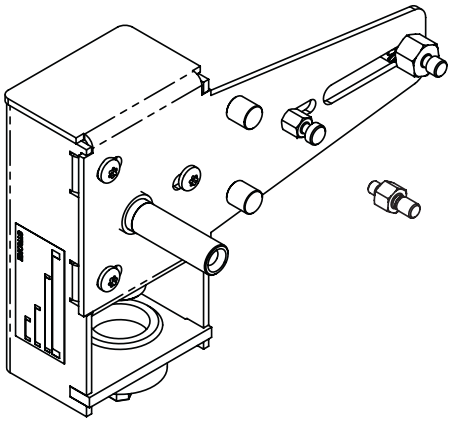
AV-611 Linkage

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	

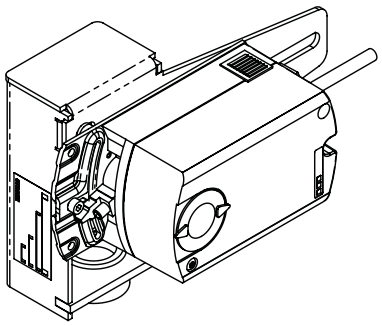
Note: The AV-611 linkage is also compatible with the actuators above with the auxiliary switch option (-5xx in the third part number field).



AV-611 SmartX Actuator
Globe Valve Linkage

Applicable Literature

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



Typical Actuator Mounting

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					
MF41-6043ad	24 Vac +20/-15%	2.3	—	2.0	No	90 @ 60 Hz 108 @ 50 Hz	35 (4)	AV-611
MS41-6043d	24 Vac +20/-15%	3.3	1.2	3.0	No			
MF41-6083d	24 Vac +20/-15%[b]	2.3	—	2.0	No	125 @ 60 Hz 150 @ 50 Hz	70 (8)	
MS41-6083d	24 Vac +20/-15%[b]	3.3	1.2	3.0	No			
MF41-6153	24 Vac +20/-15%[c]	3.0	—	3.0	No		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

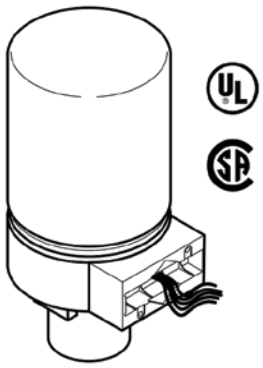
MA-52xx Electronic Hydraulic Two-Position SR Actuators

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



MA-52xx Spring Return Series

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

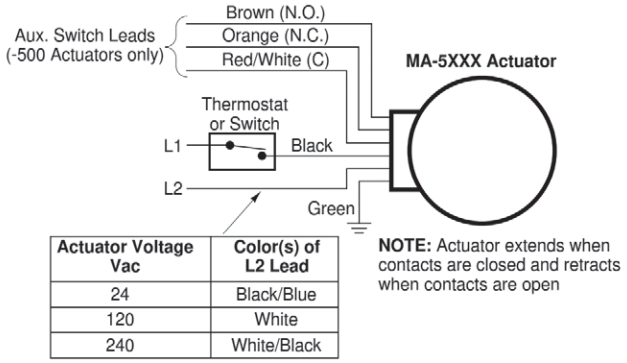
Inputs	
Control Circuit	Two-wire, SPDT
Power Input	Refer to Model Table
Connections	Color-coded 4 ft. (1.2 m) leads.
Outputs	
Electrical	Auxiliary Switch (MA-5xxx-500 models), 10 Amps, 120 Vac adjustable SPDT, factory set to close the N.C. contact at the retracted end of stroke.
Mechanical	Stroke, Valve: 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." (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.



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

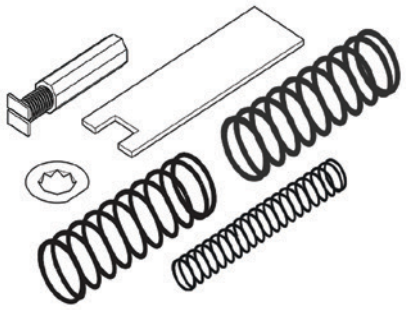
Typical Wiring for MA-5xxx Series Actuators

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



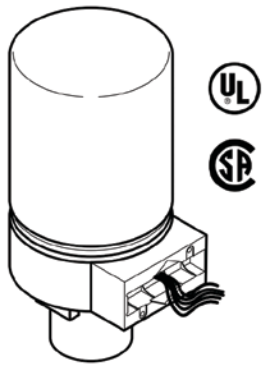
MP-52xx Electronic Hydraulic Proportional SR Actuators

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 and 120 Vac models.
- Die cast lower housing with ½" (12.7 mm) conduit opening and painted steel upper housing.
- Hydraulic actuator with oil-immersed motor, transducer, and pump.



MP-52xx Proportional

Model Table

Part Number	Actuator Power Input					10 Amps Auxiliary Switch[a]	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-601[b]
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.

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 *Pg. 29, 2. VB-7xxx Series Globe Valves ½" to 2"*
Humidity	5…95% RH, non-condensing
Location	NEMA Type 1
Dimensions	6¾ x 3¼ Dia." (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-600[a] or AV-7600[b] Only for Chilled Water Applications Only	AV-600[a] or AV-7600[b] & AV-601	AV-600[a] or AV-7600[b] Only	AV-600[a] or AV-7600[b] & 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 Installation Instructions, F-26279.
b For detailed valve linkage installation instructions, refer to AV-7600 Hydraulic Actuator Valve Linkage Kit Installation Instructions, F-26235.
c Maximum allowable ambient temperature of the actuator.

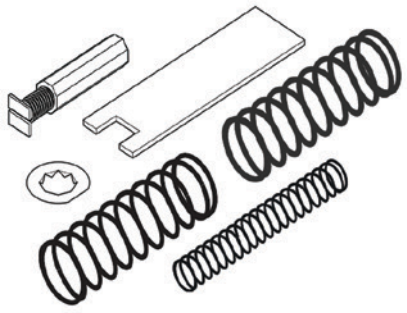
Accessories	
Valve Linkages	
AV-601	Valve linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Valve linkage for VB-7xxx.

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



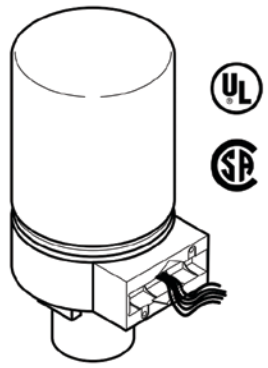
MP-541x Electronic Hydraulic Proportional SR Actuators

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 and 120 Vac models.
- Damper models with linkage or base models that require separate damper or valve linkage.
- Die cast lower housing with ½" conduit opening and painted steel upper housing.
- Hydraulic actuator with oil immersed motor, transducer, and pump.



MP-541x Series Positive Positioning

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-601b 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.

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 *Pg. 29, 2. VB-7xxx Series Globe Valves ½" to 2"*
Humidity	5…95% RH, non-condensing
Location	NEMA Type 1
Dimensions	6¾ x 3¼ Dia." (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-600[a] or AV-7600[b] Only for Chilled Water Applications Only	AV-600[a] or AV-7600[b] & AV-601	AV-600[a] or AV-7600[b] Only	AV-600[a] or AV-7600[b] & 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 Installation Instructions, F-26279.

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

[c] Maximum allowable ambient temperature of the actuator.

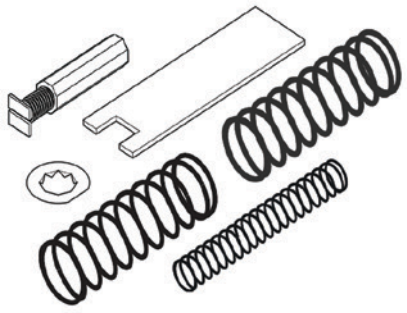
Accessories	
Valve Linkages	
AV-601	Valve linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Valve linkage for VB-7xxx.

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



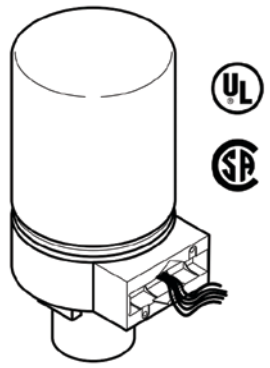
MPR-561x SR Hydraulic Proportional SR Actuators

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" 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.



MPR-561x Series Proportional

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 AV-601a
MPR-5613	24	12.0	0.80	13.2	0.97				

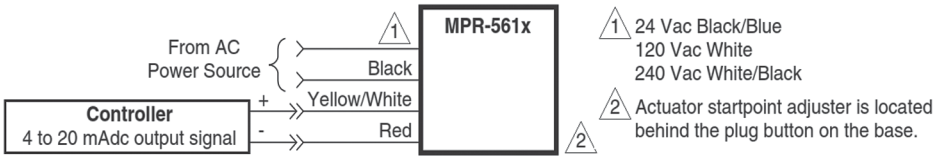
[a] May be required for steam or hot water.

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 *Pg. 29, 2. VB-7xxx Series Globe Valves ½" to 2"*
Humidity	5…95% RH, non-condensing
Location	NEMA Type 1
Dimensions	MP-5x1x: 6¾ x 3¼" (171 x 83 mm)

Accessories and Applications

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.



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

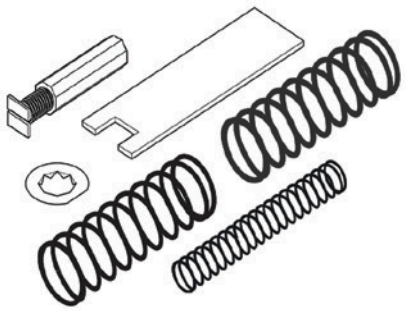


Application
The AV-7600-1 valve linkage kit is used to field assemble MA-521x, MP-521x, MP-541x and MP-561x round hydraulic actuators to ½" through 2" VB-7xxx series valve bodies.

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.

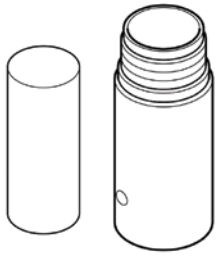
AV-7600-1
Hydraulic Actuator Valve Linkage Kit



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

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.



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

Specifications

Kit consists of an extension coupling and a spacer.
Dimensions: Add 2-1/32" (52 mm) to the "E" dimension for the valve assembly using an AV-601 linkage extension. Refer to complete dimensions in *Pg. 111, 6. VB-7xxx Series Dimensions* :

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

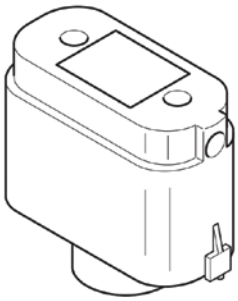
Restrictions on the Maximum Ambient Temperature for Valve Actuator				
Maximum Temperature of Media in the Valve Body (Check Valve Ratings)	Maximum Ambient Temperature of MP-541x or MPR-5x1x		Maximum Ambient Temperature of MA-521x or MP-521x	
	AV-600[a] or AV-7600[b] Only for Chilled Water Applications Only	AV-600[a] or AV-7600[b] & AV-601	AV-600[a] or AV-7600[b] Only	AV-600[a] or AV-7600[b] & 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 Installation Instructions, F-26279.

[b] For detailed valve linkage installation instructions, refer to AV-7600 Hydraulic Actuator Valve Linkage Kit Installation 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" to 2" VB-7xxx Series valves (subject to close-off ratings) and discontinued ½" to 1¼" VB-9xxx valves.

Features

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

Model Table		
Model Number	Nominal Spring Range[a] (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" (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" FNPT located on side of housing.
Max. Air Pressure	30 psig (207 kPa)
Mechanical Outputs	
Stroke	5/8" 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" (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

AV-7400 Pneumatic Actuator Valve Linkage Kit

Application

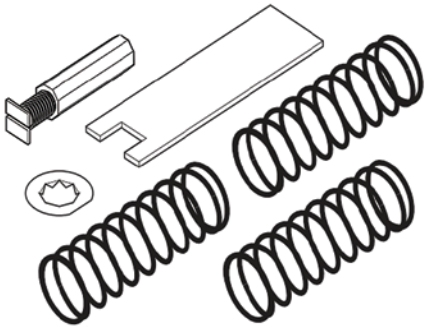
The AV-7400 valve linkage kit is used to field install MK-2690 pneumatic actuators to a variety of ½" through 2" VB-7xxx series valve bodies.

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

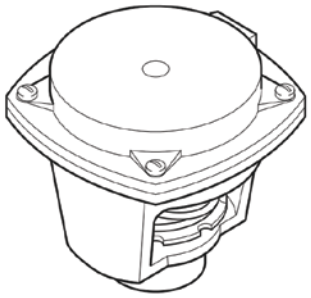
- Actuator mounting: In any upright position with actuator above the center line of the valve body.



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 cm^2) 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" 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" (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" (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" 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. See F-19072).
Mounting	In any upright position with actuator head above the center line of the valve body.
Dimensions	3-7/8 x 4¾ x 4¾" (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.

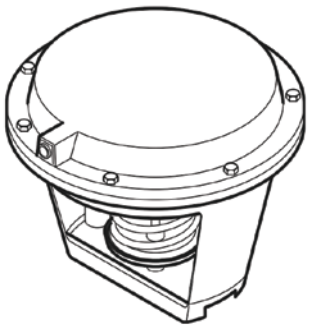
MK-66xx Pneumatic Actuator - Proportional

Application

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

Features

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



MK-66xx
Proportional Pneumatic Valve Actuator

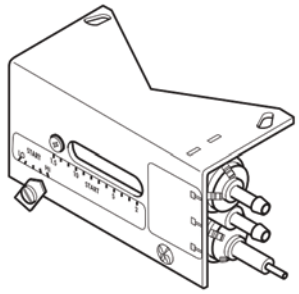
Model Table

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" FNPT
Valve linkage	AV-430 (order separately. See F-19072).
Mounting	Any upright position with actuator head above center line of the valve body.
Dimensions	7¾ H x 10½ W x 10½ D" (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.

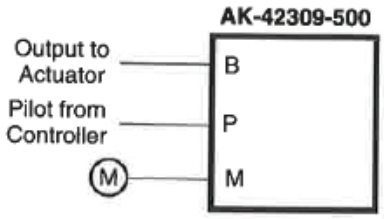


Figure 1 Piping Connections.

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" 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
Air connections	
“M” and “B”	Barbed for 1/4" O.D. plastic tubing.
“P”	Dual-contoured for 1/4" O.D. and 5/32" 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" (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

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).



E9429

MG-350V

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. (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.

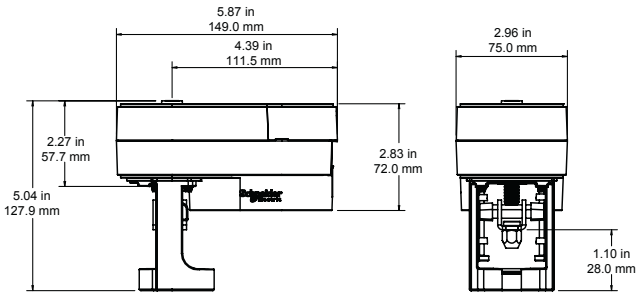
MG350V Actuator Models

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

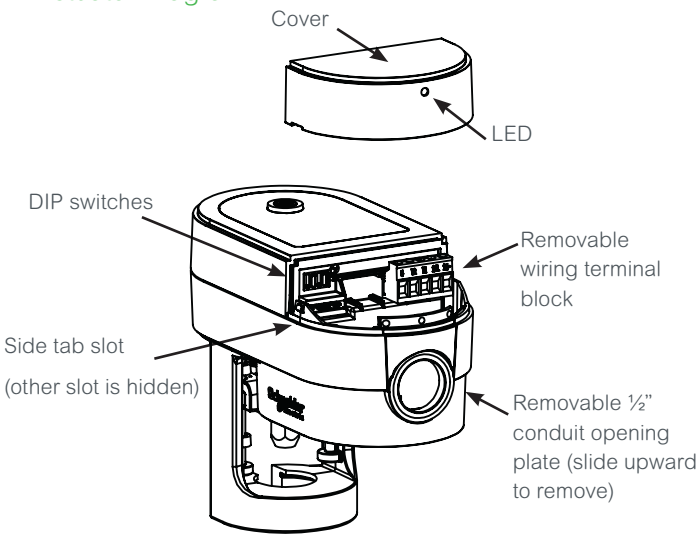
a) 24 Vac (Class 2 power supply), ±20%, 50/60 Hz, 20…29 Vdc, 5 W; see the MG350V series installation instruction (F-27852) for more information.
b) DIP switch configurable 0…10 Vdc or 2…10 Vdc control input, (4…20 mA requires an externally mounted 500 ohm resistor).
c) DIP switch configurable 0…10 Vdc, 2…10 Vdc, or 4…20 mA control input.
d) DIP switch configurable 0.1…25.5 sec, 0.59…2.93 sec.
e) DIP switch configurable 2…10 Vdc or 0…5 Vdc.

MG-350V Globe Valve Actuator

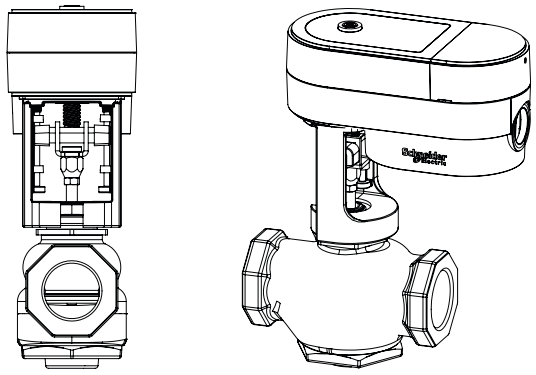
Dimensions (inches)



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.

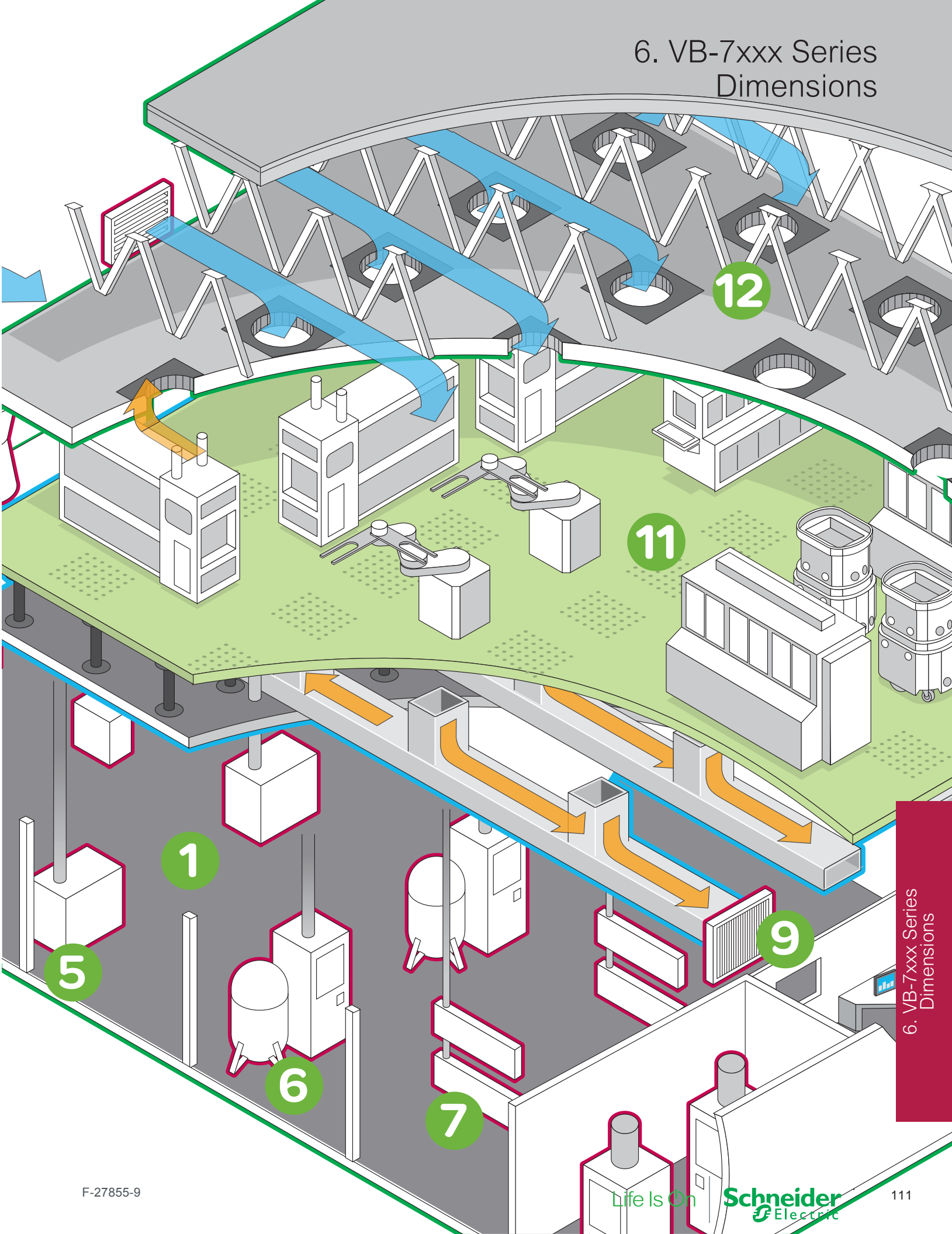
Select Valve/Actuator Combination Having Sufficient Close-Off for Application

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-7221-0-4-P, VB-7222-0-4-P, VB-7223-0-4-P, VB-7224-0-4-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-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

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-7xxx Series Dimensions



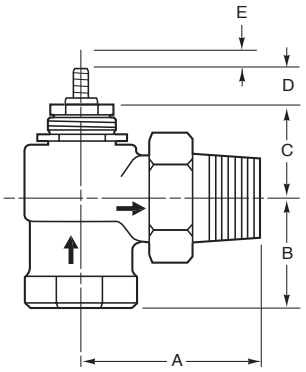
F-27855-9

½"…2" 2-Way Stem-Up Open Valve Bodies

Stem Up Open

Union Angle: VB-7211-0-3-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)		

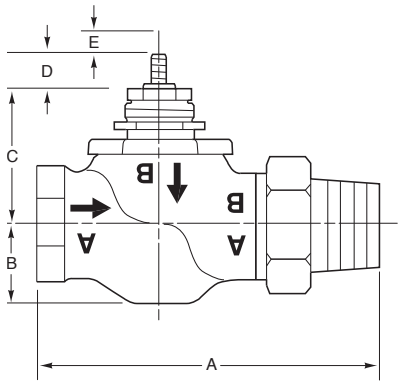
* Stem down



Stem Up Open

Union Straightway: VB-7211-0-4-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)			

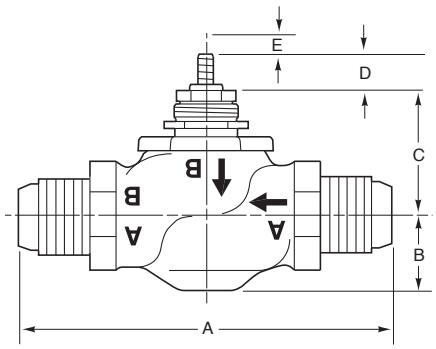
* Stem down



Stem Up Open

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)

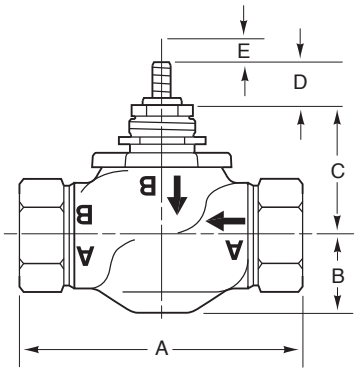
* Stem down



Stem Up Open

Threaded NPT: VB-7213-0-4-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)		

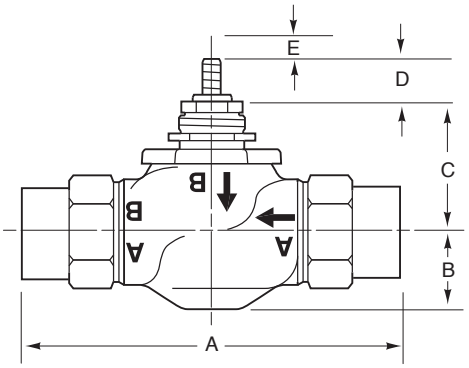
* Stem down



Life Is On Schneider Electric

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

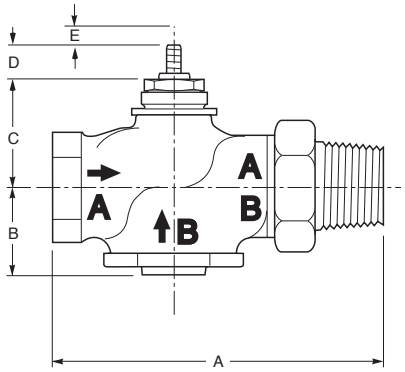
Stem Up Open



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

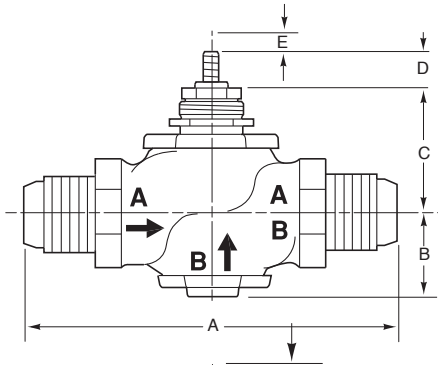
Stem Up Closed



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

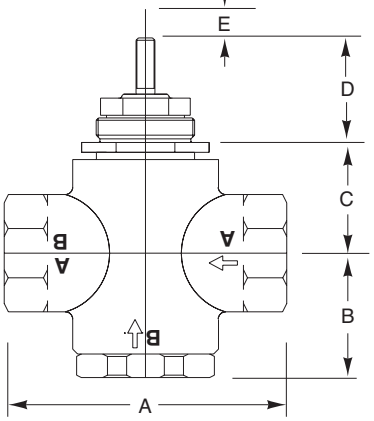
Stem Up Closed



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-9263-0-4-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)		

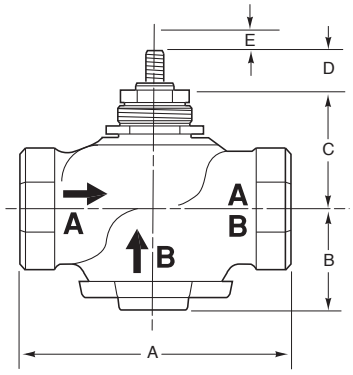
[a]Add up to 1/16" (1.6 mm) for disc seating and compression.

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

Threaded NPT: VB-7223-0-4-P, VB-7253-0-4-P, VB-7263-0-4-P, VB-7273-0-4-P, VB- 7275-0-4-P, VB-7283-0-4-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.

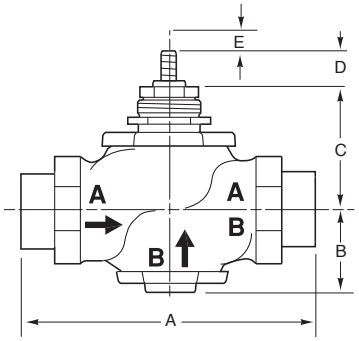


Note - VB-7253-0-4-P, VB-7273-0-4-P, stem-up, normally open valves have inverted A, B, and AB port embossings.

Stem Up Closed

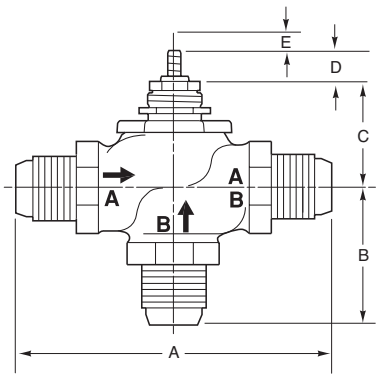
Union Sweat: VB-7224-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E
01, 02, 03, 04	½"	4-3/16 (106)	1¼ (32)	1-11/16 (43)	¾ (19)	7/16 (11)
05, 06	¾"	5-7/16 (138)				
07, 08	1"	6-5/8 (168)	1¾ (45)	1¾ (45)		
09	1¼"	6-13/16 (173)		2 (51)		
10	1½"	8-5/16 (211)	1-13/16 (46)	2-1/8 (54)		
11	2"	9-3/16 (233)	2-1/16 (53)	2-3/16 (56)		

* Stem down



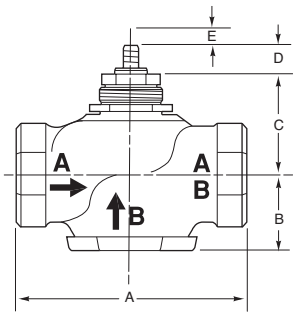
Stem and Bonnet Nut-Thread Information for All VB-7000 Valve Series	
Valve Stem Threads	1/4"-28 UNF-2A Thread
Bonnet Nut Threads	1¼" -16 Thread
Bonnet Nut Outer Hex Size	1-5/8" (use M-370 wrench or equiv.)

VB-7300 ½"…2" 3-Way Valve Bodies



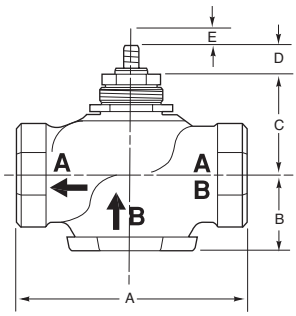
SAE Flare: VB-7312-0-4-P, VB-7332-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04 for 7312	5/8" O.D.	4 (102)	2¼ (57)	1-11/16 (43)	¾ (19)	7/16 (11)
02, 03 for 7332					15/16 (24)	

* Stem down



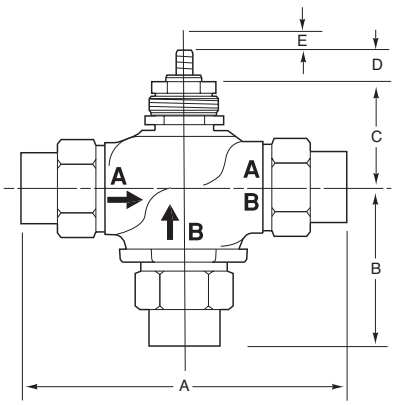
Threaded NPT: VB-7313-0-4-P						
Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04	½"	3-1/16 (78)	1¾ (45)	1-11/16 (43)	¾ (19)	7/16 (11)
06	¾"	3-5/8 (92)				
08	1"	4-5/8 (118)	1-3/8 (35)	1¾ (45)		
09	1¼"		1-5/8 (41)	2 (51)		
10	1½"	5-3/8 (137)	1¾ (45)	1-1/8 (29)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

* Stem down



Threaded NPT: VB-7323-0-4-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 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 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

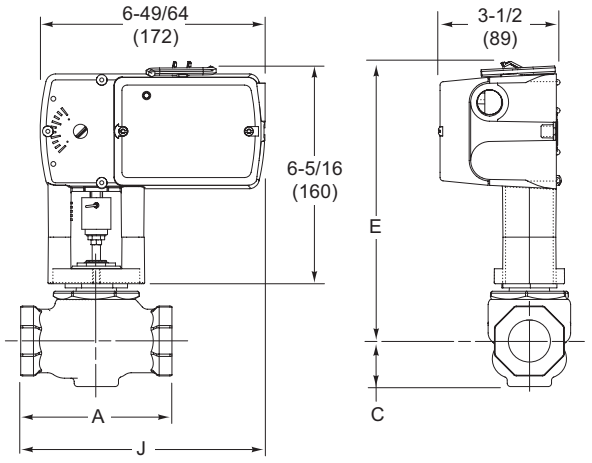


Figure-1 Mx51-710x with 2-Way Globe Valve.

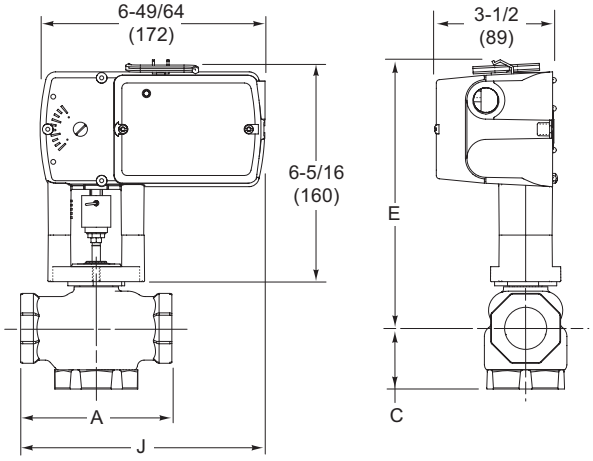


Figure-2 Mx51-710x with 3-Way Globe Valve.

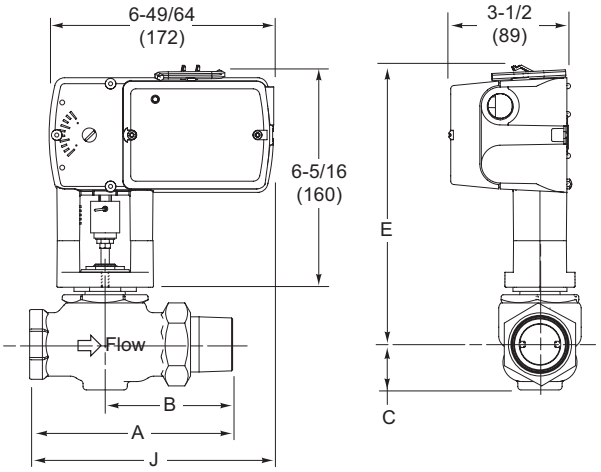


Figure-3 Mx51-710x with 2-Way Union Straightway Globe Valve.

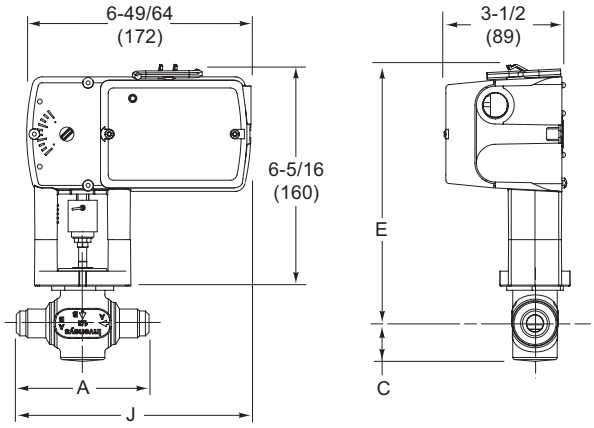


Figure-4 Mx51-710x with 2-Way Flared Globe Valve.

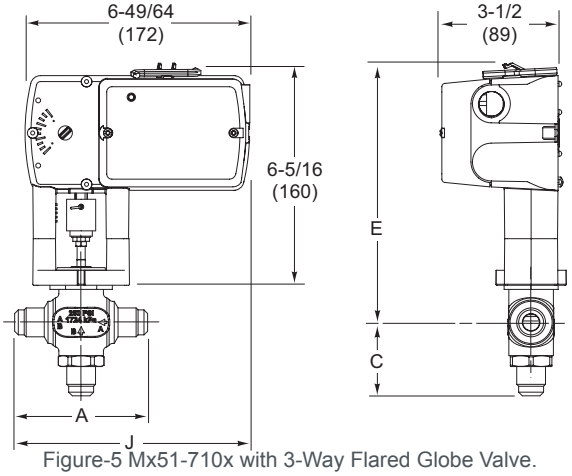


Figure-5 Mx51-710x with 3-Way Flared Globe Valve.

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 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 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)				

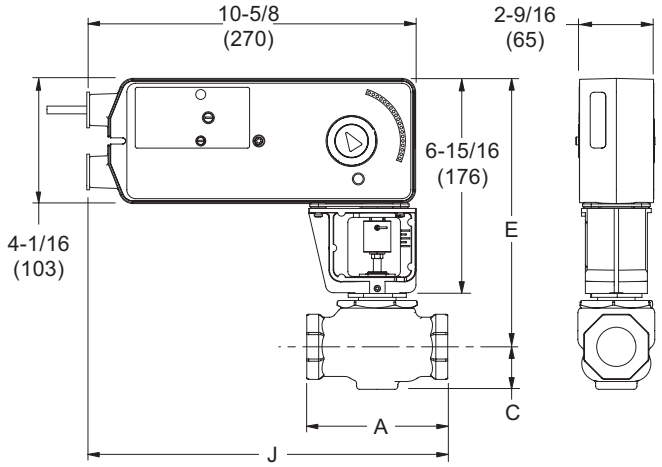


Figure-1 Mx51-720x with ½"…2" 2-Way Globe Valve.

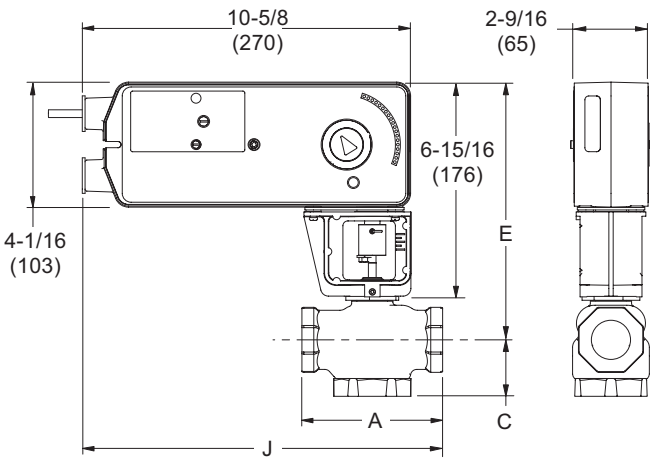


Figure-2 Mx51-720x with ½"…2" 3-Way Globe Valve.

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 Thread 2-Way (N.C.) **VF-7223-50x-4-P VS-7223-50x-4-P** 3-Way **VF-7313-50x-4-P VF-7323-50x-4-P VS-7313-50x-4-P VS-7323-50x-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 Thread 2-Way (N.O.) **VF-7213-50x-4-P VS-7213-50x-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

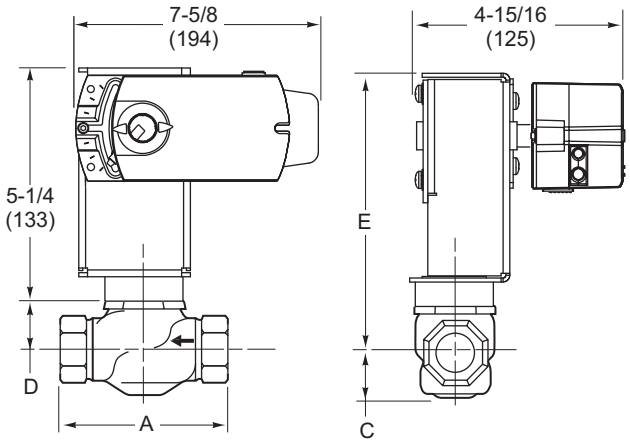


Figure-1 Mx41-6043 or Mx41-6083 with 3-Way Globe Valve with AV-611 Linkage.

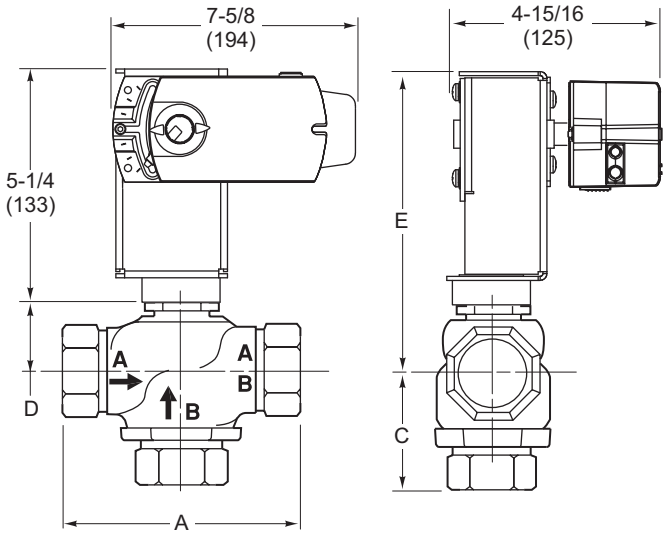


Figure-2 Mx41-6043 or Mx41-6083 with 2-Way Globe Valve with AV-611 Linkage.

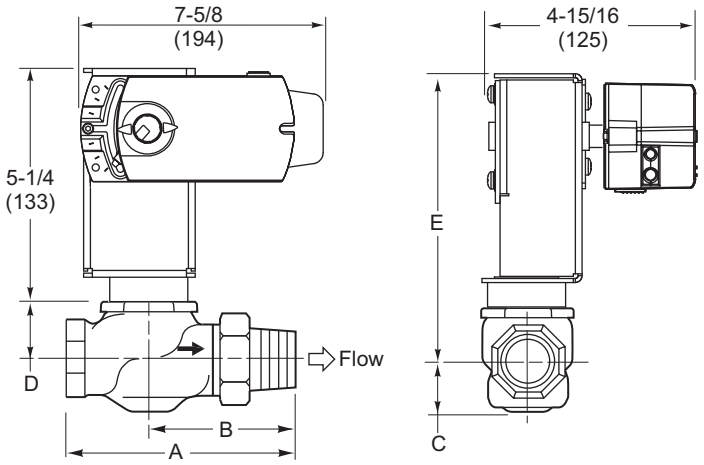


Figure-3 Mx41-6043 or Mx41-6083 with 2-Way Union Straightway Globe Valve with AV-611 Linkage.

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 Thread 2-Way (N.C.) **Vx-7223-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 Thread 2-Way (N.O.) **Vx-7213-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)				

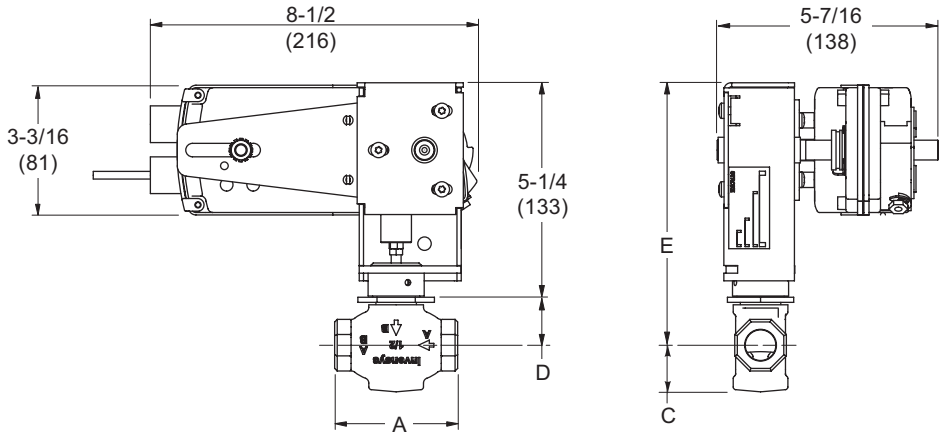


Figure-1 Mx41-6153 with ½"…2" 2-Way Globe Valve with AV-611 Linkage.

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

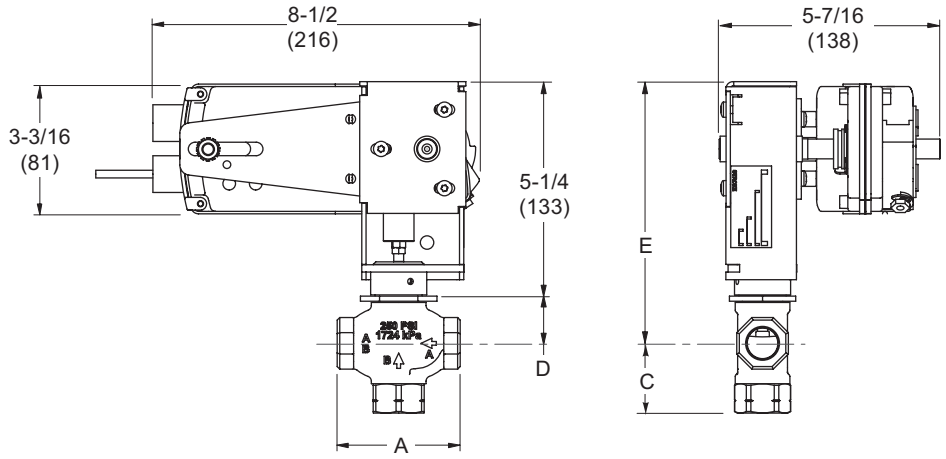


Figure-2 Mx41-6153 with ½"…2" 3-Way Globe Valve with AV-611 Linkage.

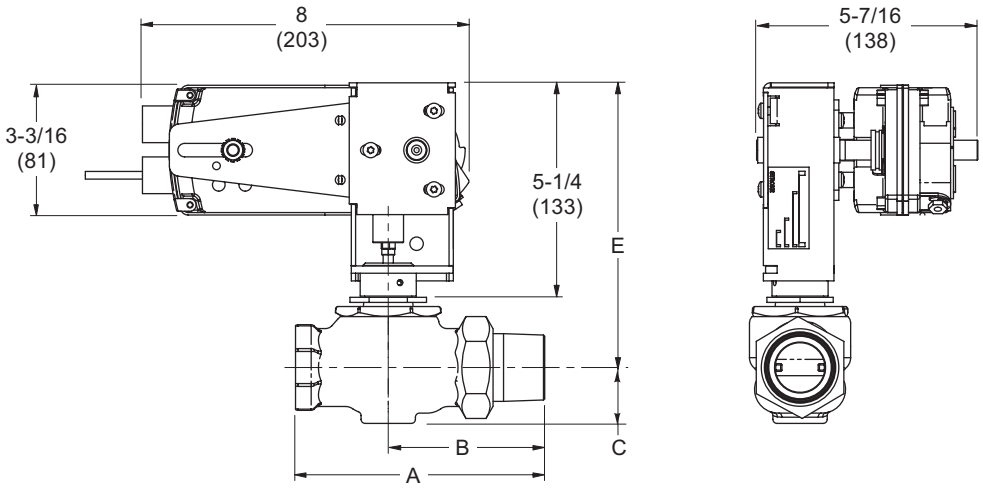


Figure-3 Mx41-6153 with 1" or 1¼" Union Straightway Globe Valve with AV-611 Linkage.

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 Thread 2-Way (N.C.) Vx-7223-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 Thread 2-Way (N.O.) Vx-7213-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)				

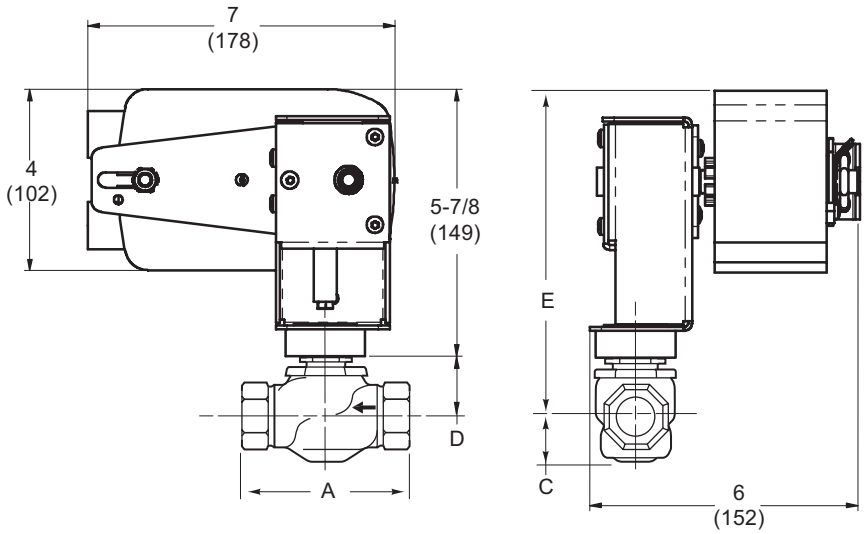


Figure-1 Mx40-704x with ½"…2" 2-Way Globe Valve With AV-611 Linkage.

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

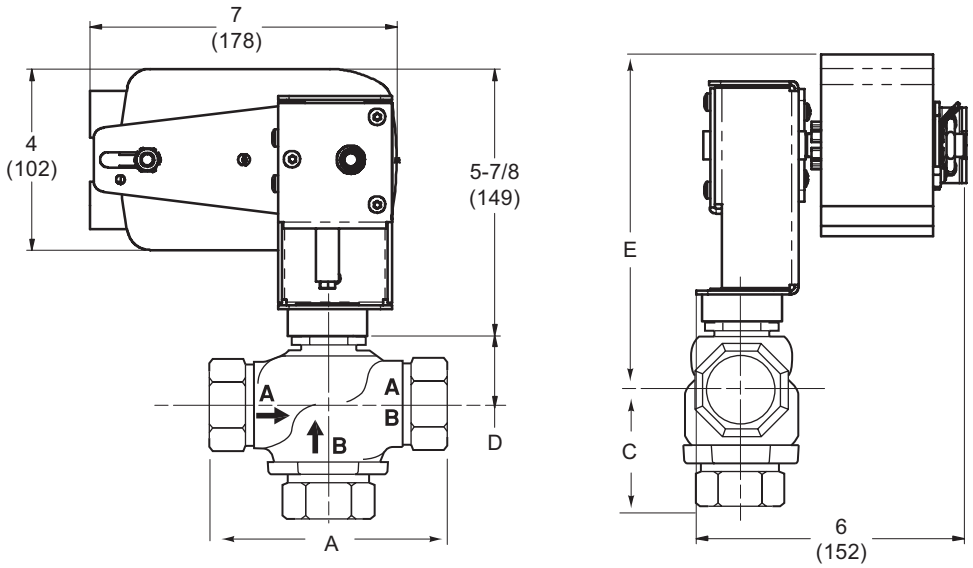


Figure-2 Mx40-704x with ½"…2" 3-Way Globe Valve With AV-611 Linkage.

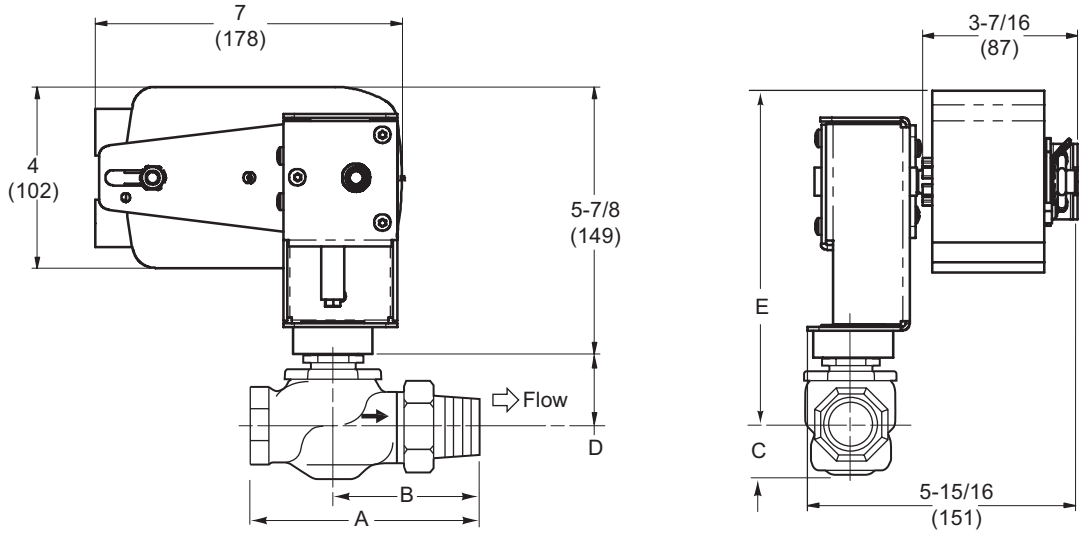


Figure-3 Mx40-704x with ½"…1¼" Union Straightway Globe Valve With AV-611 Linkage.

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 Thread 2-Way (N.C.) Vx-7223-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 Thread 2-Way (N.O.) Vx-7213-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)				

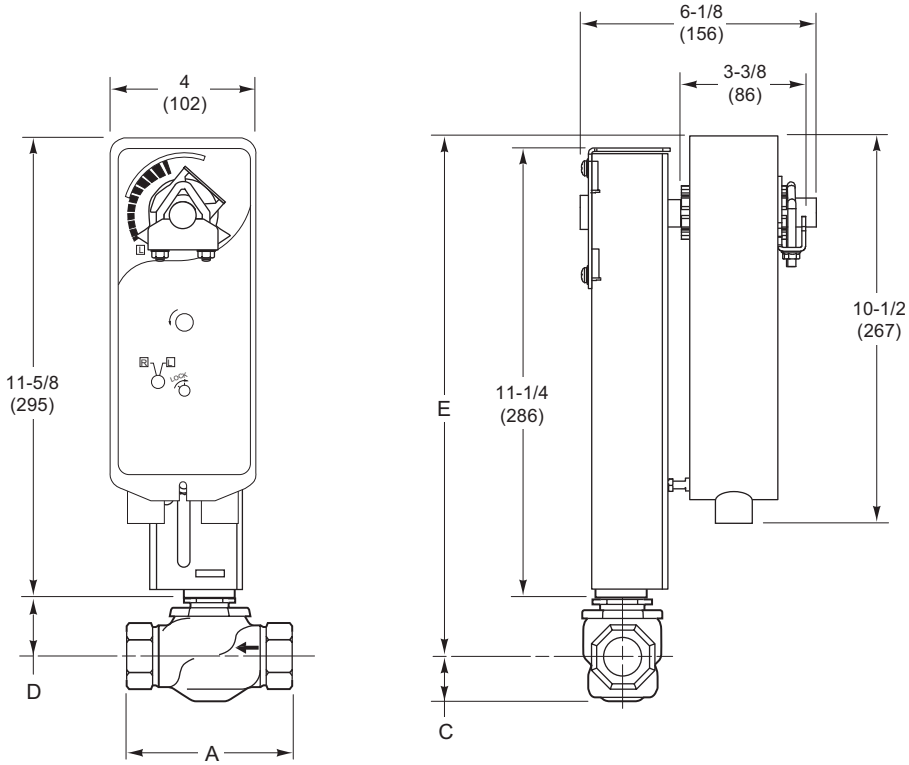


Figure-1 Mx41-715x or Mx41-707x with 1"…2" 2-Way Globe Valve With AV-602 Linkage.

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

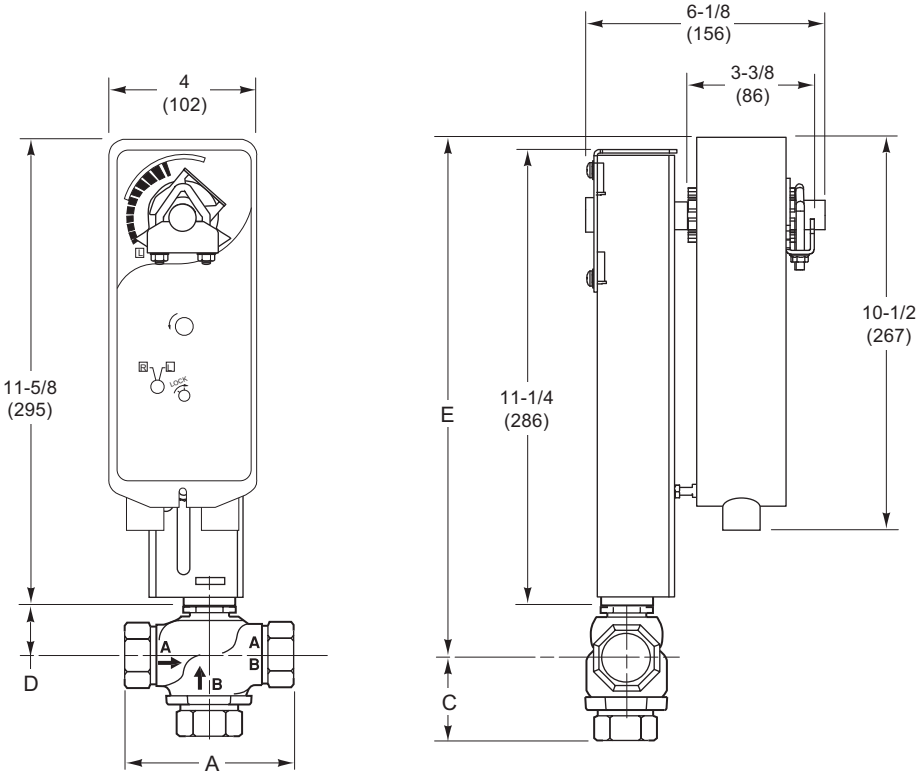


Figure-2 Mx41-715x or Mx41-707x with 1"…2" 3-Way Globe Valve With AV-602 Linkage.

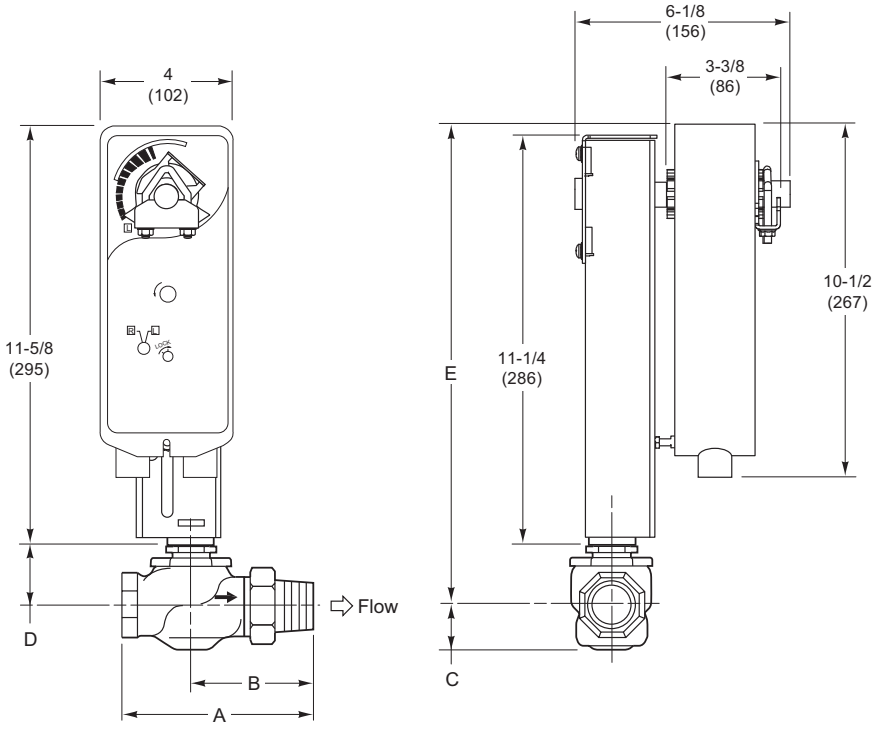


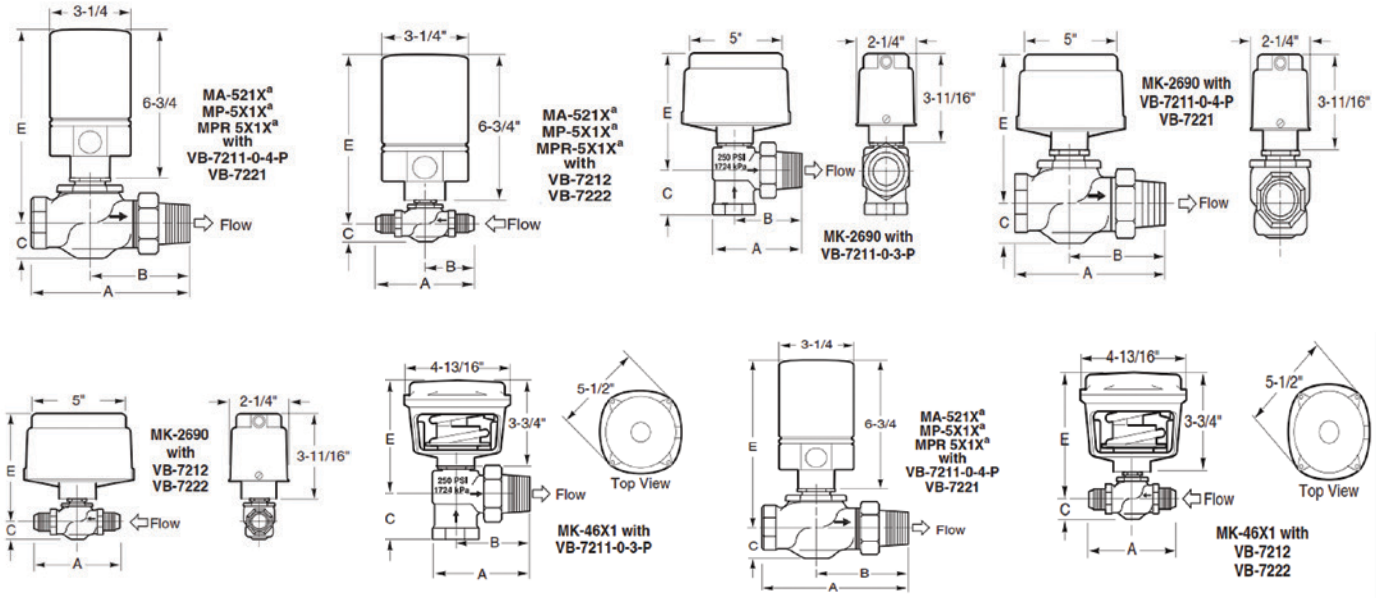
Figure-3 Mx41-715x or Mx41-707x with 1” or 1¼” Union Straightway Globe Valve With AV-602 Linkage.

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

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

Valve Body					Actuator Series		
					MA-5x1x MP-5x1x MPR-5x1xa	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" (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

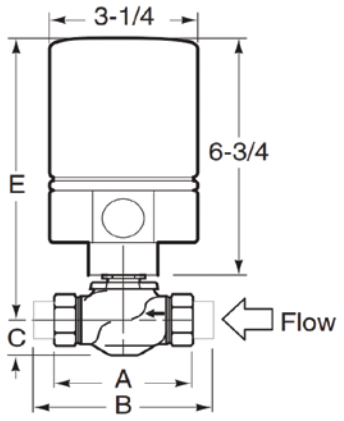
2-Way Globe Valves, Screwed and Union Sweat (½"…2") with Hydraulic Actuators					
Valve Body					Actuator Series
					MA/MP/MPR-5XXX[a]
Part Number	Size (in.)	A	B[b]	C	E
VB-7213-0-4-P VB-7214-0-4-P	½	3 (76)	4-3/16 (106)	1-1/16 (27)	7-15/16 (202)
	¾	3-5/8 (92)	5-7/16 (138)	1-1/16 (27)	7-15/16 (202)
	1	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" (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

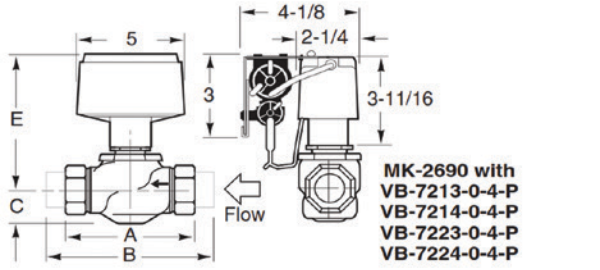


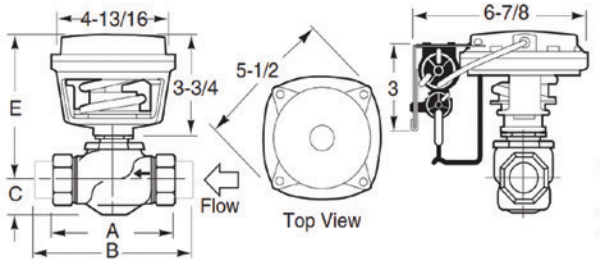
[a]AV-601 linkage extension (not shown) required for hot water applications for MP-54XX, MPR-5XXX, MP-55XX.

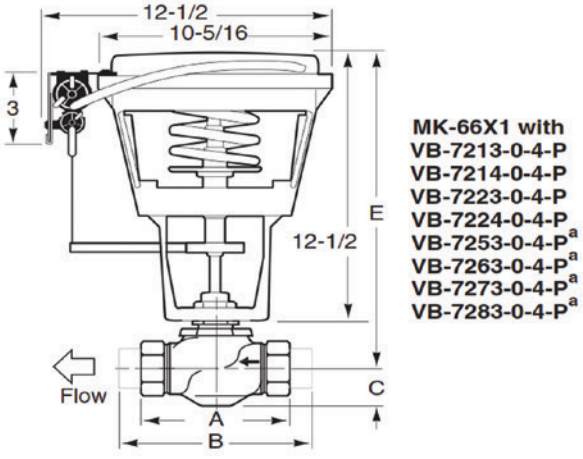
2-Way Valves, Screwed & Union Sweat (½"…2") Pneumatic Actuators

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.







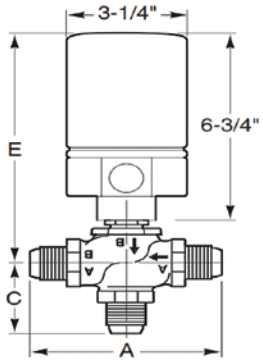
[a]Not available factory assembled.

(Actuators shown with optional Positive Positioner.)

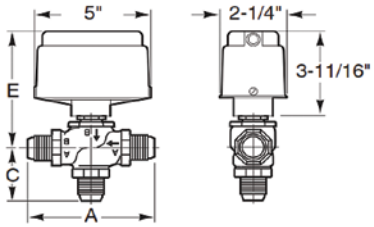
3-Way Mixing & Sequencing Valves, Flared (5/8" O.D.)

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)

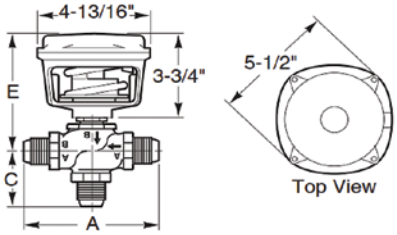
[a]Add 2-1/32" (52 mm) to the "E" dimension for a valve assembly using an AV-601 linkage extension.
NOTE: Allow 3 inches clearance above actuator for removal. Mount MA/MP/MPR-5XXX actuators above the valve body at 45° from vertical.



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



MK-2690
with
VB-7312
VB-7332



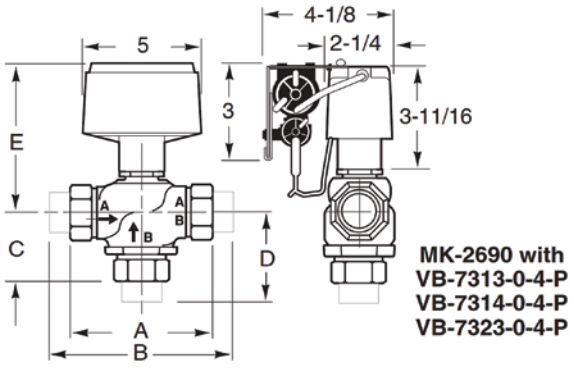
MK-46X1
with
VB-7312
VB-7332

[a]AV-601 linkage extension (not shown) required for hot water applications. Refer to *Pg. 102, AV-601 Extension for MA, MP 5x1x-xxx, MPR-5x1x and MP-541x* .

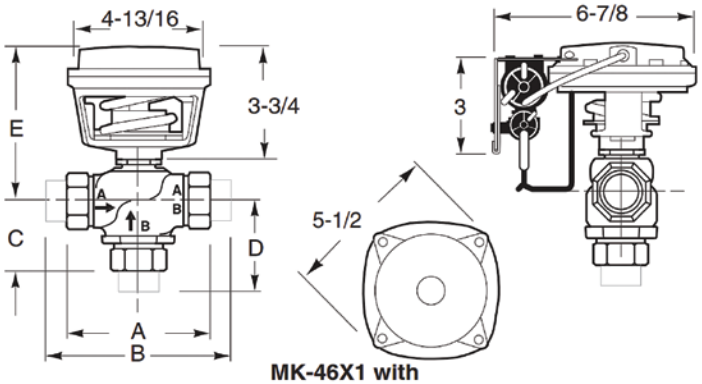
3-Way Mixing, Diverting, Screwed & Union Sweat (½"…2")

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	D[a]	E	E	E
VB-7313-0-4-P VB-7314-0-4-Pa 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)

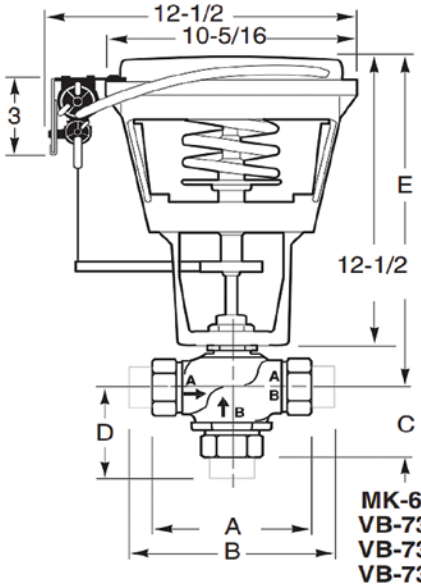
[a]Use B and D dimensions for VB-7314 valve body.



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

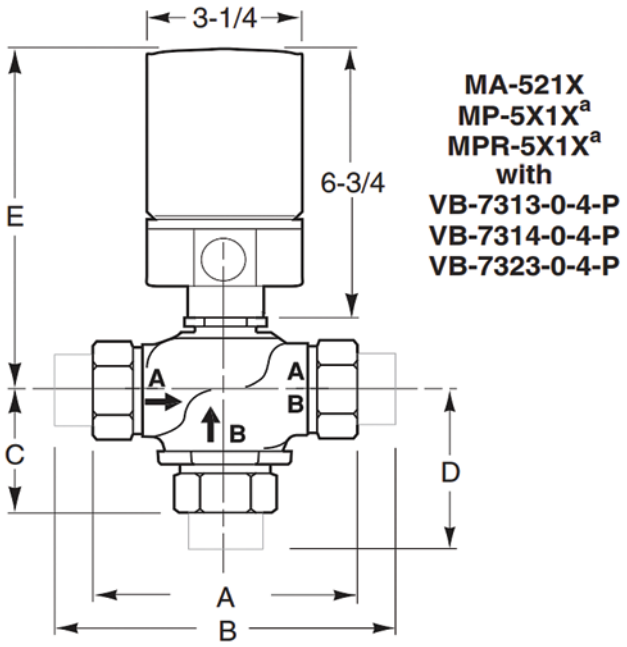
(Actuators shown with optional Positive Positioner.)

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

3-Way Globe Valves, Mixing (½…2"), Diverting (½…2"), and Screwed, Union Sweat (½…2") 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" (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.



MA-521X
MP-5X1X[a]
MPR-5X1X[a]
with
VB-7313-0-4-P
VB-7314-0-4-P
VB-7323-0-4-P

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

Life Is On Schneider Electric

Forta NSR M4xx, M8xx & M15xx A-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	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-7253-0-4-P VB-7273-0-4-P	½”	3 (76)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	¾“	3-5/8 (92)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	1“	4-5/8 (117)	1-1/8 (29)	1-3/16 (30)	7-27/32 (199)
	1¼“	4-5/8 (117)	1-3/8 (35)	1-7/16 (37)	8-3/32 (206)
	1½"	5-3/8 (137)	1½ (38)	1-7/8 (48)	8-17/32 (217)
	2“	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-7263-0-4-P VB-7283-0-4-P	½”	3-1/16 (78)	1-3/16 (30)	1-1/8 (29)	7-25/32 (198)
	¾“	3-5/8 (92)	1-3/16 (30)	1-1/8 (29)	7-25/32 (198)
	1“	4-5/8 (117)	1¾ (44)	1-3/16 (30)	7-27/32 (199)
	1¼“	4-5/8 (117)	1¾ (44)	1-7/16 (37)	8-3/32 (206)
	1½"	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	8-7/32 (209)
	2“	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.

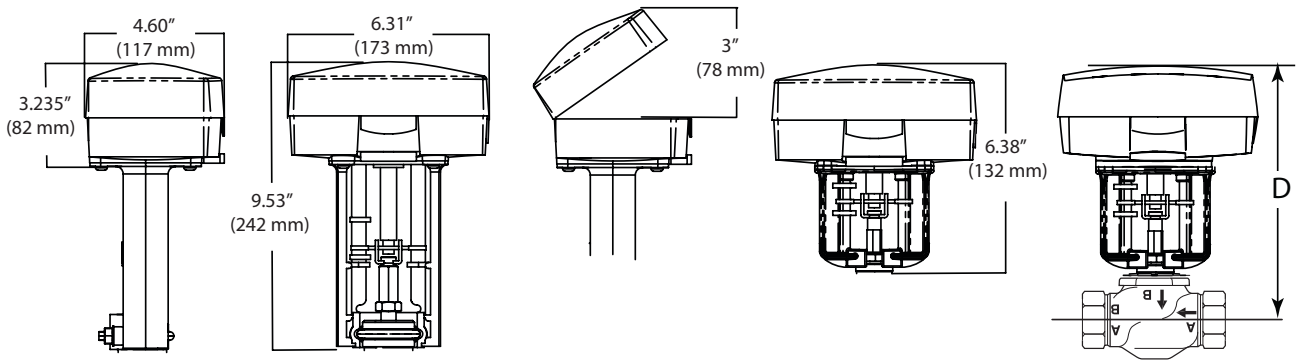


Figure-1 Forta Actuator Dimensions

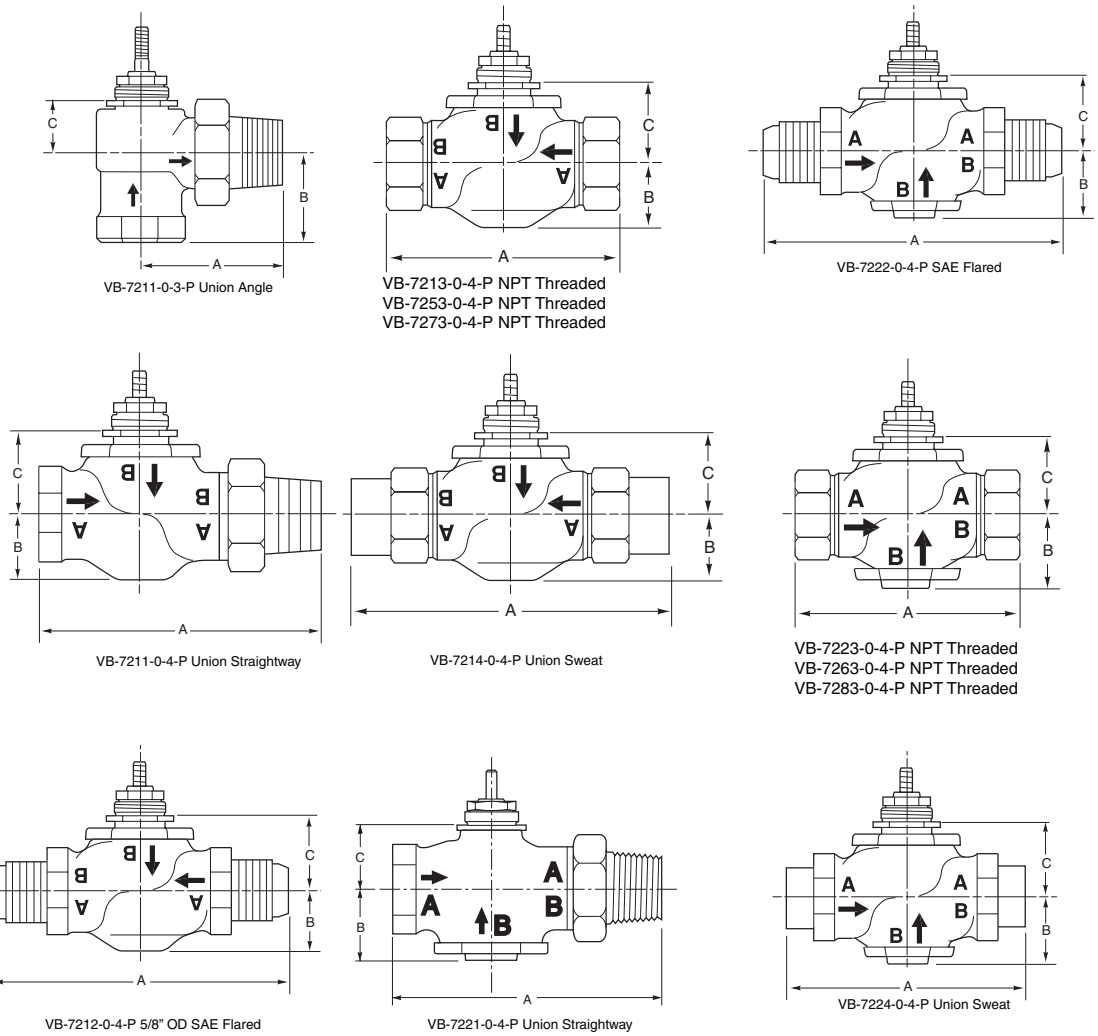


Figure-2 VB-72xx Valve Dimensions

Forta NSR M400A-VB, 8xx & M15xxA-VB with VB-7300 Valves

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	½"	3-1/16 (76)	1¾ (44)	1-1/8 (29)	7-25/32 (198)
	¾"	3-5/8 (92)	1-13/16 (46)	1-1/8 (29)	7-25/32 (198)
	1"	4-5/8 (118)	1¾ (44)	1-3/16 (30)	7-27/32 (199)
	1¼"	4-5/8 (118)	1¾ (44)	1-7/16 (37)	8-3/32 (206)
	1½"	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	8-7/32 (209)
	2"	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.

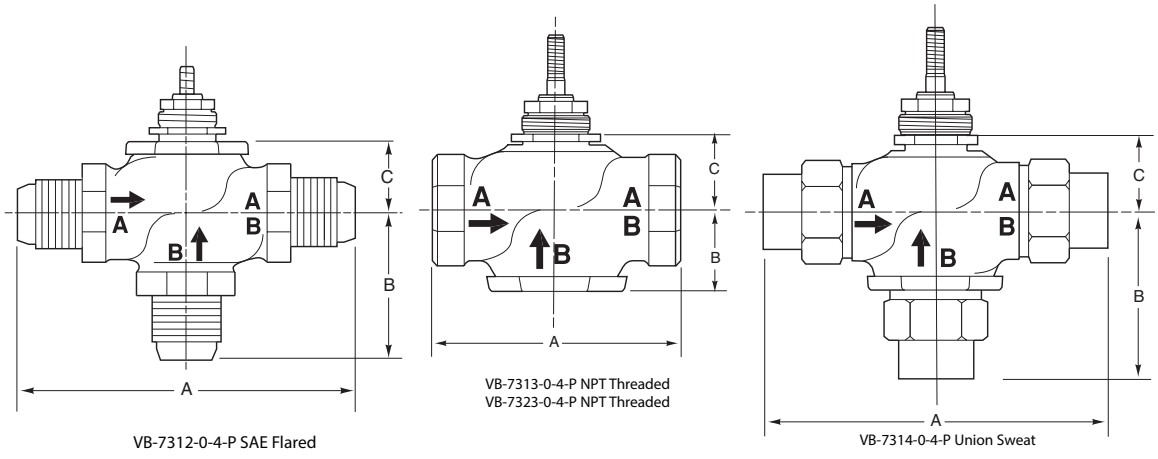


Figure-3 3-Way VB-73xx Valve Body Dimensions

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-7253-0-4-P VB-7273-0-4-P	½"	3 (76)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	¾"	3-5/8 (92)	1-1/16 (27)	1-1/8 (29)	7-25/32 (198)
	1"	4-5/8 (117)	1-1/8 (29)	1-3/16 (30)	7-27/32 (199)
	1¼"	4-5/8 (117)	1-3/8 (35)	1-7/16 (37)	8-3/32 (206)
	1½"	5-3/8 (137)	1½ (38)	1-7/8 (48)	8-17/32 (217)
	2")	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-7263-0-4-P VB-7283-0-4-P	½"	3-1/16 (78)	1-3/16 (30)	1-1/8 (29)	7-25/32 (198)
	¾"	3-5/8 (92)	1-3/16 (30)	1-1/8 (29)	7-25/32 (198)
	1"	4-5/8 (117)	1¾ (44)	1-3/16 (30)	7-27/32 (199)
	1¼"	4-5/8 (117)	1¾ (44)	1-7/16 (37)	8-3/32 (206)
	1½"	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	8-7/32 (209)
	2"	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.

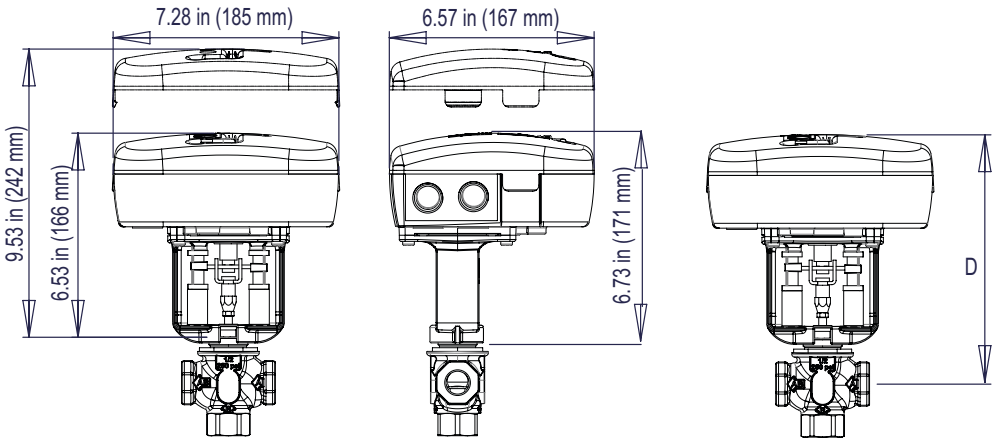


Figure-1 Forta M900Axx-VB Style Dimensions[a]

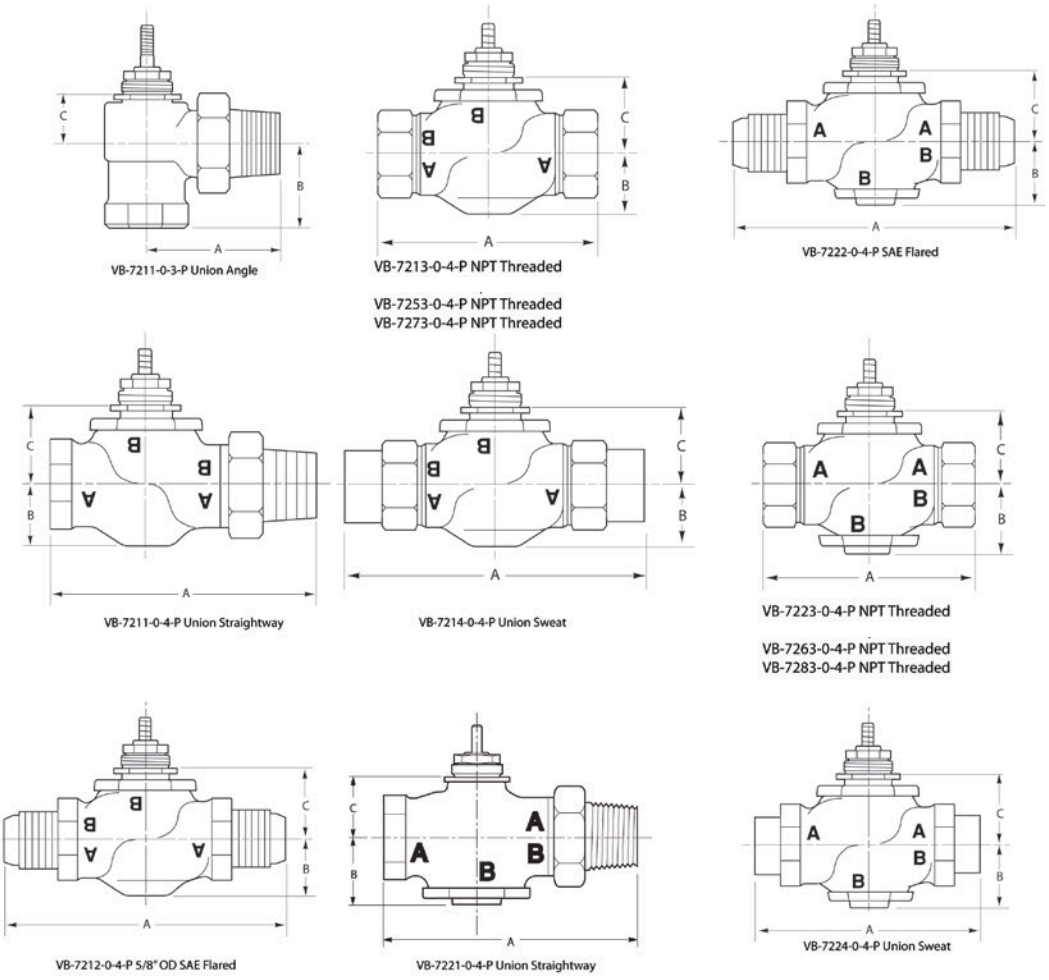


Figure-2 2-Way VB-7xxx Valve Body Dimensions

[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 U-Bolt Style[a b]	D - M900Axx-VB Screw Mount Style[a]
VB-7312-0-4-P	5/8" OD	4 (102)	2¼ (57)	1-1/8 (29)	10-21/32 (271)	7-25/32 (198)
VB-7313-0-4-P	½"	3-1/16 (76)	1¾ (44)	1-1/8 (29)	10-21/32 (271)	7-25/32 (198)
	¾"	3-5/8 (92)	1-13/16 (46)	1-1/8 (29)	10-21/32 (271)	7-25/32 (198)
	1"	4-5/8 (118)	1¾ (44)	1-3/16 (30)	10-23/32 (272)	7-27/32 (199)
	1¼"	4-5/8 (118)	1¾ (44)	1-7/16 (37)	10-31/32 (279)	8-3/32 (206)
	1½"	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	11-3/32 (282)	8-7/32 (209)
	2"	6-1/8 (156)	2¼ (57)	1-5/8 (42)	11-5/32 (283)	8-9/32 (210)
VB-7314-0-4-P	½"	4-3/16 (106)	2-5/16 (59)	1-1/8 (29)	10-21/32 (271)	7-25/32 (198)
	¾"	5-7/16 (138)	2-5/8 (67)	1-1/8 (29)	10-21/32 (271)	7-25/32 (198)
	1"	6-5/8 (168)	3-3/16 (81)	1-3/16 (30)	10-23/32 (272)	7-27/32 (199)
	1¼"	6-13/16 (173)	3-7/16 (87)	1-7/16 (37)	10-31/32 (279)	8-3/32 (206)
	1½"	8-5/16 (211)	3¾ (95)	1-9/16 (40)	11-3/32 (282)	8-7/32 (209)
	2"	9-3/16 (233)	4-3/16 (106)	1-5/8 (42)	11-5/32 (283)	8-9/32 (210)
VB-7323-0-4-P	½"	3-1/16 (76)	1-3/8 (35)	1-1/8 (29)	10-21/32 (271)	7-25/32 (198)
	¾"	3-5/8 (92)	1-11/16 (43)	1-1/8 (29)	10-21/32 (271)	7-25/32 (198)
	1"	4-5/8 (118)	1-9/16 (40)	1-3/16 (30)	10-23/32 (272)	7-27/32 (199)
	1¼"	4-5/8 (118)	1-5/8 (41)	1-7/16 (37)	10-31/32 (279)	8-3/32 (206)
	1½"	5-3/8 (137)	1-11/16 (43)	1-9/16 (40)	11-3/32 (282)	8-7/32 (209)
	2"	6-1/8 (156)	1-7/8 (48)	1-5/8 (42)	11-5/32 (283)	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.

b. U-Bolt Style requires an AV-821 Adapter Kit (Order Separately).

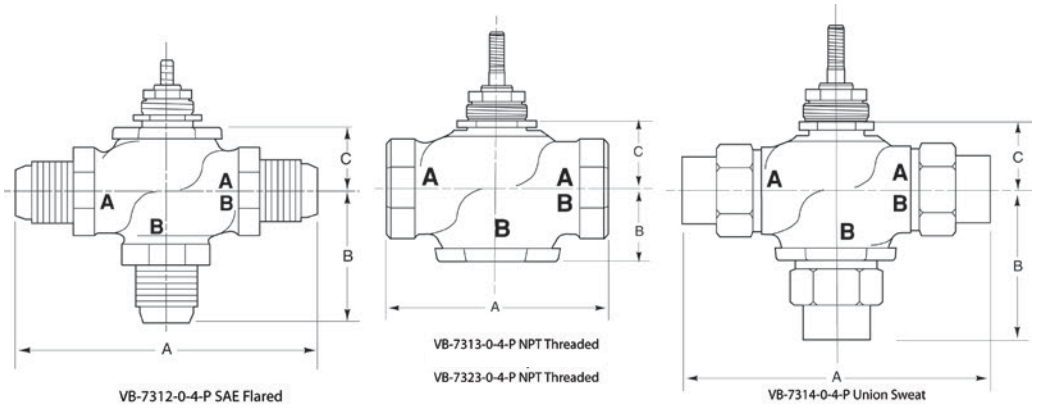


Figure-3 3-Way VB-73xx Valve Body Dimensions

7. VB-8/9xxx Sizing and Selection



Assembly Ordering VB-8000/VB-9000

Specifying the Available Four Part Number Fields (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 –

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.

6) Port Code Cv Value

□□

Specify Option 5 (Flanged) for all valves.

Assembly Ordering VB-8000/VB-9000

V□□–□□□3–□□□–5–□□

- V□□: A = Two Position; B = Valve Body Only; F = Floating; S = Proportional; K = Pneumatic 0-30 Psi
- □□: 4 = AK-42309-500 (VK4-xxxx Pneu only)
- □□□: 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")
- 3: Pipe Connection End Fitting; 3 = Flanged
- □□□: 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.
- 5: Connection; 5 = Flanged
- □□: Port Code
  2½"…6" (Cv 56 to 500)
  12 = 2½"
  13 = 3"
  14 = 4"
  15 = 5"
  16 = 6"

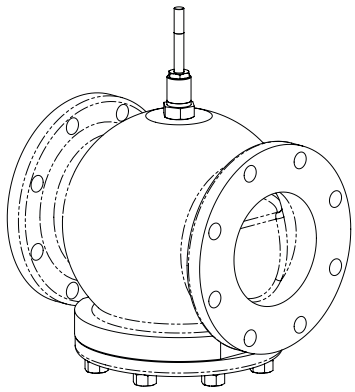
NOTE: Screwed bodies are not available in size 2½" and larger.

2-Way and 3-Way Valves

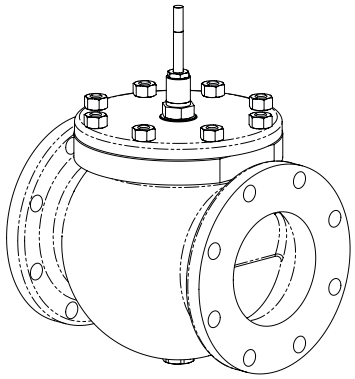
2-Way Stem Up Open or Stem Up Closed

3-Way Mixing/Diverting

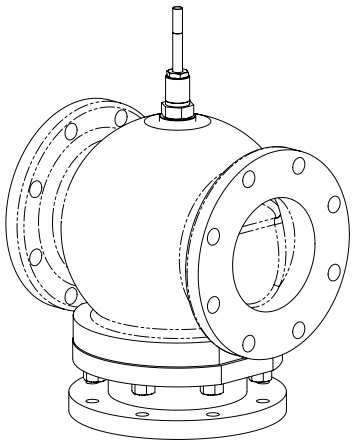
ASA 125 Flanged Cast Iron Body



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[i]		Chilled or Hot Water[i]	
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/Diverting[a]	
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, psi[g]		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) Mixing[e]	Cv (kvs) Diverting[d]
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.

i Glycol up to 50%

VB-8000 3-Way Flow Patterns



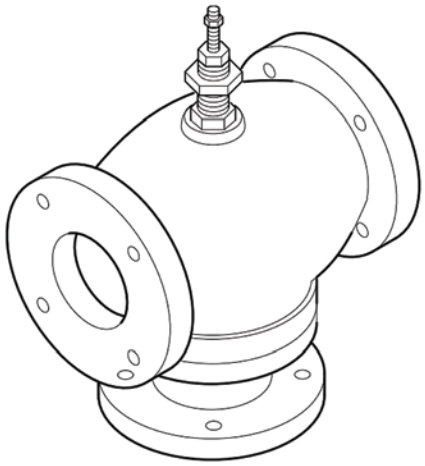
VB-9313 3-Way Mixing Valve Bodies Specifications

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.

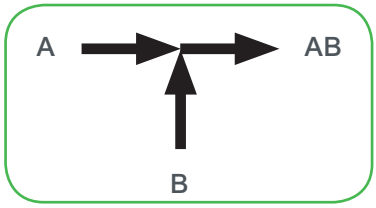


VB-9313-0-5-P
(Typical)

Specifications		Valve Body Series VB-9313-0-5-P
Application		Chilled or Hot Water[c]
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).
c: Glycol up to 50%



VB-93xx 3-Way Mixing Flow Pattern

Sizing & Selection VB-8/9000 2 & 3-Way Sizing for Water

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.

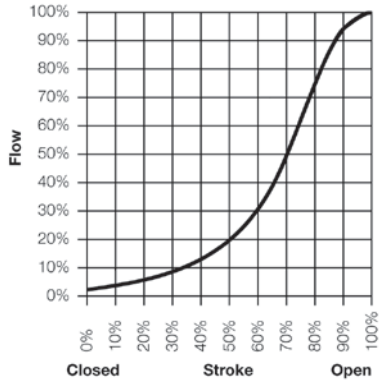
- CA-27 3-Way Valves Application Information
- Valve Selection Table Water, F-11080

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

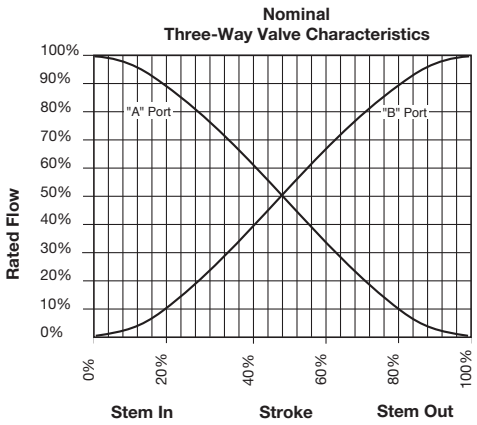
2-Way Valves: The flow curve shown below is representative of all sizes. All valve plugs have lower gain when nearly closed to enhance control at low demand. 2-Way valves are nominally equal percentage and normally used for water and low pressure steam.



Typical Modified Equal Percentage Flow Characteristics

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.



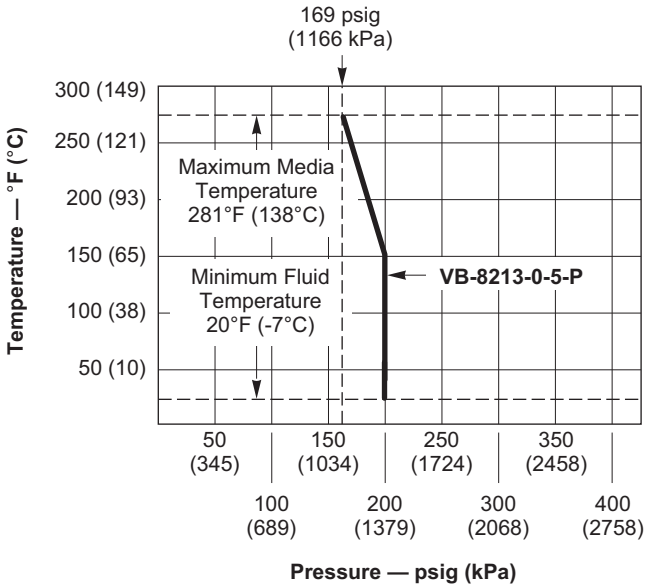
Typical Flow Characteristics

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.

Temperature/Pressure Ratings

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



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 (Cv), Temp. & Materials

Water Flow Coefficient (Cv)

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).

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

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

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.

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

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

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)

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.

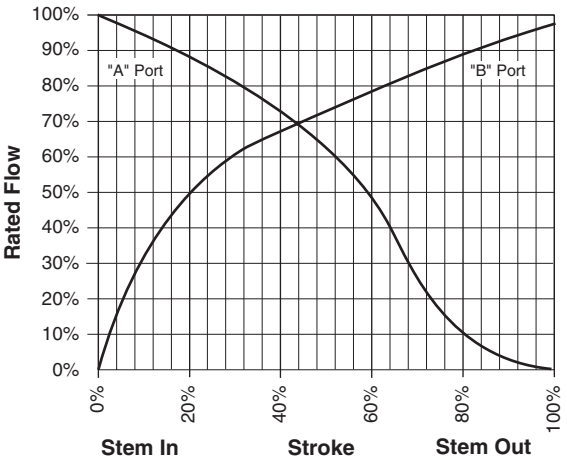
Vapor Pressure of Water Table

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

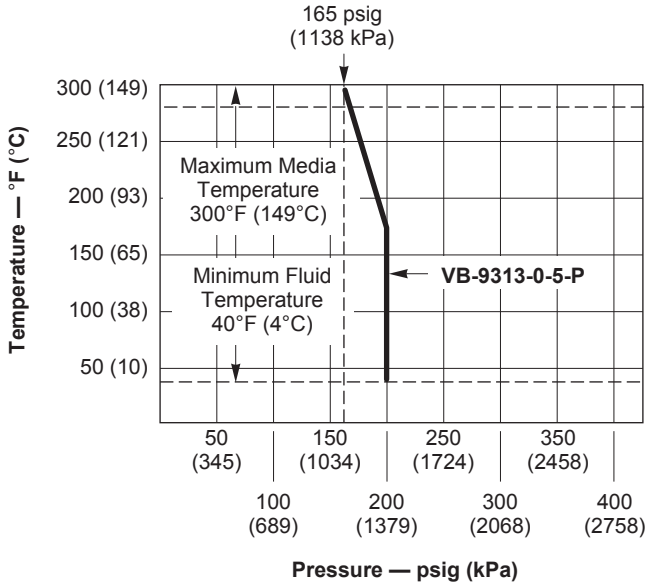
3-Way mixing valves are designed so that the flow from either of the inlet ports to the outlet is approximately linear, which means the total flow from the outlet is almost constant over the stroke of the valve stem. Typical flow characteristics of VB-9313 series valve bodies are shown below.



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

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

Where:

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

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.

VB-8xx3/9313 Close-Off Pressure Capability

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

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 (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).

Note: Valve body and actuator size determine the close-off capabilities.

VB-8xx3/9313 Close-Off Ratings

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

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”						35/35	35/35			
3”						35/35	35/35			
4”						35/35	35/35			
5”						35/35	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)

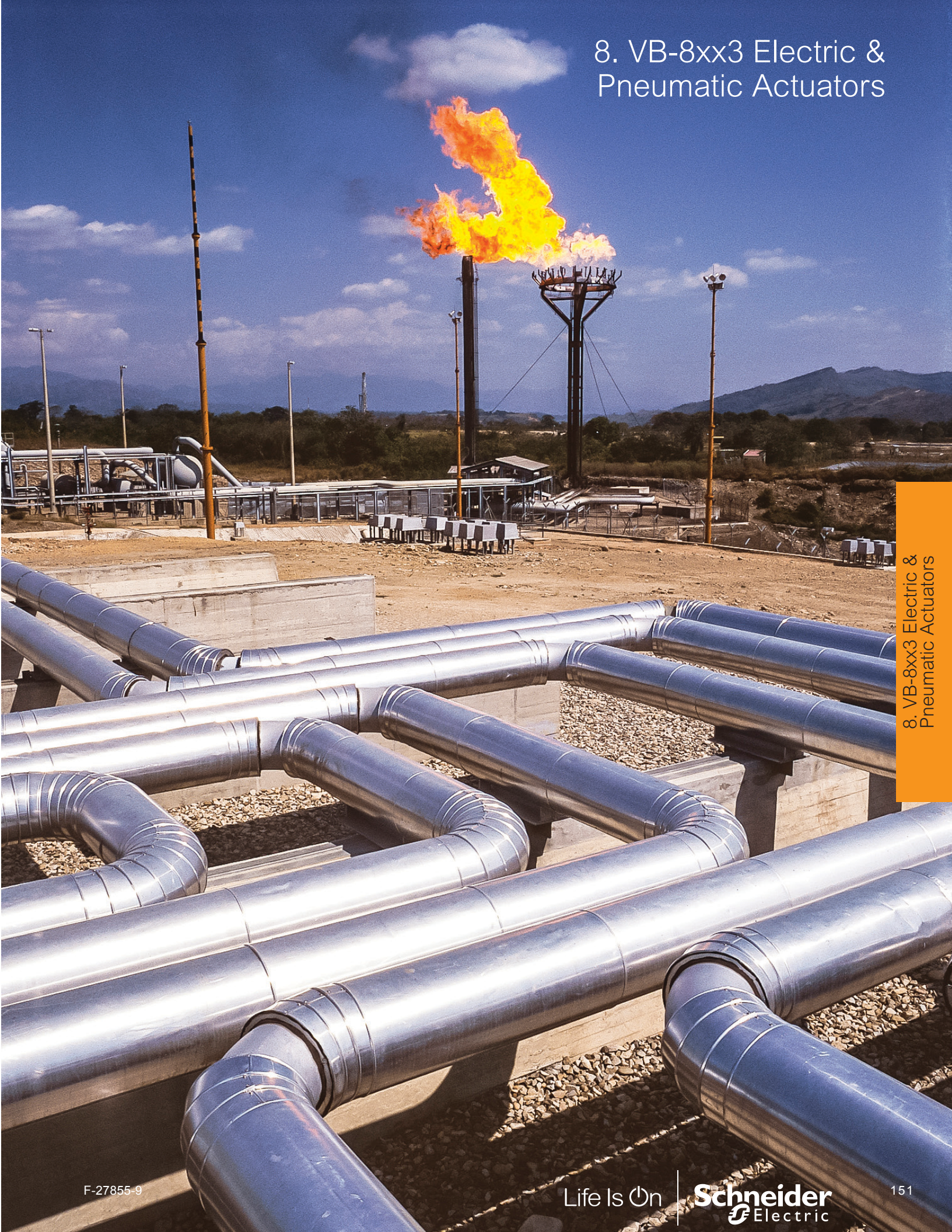
MORE INFO VB-8303
Scan the QR code or visit the link below for more information.

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

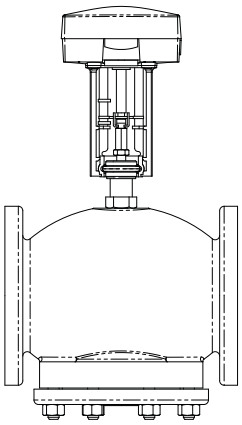
8. VB-8xx3 Electric & Pneumatic Actuators



VB-8xx3 Electric & Pneumatic Actuators

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



VB-8213 with M1500A Actuator

Vx-8xx3 Series Balanced Plug Valve Assemblies

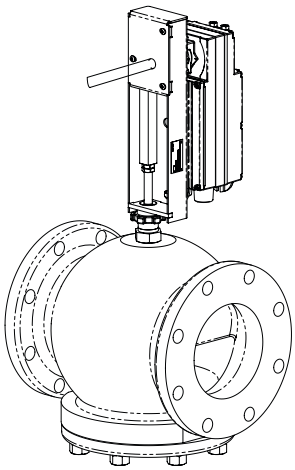
Schneider Electric VA, VF, VK, VK4, VS and VU-8xx3-xxx-5-P series valve assemblies are complete actuator/valve assemblies that accept two-position, floating, and proportional electric/electronic and proportional pneumatic control signals, for control of chilled water, hot water, or low pressure steam. 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

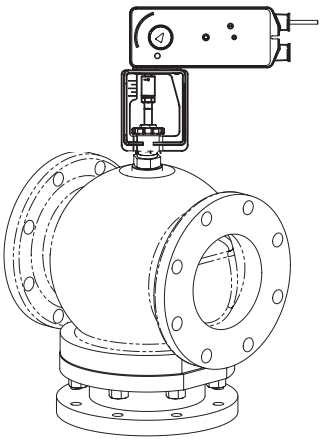
VB-8xx3-0-5-P valve bodies are also available separately to allow field mounting of a variety of Forta, Schneider Electric SmartX or pneumatic actuators using the appropriate linkage.

Features

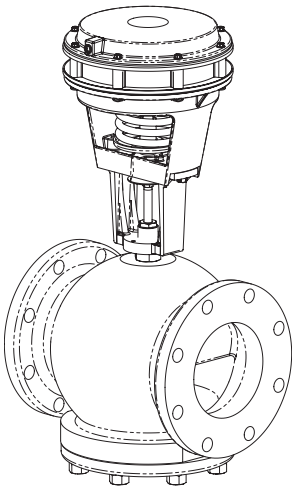
- Balanced plug design provides high close-offs using economical actuation
- Up to 125 psi (856 kPa) close-off on 2-Way models, 35 psi (240 kPa) on 3-Way models
- Universal 3-Way valve can be piped in either mixing or Diverting configurations
- Valve sizes 2½"…6", ASA 125 flanged
- A variety of Forta, 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.



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

2½”… 6” Linked Assemblies with SmartX Actuators

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

Refer to Assembly Ordering and 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 Assembly Ordering 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.

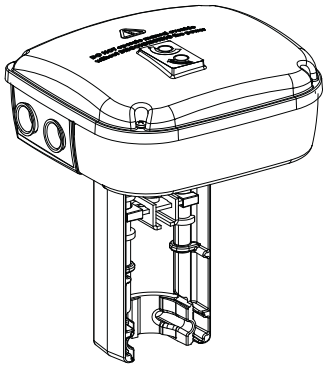
4. Close-off Pressure

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.

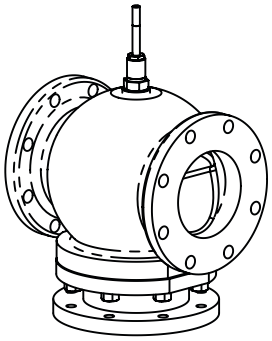
5. Available Space

If available space is a consideration, check the appropriate dimensional figure 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 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.

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 close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

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

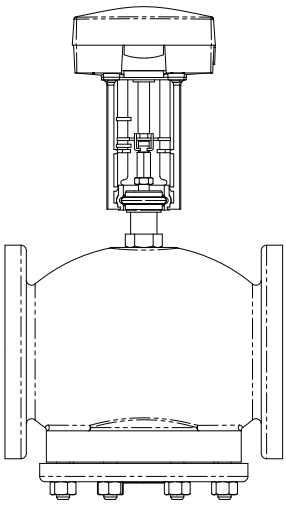
Non-Spring Return (NSR) 2-Way Globe Valve Assemblies					**M1500A**	**Mx41-634x**	
					Actuator Output Rating (Minimum)		
					337 lbf (1500 N)	300 lb-in (34 N-m)	
					Actuator Model (Actuator Code)		
					Floating/ Proportional **M1500A (686)**	Floating **MF41-6343** Proportional **MS41-6340 (512)** **MS41-6343**	
					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]**		
					M1500A	**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 *Pg. 140, Assembly Ordering VB-8000/VB-9000* for the relevant part series to determine a specific part number.

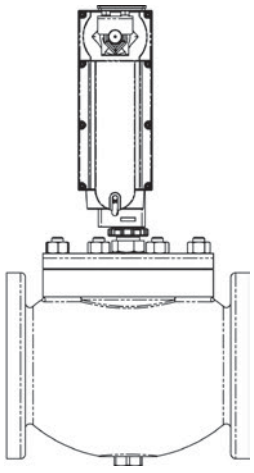
[b]$k_{vs} = m^3/h$ ($\Delta P = 100$ kPa) $k_{vs} = C_v / 1.156$ C_v = gpm /√ΔP (in psi).

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

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



VB-8213 with M1500A Actuator



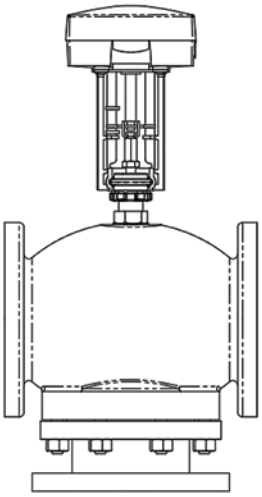
VB-8223 with Mx41-634x Actuator

Balanced VB-8303 Flanged Bodies with NSR Electric Actuators

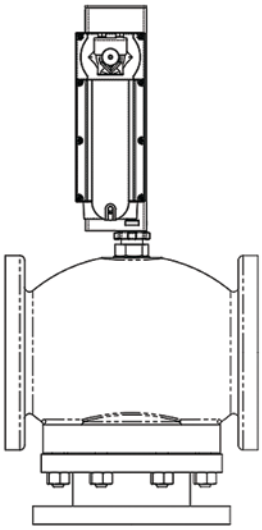
Valve/Actuator Combinations and Operating Pressure Differentials

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 close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

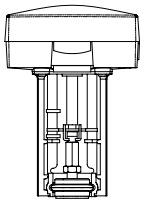


Vx-8303 with M1500A Actuator



Vx-8303 with Mx41-634x Actuator

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

					M1500A	Mx41-634x	
							
					Actuator Output Rating (Minimum)		
Non-Spring Return (NSR) 3-Way Globe Valve Assemblies					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)** **MS41-6343 (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.**	**Cv[b]**	**kvs[b]**	**Maximum Allowable Operating Differential Pressure[c] psi (kPa) (Mixing/Diverting)**		
					M1500A	**Single Actuator**	**Dual Actuator[d]**
Vx-8303-xxx-5-P	12	2½	80[e]	69[e]	35 (240)/ 35 (240)	—	—
			95[f]	82[f]			
			115[g]	99[g]			
	13	3	110[e]	95[e]		—	—
			120[f]	104[f]			
			120[g]	104[g]			
	14	4	190[h]	164[h]		—	—
	15	5	290[h]	251[h]		—	—
	16	6	500[h]	433[h]		32 (219) 28 (192)	35 (240)

[a] See *Pg. 140, Assembly Ordering VB-8000/VB-9000* for the relevant part series to determine a specific part number.

[b] $k_{vs} = m^3/h$ ($\Delta P = 100$ 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 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.

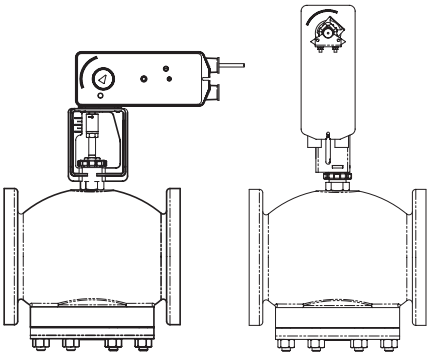
Balanced VB-82x3 Flanged Bodies with SR Electric Actuators

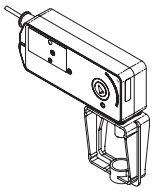
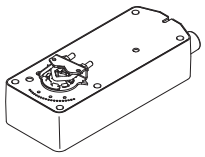
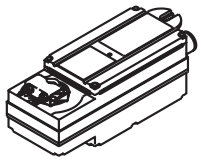
2-Way Electric Spring Return Models

Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult 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** **MA61-7203 (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)**				
					Mx61-720x	**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 *Pg. 140, Assembly Ordering VB-8000/VB-9000* 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 close-off pressure ratings.

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

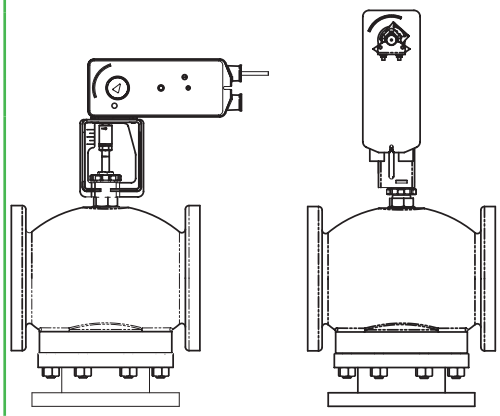
Balanced VB-8303 Flanged Bodies with SR Electric Actuators

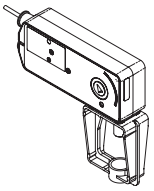
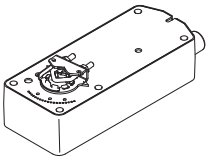
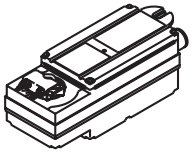
Valve/Actuator Combinations and Operating Pressure Differentials

Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult 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



					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** **MA61-7203 (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				
Valve Assembly Part Number[a]	**P Code**	**Valve Size in.**	**Cv[b]**	**kvs[b]**	**Maximum Allowable Operating Differential Pressurec, psi (kPa) (Mixing/Diverting)**				
					Mx61-720x	**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 *Pg. 140, Assembly Ordering VB-8000/VB-9000* 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 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.

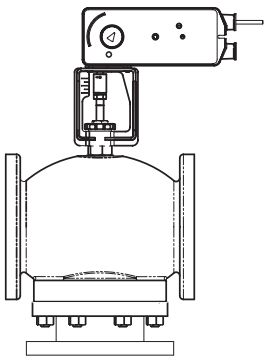
Vx-9313 Valve Bodies with Spring Return Actuators

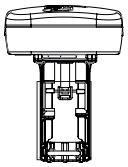
3-Way Linked Globe Valve Assemblies with Linear Series Actuators

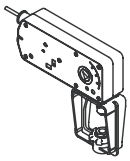
Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

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 *Pg. 390, Piping ½"…6" Valves* for 3-Way linked globe valve assemblies.

[b] To determine a specific part number, see *Pg. 140, Assembly Ordering VB-8000/VB-9000* for the relevant part series.

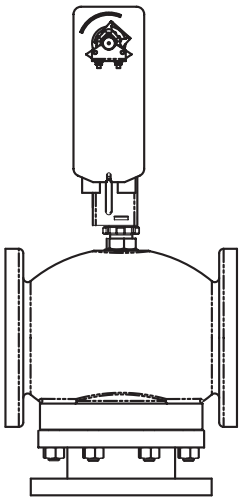
[c] $C_v = \frac{gpm}{\sqrt{\Delta P}}$ (where ΔP is measured in psi) $k_{vs} = C_v / 1.156$ $k_{vs} = \frac{m^3/h}{\sqrt{\Delta P}}$ (where ΔP is measured in bar; 1 bar = 100 kPa).

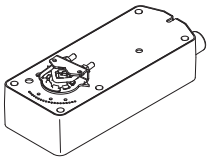
[d] Close-off pressure ratings describe only the differential pressure which the actuator can close-off with adequate seating force. Consult valve body specifications for other limitations. The rating value is the pressure difference between the inlet and outlet ports.

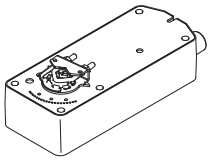
Vx-9313 Valve Bodies with Spring Return Actuators

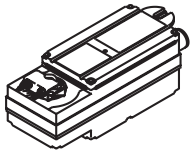
3-Way Linked Globe Valve Assemblies with Spring Return Actuators

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









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")

Valve Assembly Part Number [b]	P Code	Valve Size in. (mm)	C_v [c]	k_{vs} [c]	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 *Pg. 390, Piping ½"…6" Valves* for 3-Way linked globe valve assemblies.

[b] To determine a specific part number, see *Pg. 140, Assembly Ordering VB-8000/VB-9000* for the relevant part series.

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

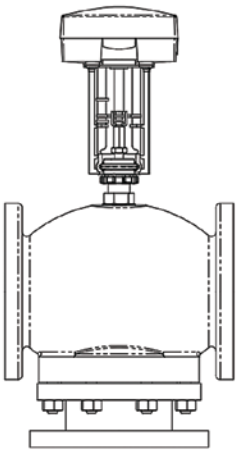
[d] Close-off ANSI III (0.1%) for metal-to-metal seats with pressure at inlet (port A).

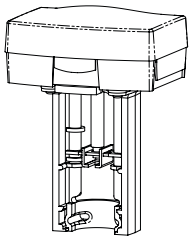
[e] Dual actuators are not available as factory assemblies.

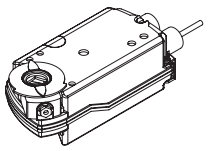
Vx-9313 Valve Bodies with NSR Actuators

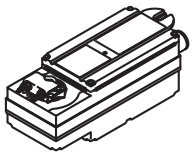
3-Way Linked Globe Valve Assemblies with Non-Spring Return Actuators

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









Valve Assembly Part Number[b]	P Code	Valve Size in.	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]					
					AV-822	AV-822	Single Actuator	Dual Actuator[e]	Single Actuator	Dual Actuator[e]
Vx-9313-xxx-5-Pf	12	2½	74.0	64	29	61	33	70	46	96
	13	3	101.0	87	19	42	22	48	31	66
	14	4	145.0	125	10	22	12	27	18	38
	15	5	235.0	203	—	14	—	9	—	24
	16	6	350.0	303	—	9	—	6	—	17

[a]Refer to *Pg. 390, Piping ½"…6" Valves* for 3-way linked globe valve assemblies.

[b]To determine a specific part number, see *Pg. 140, Assembly Ordering VB-8000/VB-9000* 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.

[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)	24 Vac ±10% 20-30 Vdc	24[c]	—	—	60 or 300 adj.[d]		337 lb-in (1500 N)	Yes
		Proportional (Vdc or mAdc)					20 sec[e] 1" of stroke			
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				
MS41-6340	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			Powered	Spring Return		
				50 Hz		60 Hz			50 Hz	60 Hz					
				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	Yes
MA61-7203	596		24 Vac ±20% 22-30 Vdc	9.8	7.5	9.7	7.5	0.29	2.8	2.8				
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				
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	<190	<30	33 (15)	Yes
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-6811[b]	AV-497 (VB-8000 only) AV-495 (VB-9313 up to 4" only)
6" 2-Way & 3-Way	MK-6911[b]	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 MF41-6343[a] MF41-7153 MF40-7173 MS41-6340[a] MS41-6343[a] 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.

VB-8000/VB-9313 Forta Actuator Application			
Valve Size	M800A* (180 lbf)	M1500A (337 lbf) Size	M900Ax* (157 lbf) Spring Return
2½"	•	•	•
3"	•	•	•
4"	•	•	•
5"		•	
6"		•	

*VB-9313 valves only.



U-Bolt Mount

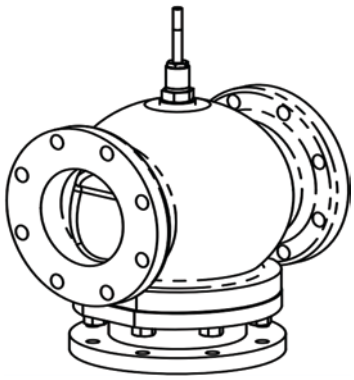
Forta Actuator Specifications								
Actuator Mounting	Part Number	Power	Input Signal	Spring Return Action	Feedback	Force	Auxiliary Switch	NEMA 4
U-Bolt	**M800A***	24 vac 50-60 Hz	Two-Position Floating	N/A	2…10 vdc	180 lbf	None	
	M800A-S2*						2-SPDT	
	M1500A					337 lbf	None	
	M1500A-S2						2-SPDT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

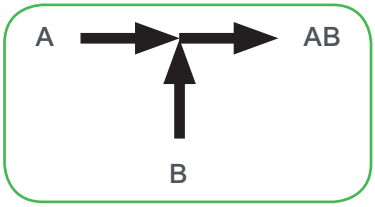
VB-9313 Mixing Valves with M900Axx SR Actuators

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 $\sqrt{\Delta P}$ (in psi).

Schneider Electric Forta Actuator Model Table											
Model	Actuator Code	Force	Power	Running Watts	Trans-former Size	Floating Control[a,b]	Proportional Control[b]	Feed-back[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).

M900Axx SR Actuators with VB-9313 Valves

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.

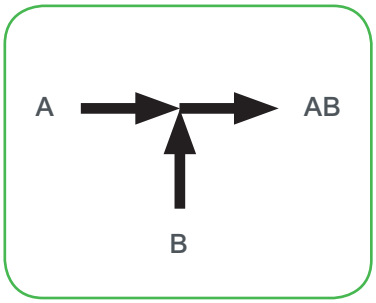
VB-9313 Valve Body and M900Axx Spring Return Actuator Actions								
			M900ARx			M900AEx		
Valve Body Part Number	Valve Body Description	Valve Body Stem Up Water Flow	Unpowered Valve Assembly Water Flow	Switch 7 off, Loss of Control Signal Only	Switch 7 on, Loss of Control Signal Only	Unpowered Valve 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

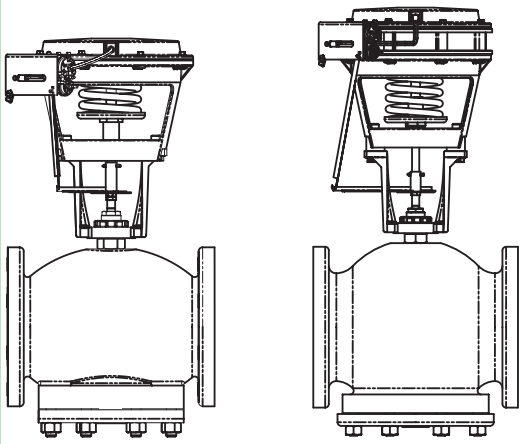
Balanced Vx-82x3-xxx-5-x 2-Way Flanged Valves with Pneumatic Actuators

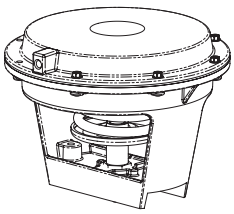
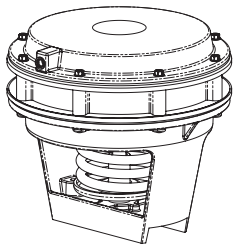
Valve/Actuator Combinations and Operating Pressure Differentials

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)



Valve Assembly Part Number[b]	P Code	Valve Size in.	C_v[b]	k_{vs}[b]	MK-6811[b] Maximum Allowable Operating Differential Pressure[d], psi (kPa)	MK-6911[b] Maximum Allowable Operating Differential Pressure[d], psi (kPa)
						
					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	
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 *Pg. 140, Assembly Ordering VB-8000/VB-9000* for the relevant part series to determine a specific part number.

[c] $k_{vs} = m^3/h$ ($\Delta P = 100$ 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 close-off pressure ratings.

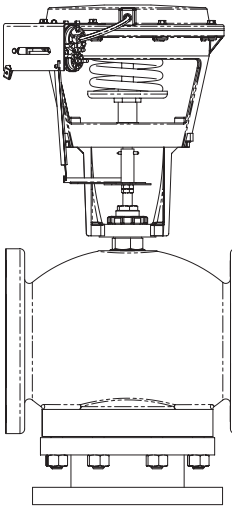
Balanced Vx-8303-xxx-5-x 3-Way Flanged Valves with Pneumatic Actuators

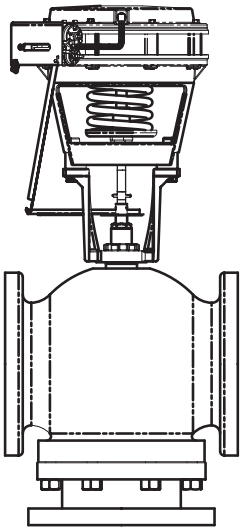
Valve/Actuator Combinations and Operating Pressure Differentials

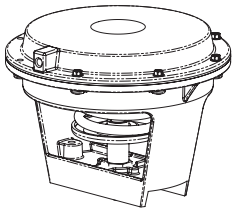
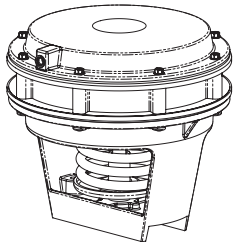
Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Not all actuator and valve body combinations are offered as factory assemblies.

3-Way Globe Valve Assemblies with Pneumatic Spring Return Actuators

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





	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	

Valve Assembly Part Number[b]	P Code	Valve Size in.	C_v[c]	k_{vs}[c]	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 "*Pg. 140, Assembly Ordering VB-8000/VB-9000* 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 close-off pressure ratings.

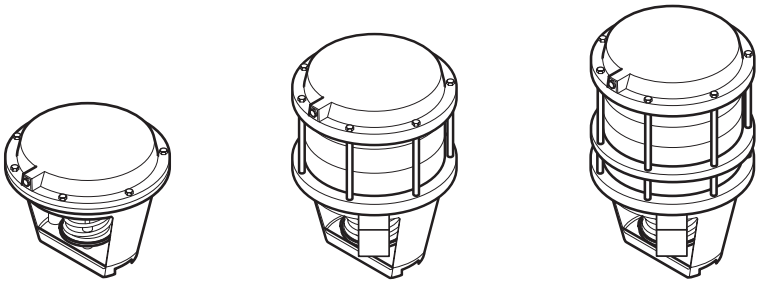
[e]Mixing configuration, ports A and B are inlets, AB port is outlet.

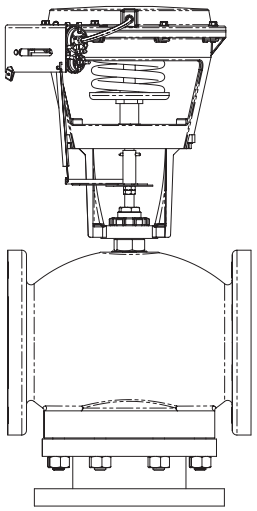
[f]Diverting configuration, flow AB to A port.

[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





VK4-9313 with a MK-6811 Pneumatic Actuator and AK-42309-500 Positive Positioner

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 " Stroke)			100 Sq. In. (1 " Stroke)			100 Sq. In. (2" Stroke)		
Positive Positioner				AK-42309-500								
Factory Assembly with Positive Positioner				Yes			Yes			Yes		
Actuator Code (xxx)				602[f]			802[e]			812[e]		
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 Position[c]				SU	SD	SD	SU	SD	SD	SU	SD	SD
Valve Assembly	Valve Body	P Code	Size "									
VK4-9313-xx2-5-P[d]	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-P[d]	VB-9313-0-5-P	-15	5	—	—	—	—	—	—	15	20	45
		-16	6	—	—	—	—	—	—	10	13	30

[a]Close-off ratings for mixing 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 *Pg. 390, Piping ½"…6" Valves* 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

Notes

9. VB-8/9xxx Series Flanged Valve Actuators



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.)



Mx41-7153

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

Mx41-7150 Series SmartX Actuator (Code 552) 120 Vac (Linkage not shown.)



Mx41-7150

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.

Note: Single mount actuators may be factory assembled, dual mount are field assembled.

VB-8000/9313 Globe Valve Electric Actuators

150 in-lb Spring Return Actuators

Mx40-7173 Series SmartX Actuator (Code 576) 24 Vac



Mx40-7173

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



Mx40-7150

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



Mx61-7203

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 Vac



MA61-7200

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



Mx41-6343

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



MS41-6340

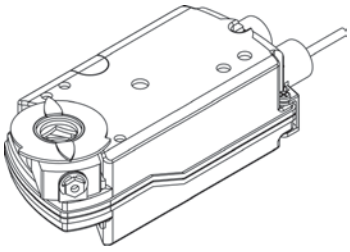
Specifications	
Connection	3 ft. (91 cm) Color-coded wires
Housing	Aluminum die-cast, NEMA 4 with customer supplied water tight connector or plug
Dimensions	10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage	AV-609-1 (6" VB-8000 or 5"-6" VB-9313 valves), the AV-609-1 linkage can be used with the Mx41-634x actuator 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)
24 Vac



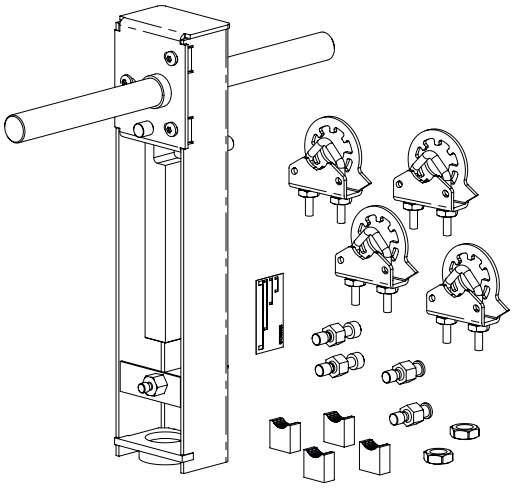
Mx41-6153

Specifications	
Torque	133 lb-in. (15 N-m).
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" (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)
Installation 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.

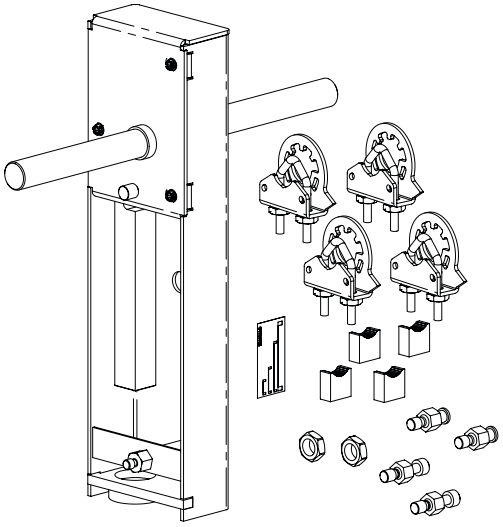
Specifications - Electrical & Timing

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		

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-609-1 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 Installation Instructions, F-27253
- AV-607-1, 609-1 SmartX Actuator Linkages for 2-1/2” to 6” Globe Valves
- MA40-704x, MA4x-707x, MA4x-715x SmartX Series Spring Return Two-Position Actuators Installation Instructions, F-26642
- MA40-717x SmartX Series Spring Return Two-Position Actuators Installation Instructions, F-26742
- MF4x-7xx3 SmartX Series Spring Return Floating Actuator Installation Instructions, F-26644
- MF40-7173 SmartX Series Spring Return Floating Actuator Installation Instructions, F-26749
- MF41-6153,/MS41-6153 Series Non-Spring Return Rotary Electronic Damper Actuator Installation Instructions, F-27215
- MS4x-7xx3 SmartX Series Spring Return Proportional Actuator Installation Instructions, F-26645
- MS40-717x SmartX Series Spring Return Proportional Actuator Installation 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.

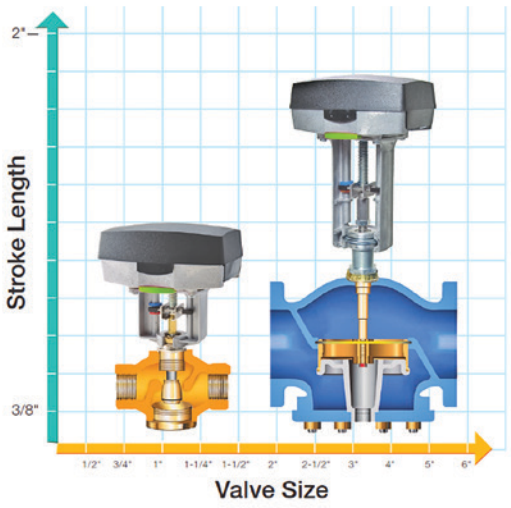
Visit:
http://goo.gl/372hEJ

Forta SR & NSR Actuator Assemblies

One model does it all, with one-touch switching.

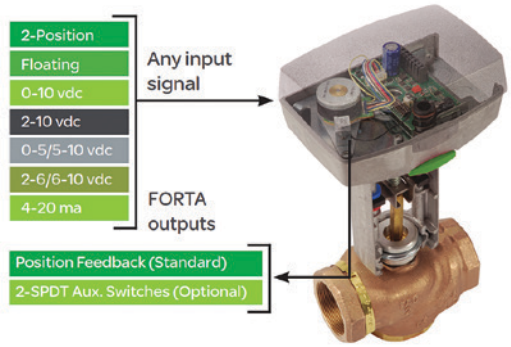
Sets up automatically

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.



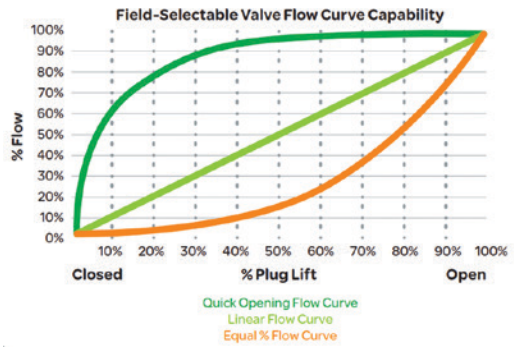
'Synchs' to any input signal

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 conversion to 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.



157 lbf Spring Return Actuators



M900A
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, RSM, CE
Environmental	RoHS, REACH

Forta NSR 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 ½" 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, RSM

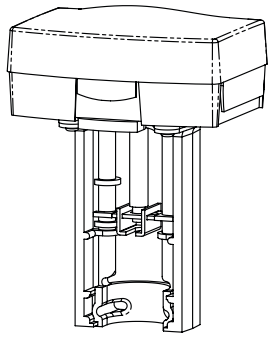
MORE INFO

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

Visit:
http://goo.gl/D0THpd

180 & 337 lbf Non-Spring Return Actuators

Forta
M800A & M1500A Actuators
24 Vac - 20-29 Vdc



M800A and M1500A

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, RSM, 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

M1500A Forta NSR Actuator for VB-8000/VB-9313 Valves

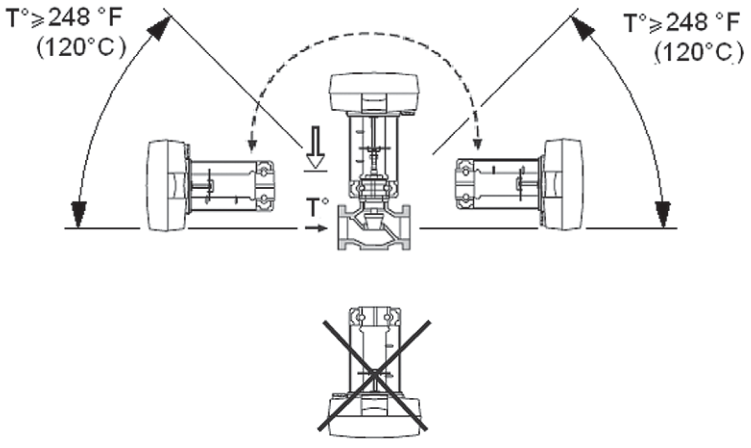
M1500A Specifications	
Stroke	U-Bolt style: >3/8" up to 2" (9-52mm)
Stroke Timing	Floating: 60 or 300 sec selectable, Proportional: 15 sec @½" stroke
Feedback AO	2…10 Vdc
Power Supply Type	Half Wave
Motor Type	Brushless DC
Enclosure	NEMA 2 (IP 54, vertical mount only) with both conduit connectors used. 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

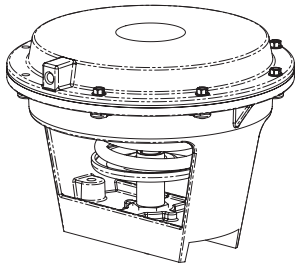
Refer to the Dimensions section of this catalog.

Mounting

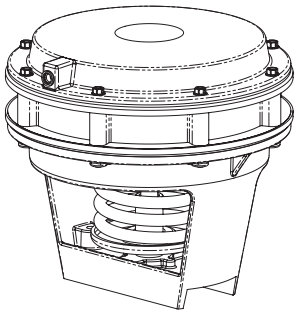
The actuator may be mounted horizontally, vertically and in any position in between, but not upside down. Note that to maintain NEMA 2(IP54) rating the actuator must be mounted vertically.



MK-6811, MK-6911
Pneumatic SR Actuators



MK-6811



MK-6911

MK-6811, MK-6911 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 cm^2)
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

MK-88/8900 Pneumatic Actuators for VB-8000/9000 Flanged Valves

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.

MK-88/8900 Actuator Specifications	
Effective Area	100 sq. in. (645 cm^2)
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.



MK-8xxx
Series Actuator
with 3-Way Valve Assembly

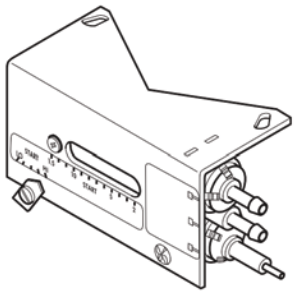
Accessories

AK-52309-500	Positive positioner with linkage
Tool-95	Pneumatic calibration tool kit

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" 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" O.D. plastic tubing.
“P”	Dual-contoured for 1/4" O.D. and 5/32" 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" (64 x 114 x 76 mm).

MORE INFO
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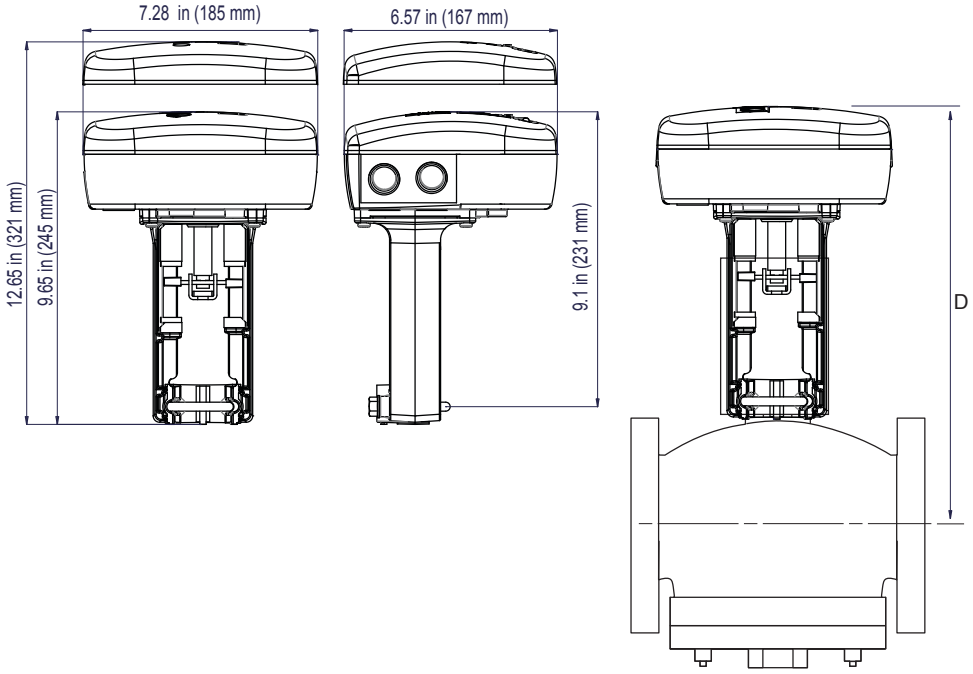
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Notes

10. VB-8/9xxx Series Dimensions



VB-9313 with M900A SR U-Bolt-Style Actuator



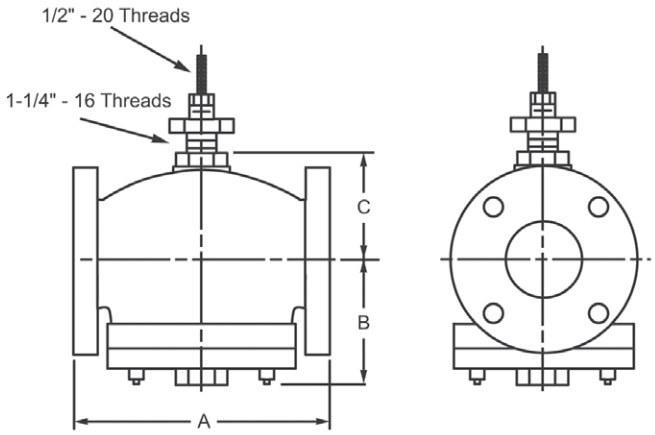
Forta M900 Dimensions

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)

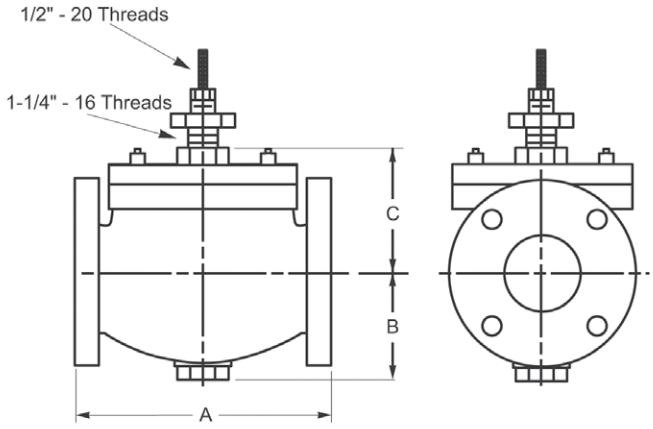
[a] See next page for flange dimensions.

[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.

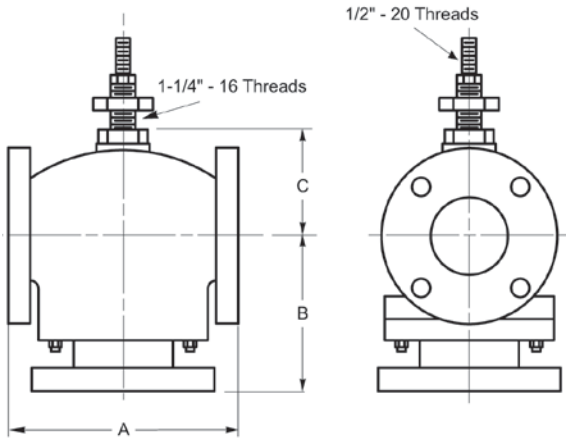
VB-9000 with M900A SR U-Bolt-Style Actuator



VB-9223-0-5-P

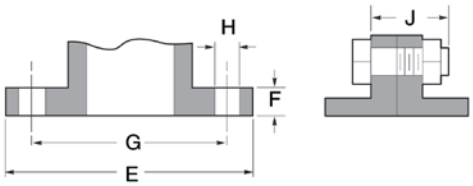


VB-9213-0-5-P



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 Valve 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)	—	—	—	—	—	—

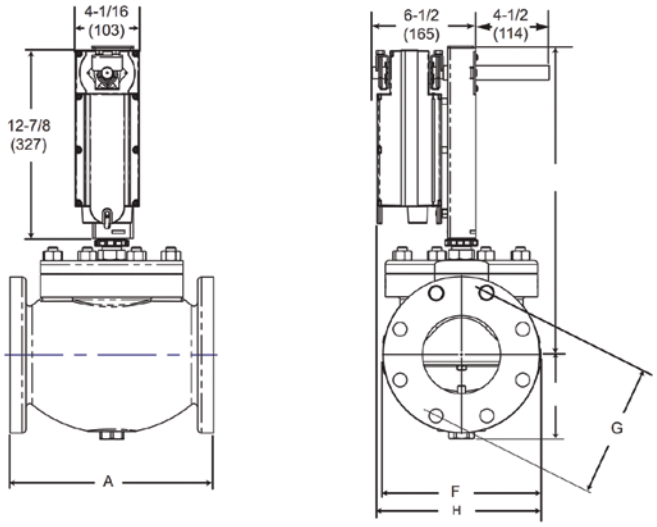


Figure-1 Mx41-634x with 6" VB-82x3 Flanged 2-Way Globe Valves

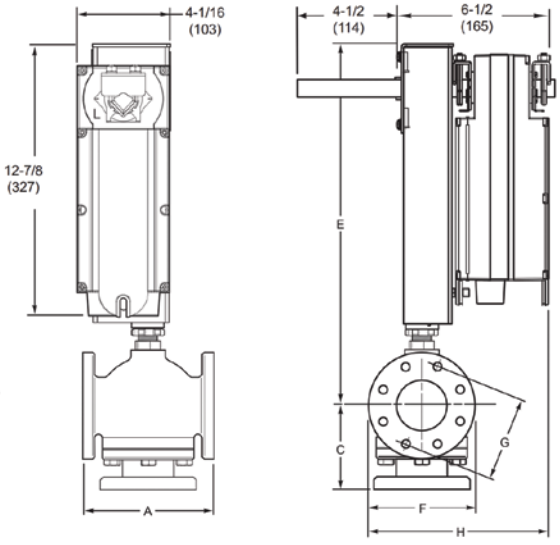


Figure-2 Mx41-634x with 6" VB-8303 Flanged 3-Way Globe Valves

Mx41-634x & AV-609-1 Actuator/Linkage Assembly

Life Is On Schneider Electric

2½”…6” Flanged Valves and M1500A Assemblies

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.

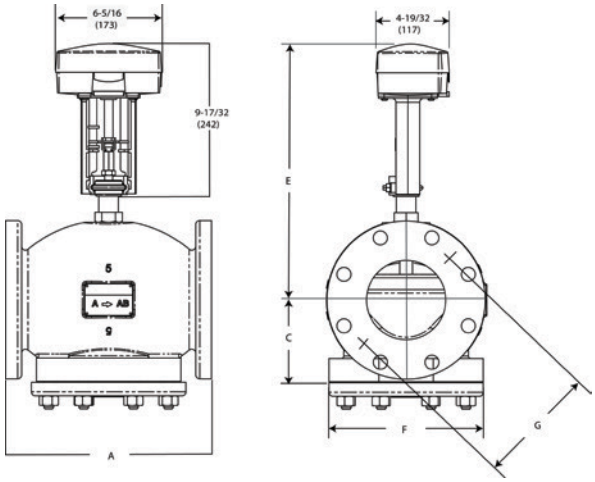


Figure-3 M1500A Series U-Bolt-style with VB-82x3 Flanged 2-Way Globe Valves

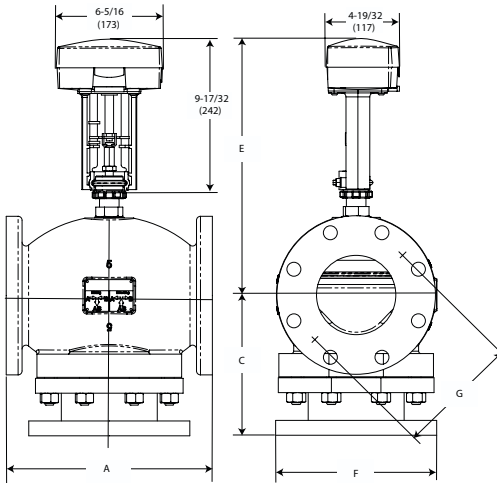


Figure-4 M1500A Series U-Bolt-style with VB-8303 Flanged 3-Way Globe Valves

2½”…5” Flanged Valves 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)	—	—	—	—	—

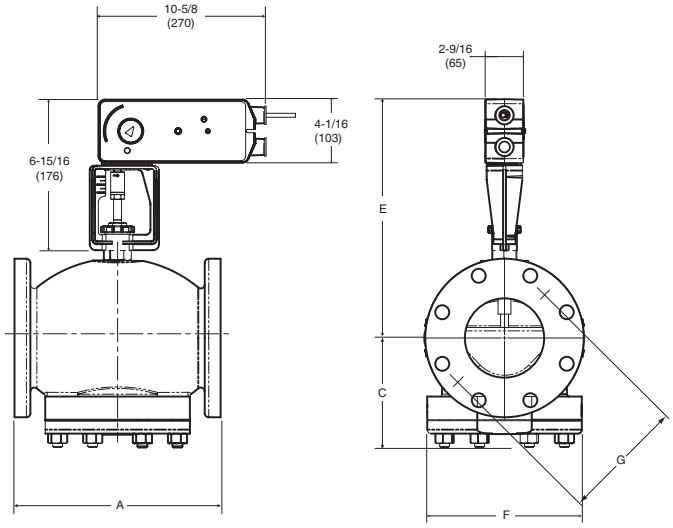


Figure-5 Mx61-720x with 2½” to 5”
VB-82x3 Flanged 2-Way Globe Valves

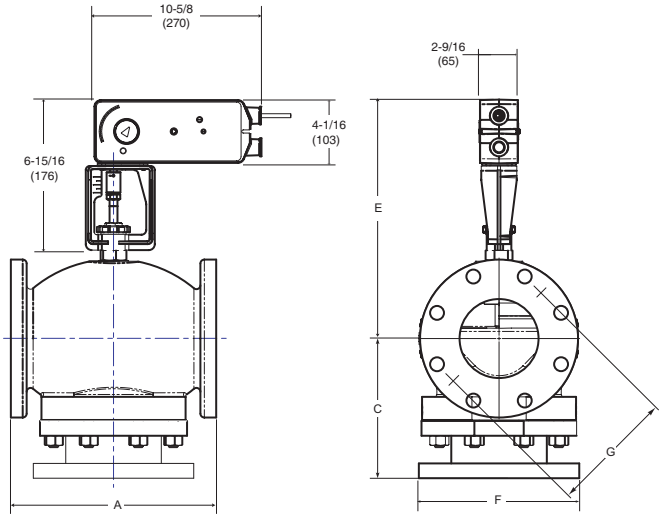


Figure-6 Mx61-720x with 2½” to 5”
VB-8303 Flanged 3-Way Globe Valves

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VB-8xx3 2 & 3-Way Flanged 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)	—	—	—	—	—	—

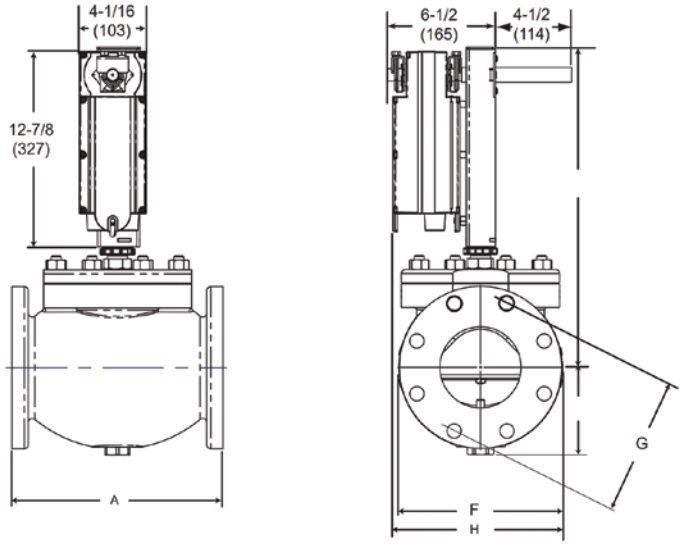


Figure-7 Mx40-717x with VB-82x3 Flanged 2-Way Globe Valves

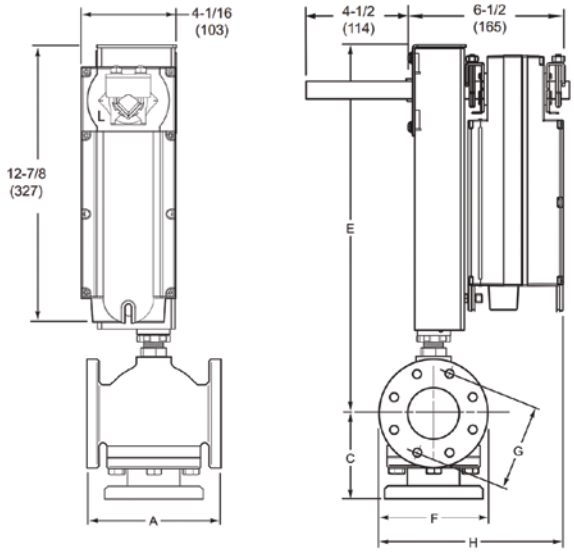


Figure-8 Mx40-717x with VB-8303 Flanged 3-Way Globe Valves

Mx40-717x Actuators/AV-607-1/AV-609-1 Linkage

VB-8xx3 2½"…6" Flanged 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)	—	—	—	—	—	—

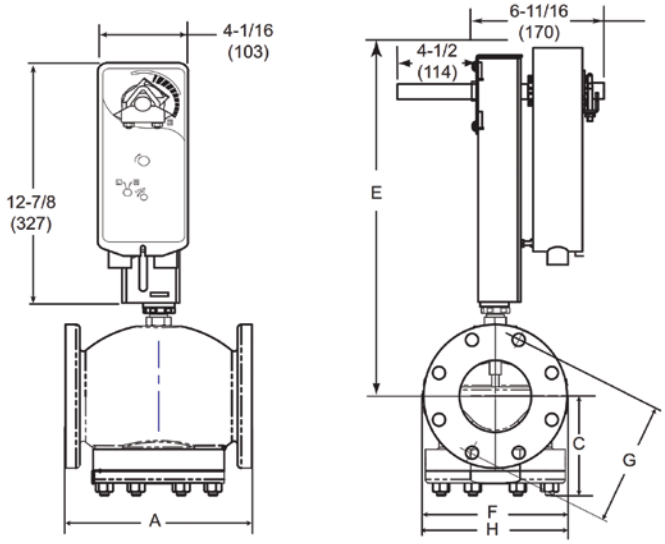


Figure-9 Mx41-715x with VB-82x3 Flanged 2-Way Globe Valves

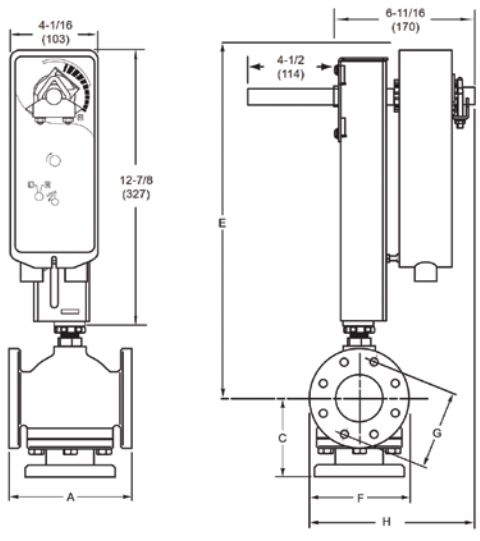


Figure-10 Mx41-715x with VB-8303 Flanged 3-Way Globe Valves

Mx41-715x Actuators/AV-607-1/AV-609-1 Linkage

VB-9313 2½”…6” Flanged Valves 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.

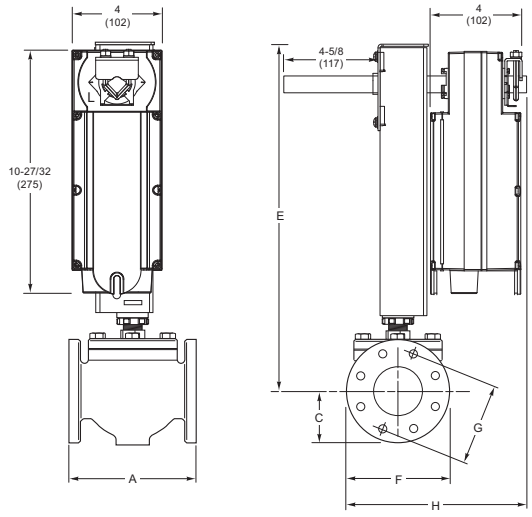


Figure-11 Mx41-6343 with VB-92x3 Flanged 2-Way Globe Valve With AV-609-1 Linkage.

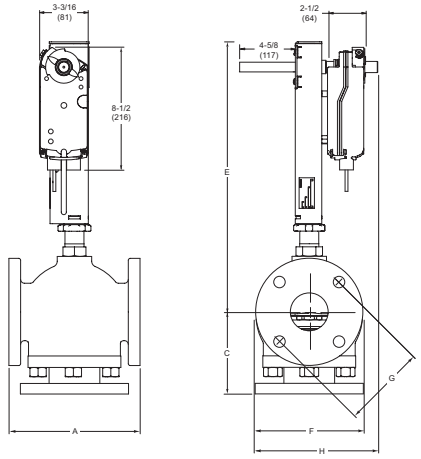


Figure-12 Mx41-6153 with 2½” to 4” VB-9313 Flanged 3-Way Globe Valve With AV-607-1 Linkage.

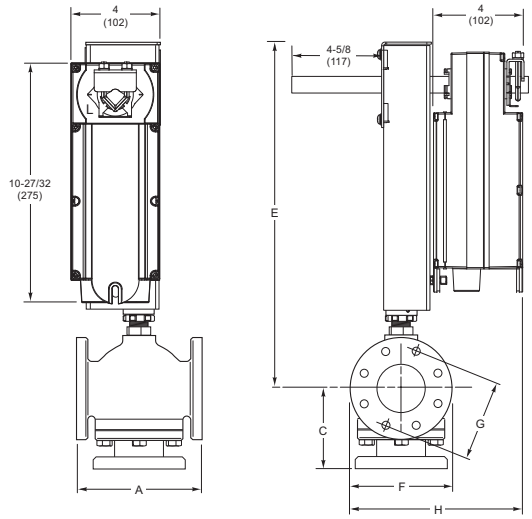


Figure-13 Mx41-6343 with VB-9313 Flanged 3-Way Globe Valve With AV-609-1 Linkage.

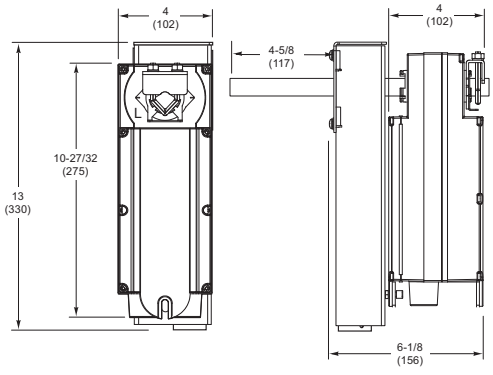


Figure-14 Mx41-6343 Actuator/Linkage Assembly With AV-609-1 Linkage.

VB-9313 2½"…6" Flanged Valves 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)						

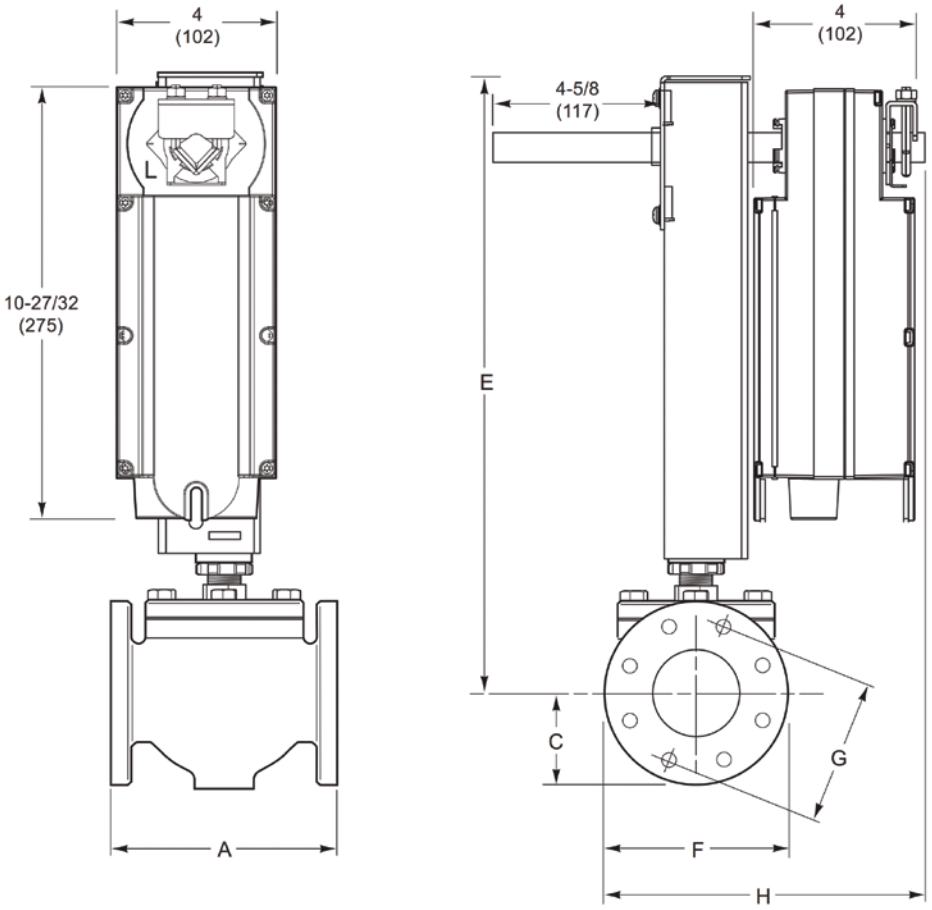


Figure-15 Mx40-717x with 2½" to 4" 2-Way VB-9313 Flanged Globe Valve With AV-607-1 Linkage.
Mx40-717X with 5" and 6" 2-Way VB-92x3 Flanged Globe Valve with AV-609-1 linkage

Mx40-717x Actuators/AV-607-1 or AV-609-1 Linkage

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VB-9313 2½”…6” Flanged Valves with SR/NSR Actuators & AV-60x Linkages

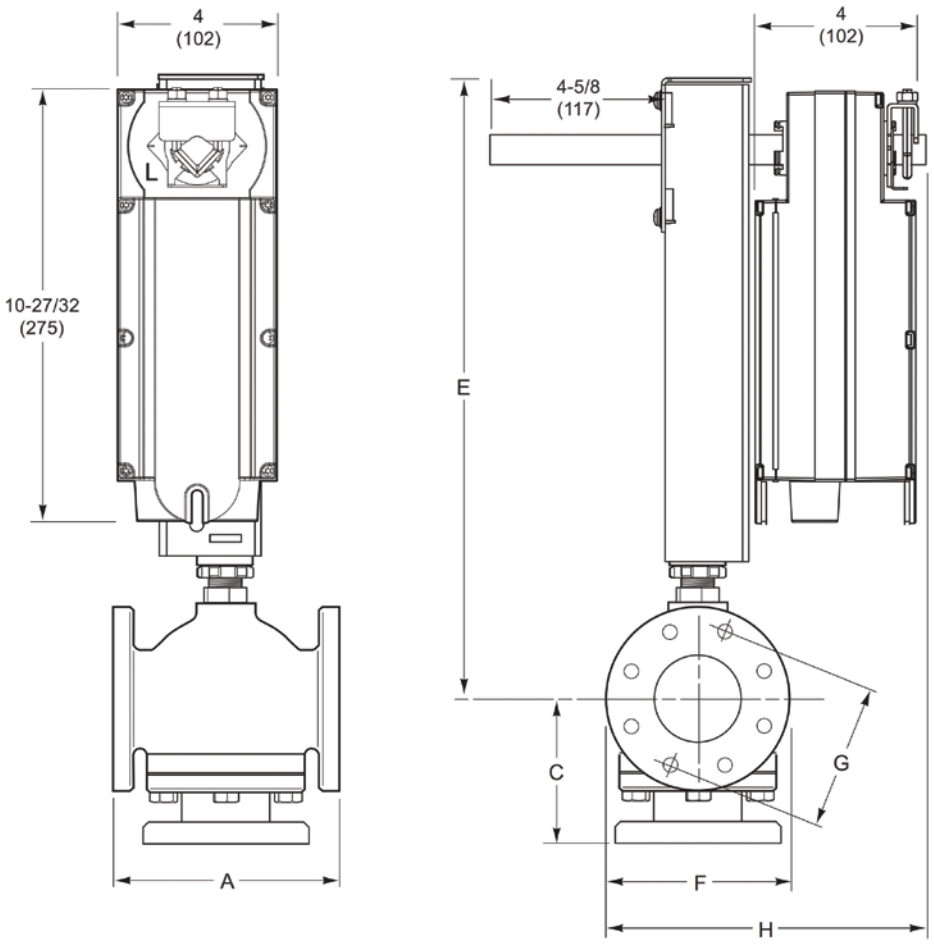


Figure-16 Mx40-717x-2xx with 2½” to 4” 3-Way VB-9313 Flanged Globe Valve With AV-607-1 Linkage.
Mx40-717x with 5" and 6" 2-Way VB-9313 Flanged Globe Valve with AV-609-1 linkage

VB-9313 2½”…4” Flanged Valves with Mx61-720x SR 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)						

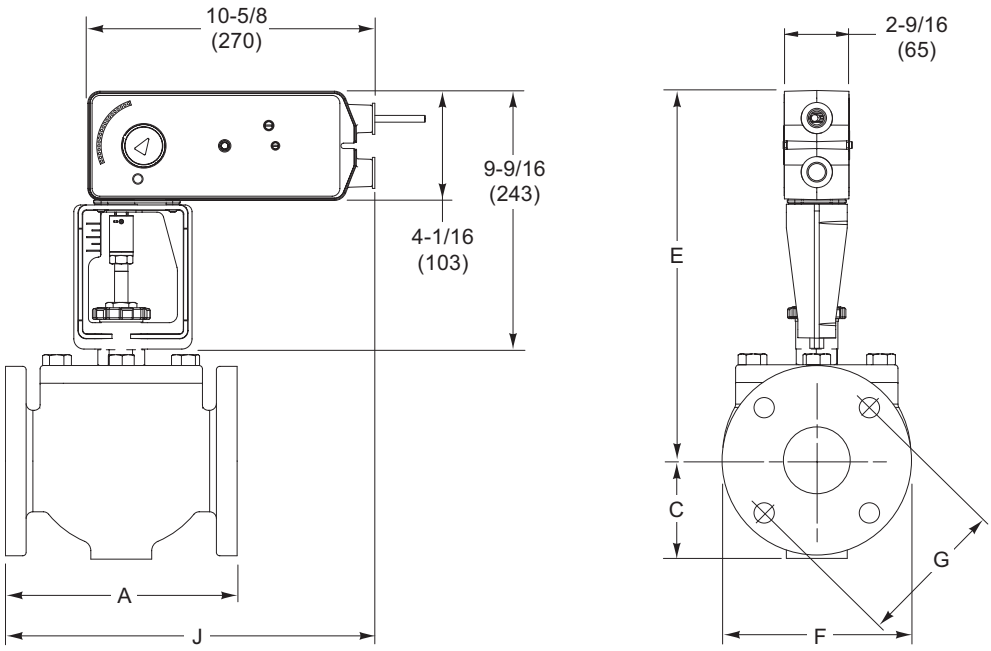


Figure-17 Mx61-720x with 2½” to 4” N.O. 2-Way VB-9213 Flanged Globe Valve.

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VB-9313 2½”…4” Flanged Valves with Mx61-720x SR Actuator

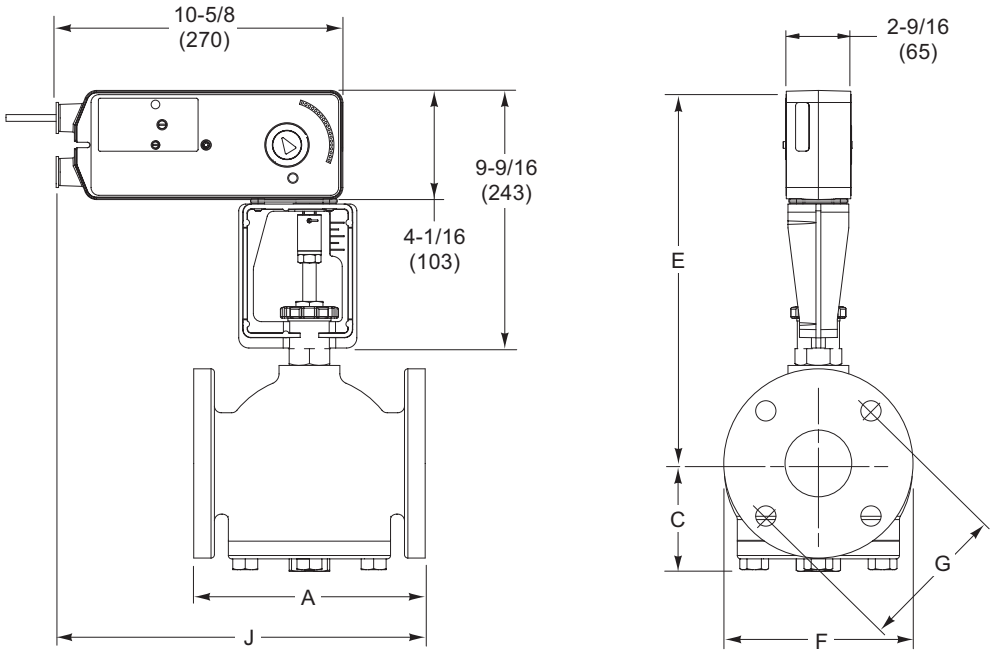


Figure-18 Mx61-720x with 2½” to 4” N.C. 2-Way VB-9313 Flanged Globe Valve.

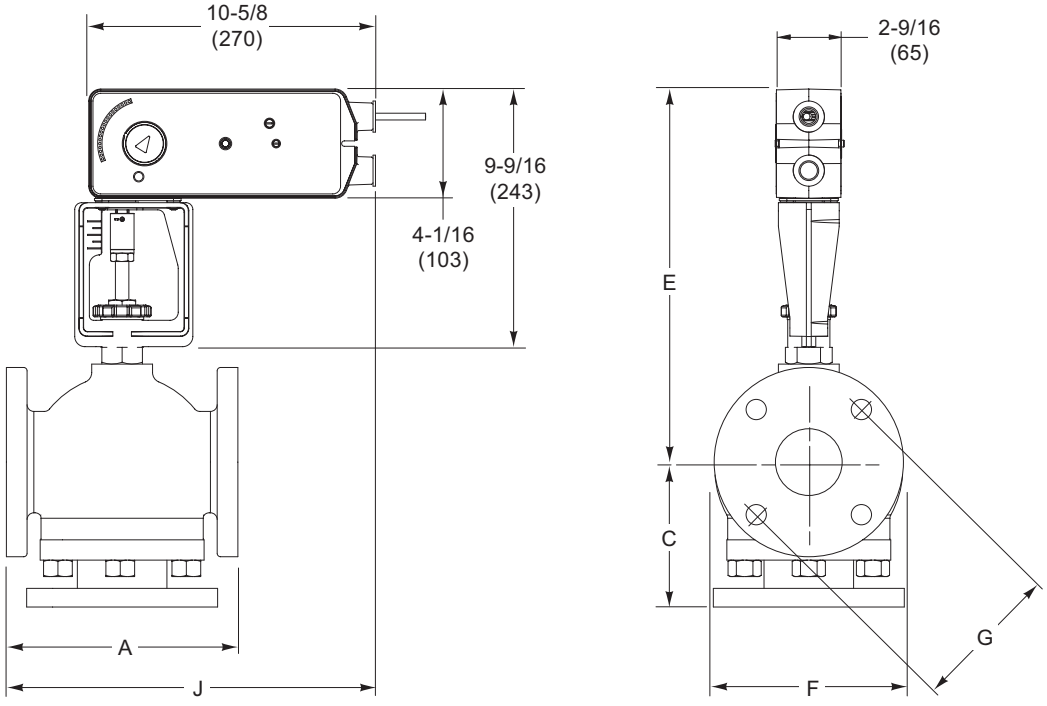


Figure-19 Mx61-720x with 2½” to 4” 3-Way VB-9313 Flanged Globe Valve.

VB-9313 2½"…4" Flanged Valves 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)						

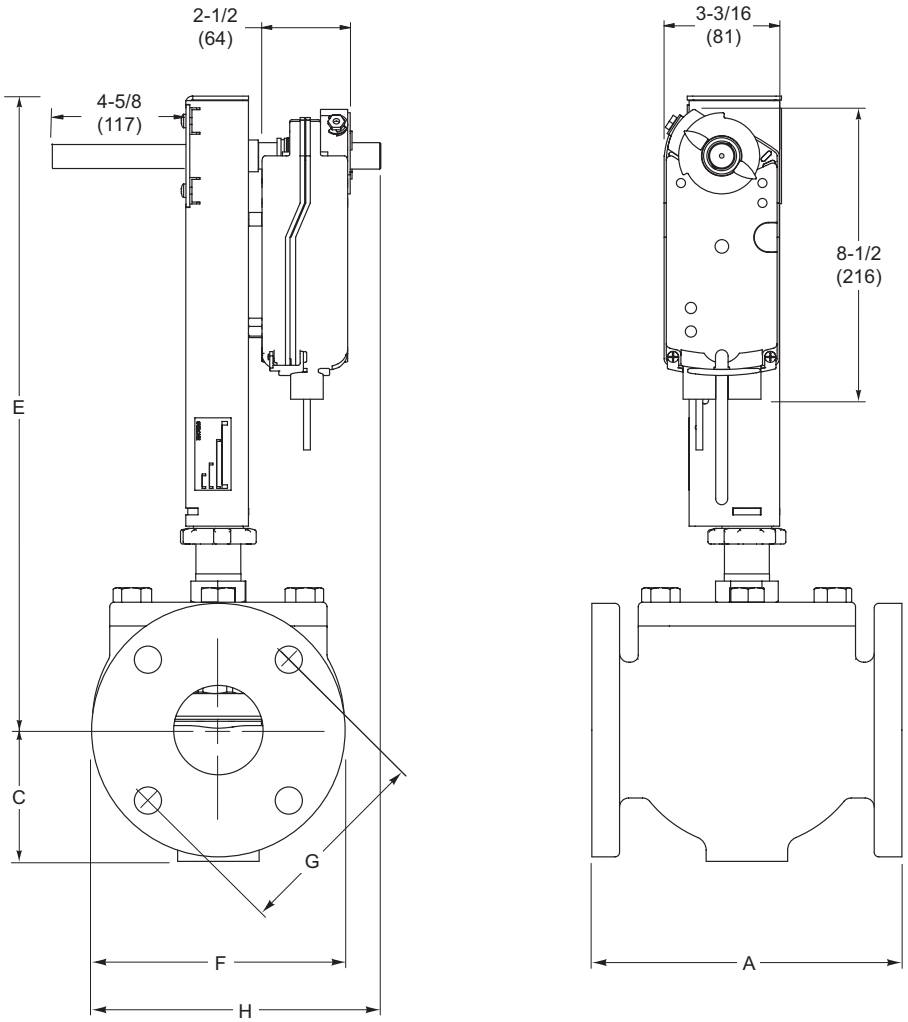


Figure-20 Mx41-6153 with 2½" to 4" VB-92x3 Flanged 2-Way Globe Valve With AV-607-1 Linkage.

Mx41-6153 Actuators/AV-607-1 Linkage

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VB-9313 2½"…4" Flanged Valves with Mx41-6153 NSR Actuator

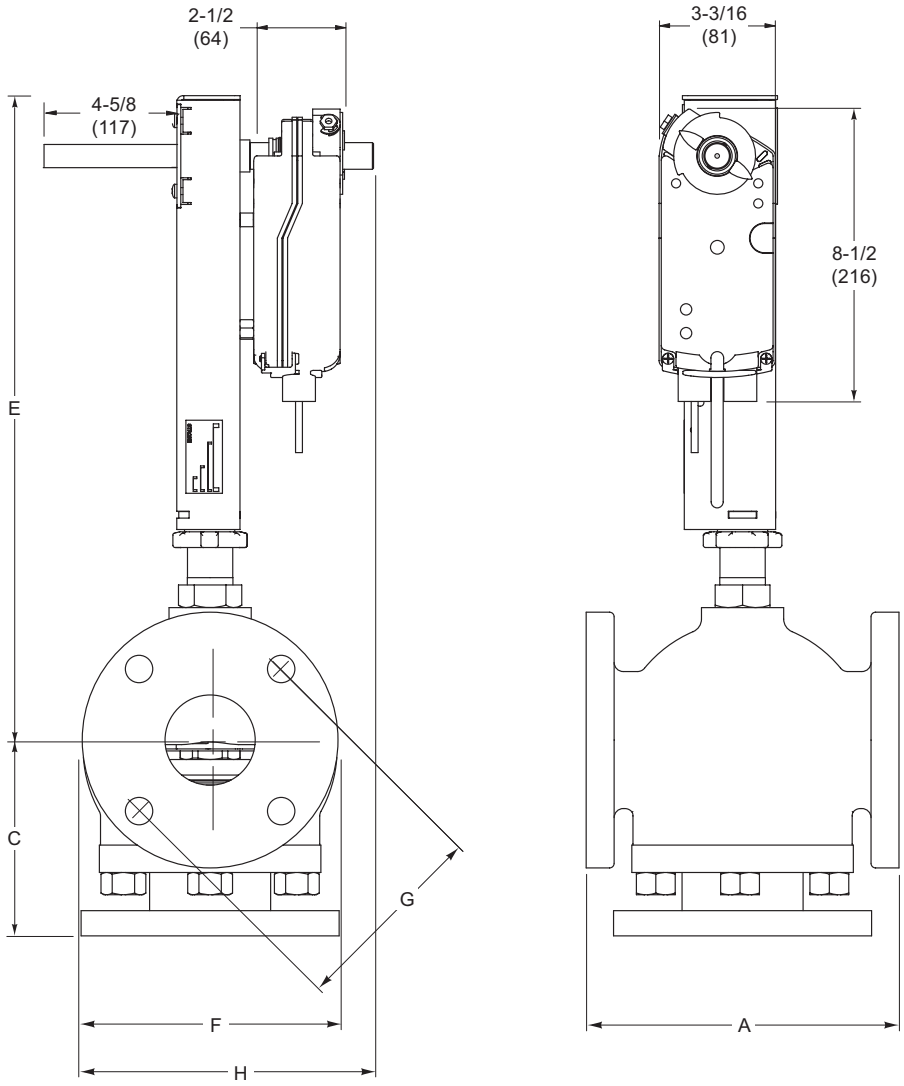


Figure-21 Mx41-6153 with 2½" to 4" VB-9313 Flanged 3-Way Globe Valve With AV-607-1 Linkage.

VB-9313 Flanged Valves with Mx41-715x SR Actuators & AV-607/9-1 Linkages

Dimensions - 2½"…6" Flanged Globe Valve Assemblies													
Valve Assembly Part Number[b]	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)
	5[a]	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)
	6[a]	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.

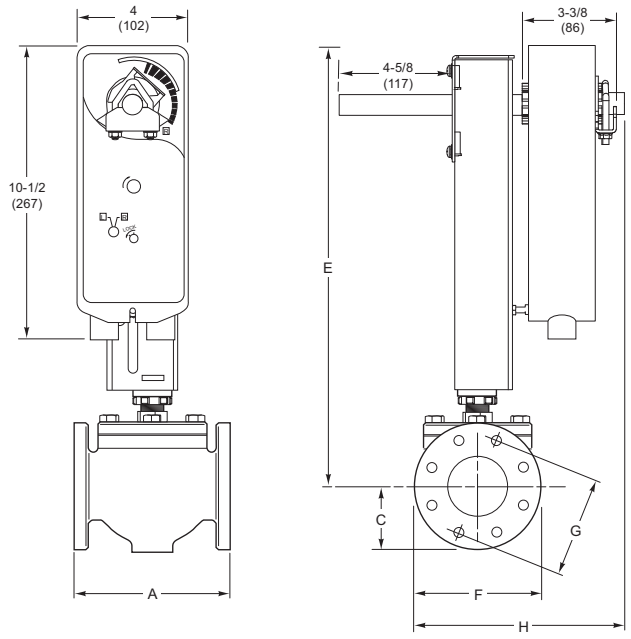


Figure-22 Mx41-715x or Mx41-707x with 2½" to 4" 2-Way VB-92x3 Flanged Globe Valve with AV-607-1 Linkage.

Mx41-715x with 5" and 6" 2-Way VB-92x3 Flanged Globe Valve with AV-609-1 linkage

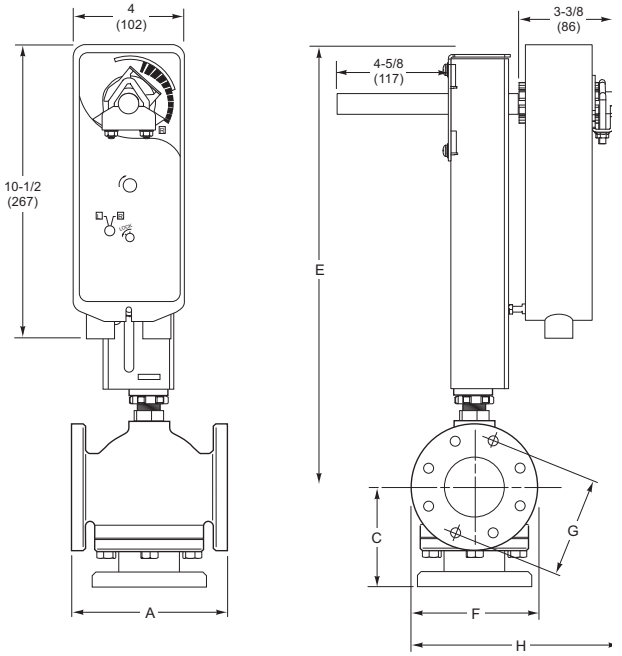


Figure-23 Mx41-715x or Mx41-707x with 2½" to 4" 3-Way VB-9313 Flanged Globe Valve With AV-607-1 Linkage.

Mx41-715x with 5" and 6" 3-Way VB-9313 Flanged Globe Valve with AV-609-1 linkage

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VB-9313 Flanged Valves with Mx40-717x Actuators & AV-607/9-1 Linkages

Dimensions - 2½"…6" Flanged Globe Valve Assemblies													
Valve Assembly Part Number[a]	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.

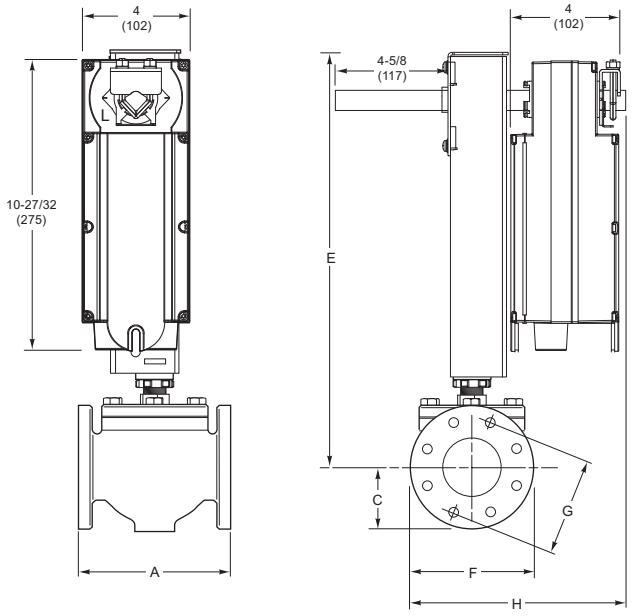


Figure-24 Mx40-717x with 2½" to 4" 2-Way VB-92x3 Flanged Globe Valve With AV-607-1 Linkage.
Mx40-717x with 5" and 6" 2-Way VB-9213 Flanged Globe Valve with AV-609-1 linkage

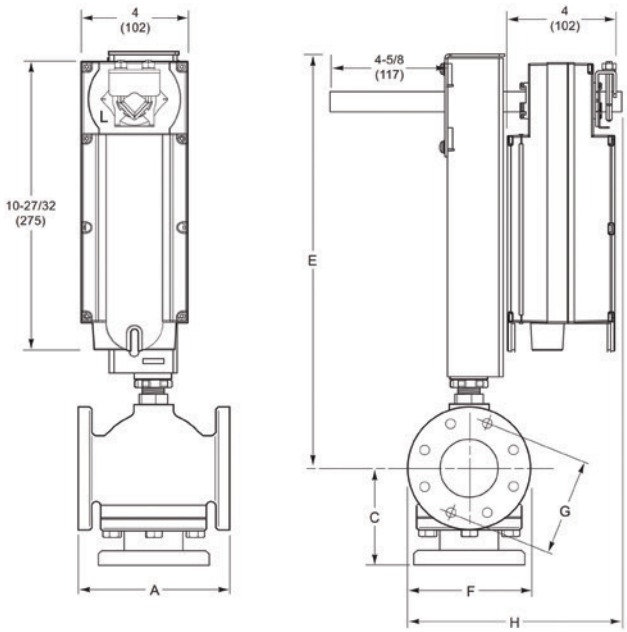


Figure-25 Mx40-717x-2xx with 2½" to 4" 3-Way VB-9313 Flanged Globe Valve With AV-607-1 Linkage.
Mx40-717x with 5" and 6" 2-Way VB-9313 Flanged Globe Valve with AV-609-1 linkage

VB-8xx3 Flanged Valves with MK-68/6911 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)	—	—	—	—	—

a-VK4 factory assemblies include AK-42309-500 positive positioner. Positive positioner optional for 2½" to 5", required for 6".

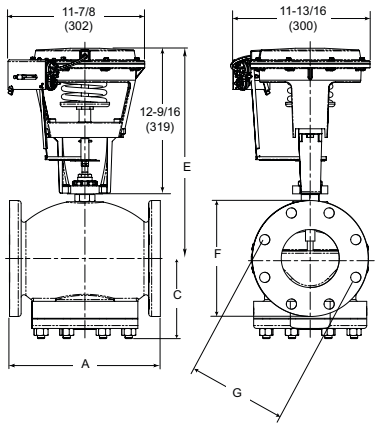


Figure 26. MK-6811 with VB-8213 Flanged 2-Way Globe Valves [a]

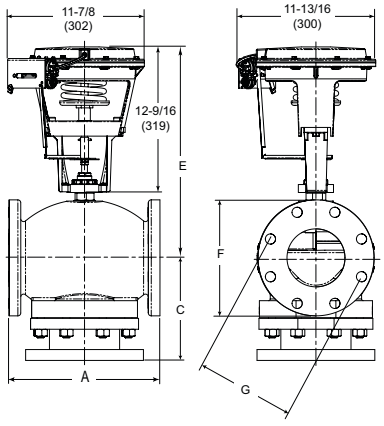


Figure 27. MK-6811 with VB-8303 Flanged 3-Way Globe Valves [a]

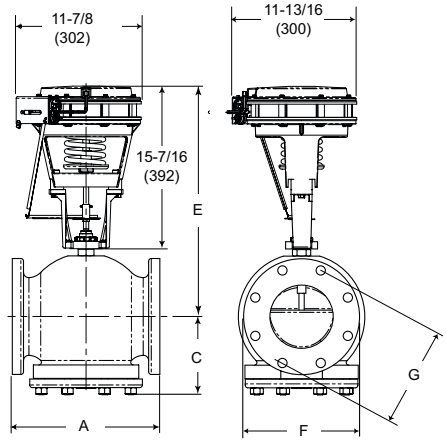


Figure 28. MK-6911 with VB-8213 Flanged 2-Way Globe Valves [a]

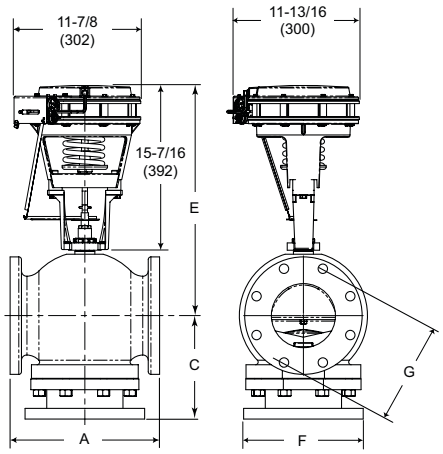
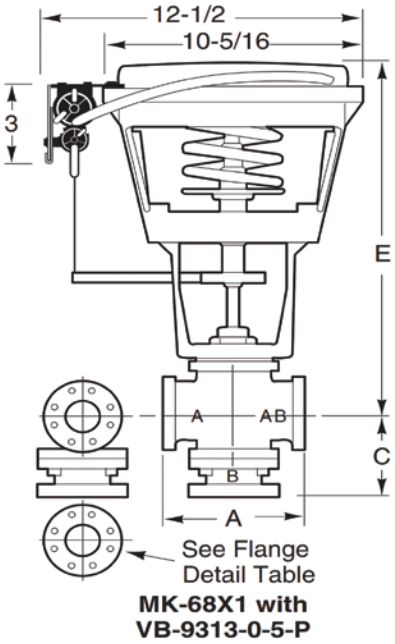
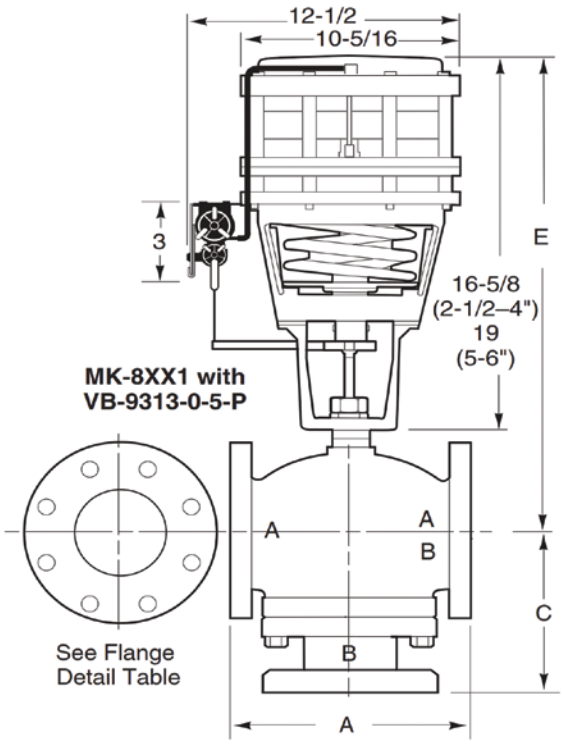


Figure 29. MK-6911 with VB-8303 Flanged 3-Way Globe Valves [a]

VB-9313 Flanged Valves with MK-68xx/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 "	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)



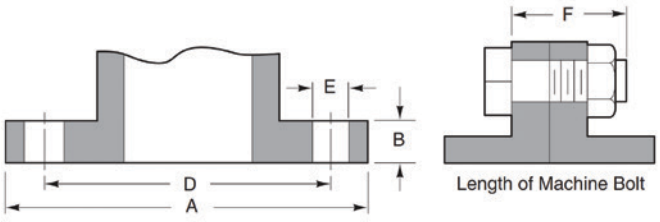


Flow Pattern					
Body Part Number	Flow Type	Stem Up (SU) (Normal Position)		Stem Down (SD)	
		Flow	Closed Port	Flow	Closed Port
VB-9313-0-5-P	Mixing	B to AB	A	A to AB	B

Restrictions on Maximum Ambient Temperature for Valve Actuators		
TEMPERATURES °F (°C)		
VB-9313-0-5-P	Actuators	All
	Maximum Ambient	220 (104)
	Max. Allowable Fluid	250 (121)
	Maximum Fluid	300 (149)
	Max. Allowable Ambient	100 (38)

VB-8xx3 & VB-9313 Valve Body Flange Detail

Flange Detail							
Nominal Pipe Size	Flanges		Drilling		Bolting		Machine Bolt Length F
	Flange Diameter A	Flange Thickness B	Diameter of Bolt Circle D	Diameter of Bolt Holes E	Number of Bolts	Bolt Diameter	
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

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11. VBB/VBS and VB-2xxx Ball Valve Assemblies



F-27855-9

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VBB/VBS Assembly Ordering

VBB/VBS Ball

V B x 2 N x x

Valve Body Type
B = Chrome Plated Brass Ball & Nickel Plated Brass Stem
S = Stainless Steel Ball & Stem

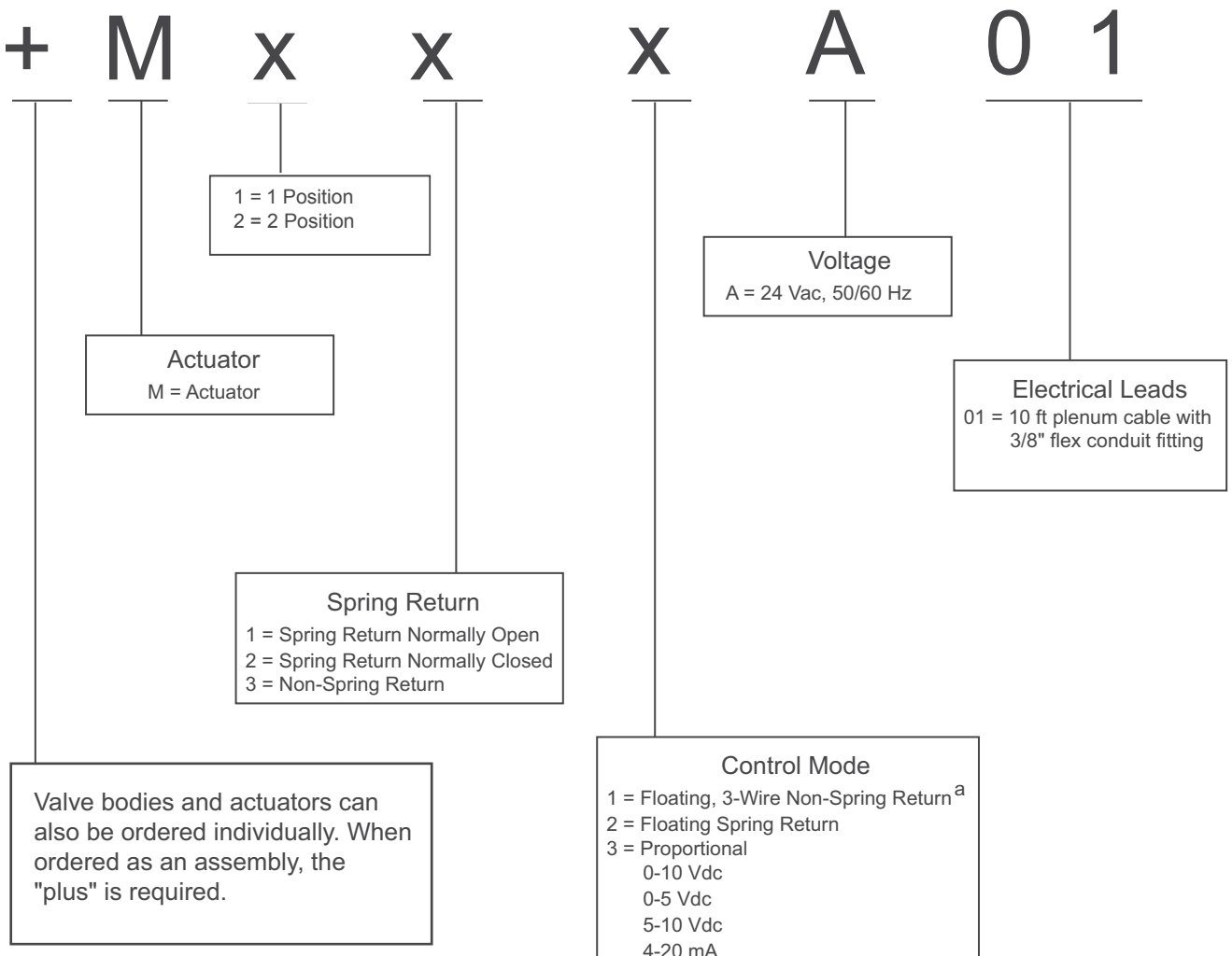
Valve Body Data
2 = Two-Way

End Fittings
N = NPT, Female

2-Way		
Size	Port Code	Cv
1/2"	00	.3
	01	.7
	02	1.2
	03	2.1
	04	3.5
	05	4.7
	06	7.7
	07*	10.0
3/4"	10	.3
	11	.7
	12	1.2
	13	2.1
	14	3.5
	15	4.7
	16	7.7
	17*	10.0

* Full port.

Valve Assemblies



a No time out feature. The controller must provide a time out after three minutes.

VBB/VBS Product Overview







Application

The VBB and VBS Series valves with SmartX Actuators are Two-Way or Three-way, 1/2” or 3/4”, characterized ball valves. The M1 and M2 SmartX Actuators are direct coupled to the VBB/VBS Series valves and accept two-position, floating or proportional control signals from a DDC system, controller, or thermostat for control of hot or chilled water, or solutions of up to 60% glycol.

Typical applications include VAV reheat, fan coil units, hot and chilled water coils in air handling units, heat pumps and unit ventilators.

Features

- Easy product selection — all actuators fit all valve bodies.
- Fast, easy actuator installation — no linkage or tools required.
- Flow characterizing insert provides equal percentage flow characteristic for stable, accurate floating and proportional control.
- ANSI IV seat leakage (0.01%) for both Two-Way and Three-way valves (A and B port).
- Brass and stainless steel trim models.
- Cvs from 0.3…10.
- Normally open, normally closed, and non-spring return assemblies available.
- Two-position, Floating or Proportional (0…5 Vdc, 0…10 Vdc, 5…10 Vdc, or 4…20 mA dc).
- Proportional actuator is direct or reverse acting.
- RoHS Compliant (VBS Assemblies).
- Reach Compliant.

Applicable Literature

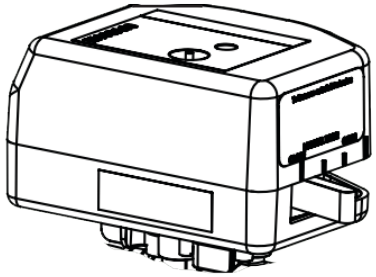
- VBB and VBS Series Two-position Spring-Return Ball Valves Installation Instructions, F-27392.
- VBB and VBS Series Floating Spring Return and Non-spring Return Ball Valves Installation Instructions, F-27393.
- VBB and VBS Series Proportional Spring Return and Non-spring Return Ball Valves Installation Instructions, F-27394.
- VBB and VBS Series Brochure, F-27681.
- EN-205 Water System Guidelines, F-26080.
- EN-206 Guidelines for Powering Multiple Actuators, F-26363.

M2xxxxx Series
Two-Position SR, 24v/100-277v

Product Description

M2xxxxx actuators are used together with VBB/VBS ½" or ¾" valve bodies for Two-Position Control. When powered, the actuator moves to the desired position, winding the spring return system. When power is removed, the spring returns the actuator to the normal position.

Two position spring return actuators can be purchased with an optional built-in auxiliary SPST end switch for interfacing or signaling; for example, zone pump burner control. Typical applications include VAV Reheat, Fan Coil units, Hot and Chilled Water Coils in AHU's, Heat Pumps and Unit Ventilators.



Specifications

Voltage	24 Vac Standard Model 100-277 Vac for Multi Voltage Model
Power Requirements	3.5/1.8 VA Standard Model 6.0 VA Multi Voltage Model
Timing	
Full Open to Full Close	50 Sec.
Spring Return	35 Sec.
Manual Operating Lever/Position Indicator	Standard on all models
Auxiliary End Switch (optional)	SPST 24 Vac/Vdc, 101mA…5 A max
Materials	Thermoplastic base and cover. Approved for use in air plenum
Shipping & Storage Temp. Limit	-40…169 °F (-40…76 °C)
Operating Temperature Limit at max fluid temp.	32…169 °F (0…76 °C)
Humidity	5…95% relative humidity, non-condensing
Locations	NEMA 2, IEC IP31, Indoor use Only

Suitable Valve Body Series

Actuator	Brass Ball Valve	Stainless Steel Ball Valve
M2xxxxx (Two-Position)	VBB Series	VBS Series

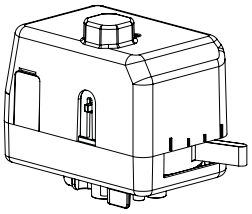
Available Part Numbers

Part Number	Spring Return Action	VA/Voltage	Leads	End Switch
M210A00	Normally Open	3.5/1.8 at 24 Vac/Vdc	TB	None
M210A01			PL	None
M210A11				SPST
M210A02			AP	None
M210A12				SPST
M210M02		6.0 at 100V-277 Vac. 50/60 Hz	AP	None
M210M12				SPST
M220A00	Normally Closed	3.5/1.8 at 24 Vac/Vdc	TB	None
M220A01			PL	None
M220A11				SPST
M220A02			AP	None
M220A12				SPST
M220M02		6.0 at 100V-277 Vac. 50/60 Hz	AP	None
M210M12				SPST

TB- Terminal Block
PL- 10 ft Plenum Cable
AP- 18 in Appliance Cable

M11, M12, M13 A01 Series Actuators

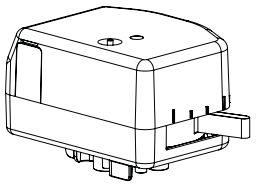
M11/12xA01 Series
24 Vac Spring Return



Specifications

Connection:
10 ft. (3 m) Plenum cable with 3/8" flex conduit fitting.
Housing:
Thermoplastic-plenum rated.
Dimensions:
3-9/16 H x 3-5/16 W x 5-1/8 D in.
(90.1x 84 x 130 mm)
Position Indicator:
Graduated.
Override:
Manual.
Control Signal:
M1x2A01: Floating spring return.
M1x3A01: Proportional; spring return, 0-10 Vdc, 0-5 Vdc, 2-10 Vdc, 5-10 Vdc, 4-20 mA direct or reverse acting.
Voltage:
24 Vac
Operating VA @ 50/60 Hz
M1x2A01: 2.8/2.8
M1x3A01: 2.0/2.2.
Inrush VA @ 50/60 Hz:
Use 10 Va per actuator when sizing the transformer.
Timing (seconds):
50 Hz: 167
60 Hz: 139
Feedback
None.
Install Instructions
F-27393
F-27394

M13xA01 Series
24 Vac Non-Spring Return

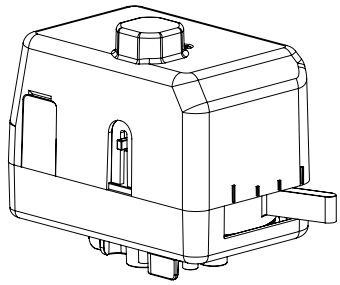


Specifications

Connection:
10 ft. (3 m) Plenum cable with 3/8" flex conduit fitting.
Housing:
Thermoplastic-plenum rated.
Dimensions: in.
3-13/16 H x 3-5/16 W x 5 D
(97 x 84 x 127 mm)
Position Indicator:
Graduated
Override:
Manual
Control Signal:
M131A01: Floating, non-spring return, no timeout.
M133A01: Proportional non-spring return; 0-10 Vdc, 0-5 Vdc, 2-10 Vdc, 5-10 Vdc, 4-20 mA.
Voltage:
24 Vac
Operating VA @ 50/60 Hz
M131A01: 1.7/1.9
M133A01: 2.0/2.4
Timing (seconds):
50 Hz: 167
60 Hz: 139
Feedback
None.
Install Instructions
F-27393
F-27394

Note: These actuators can be ordered with option for Terminal Block connections by ordering A00 options.

VBB ½" and ¾" 2-Way Spring Return N.O. Threaded NPT



Spring Return VBB Series

Application	Chilled or hot water up to 60% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	32 to 140 °F (0 to 60 °C) at maximum fluid temperature.
Ball Seat Leakage	ANSI class IV (0.01% of Cv).
System Static Pressure Limits	600 psig (4137 kPa).
Material	
Body	Forged brass.
Ball	Chrome plated brass.
Stem	Nickel-plated brass.
Seat	Teflon® .

Two-Way Normally Open Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Floating	Proportional	Input Voltage Vac
1/2	0.3 (0.3)	130 (890)	VBB2N00+M112A01	VBB2N00+M113A01	24
	0.7 (0.6)		VBB2N01+M112A01	VBB2N01+M113A01	
	1.2 (1.0)		VBB2N02+M112A01	VBB2N02+M113A01	
	2.1 (1.8)		VBB2N03+M112A01	VBB2N03+M113A01	
	3.5 (3.0)		VBB2N04+M112A01	VBB2N04+M113A01	
	4.7 (4.1)		VBB2N05+M112A01	VBB2N05+M113A01	
	7.7 (6.7)		VBB2N06+M112A01	VBB2N06+M113A01	
	10 (8.7)[a]		VBB2N07+M112A01	VBB2N07+M113A01	
3/4	0.3 (0.3)		VBB2N010+M112A01	VBB2N010+M113A01	
	0.7 (0.6)		VBB2N011+M112A01	VBB2N011+M113A01	
	1.2 (1.0)		VBB2N012+M112A01	VBB2N012+M113A01	
	2.1 (1.8)		VBB2N013+M112A01	VBB2N013+M113A01	
	3.5 (3.0)		VBB2N014+M112A01	VBB2N014+M113A01	
	4.7 (4.1)		VBB2N015+M112A01	VBB2N015+M113A01	
	7.7 (6.7)		VBB2N016+M112A01	VBB2N016+M113A01	
	10 (8.7)[a]		VBB2N017+M112A01	VBB2N017+M113A01	

[a] Full port.

Actuator Code Table.

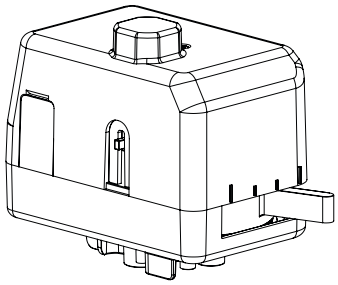
VBB2Nxx+M11xA01 *

Actuator Model (Reference pages)	Description
M112A01	Floating N.O. Spring Return
M113A01	Proportional, N.O. Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.

* Actuator equipped with 10 foot plenum cable and 3/8-in flex conduit fitting.

For wiring and dimensions refer to those sections.

VBB ½" and ¾" 2-Way Spring Return N.C. Threaded NPT



Spring Return

VBB Series

Application	Chilled or hot water up to 60% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	32 to 140 °F (0 to 60 °C) at maximum fluid temperature.
Ball Seat Leakage	ANSI class IV (0.01% of Cv).
System Static Pressure Limits	600 psig (4137 kPa).
Material	
Body	Forged brass.
Ball	Chrome plated brass.
Stem	Nickel-plated brass.
Seat	Teflon® .

Two-Way Normally Closed Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	2-Position	Floating	Proportional	Input Voltage Vac
1/2	0.3 (0.3)	130 (890)	VBB2N00+M223A01	VBB2N00+M122A01	VBB2N00+M123A01	24
	0.7 (0.6)		VBB2N01+M223A01	VBB2N01+M122A01	VBB2N01+M123A01	
	1.2 (1.0)		VBB2N02+M223A01	VBB2N02+M122A01	VBB2N02+M123A01	
	2.1 (1.8)		VBB2N03+M223A01	VBB2N03+M122A01	VBB2N03+M123A01	
	3.5 (3.0)		VBB2N04+M223A01	VBB2N04+M122A01	VBB2N04+M123A01	
	4.7 (4.1)		VBB2N05+M223A01	VBB2N05+M122A01	VBB2N05+M123A01	
	7.7 (6.7)		VBB2N06+M223A01	VBB2N06+M122A01	VBB2N06+M123A01	
	10 (8.7)[a]		VBB2N07+M223A01	VBB2N07+M122A01	VBB2N07+M123A01	
3/4	0.3 (0.3)		VBB2N010+M223A01	VBB2N010+M122A01	VBB2N010+M123A01	
	0.7 (0.6)		VBB2N011+M223A01	VBB2N011+M122A01	VBB2N011+M123A01	
	1.2 (1.0)		VBB2N012+M223A01	VBB2N012+M122A01	VBB2N012+M123A01	
	2.1 (1.8)		VBB2N013+M223A01	VBB2N013+M122A01	VBB2N013+M123A01	
	3.5 (3.0)		VBB2N014+M223A01	VBB2N014+M122A01	VBB2N014+M123A01	
	4.7 (4.1)		VBB2N015+M223A01	VBB2N015+M122A01	VBB2N015+M123A01	
	7.7 (6.7)		VBB2N016+M223A01	VBB2N016+M122A01	VBB2N016+M123A01	
	10 (8.7)[a]		VBB2N017+M223A01	VBB2N017+M122A01	VBB2N017+M123A01	

[a] Full port.

Actuator Code Table.

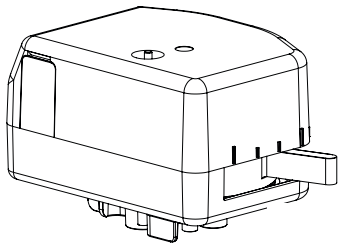
VBB2Nxx+M12xA01*

Actuator Model (Reference pages)	Description
M122A01	Floating N.C. Spring Return
M123A01	Proportional, N.C. Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.

* Actuator equipped with 10 foot plenum cable and 3/8-in flex conduit fitting.

For wiring and dimensions refer to those sections.

VBB ½" and ¾" 2-Way Non-Spring Return Threaded NPT



Non-Spring Return
VBB Series

Application	Chilled or hot water up to 60% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	32 to 140 °F (0 to 60 °C) at maximum fluid temperature.
Ball Seat Leakage	ANSI class IV (0.01% of Cv).
System Static Pressure Limits	600 psig (4137 kPa).
Material	
Body	Forged brass.
Ball	Chrome plated brass.
Stem	Nickel-plated brass.
Seat	Teflon® .

Two-Way Assemblies.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Floating	Proportional	Input Voltage Vac
1/2	0.3 (0.3)	130 (890)	VBB2N00+M131A01	VBB2N00+M133A01	24
	0.7 (0.6)		VBB2N01+M131A01	VBB2N01+M133A01	
	1.2 (1.0)		VBB2N02+M131A01	VBB2N02+M133A01	
	2.1 (1.8)		VBB2N03+M131A01	VBB2N03+M133A01	
	3.5 (3.0)		VBB2N04+M131A01	VBB2N04+M133A01	
	4.7 (4.1)		VBB2N05+M131A01	VBB2N05+M133A01	
	7.7 (6.7)		VBB2N06+M131A01	VBB2N06+M133A01	
	10 (8.7)[a]		VBB2N07+M131A01	VBB2N07+M133A01	
3/4	0.3 (0.3)		VBB2N010+M131A01	VBB2N010+M133A01	
	0.7 (0.6)		VBB2N011+M131A01	VBB2N011+M133A01	
	1.2 (1.0)		VBB2N012+M131A01	VBB2N012+M133A01	
	2.1 (1.8)		VBB2N013+M131A01	VBB2N013+M133A01	
	3.5 (3.0)		VBB2N014+M131A01	VBB2N014+M133A01	
	4.7 (4.1)		VBB2N015+M131A01	VBB2N015+M133A01	
	7.7 (6.7)		VBB2N016+M131A01	VBB2N016+M133A01	
	10 (8.7)[a]		VBB2N017+M131A01	VBB2N017+M133A01	

[a] Full port.

Actuator Code Table.

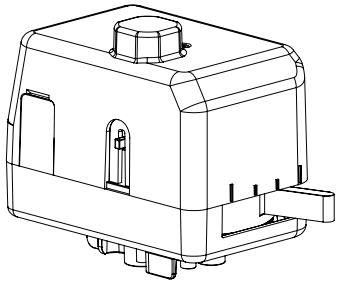
VBB2Nxx+M13xA01*

Actuator Model (Reference pages)	Description
M131A01	Floating Non- Spring Return
M133A01	Proportional, Non-Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.

* Actuator equipped with 10 foot plenum cable and 3/8-in flex conduit fitting.

For wiring and dimensions refer to those sections.

VBS ½" and ¾" 2-Way Spring Return N.O. Threaded NPT



Spring Return

VBS Series

Application	Chilled or hot water up to 60% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	32 to 140 °F (0 to 60 °C) at maximum fluid temperature.
Ball Seat Leakage	ANSI class IV (0.01% of Cv).
System Static Pressure Limits	600 psig (4137 kPa).
Material	
Body	Forged brass.
Ball	Stainless steel.
Stem	Stainless steel.
Seat	Teflon® .

Two-Way Normally Open Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	2-Position	Floating	Proportional	Input Voltage Vac
1/2	0.3 (0.3)	130 (890)	VBS2N00+M212A01	VBS2N00+M112A01	VBS2N00+M113A01	24
	0.7 (0.6)		VBS2N01+M212A01	VBS2N01+M112A01	VBS2N01+M113A01	
	1.2 (1.0)		VBS2N02+M212A01	VBS2N02+M112A01	VBS2N02+M113A01	
	2.1 (1.8)		VBS2N03+M212A01	VBS2N03+M112A01	VBS2N03+M113A01	
	3.5 (3.0)		VBS2N04+M212A01	VBS2N04+M112A01	VBS2N04+M113A01	
	4.7 (4.1)		VBS2N05+M212A01	VBS2N05+M112A01	VBS2N05+M113A01	
	7.7 (6.7)		VBS2N06+M212A01	VBS2N06+M112A01	VBS2N06+M113A01	
	10 (8.7)[a]		VBS2N07+M212A01	VBS2N07+M112A01	VBS2N07+M113A01	
3/4	0.3 (0.3)		VBS2N010+M212A01	VBS2N010+M112A01	VBS2N010+M113A01	
	0.7 (0.6)		VBS2N011+M212A01	VBS2N011+M112A01	VBS2N011+M113A01	
	1.2 (1.0)		VBS2N012+M212A01	VBS2N012+M112A01	VBS2N012+M113A01	
	2.1 (1.8)		VBS2N013+M212A01	VBS2N013+M112A01	VBS2N013+M113A01	
	3.5 (3.0)		VBS2N014+M212A01	VBS2N014+M112A01	VBS2N014+M113A01	
	4.7 (4.1)		VBS2N015+M212A01	VBS2N015+M112A01	VBS2N015+M113A01	
	7.7 (6.7)		VBS2N016+M212A01	VBS2N016+M112A01	VBS2N016+M113A01	
	10 (8.7)[a]		VBS2N017+M212A01	VBS2N017+M112A01	VBS2N017+M113A01	

[a] Full port.

Actuator Code Table.

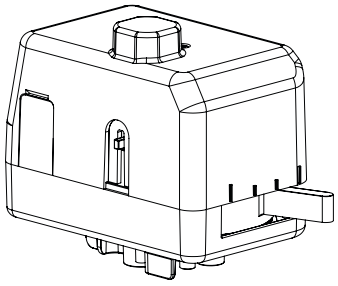
VBS2Nxx+M11xA01*

Actuator Model (Reference pages)	Description
M112A01	Floating N.O. Spring Return
M113A01	Proportional, N.O. Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.

* Actuator equipped with 10 foot plenum cable and 3/8-in flex conduit fitting.

For wiring and dimensions refer to those sections.

VBS ½" and ¾" 2-Way Spring Return N.C. Threaded NPT



Spring Return

VBS Series

Application	Chilled or hot water up to 60% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	32 to 140 °F (0 to 60 °C) at maximum fluid temperature.
Ball Seat Leakage	ANSI class IV (0.01% of Cv).
System Static Pressure Limits	600 psig (4137 kPa).
Material	
Body	Forged brass.
Ball	Stainless steel.
Stem	Stainless steel.
Seat	Teflon® .

Two-Way Normally Closed Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	2-Position	Floating	Proportional	Input Voltage Vac
1/2	0.3 (0.3)	130 (890)	VBS2N00+M222A01	VBS2N00+M122A01	VBS2N00+M123A01	24
	0.7 (0.6)		VBS2N01+M222A01	VBS2N01+M122A01	VBS2N01+M123A01	
	1.2 (1.0)		VBS2N02+M222A01	VBS2N02+M122A01	VBS2N02+M123A01	
	2.1 (1.8)		VBS2N03+M222A01	VBS2N03+M122A01	VBS2N03+M123A01	
	3.5 (3.0)		VBS2N04+M222A01	VBS2N04+M122A01	VBS2N04+M123A01	
	4.7 (4.1)		VBS2N05+M222A01	VBS2N05+M122A01	VBS2N05+M123A01	
	7.7 (6.7)		VBS2N06+M222A01	VBS2N06+M122A01	VBS2N06+M123A01	
	10 (8.7)[a]		VBS2N07+M222A01	VBS2N07+M122A01	VBS2N07+M123A01	
3/4	0.3 (0.3)		VBS2N010+M222A01	VBS2N010+M122A01	VBS2N010+M123A01	
	0.7 (0.6)		VBS2N011+M222A01	VBS2N011+M122A01	VBS2N011+M123A01	
	1.2 (1.0)		VBS2N012+M222A01	VBS2N012+M122A01	VBS2N012+M123A01	
	2.1 (1.8)		VBS2N013+M222A01	VBS2N013+M122A01	VBS2N013+M123A01	
	3.5 (3.0)		VBS2N014+M222A01	VBS2N014+M122A01	VBS2N014+M123A01	
	4.7 (4.1)		VBS2N015+M222A01	VBS2N015+M122A01	VBS2N015+M123A01	
	7.7 (6.7)		VBS2N016+M222A01	VBS2N016+M122A01	VBS2N016+M123A01	
	10 (8.7)[a]		VBS2N017+M222A01	VBS2N017+M122A01	VBS2N017+M123A01	

[a] Full port.

Actuator Code Table.

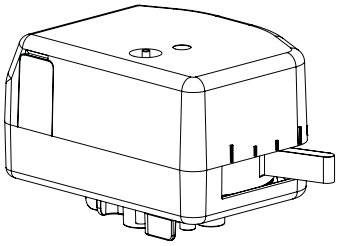
VBS2Nxx+M12xA01*

Actuator Model (Reference pages)	Description
M122A01	Floating N.C. Spring Return
M123A01	Proportional, N.C. Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.

* Actuator equipped with 10 foot plenum cable and 3/8-in flex conduit fitting.

For wiring and dimensions refer to those sections.

VBS ½" and ¾" 2-Way Non-Spring Return Threaded NPT



Non-Spring Return
VBS Series

Application	Chilled or hot water up to 60% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	32 to 140 °F (0 to 60 °C) at maximum fluid temperature.
Ball Seat Leakage	ANSI class IV (0.01% of Cv).
System Static Pressure Limits	600 psig (4137 kPa).
Material	
Body	Forged brass.
Ball	Stainless steel.
Stem	Stainless steel.
Seat	Teflon® .

Two-Way Assemblies.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Floating	Proportional	Input Voltage Vac
1/2	0.3 (0.3)	130 (890)	VBS2N00+M131A01	VBS2N00+M133A01	24
	0.7 (0.6)		VBS2N01+M131A01	VBS2N01+M133A01	
	1.2 (1.0)		VBS2N02+M131A01	VBS2N02+M133A01	
	2.1 (1.8)		VBS2N03+M131A01	VBS2N03+M133A01	
	3.5 (3.0)		VBS2N04+M131A01	VBS2N04+M133A01	
	4.7 (4.1)		VBS2N05+M131A01	VBS2N05+M133A01	
	7.7 (6.7)		VBS2N06+M131A01	VBS2N06+M133A01	
	10 (8.7)[a]		VBS2N07+M131A01	VBS2N07+M133A01	
3/4	0.3 (0.3)		VBS2N010+M131A01	VBS2N010+M133A01	
	0.7 (0.6)		VBS2N011+M131A01	VBS2N011+M133A01	
	1.2 (1.0)		VBS2N012+M131A01	VBS2N012+M133A01	
	2.1 (1.8)		VBS2N013+M131A01	VBS2N013+M133A01	
	3.5 (3.0)		VBS2N014+M131A01	VBS2N014+M133A01	
	4.7 (4.1)		VBS2N015+M131A01	VBS2N015+M133A01	
	7.7 (6.7)		VBS2N016+M131A01	VBS2N016+M133A01	
	10 (8.7)[a]		VBS2N017+M131A01	VBS2N017+M133A01	

[a] Full port.

Actuator Code Table.

VBS2Nxx+M13xA01*

Actuator Model (Reference pages)	Description
M131A01	Floating
M133A01	Proportional, Non-Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.

* Actuator equipped with 10 foot plenum cable and 3/8-in flex conduit fitting.

Using Pipe Reducers with VBB/VBS Ball Valves

The table below provides estimated effective Cv's when using pipe reducers with ball valve assemblies. Use these estimated effective Cv's in place of the rated Cv's when reducers in increasers are located within 6 pipe diameters upstream and 3 pipe diameters downstream of the valve.

Warning: Do not reduce the valve size to less than one-half the line size, as this may weaken the pipe reduction area. Physical injury can result if the weakened piping fails.

Estimated Effective Cv (k_{vs}) When Using Pipe Reducers

Valve Size, in (mm)	Valve Body	Cv (k_{vs})	Estimated Effective Cv (k_{vs})				
			Pipe Size — Inches				
	NPT Threaded		1/2"	3/4"	1"	1-1/4"	1-1/2"
1/2 (15)	VBx2N00	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	—	—
	VBx2N01	0.7 (0.6)	0.7 (0.6)	0.7 (0.6)	0.7 (0.6)	—	—
	VBx2N02	1.2 (1.0)	1.2 (1.0)	1.2 (1.0)	1.2 (1.0)	—	—
	VBx2N03	2.1 (1.8)	2.1 (1.8)	2.1 (1.8)	2.1 (1.8)	—	—
	VBx2N04	3.5(3.0)	3.5(3.0)	3.3 (2.8)	3.1 (2.7)	—	—
	VBx2N05	4.7 (4.1)	4.7 (4.1)	4.4 (3.8)	4.1 (3.5)	—	—
	VBx2N06	7.7(6.7)	7.7(6.7)	6.6 (5.7)	5.5 (4.8)	—	—
	VBx2N07	10 (8.7)	10 (8.7)	8.5 (7.4)	7.0 (6.0)	—	—
3/4 (20)	VBx2N10	0.3 (0.3)	—	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)
	VBx2N11	0.7 (0.6)	—	0.7 (0.6)	0.7 (0.6)	0.7 (0.6)	0.7 (0.6)
	VBx2N12	1.2 (1.0)	—	1.2 (1.0)	1.2 (1.0)	1.2 (1.0)	1.2 (1.0)
	VBx2N13	2.1 (1.8)	—	2.1 (1.8)	2.1 (1.8)	2.1 (1.8)	2.1 (1.8)
	VBx2N14	3.5(3.0)	—	3.5 (3.0)	3.5 (3.0)	3.5 (3.0)	3.5 (3.0)
	VBx2N15	4.7 (4.1)	—	4.7 (4.1)	4.6 (4.0)	4.5 (3.9)	4.4 (3.8)
	VBx2N16	7.7(6.7)	—	7.7(6.7)	7.5 (6.5)	7.3 (6.3)	7.2 (6.2)
	VBx2N17	10 (8.7)	—	10 (8.7)	9.5 (8.2)	9.0 (7.8)	7.2 (6.2)

VB-2xxx Ball Valves with SmartX Actuators

NOTE: The following section has numbered sub-pages referenced.

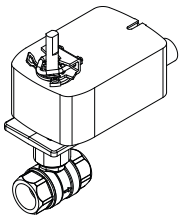
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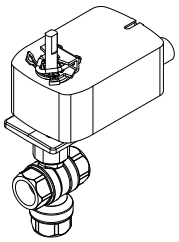
The Schneider Electric VA, VF, and VS-2xx3-xxx-9-xx series Ball Valve Assemblies are complete actuator/valve assemblies that accept two-position, floating, or proportional control signals from a DDC system or a thermostat, for control of hot or chilled water, or solutions of up to 50% glycol. They consist of direct-coupled, SmartX, spring return or non-spring return actuators mounted on 2-way (1/2" to 3") and 3-way (1/2" to 2") ball valve bodies. Typical applications include reheat on VAV boxes, fan coil units, hot and chilled water coils in air handling units, and unit ventilators.

Ball Valve Assemblies with SmartX Actuators

Vx-2xx3-5xx-9-xx series ball valve assemblies are available with either spring return or non-spring return SmartX® Actuators.

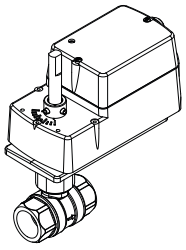


Vx-22x3-5xx-9-xx
2-Way Assembly with
Spring Return Actuator

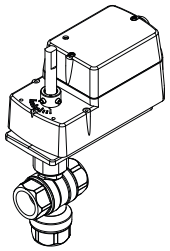


Vx-2313-5xx-9-xx
3-Way Assembly with
Spring Return Actuator

Vx-2xx3-8xx-9-xx Spring return valve assemblies equipped with Mx4D-x0x3 SmartX Actuators, respectively.



Vx-22x3-8xx-9-xx
2-Way Assembly with
Mx4D Series Actuator



Vx-2313-8xx-9-xx
3-Way Assembly with
Mx4D Series Actuator

Ball Valve Body/Linkage Assemblies

Ball valve body/linkage assemblies allow field mounting of SmartX Actuators.

Features and Benefits

Feature	Benefit
Close-offs of 40 to 130 psi.	Accommodates most close-off requirements.
Available in full range of line sizes, 1/2 in. to 3 in. for 2-way valves and 1/2 in. to 2 in. for 3-way valves.	Satisfies a wide range of applications.
Cvs from 0.33 to 266.	Permits optimal valve sizing, minimizing the need for pipe reducers.
Flow characterizing insert, made of glass-filled Noryl™.	Provides equal percentage flow characteristic so that the heat output of the coil is linear with respect to valve position.
Available in both spring return and non-spring return models.	Allows power loss mode requirement to be met for any given application.
Utilizes SmartX Actuators with two-position, floating, and proportional control.	Models to fit a wide range of applications.
All models equipped with pigtail leads.	Eases installation. Reduced electrician costs.
Low-friction seals and o-rings.	Allows the use of lower-torque actuators, reducing cost.
Valve body made of forged brass ASTM B283-06.	Rated for static pressure of 360 psi at fluid temperatures of 20 to 250 °F (-7 to 121 °C).
ANSI Class IV (0.01% of Cv) shutoff with 2-way valves.	Allows accurate control, saves energy.
Choices of spring return direction.	Provides Normally Closed or Normally Open spring return.
Thermally isolated mounting plate.	Protects the actuator from excess cold or heat from chilled or hot water passing through the valve. Discourages condensation.
Ball Valve Body/Linkage Assemblies are available separately. They include anti-rotation clips for SmartX Actuators.	Increases flexibility and minimizes inventory.

Ball Valve Assembly Selection Procedure

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

1. Control Signal Type, Valve Body Configuration, and End Connection
   Refer to “Ball Valve Assemblies Using SmartX 5xx Actuators” on page 4 of this section or “Ball Valve Assemblies Using SmartX 8xx Actuators” on page 5 of this section , and then select the appropriate codes for these part number fields.
2. Valve Size (Flow Coefficient)
   If the required flow coefficient (Cv) has not yet been determined, do so as follows:
   a. Refer to the “Sizing and Selection” on page 27 of this section to calculate the required Cv.
   b. Select the nearest available Cv and corresponding valve body port code from “2-Way Ball Valve Assemblies with SmartX Actuators” on page 6 or “3-Way Ball Valve Assemblies with SmartX Actuators” on page 7 of this section .
3. Actuator
   Select the appropriate actuator and code, according to “Ball Valve Assemblies Using SmartX 5xx Actuators” on page 4 of this section or “Ball Valve Assemblies Using SmartX 8xx Actuators” on page 5 of this section, based on the control signal type, required valve normal position, and voltage requirements. For detailed actuator information, refer to the applicable actuator specifications on pages of this section 13, 16, 19, and 22.

NOTE: Ball Valve Assemblies with SmartX Actuators use the basic actuators. However, if an actuator with auxiliary switch(es) is required, you may field-assemble a ball valve assembly using a ball valve body/linkage assembly (VB-2x13-500-9-xx). For information on switch-equipped actuators, refer to “Valve Assemblies with Mx40-704x Spring Return SmartX Actua-tors” on page 19 of this section and “Valve Assemblies with Mx4D-7033 and Mx4D-8033 Spring Return SmartX Actuators” on page 23 of this section “Valve Assemblies with MF41-6043, MF41-6083, MS41-6043, and MS41-6083 Non-Spring Return SmartX Actuators” on page 13 of this section.

Applicable Literature



MA40-704x, MA4x-707x, MA4x-715x General Instructions	F-26642
MF4x-7xx3, MF4x-7xx3-50x General Instructions	F-26644
MS4x-7xx3, MS4x-7xx3-50x General Instructions	F-26645
MF41-6043, MF41-6083 General Instructions	F-27213
MA4D-xxxx, MF4D-xxxx, MS4D-xxxx General Instructions	F-27170
MS41-6043, MS41-6083 General Instructions	F-27214
Mx40-704x Mounting and Wiring Instruction	F-27003
Mx41-6043 Data Sheet	F-26737
Mx41-6043 Submittal Sheet	F-27216
Vx-2xx3-5xx-9-xx, VB-2xx3-500-9-xx	F-27087
EN205 Water and Steam Systems	F-26080

Ball Valve Assemblies Using SmartX 5xx Actuators

V x - 2 x x 3 - 5 x x - 9 - x x

Control Signal Type
A = Two Position
F = Floating
S = Proportional
B = Valve Body & Linkage[a] (less actuator)

Configuration
2 = 2-Way
3 = 3-Way Mixing

Material
1 = Nickel/Chromium Plated Brass
5 = Stainless Steel △3

Connection
3 = Threaded NPT

Port Code
Refer to separate Port Code table

Actuator Code △1 △2				Valves Used On △3					
				1/2 to 1"		1-1/4"		1-1/2" to 3"	1-1/2" to 2"
Model	Code	Normal Position	Voltage	2-way	3-way	2-way	3-Way	2-Way	3-way
Two-Position									
MA40-7040	**522**	SR Close	120 Vac	X	X	X	X	X	X
MA40-7040	**532**	SR Open	120 Vac	X	X	X	X	X	X
MA40-7043	**526**	SR Close	24 Vac	X	X	X	X	X	X
MA40-7043	**536**	SR Open	24 Vac	X	X	X	X	X	X
Floating									
MF41-6043	**505**	NSR	24 Vac	X	X	X	X	—	—
MF41-6083	**506**	NSR	24 Vac	—	—	—	—	X	X
MF40-7043	**526**	SR Close	24 Vac	X	X	X	X	X	X
MF40-7043	**536**	SR Open	24 Vac	X	X	X	X	X	X
Proportional									
MS41-6043	**505**	NSR	24 Vac	X	X	X	X	—	—
MS41-6083	**506**	NSR	24 Vac	—	—	—	—	X	X
MS40-7043	**526**	SR Close	24 Vac	X	X	X	X	X	X
MS40-7043	**536**	SR Open	24 Vac	X	X	X	X	X	X
Valve Body/Linkage Assembly [a]				**VB-22x3-500-9-xx, VB-2313-500-9-xx**					

SR = Spring Return
NSR = Non-Spring Return

△1 Normal position for 3-way spring return ball valve assemblies refers to A to AB ports.

△2 Only the listed 35 lb-in. and 70 lb-in. SmartX actuators are compatible with ball valve body/linkage assemblies.

△3 Stainless steel ball is available only on 2-way versions.

[a] Includes valve body, linkage, and anti-rotation clips for spring return and non-spring return SmartX actuators, listed above. Ordered separately.

Note: Not all model configurations are available as factory assemblies. You can purchase the the actuator and a VB-22x3-500-9-xx valve body and linkage separately for field assembly.

Ball Valve Assemblies Using SmartX 8xx Actuators

V x - 2 x x 3 - 8 x x - 9 - x x

Control Signal Type
A = Two Position
F = Floating
S = Proportional
B = Valve Body & Linkage[c] (less actuator)

Configuration
2 = 2-Way
3 = 3-Way Mixing

Material
1 = Nickel/Chromium Plated Brass
5 = Stainless Steel 3

Connection
3 = Threaded NPT

Port Code
Refer to separate Port Code table

Actuator Code 1 2					Valves Used On 3			
					1/2" to 1"		1-1/4" to 3"	1-1/4" to 2"
Model[a]	Code	Normal Position	Voltage	Type	2-way	3-way	2-way	3-way
Two-Position								
MA4D-7030-000	**815**	SR Open	120 Vac	—	X	X	—	—
MA4D-8030-000	**817**	SR Closed	120 Vac	—	X	X	—	—
MA4D-7033-100	**821**	SR Open	24 Vac	—	X	X	—	—
MA4D-8033-100	**831**	SR Closed	24 Vac	—	X	X	—	—
Floating								
MF4D-7033-100	**821**	SR Open	24 Vac	—	X	X	—	—
MF4D-8033-100	**831**	SR Closed	24 Vac	—	X	X	—	—
MF4D-6083-100	**N/A**[b]	NSR	24 Vac	—	X	X	X	X
Proportional								
MS4D-7033-100	**821**	SR Open	24 Vac	2-10 Vdc	X	X	—	—
MS4D-7033-120	**N/A**[b]	SR Open	24 Vac	0-3 Vdc	X	X	—	—
MS4D-7033-130	**N/A**[b]	SR Open	24 Vac	6-9 Vdc	X	X	—	—
MS4D-7033-150	**N/A**[b]	SR Open	24 Vac	0-10 Vdc	X	X	—	—
MS4D-7033-160	**N/A**[b]	SR Open	24 Vac	4-20 mA	X	X	—	—
MS4D-8033-100	**831**	SR Closed	24 Vac	2-10 Vdc	X	X	—	—
MS4D-8033-120	**N/A**[b]	SR Closed	24 Vac	0-3 Vdc	X	X	—	—
MS4D-8033-130	**N/A**[b]	SR Closed	24 Vac	6-9 Vdc	X	X	—	—
MS4D-8033-150	**N/A**[b]	SR Closed	24 Vac	0-10 Vdc	X	X	—	—
MS4D-8033-160	**N/A**[b]	SR Closed	24 Vac	4-20 mA	X	X	—	—
MS4D-6083-100	**841**	NSR	24 Vac	2-10 Vdc	X	X	X	X
MS4D-6083-120	**N/A**[b]	NSR	24 Vac	0-3 Vdc	X	X	X	X
MS4D-6083-130	**N/A**[b]	NSR	24 Vac	6-9 Vdc	X	X	X	X
MS4D-6083-150	**N/A**[b]	NSR	24 Vac	0-10 Vdc	X	X	X	X
MS4D-6083-160	**N/A**[b]	NSR	24 Vac	4-20 mA	X	X	X	X
Valve Body/Linkage Assembly[c]	**VB-22x3-500-9-xx, VB-2313-500-9-xx**							

SR = Spring Return NSR = Non-Spring Return

1 Normal position for 3-way spring return ball valve assemblies refers to A to AB ports.

2 Only the listed 30 lb-in. and 70 lb-in. SmartX actuators are compatible with ball valve body/linkage assemblies.

3 Stainless steel ball is available only on 2-way versions.

a "-000" models have appliance cables. "-1X0" models have plenum cables.

b Factory assemblies not available. Purchase actuator and valve body separately and field assemble.

c Includes valve body, linkage, and anti-rotation clips for spring return and non-spring return SmartX actuators, listed above. Ordered separately.

Port Codes

2-Way Ball Valve Assemblies with SmartX Actuators

Table-1. 2-Way Ball Valve Assemblies—Sizes, Port Codes, and Cvs.

Size in.	2-Way		
	Port Code	Cv[a]	Kvs[a]
1/2	01	0.38	0.33
	02	0.68	0.59
	03	1.3	1.1
	04	2.6	2.2
	05	4.7	4.1
	06	8.0	6.9
	07	11.7[b]	10.1
3/4	11	0.31	0.27
	12	0.63	0.54
	13	1.2	1.0
	14	2.5	2.2
	15	4.3	3.7
	16	10.1	8.7
	17	14.7[b]	12.7
	18	28.6[b]	24.7
1	21	4.4	3.8
	22	9.0	7.8
	23	15.3	13.2
	24	26.1	22.6
	25	28.4[b]	24.6
	26	43.9[b]	38.0
	27	54.2[b]	46.9
1-1/4	41	4.4	3.8
	42	8.3	7.2
	43	14.9	12.9
	44	36.5	31.6
	45	41.1[b]	35.6
	46	102.3[b]	88.5
1-1/2	51	22.8	19.7
	52	41.3	35.7
	53	73.9[b]	63.9
	54	171.7[b]	148.5
2	61	41.7	36.1
	63	71.1	61.5
	65	108[b]	93.4
	66	210	181.7
	67	266[b]	230.1
2-1/2	71	45	38.9
	72	55	47.6
	73	72.3	62.5
	74	101	87.4
	75	162	140.1
	76	202[b]	174.7
3	82	63	54.5
	85	145[b]	125.4

a) $Cv = \frac{gpm}{\sqrt{\Delta P}}$ (where ΔP is measured in psi) $kvs = \frac{Cv}{1.156}$

$kvs = \frac{m^3/h}{\sqrt{\Delta P}}$ (where ΔP is measured in bar; 1 bar = 100 kPa)

b) Denotes a full port valve, without the characterized insert.

3-Way Ball Valve Assemblies with SmartX Actuators

Table-2. 3-Way Ball Valve Assemblies—Sizes, Port Codes, and Cvs

Size in.	3-Way		
	Port Code	A Port Cv[a b]	Kvs[a]
1/2	01	0.33	0.28
	02	0.59	0.51
	03	1	0.86
	04	2.4	2.1
	05	4.3	3.7
	06	8.0[c]	6.9
3/4	11	0.40	0.35
	12	0.66	0.57
	13	1.3	1.1
	14	2.4	2.1
	15	3.8	3.3
	16	11[c]	9.5
1	21	0.40	0.35
	22	0.65	0.56
	23	1.3	1.1
	24	2.3	2.0
	25	3.5	3.0
	26	4.5	3.9
	27	8.6	7.4
	28	10	8.6
	29	14.9	12.9
	30	22.3[c]	19.3
	31	30.8[c]	26.6
1-1/4	41	4.1	3.5
	43	8.7	7.5
	44	12.7	11.0
	45	19.4[c]	16.8
	46	34.1[c]	29.5
1-1/2	51	4	3.5
	52	8.3	7.2
	53	13.4	11.6
	54	23.5	20.3
	55	32[c]	27.7
	56	61.1[c]	52.8
2	61	23.9	20.7
	62	38.2	33.0
	63	56.7[c]	49.0
	64	108.5[c]	93.8

a) $Cv = \frac{gpm}{\sqrt{\Delta P}}$ (where ΔP is measured in psi) $kvs = \frac{Cv}{1.156}$

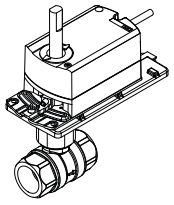
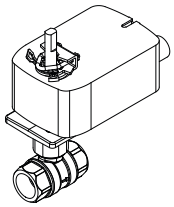
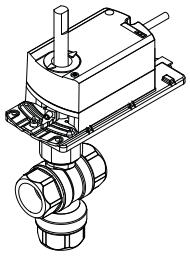
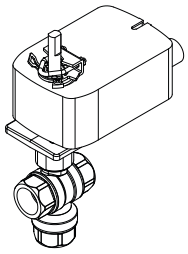
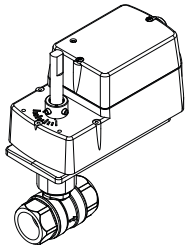
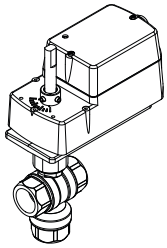
$kvs = \frac{m^3/h}{\sqrt{\Delta P}}$ (where ΔP is measured in bar; 1 bar = 100 kPa)

b) B port Cv is 80% of A port Cv.

c) Denotes a full port valve, without the characterized insert.

VB-2xxx 2-Way and 3-Way Assembly Specifications

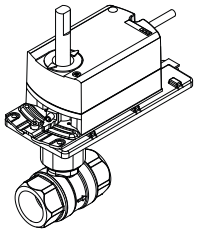
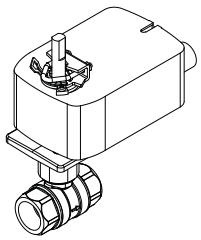
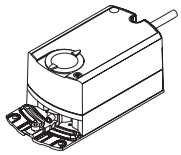
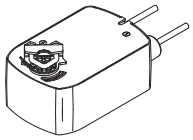
Table-3. Specifications for Ball Valve Assemblies

Valve Assembly Series		2-Way	3-Way Mixing
Ball Valve Assemblies using SmartX Actuators		 **Non-Spring Return** Vx-22x3-505-9-P Vx-22x3-506-9-P  **Spring Return** Vx-22x3-5xx-9-P	 **Non-Spring Return** Vx-2313-505-9-P Vx-2313-506-9-P  **Spring Return** Vx-2313-5xx-9-P
		 **Spring Return** Vx-22x3-81x-9-P Vx-22x3-82x-9-P Vx-22x3-83x-9-P **Non-Spring Return** Vx-22x3-841-9-P	 **Spring Return** Vx-2313-81x-9-P Vx-2313-82x-9-P Vx-2313-83x-9-P **Non-Spring Return** Vx-2313-841-9-P
Applications		Chilled or Hot Water, up to 50% Glycol Solution	
Type of End Fitting		NPT Screwed	
Size		1/2 in. through 3 in.	1/2 in. through 2 in.
Valve Assembly Series		Vx-22x3-xxx-9-P	Vx-2313-xxx-9-P
Flow Type		Equal Percentage	
Material	Body	Forged Brass (ASTM B283-06)	
	Ball	1 = Nickel/Chromium-Plated Brass 5 = Stainless Steel	Nickel/Chromium-Plated Brass
	Characterizing Insert	Glass-filled Noryl	
	Stem	Stainless Steel	
	Ball Seals	Reinforced Teflon® Seals with EPDM O-Rings	
	Stem Seals	EPDM O-Rings	
	Mounting Plate	Glass-filled Polymer	
Maximum Static Pressure		360 psig (25 bar) at 250 °F (121 °C)	
Maximum Operating Differential Pressure		Same as close-off pressures shown in Table-4 or Table-6. Refer to “Cavitation Limitations on Valve Pressure Drop” on page 29 of this section.	Same as close-off pressures shown in Table-5 or Table-7. Refer to “Cavitation Limitations on Valve Pressure Drop” on page 29 of this section.
Seat Leakage		ANSI Class IV (0.01% of Cv)	ANSI Class IV (0.01% of Cv), piped coil-side outlet to A only
Fluid (water) Temperature	Minimum	20 °F (-7 °C)	
	Maximum	250 °F (121 °C)	

2-Way Ball Valve Assemblies Using SmartX Actuators

Note: All valve sizes — ANSI Class IV (0.01% of Cv) shut-off.

Table-4. Selection Chart—2-Way Ball Valve Assemblies with SmartX Actuators

2-Way Ball Valve Assemblies with SmartX			Non-Spring Return[a]		Spring Return
 Vx-22x3-505-9-P  Vx-22x3-5xx-9-P					
			Actuator Models (Actuator Codes)		
			24 Vac		
			Floating MF41-6043 (505) Proportional MS41-6043 (505)	Floating MF41-6083 (506) Proportional MS41-6083 (506)	Two-Position MA40-7043 (N.C.) (526) MA40-7043 (N.O.) (536) Floating MF40-7043 (N.C.) (526) MF40-7043 (N.O.) (536) Proportional MS40-7043 (N.C.) (526) MS40-7043 (N.O.) (536)
			—	—	120 Vac
			—	—	Two-position MA40-7040 (N.C.) (522) MA40-7040 (N.O.) (532)
Valve Assembly Part Number	Valve Size (in.)	P Code[b]	Close-Off Pressure, psi (kPa)		
Ball Valve Assembly With SmartX Vx-22x3-5xx-9-P[c] Valve/Linkage Assembly VB-22x3-500-9-P	1/2	1, 2, 3, 4, 5, 6, 7	130 (896) (field assemble[d])	—	130 (896) (field assemble[d])
	3/4	11, 12, 13, 14, 15, 16, 17, 18	130 (896) (field assemble[d])	—	130 (896) (field assemble[d])
	1	21, 22, 23, 24, 25, 26, 27	100 (689)	—	100 (689) (field assemble[d])
	1-1/4	41. 42, 43, 44, 45, 46	70 (482)	—	70 (482)
	1-1/2	51, 52, 53, 54	—	70 (482)	70 (482)
	2	61, 63, 65, 66, 67	—	70 (482)	70 (482)
	2-1/2	71, 72, 73, 74, 75, 76	—	70 (482)	70 (482)
	3	82, 85	—	70 (482)	70 (482)

a) VSxx, non-spring return, NO (normally open), 2-way ball valve assemblies are shipped open. For VS-22x3, a control voltage increase will close the valve.

b) To find the corresponding flow coefficients for these port codes, refer to "2-Way Ball Valve Assemblies with SmartX Actuators" on page 6 of this section.

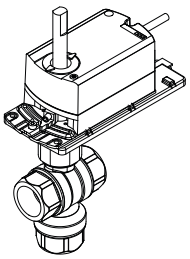
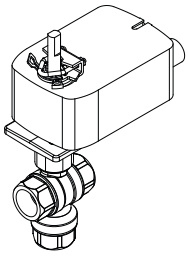
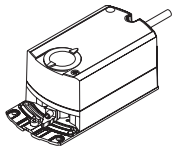
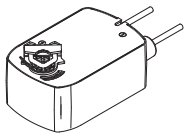
c) To determine a specific part number, identify the actuator's control signal type ("A," "F," or "S"), actuator code, and P code. Refer to "Part Numbering System" on page 4 of this section.

Note: Not all model configurations are available as factory assemblies. You can purchase the the actuator and a VB-22x3-500-9-xx valve body and linkage separately for field assembly.

VB-2xxx 3-Way Mixing Assemblies Mx41-6043/83 and Mx40-7040/43

Note: All valve sizes — ANSI Class IV (0.01% of Cv) shut-off piped coil-side outlet to A.

Table-5. Selection Chart—3-Way Mixing Ball Valve Assemblies with SmartX Actuators

3-Way Mixing Ball Valve Assemblies with SmartX[ab]			Non-Spring Return		Spring Return
 Vx-2313-505-9-P Vx-2313-506-9-P  Vx-2313-5xx-9-P					
			Actuator Models (Actuator Codes)		
			24 Vac		
			Floating MF41-6043 (505) Proportional MS41-6043 (505)	Floating MF41-6083 (506) Proportional MS41-6083 (506)	Two-Position MA40-7043 (N.C.) (526) MA40-7043 (N.O.) (536) Floating MF40-7043 (N.C.) (526) MF40-7043 (N.O.) (536) Proportional MS40-7043 (N.C.) (526) MS40-7043 (N.O.) (536)
					120 Vac
					Two-position MA40-7040 (N.C.) (522) MA40-7040 (N.O.) (532)
Valve Assembly Part Number	Valve Size (in.)	P Code[c]	Close-Off Pressure, psi (kPa)		
Ball Valve Assembly with SmartX Vx-2313-5xx-9-P[d] Valve/Linkage Assembly VB-2313-500-9-P	1/2	1, 2, 3, 4, 5, 6	50 (344) (field assemble[e])	—	50 (344) (field assemble[e])
	3/4	11, 12, 13, 14, 15, 16	50 (344) (field assemble[e])	—	50 (344) (field assemble[e])
	1	21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	50 (344)	—	50 (344) (field assemble[e])
	1-1/4	41. 43, 44, 45, 46	40 (275)	—	40 (275))
	1-1/2	51, 52, 53, 54, 55, 56	—	40 (275)	40 (275)
	2	61, 62, 63, 64	—	40 (275)	40 (275)

a) Non-spring return 3-way ball valve assemblies are shipped open A to AB. For VS-2313 models, a control voltage increase will close A to AB and open B to AB

b) Spring return, NC (normally closed), 3-way mixing valves are normally closed, A to AB. For VS-2313 models, a control voltage increase will close A to AB and open B to AB

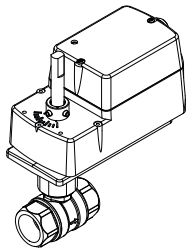
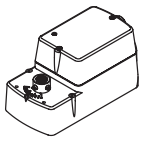
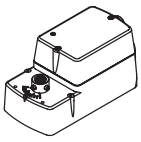
c) To find the corresponding flow coefficients for these port codes, refer to “3-Way Ball Valve Assemblies with SmartX Actuators” on page 7 of this section .

d) To determine a specific part number, identify the actuator’s control signal type (“A,” “F,” or “S”), actuator code, and P code. Refer to ““Ball Valve Assemblies Using SmartX 8xx Actuators” on page 5 of this section.

Note: Not all model configurations are available as factory assemblies. You can purchase the the actuator and a VB-22x3-500-9-xx valve body and linkage separately for field assembly.

Note: All valve sizes — ANSI Class IV (0.01% of Cv) shut-off.

Table-6. Selection Chart—2-Way Ball Valve Assemblies with SmartX Actuators

2-Way Ball Valve Assemblies with SmartX			Non-Spring Return[a]	Spring Return
 **Spring Return** Vx-22x3-81x-9-P Vx-22x3-82x-9-P Vx-22x3-83x-9-P **Non-Spring Return** Vx-22x3-841-9-P				
			Actuator Models (Actuator Codes)	
			24 Vac	
			Floating MF4D-6083-100 (field assembly only) Proportional MS4D-6083-100 (841)	Two-Position MA4D-7033-100 (N.O.) (821) MA4D-8033-100 (N.C.) (831) Floating MF4D-7033-100 (N.O.) (821) MF4D-8033-100 (N.C.) (831) Proportional MS4D-7033-100 (N.O.) (821) to (829) MS4D-8033-100 (N.C.) (831) to (839)
				120 Vac
				Two-position MA4D-7030-100 (N.O.) (815) MA4D-8030 (N.C.) (817)
				230 Vac
				Two-Position MA4D-7031-100 (N.O.) (816) MA4D-8031-100 (N.C.) (818)
Valve Assembly Part Number	Valve Size (in.)	P Code[b]	Close-Off Pressure, psi (kPa)	
Ball Valve Assembly with SmartX Vx-22x3-5xx-9-P[c] Valve/Linkage Assembly VB-22x3-500-9-P	1/2	1, 2, 3, 4, 5, 6, 7	130 (896)	130 (896)
	3/4	11, 12, 13, 14, 15, 16, 17, 18	130 (896)	130 (896)
	1	21, 22, 23, 24, 25, 26, 27	100 (689)	100 (689)
	1-1/4	41. 42, 43, 44, 45, 46	70 (482)	—
	1-1/2	51, 52, 53, 54	70 (482)	—
	2	61, 63, 65, 66, 67	70 (482)	—
	2-1/2	71, 72, 73, 74, 75, 76	70 (482)	—
	3	82, 85	70 (482)	—

a) Non-spring return 2-way ball valve assemblies are shipped open. For VS-22x3, a control voltage increase will close the valve.

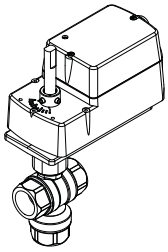
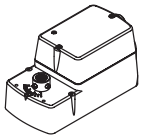
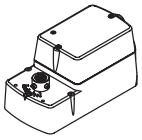
b) To find the corresponding flow coefficients for these port codes, refer to “2-Way Ball Valve Assembly Dimensions” on page 24 of this section .

c) To determine a specific part number, identify the actuator’s control signal type (“A,” “F,” or “S”), actuator code, and P code. Refer to “Part Numbering System” on page 4 of this section.

Note: Not all model configurations are available as factory assemblies. You can purchase the the actuator and a VB-22x3-500-9-xx valve body and linkage separately for field assembly.

Note: All valve sizes — ANSI Class IV (0.01% of Cv shut-off piped coil-side outlet to A.

Table-7. Selection Chart—3-Way Mixing Ball Valve Assemblies with SmartX Actuators

3-Way Mixing Ball Valve Assemblies with SmartX[ab]			Non-Spring Return	Spring Return	
 **Spring Return** Vx-2313-81x-9-P Vx-2313-82x-9-P Vx-2313-83x-9-P **Non-Spring Return** Vx-2313-841-9-P					
			Actuator Models (Actuator Codes)		
			24 Vac		
			Floating MF4D-6083-100 (field assembly only) Proportional MS4D-6083-100 (841)	Two-Position MA4D-7033-100 (N.O.) (821) MA4D-8033-100 (N.C.) (831) Floating MF4D-7033-100 (N.O.) (821) MF4D-8033-100 (N.C.) (831) Proportional MS4D-7033-100 (N.O.) (821) MS4D-8033-100 (N.C.) (831)	Two-Position MA4D-7030-100 (N.O.) (815) MA4D-8030-100 (N.C.) (817)
Valve Assembly Part Number	Valve Size (in.)	P Code[c]	Close-Off Pressure, psi (kPa)		
Ball Valve Assembly with SmartX Vx-2313-8xx-9-P[d] Valve/Linkage Assembly VB-2313-500-9-P	1/2	1, 2, 3, 4, 5, 6	50 (344)	50 (344)	
	3/4	11, 12, 13, 14, 15, 16	50 (344)	50 (344)	
	1	21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	50 (344)	50 (344)	
	1-1/4	41. 43, 44, 45, 46	40 (275)	—	
	1-1/2	51, 52, 53, 54, 55, 56	40 (275)	—	
	2	61, 62, 63, 64	40 (275)	—	

a) Non-spring return, NO (normally open), 3-way ball valve assemblies are shipped open A to AB. For VS-2313, a control voltage increase will close A to AB and open B to AB

b) Spring return, NC (normally closed), 3-way mixing valves are normally A to AB closed. For VS-2313, a control voltage increase will open A to AB and close B to AB

c) To find the corresponding flow coefficients for these port codes, refer to “3-Way Ball Valve Assemblies with SmartX Actuators” on page 7 of this section.

d) To determine a specific part number, identify the actuator’s control signal type (“A,” “F,” or “S”), actuator code, and P code. Refer to ““Ball Valve Assemblies Using SmartX 8xx Actuators” on page 5 of this section .

Table-8. Actuator Specifications

<table>
<tr><td colspan="2">Inputs</td><td></td></tr>
<tr><td></td><td>Control Signal</td><td>MF41-6043 and MF41-6083: Floating three-position control, 24 Vac.
MS41-6043 and MS41-6083: Proportional, 0 to 10 Vdc; input resistance 100K ohms.
Control signal adjustment available with MS41-6043-520 and MS41-6043-522:
Start point (offset) — Between 0 and 5 Vdc (factory setting = 0 Vdc)
Span — 2 to 30 Vdc</td></tr>
<tr><td></td><td>Power Requirements</td><td>All 24 Vac circuits are Class 2.
<table>
<tr><td rowspan="2">Part Number</td><td colspan="4">Power Input @ 50/60 Hz</td></tr>
<tr><td>Voltage</td><td>Running VA</td><td>Holding VA</td><td>Watts</td></tr>
<tr><td>MF41-6043 and MF41-6083</td><td rowspan="2">24 Vac +20/-15%</td><td>2.3</td><td>—</td><td>2.0</td></tr>
<tr><td>MS41-6043 and MS41-6083</td><td>3.3</td><td>1.2</td><td>3.0</td></tr>
</table></td></tr>
<tr><td></td><td>Connections</td><td>3 ft. (0.9 m) long, 18 AWG plenum-rated leads.</td></tr>
<tr><td colspan="2">Motor Type</td><td>Synchronous</td></tr>
<tr><td colspan="2">Outputs</td><td></td></tr>
<tr><td></td><td>Electrical</td><td>Feedback potentiometer available for MF41-6043/6083-510: 0 to 1000 ohms < 10 mA
Position feedback voltage for MS41-6043/6083: 0 to 10 Vdc, 1 mA
Auxiliary Switches: Dual auxiliary switches available with MF41-6043/6083-502, MS41-6043/6083-502, and MS41-6083-522 when these actuators are ordered as separate units. Auxiliary switches are not offered with factory ball valve assemblies.
AC Rating: 24 Vac, 4 A resistive, 2 A inductive
DC Rating: 12 to 30 Vdc, DC 2 A
Switch hysteresis: 3° rotation
<table>
<tr><td rowspan="2">Timing:</td><td rowspan="2">Part Number</td><td colspan="2">90° Timing in Sec.</td></tr>
<tr><td>At 60 Hz</td><td>At 50 Hz</td></tr>
<tr><td rowspan="2"></td><td>MF41-6043
MS41-6043</td><td>90</td><td>108</td></tr>
<tr><td>MF41-6083
MS41-6083</td><td>125</td><td>150</td></tr>
</table>
Switch Range:
Switch A — 0 to 90° range in 5° intervals
Recommended range usage — 0 to 45°
Factory setting — 5°
Switch B — 0 to 90° range in 5° intervals
Recommended range usage — 45 to 90°
Factory setting — 85°</td></tr>
<tr><td></td><td>Mechanical</td><td>Output torque rating: 35 lb-in. (4 N-m) for Mx41-6043; 70 lb-in. (8 N-m) for Mx41-6083
Stroke: Normal angle of rotation is 90°, limited to a maximum of 95°. Field adjustable to limit travel on either end of stroke.
Position indicator: Adjustable pointer is provided for position indication.
Output shaft setscrew: Tightening torque 55 to 60 lb-in. (6.3 to 6.8 N-m).</td></tr>
<tr><td colspan="2">Environment</td><td></td></tr>
<tr><td></td><td>Temperature Limits</td><td>Shipping and storage: -40 to 158 °F (-40 to 70 °C) ambient.
Operating: -25 to 130 °F (-32 to 55 °C) ambient.
NOTE: Check the valve operating temperature limit. The minimum valve temperature limit is 20 °F (6.7 °C)</td></tr>
<tr><td></td><td>Humidity</td><td>5 to 95% RH, non-condensing.</td></tr>
<tr><td></td><td>Locations</td><td>NEMA Type 2 (IEC IP54).</td></tr>
<tr><td colspan="2">Agency Listings (Actuator)</td><td></td></tr>
<tr><td></td><td>UL</td><td>UL-873, Underwriters Laboratories.</td></tr>
<tr><td></td><td>cUL</td><td>Canadian Standards C22.2 No. 24-93.</td></tr>
<tr><td></td><td>European Community</td><td>EMC Directive (89/336/EEC). Emissions (EN50081-1). Immunity (EN50081-2).</td></tr>
</table>

VB-2xxx Assembly Actuator Specs and Mounting Dimensions

Table-9. 2-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code[a]	Valve Dimensions in inches (millimeters) Refer to Figure 1			
			A	B	C	D
2-Way VF-22x3-505-9-P VF-22x3-506-9-P VS-22x3-505-9-P VS-22x3-506-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	7 (178)	8-1/4 (210)	3-1/8 (79)
		6	2-5/8 (67)	7 (178)	8-1/2 (216)	3-3/8 (86)
	3/4	11, 12, 13, 14, 15, 17	2-7/16 (62)	7 (178)	8-1/4 (210)	3-1/4 (83)
		16, 18	2-3/4 (70)	7 (178)	8-1/2 (216)	3-3/8 (86)
	1	21, 23	3-1/16 (78)	7 (178)	8-7/8 (225)	3-5/8 (92)
		22, 25	2-3/4 (70)	7 (178)	8-1/2 (216)	3-3/8 (86)
		24, 26	4-1/2 (114)	7-3/8 (187)	9-3/8 (238)	3-7/8 (98)
		27	3 (76)	7 (178)	8-7/8 (225)	3-5/8 (92)
	1-1/4	41, 42, 43, 45	3 (76)	7 (178)	8-7/8 (225)	3-5/8 (92)
		44, 46	3-5/8 (92)	7-1/8 (181)	9-3/8 (238)	3-3/4 (95)
	1-1/2	51, 53	3-7/16 (87)	7-1/8 (181)	9-3/8 (238)	3-3/4 (95)
		52, 54	4-1/16 (103)	7-1/4 (184)	9-7/8 (251)	4-1/16 (103)
	2	61, 65	3-15/16 (100)	7-1/4 (184)	9-7/8 (251)	4 (102)
		63, 66, 67	4-15/16 (125)	7-3/4 (197)	10-1/2 (267)	4-7/16 (113)
	2-1/2	71, 72, 76, 73, 74, 75	5-3/8 (137)	8 (203)	10-3/4 (273)	4-1/2 (114)
	3	82, 85	5-11/16 (144)	8-1/8 (206)	10-11/16 (271)	4-1/4 (108)

a) To find the corresponding flow coefficients for these port codes, refer to "2-Way Ball Valve Assemblies with SmartX Actuators" on page 6 of this section .

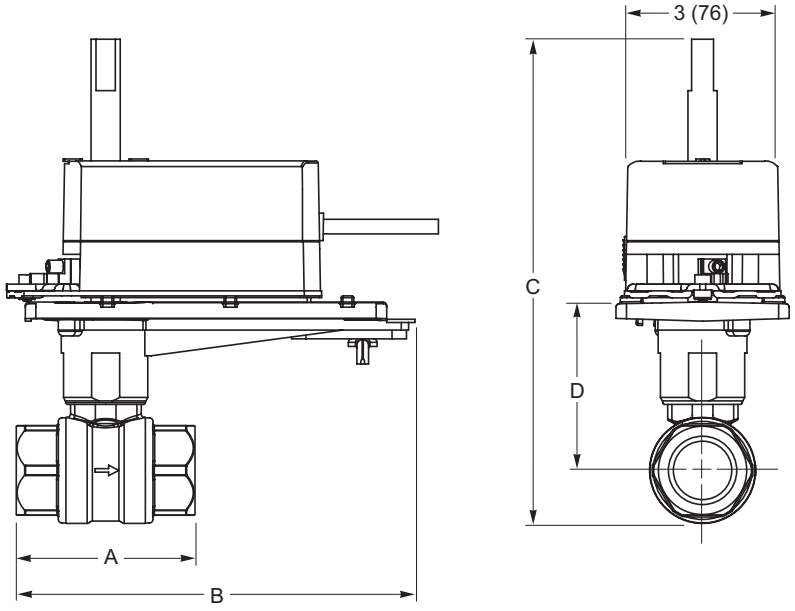


Figure 1. Mx41-6043 or Mx41-6083 with 2-Way Ball Valve.

VB-2xxx Assembly Actuator Specs and Mounting Dimensions

Table-10. 3-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code[a]	Valve Dimensions in inches (millimeters) Refer to Figure 2				
			A	B	C	D	E
3-Way VF-2313-505-9-P VF-2313-506-9-P VS-2313-505-9-P VS-2313-506-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	7 (178)	9-3/4 (248)	3-5/16 (84)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-3/4 (70)	7 (178)	9-3/4 (248)	3-1/4 (83)	2 (51)
	1	21, 22, 23, 24, 25, 28	2-3/4 (70)	7 (178)	9-13/16 (249)	3-1/4 (83)	2-1/8 (54)
		27, 30	4-1/4 (108)	7-3/8 (187)	11-5/8 (295)	3-5/8 (92)	3-1/16 (78)
		26, 29, 31	4-1/4 (108)	7-1/2 (191)	11-1/2 (292)	3-1/2 (89)	3-1/8 (79)
	1-1/4	45	3 (76)	7 (178)	10-5/8 (270)	3-5/8 (92)	2-3/8 (60)
		41, 43, 44, 46	3-5/8 (92)	7-1/8 (181)	10-7/8 (276)	3-1/2 (89)	2-3/4 (70)
	1-1/2	51, 52, 53, 55	3-5/8 (92)	7-1/8 (181)	10-7/8 (276)	3-5/8 (92)	2-3/4 (70)
		54	4 (102)	7-1/4 (184)	11-3/4 (298)	4 (102)	3-1/4 (83)
		56	4 (102)	7-3/4 (197)	11-3/4 (298)	4 (102)	3-1/4 (83)
	2	61, 63	3-15/16 (100)	7-1/4 (184)	11-3/4 (298)	3-7/8 (98)	3-1/16 (78)
		62, 64	4-7/8 (124)	7-3/4 (197)	12-11/16 (322)	4-1/2 (114)	3-7/8 (98)

a) To find the corresponding flow coefficients for these port codes, refer to "3-Way Ball Valve Assemblies with SmartX Actuators" on page 7 of this section .

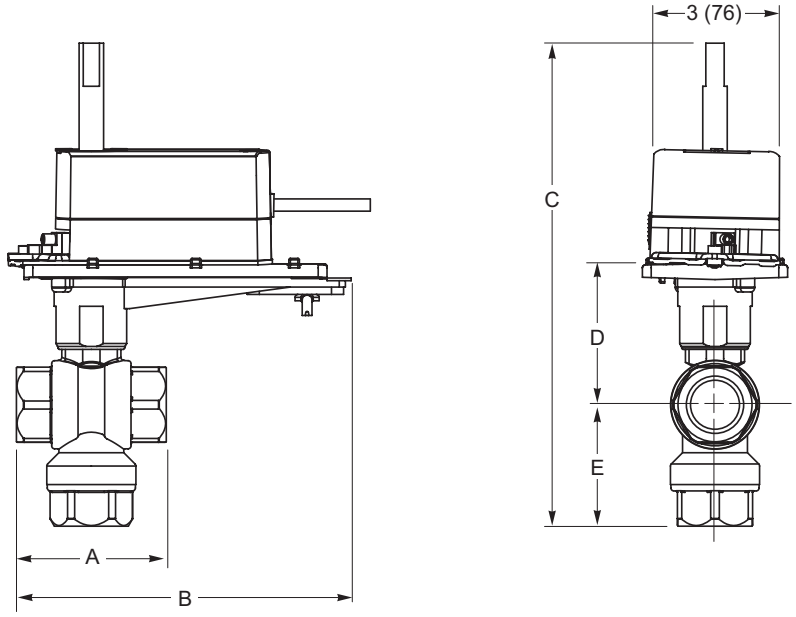


Figure 2. Mx41-6043 or Mx41-6083 with 3-Way Ball Valve.

VB-2xxx Assembly Actuator Specs and Mounting Dimensions

Table-11. Actuator Specifications

Inputs							
	Part Number	Control Signal	Voltage	Actuator Power Input			
				Running			Holding
				50/60 Hz		DC Amps	50/60 Hz
				VA	W		W
Control Signal and Power Requirements	MF4D-6083-100	Floating	24 Vac ±20% or 20 to 30 Vdc	5.9	3.6	0.13	1.6
	MS4D-6083-100	2 to 10 Vdc Proportional		5.2	2.7	0.10	1.4
	MS4D-6083-120	0 to 3 Vdc Proportional					
	MS4D-6083-130	6 to 9 Vdc Proportional					
	MS4D-6083-150	0 to 10 Vdc Proportional					
	MS4D-6083-160	4 to 20 mAdc Proportional					
Connections	Mx4D-6083-1x0: 10 ft. (3.05 m) long, plenum cable, 1/2 in. (13 mm) conduit connector. For M20 Metric conduit, use AM-756 adaptor.						
Motor Type	Brush DC						
Outputs							
Electrical	Timing: Approx. 85 sec. at 70 °F (21 °C), measured with no load applied to actuator.						
	Position Feedback Voltage: For 0 to 3 Vdc, 6 to 9 Vdc, 0 to 10 Vdc, and 2 to 10 Vdc proportional actuators, the feedback signal is the same voltage range as the input signal. The 4 to 20 mA proportional actuators and floating actuators have a 2 to 10 Vdc feedback signal. The feedback signal can supply up to 0.5 mA to operate up to four additional slave actuators.						
Mechanical	Stroke: 93° nominal.						
	Manual override: Allows positioning of valve shaft, using a manual crank..						
	Output torque rating: 70 lb-in (8 N-m).						
	RA/DA Jumper (Proportional Models): Permits selection of reverse acting or direct acting control.						
	Position indicator: Visual indicator.						
Environment							
Temperature Limits	Shipping and storage: -40 to 158 °F (-40 to 70 °C) ambient. Operating: -22 to 140 °F (-30 to 60 °C) ambient. NOTE: Check the valve operating temperature limit. The minimum valve temperature limit is 20 °F (6.7 °C)						
Humidity	15 to 95% RH, non-condensing.						
Locations	NEMA 1. NEMA 2, UL Type 2 (IEC IP54) with customer-supplied watertight conduit connectors. Enclosure is air plenum rated.						
Agency Listings (Actuator)							
UL	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment). Plenum rated..						
cUL	Canadian Standards C22.2 No. 24-93.						
European Community	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). This product fits into Installation Category (Over-voltage Category) II per EN 61010-1.						
Australia	This product meets requirements to bear the RCM Mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992.						

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Table-12. 2-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code[a]	Valve Dimensions in inches (millimeters) Refer to Figure 3			
			A	B	C	D
2-Way VF-22x3-841-9-P VS-22x3-841-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	8-1/4 (210)	8-1/4 (210)	3-1/8 (79)
		6	2-5/8 (67)	8-1/4 (210)	8-1/2 (216)	3-3/8 (86)
	3/4	11, 12, 13, 14, 15, 17	2-7/16 (62)	8-1/4 (210)	8-1/4 (210)	3-1/4 (83)
		16, 18	2-3/4 (70)	8-1/4 (210)	8-1/2 (216)	3-3/8 (86)
	1	21, 23	3-1/16 (78)	8-1/4 (210)	8-7/8 (225)	3-5/8 (92)
		22, 25	2-3/4 (70)	8-1/4 (210)	8-1/2 (216)	3-3/8 (86)
		24, 26	4-1/2 (114)	8-7/8 (225)	9-3/8 (238)	3-7/8 (98)
		27	3 (76)	8-1/4 (210)	8-7/8 (225)	3-5/8 (92)
	1-1/4	41, 42, 43, 45	3 (76)	8-1/4 (210)	8-7/8 (225)	3-5/8 (92)
		44, 46	3-5/8 (92)	8-5/8 (219)	9-3/8 (238)	3-3/4 (95)
	1-1/2	51, 53	3-7/16 (87)	8-5/8 (219)	9-3/8 (238)	3-3/4 (95)
		52, 54	4-1/16 (103)	8-3/4 (222)	9-7/8 (251)	4-1/16 (103)
	2	61, 65	3-15/16 (100)	8-3/4 (222)	9-7/8 (251)	4 (102)
		63, 66, 67	4-15/16 (125)	9-1/4 (235)	10-1/2 (267)	4-7/16 (113)
	2-1/2	71, 72, 76, 73, 74, 75	5-3/8 (137)	9-1/2 (241)	10-3/4 (273)	4-1/2 (114)
	3	82, 85	5-11/16 (144)	9-5/8 (244)	10-11/16 (271)	4-1/4 (108)

a) To find the corresponding flow coefficients for these port codes, refer to "2-Way Ball Valve Assemblies with SmartX Actuators" on page 6 of this section.

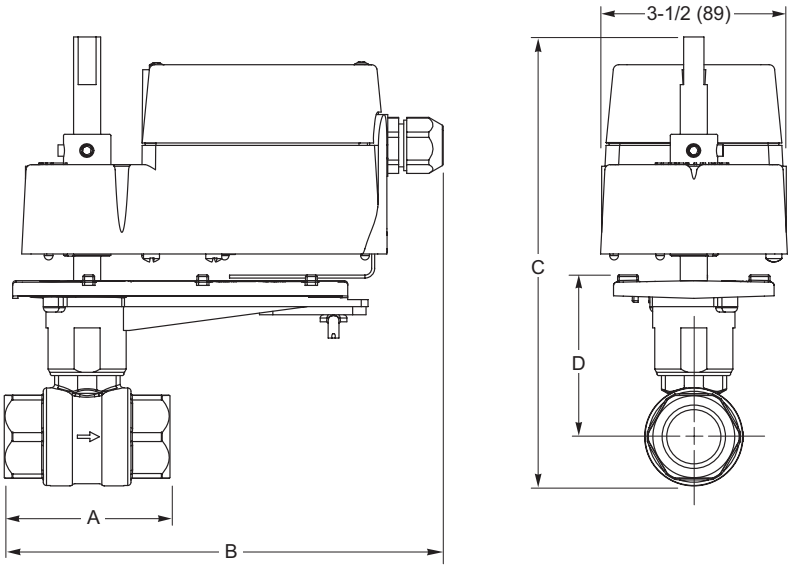


Figure 3. MF4D-6083-100, MS4D-6083-100 with 2-Way Ball Valve.

VB-2xxx Ball Valve Assembly Actuator Specs and Mounting Dimensions

Table-13. 3-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code[a]	Valve Dimensions in inches (millimeters) Refer to Figure 4				
			A	B	C	D	E
3-Way VF-2313-841-9-P VS-2313-841-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	8-1/2 (216)	9-3/4 (248)	3-5/16 (84)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-3/4 (70)	8-1/2 (216)	9-3/4 (248)	3-1/4 (83)	2 (51)
	1	21, 22, 23, 24, 25, 28	2-3/4 (70)	8-1/2 (216)	9-13/16 (249)	3-1/4 (83)	2-1/8 (54)
		27, 30	4-1/4 (108)	8-7/8 (225)	11-5/8 (295)	3-5/8 (92)	3-1/16 (78)
		26, 29, 31	4-1/4 (108)	9 (229)	11-1/2 (292)	3-1/2 (89)	3-1/8 (79)
	1-1/4	45	3 (76)	8-1/2 (216)	10-5/8 (270)	3-5/8 (92)	2-3/8 (60)
		41, 43, 44, 46	3-5/8 (92)	8-5/8 (219)	10-7/8 (276)	3-1/2 (89)	2-3/4 (70)
	1-1/2	51, 52, 53, 55	3-5/8 (92)	8-5/8 (219)	10-7/8 (276)	3-5/8 (92)	2-3/4 (70)
		54	4 (102)	8-3/4 (222)	11-3/4 (298)	4 (102)	3-1/4 (83)
		56	4 (102)	9-1/4 (235)	11-3/4 (298)	4 (102)	3-1/4 (83)
	2	61, 63	3-15/16 (100)	8-3/4 (222)	11-3/4 (298)	3-7/8 (98)	3-1/16 (78)
		62, 64	4-7/8 (124)	9-1/4 (235)	12-11/16 (322)	4-1/2 (114)	3-7/8 (98)

a) To find the corresponding flow coefficients for these port codes, refer to "3-Way Ball Valve Assemblies with SmartX Actuators" on page 7 of this section .

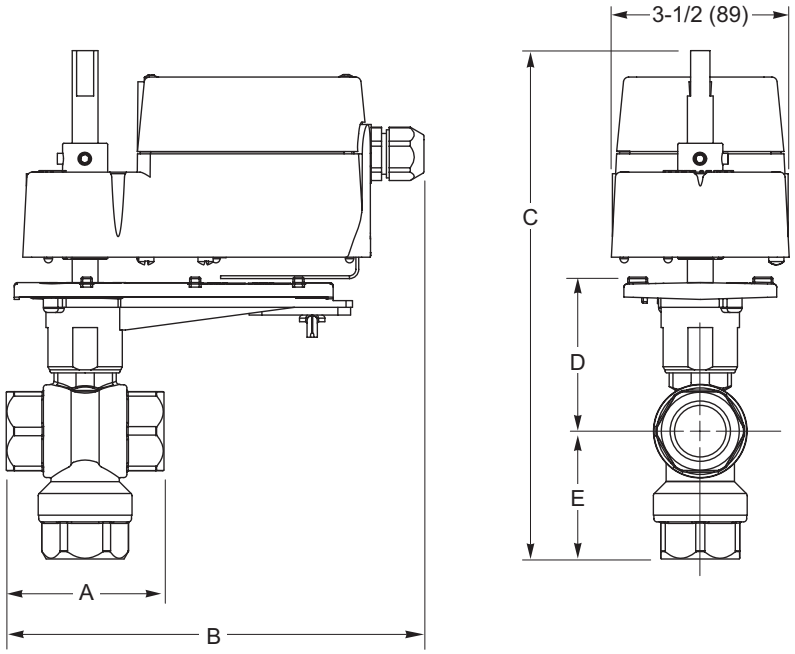


Figure 4. MF4D-6083-100, MS4D-6083-100 with 3-Way Ball Valve.

Table-14. Actuator Specifications

Inputs									
Control Signal	MA40-704x: ON/OFF SPST control contacts or Triacs (500 mA rated). MS40-7043: Proportional, 2 to 10Vdc or 4 to 20 mAdc with 500 ohm resistor. MS40-7043 MP/MP5: Proportional 6 to 9 Vdc. MF40-7043: Floating point control, 24 Vac.								
Power Requirements	All 24 Vac circuits are Class 2								
	Part Number	Voltage 50/60 Hz	Voltage Vdc	Running				Holding	
				50 Hz		60 Hz		50 Hz	60 Hz
				VA	W	VA	W	W	W
	MA40-7043	24 Vac ± 20%	22 to 30	4.4	2.9	4.4	2.9	0.8	0.8
	MS40-7043			5.6	4.2	5.6	4.2	2.4	2.4
	MF40-7043			5.9	4.4	5.9	4.4	2.9	2.9
	MS40-7043-MP			6.9	5.0	6.6	5.0	3.2	3.2
	MS40-7043-MP5								
	MA40-7040	120 Vac ± 10%	—	6.4	3.8	4.3	3.4	1.6	1.2
Connections	MA40-704x and MA40-704x-501: 3 ft. (0.9 m) long, appliance cable, 1/2 in. conduit connector. For M20 Metric conduit, use AM-756 adaptor. MF40-7043 and MF40-7043-501, MS40-7043 and MS40-7043-501: 3 ft. (0.9 m) long, plenum rated cable, 1/2 in. conduit connector. For M20 Metric conduit, use AM-756 adaptor..								
Motor Type	MA40-704x: Brush DC. MF40-7043, MS40-7043: Brushless DC.								
Outputs									
Electrical	Auxiliary Switches: Available when actuators are ordered as separate units. Auxiliary switches are not offered with factory ball valve assemblies.								
	Mx40-7043-501 and MS40-7043-MP5: One auxiliary switch available. SPDT 6 A resistive @ 24 Vac, adjustable 0 to 95° (0 to 1 scale). Switch meets VDE requirements for 6 (1.5) A, 24 Vac.			MA40-7040-501: One auxiliary switch available. SPDT 6 A resistive @ 250 Vac, adjustable 0 to 95° (0 to 1 scale). Switch meets VDE requirements for 6 (1.5) A, 250 Vac.					
	Position Feedback Voltage: For 2 to 10 Vdc proportional actuators, the feedback signal is the same voltage range as the input signal. The feedback signal can supply up to 0.5 mA to operate up to four additional slave actuators. Control Mode: Switch provided for selection of direct acting or reverse acting control mode on proportional models. Timing: MA-704x — Approx. 50 sec.; MF- and MS-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 scale numbered from 0 to 90°, provided for position indication.								
Environment									
Temperature Limits	Shipping and storage: -40 to 160 °F (-40 to 71 °C) ambient. Operating: -22 to 140 °F (-30 to 60 °C) ambient. NOTE: Check the valve operating temperature limit. The minimum valve temperature limit is 20 °F (6.7 °C)								
Humidity	5 to 95% RH, non-condensing.								
Locations	NEMA 2, UL Type 2 (IEC IP54)								
Agency Listings (Actuator)									
UL	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment).								
cUL	Canadian Standards C22.2 No. 24-93.								
European Community	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).								
Australia	This product meets requirements to bear the RCM Mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992.								

VB-2xxx Assembly Actuator Specs and Mounting Dimensions

Table-15. 2-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code[a]	Valve Dimensions in inches (millimeters) Refer to Figure 5			
			A	B	C	D
2-Way VA-22x3-522-9-P VA-22x3-526-9-P VA-22x3-532-9-P VA-22x3-536-9-P VF-22x3-526-9-P VF-22x3-536-9-P VS-22x3-526-9-P VS-22x3-536-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	7-3/8 (187)	8-1/4 (210)	3-1/8 (79)
		6	2-5/8 (67)	7-3/8 (187)	8-1/2 (216)	3-3/8 (86)
	3/4	11, 12, 13, 14, 15, 17	2-7/16 (62)	7-3/8 (187)	8-1/4 (210)	3-1/4 (83)
		16, 18	2-3/4 (70)	7-3/8 (187)	8-1/2 (216)	3-3/8 (86)
	1	21, 23	3-1/16 (78)	7-3/8 (187)	8-7/8 (225)	3-5/8 (92)
		22, 25	2-3/4 (70)	7-3/8 (187)	8-1/2 (216)	3-3/8 (86)
		24, 26	4-1/2 (114)	8 (203)	9-3/8 (238)	3-7/8 (98)
		27	3 (76)	7-3/8 (187)	8-7/8 (225)	3-5/8 (92)
	1-1/4	41, 42, 43, 45	3 (76)	7-3/8 (187)	8-7/8 (225)	3-5/8 (92)
		44, 46	3-5/8 (92)	7-3/4 (197)	9-3/8 (238)	3-3/4 (95)
	1-1/2	51, 53	3-7/16 (87)	7-3/4 (197)	9-3/8 (238)	3-3/4 (95)
		52, 54	4-1/16 (103)	7-7/8 (200)	9-7/8 (251)	4-1/16 (103)
	2	61, 65	3-15/16 (100)	7-7/8 (200)	9-7/8 (251)	4 (102)
		63, 66, 67	4-15/16 (125)	8-3/8 (123)	10-1/2 (267)	4-7/16 (113)
	2-1/2	71, 72, 76, 73, 74, 75	5-3/8 (137)	8-5/8 (219)	10-3/4 (273)	4-1/2 (114)
	3	82, 85	5-11/16 (144)	8-3/4 (222)	10-11/16 (271)	4-1/4 (108)

a) To find the corresponding flow coefficients for these port codes, refer to “2-Way Ball Valve Assemblies with SmartX Actuators” on page 6 of this se

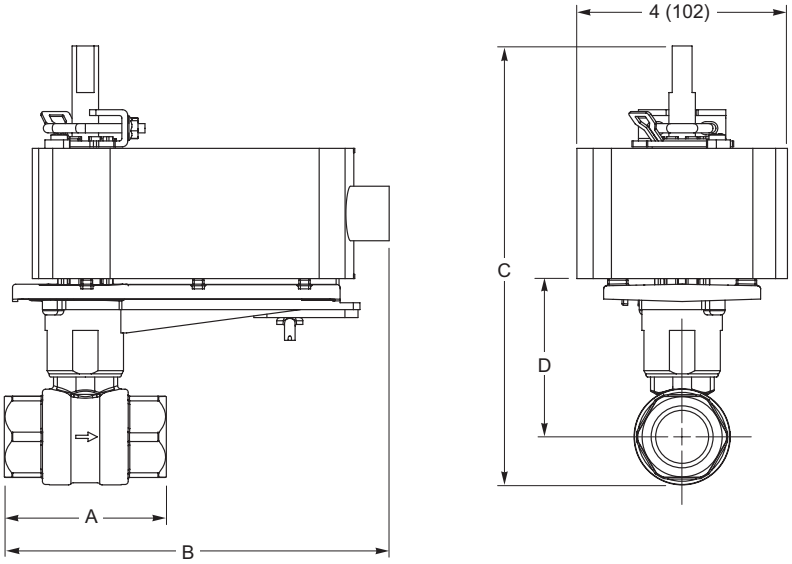


Figure 5. Mx40-704x with 2-Way Ball Valve.

Table-16. 3-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code[a]	Valve Dimensions in inches (millimeters) Refer to Figure 6				
			A	B	C	D	E
3-Way VA-2313-526-9-P VA-2313-536-9-P VF-2313-526-9-P VF-2313-536-9-P VS-2313-526-9-P VS-2313-536-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	7-3/8 (187)	9-3/4 (248)	3-5/16 (84)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-3/4 (70)	7-3/8 (187)	9-3/4 (248)	3-1/4 (83)	2 (51)
	1	21, 22, 23, 24, 25, 28	2-3/4 (70)	7-3/8 (187)	9-13/16 (249)	3-1/4 (83)	2-1/8 (54)
		27, 30	4-1/4 (108)	8 (203)	11-5/8 (295)	3-5/8 (92)	3-1/16 (78)
		26, 29, 31	4-1/4 (108)	8-1/8 (206)	11-1/2 (292)	3-1/2 (89)	3-1/8 (79)
	1-1/4	45	3 (76)	7-3/8 (187)	10-5/8 (270)	3-5/8 (92)	2-3/8 (60)
		41, 43, 44, 46	3-5/8 (92)	7-3/4 (197)	10-7/8 (276)	3-1/2 (89)	2-3/4 (70)
	1-1/2	51, 52, 53, 55	3-5/8 (92)	7-3/4 (197)	10-7/8 (276)	3-5/8 (92)	2-3/4 (70)
		54	4 (102)	7-7/8 (200)	11-3/4 (298)	4 (102)	3-1/4 (83)
		56	4 (102)	8-3/8 (213)	11-3/4 (298)	4 (102)	3-1/4 (83)
	2	61, 63	3-15/16 (100)	7-7/8 (200)	11-3/4 (298)	3-7/8 (98)	3-1/16 (78)
		62, 64	4-7/8 (124)	8-3/8 (213)	12-11/16 (322)	4-1/2 (114)	3-7/8 (98)

a) To find the corresponding flow coefficients for these port codes, refer to “3-Way Ball Valve Assemblies with SmartX Actuators” on page 7of this section .

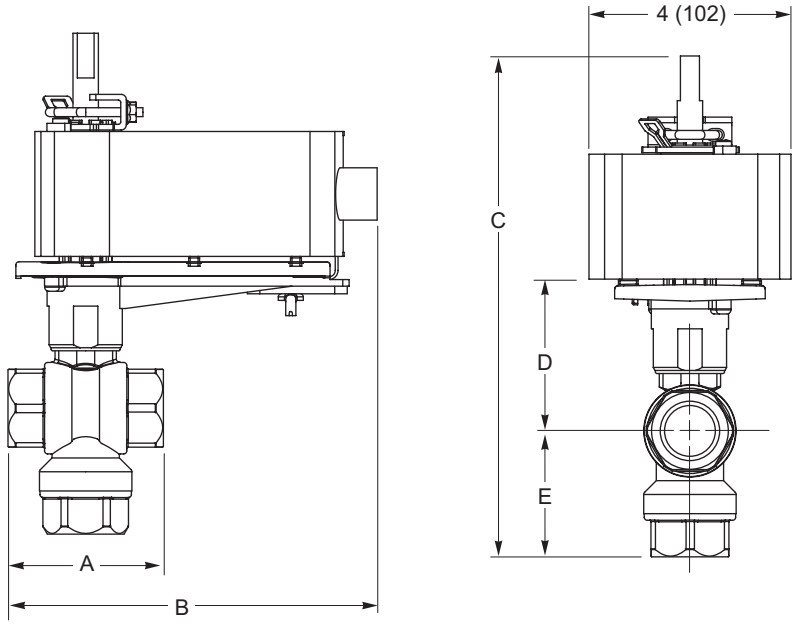


Figure 6. Mx40-704x with 3-Way Ball Valve.

Table-17. Actuator Specifications

<table>
<tr><td colspan="8">Inputs</td></tr>
<tr><td rowspan="11">Control Signal and Power Requirements</td><td rowspan="3">Part Number for Mx4D-703x-xxx Mx4D-803x-xxx</td><td rowspan="3">Control Signal</td><td rowspan="3">Voltage</td><td colspan="4">Actuator Power Input</td></tr>
<tr><td colspan="3">Running</td><td>Holding</td></tr>
<tr><td colspan="2">50/60 Hz</td><td rowspan="2">DC Amps</td><td>50/60 Hz</td></tr>
<tr><td>VA</td><td>W</td><td>W</td></tr>
<tr><td>MA4D-x033-100</td><td>2-position</td><td rowspan="8">24 Vac ±20%
or
20 to 30 Vdc</td><td>5.1</td><td>3.6</td><td>0.14</td><td>1.3</td></tr>
<tr><td>MF4D-x033-100</td><td>Floating</td><td>6.8</td><td>4.2</td><td>0.15</td><td>1.9</td></tr>
<tr><td>MS4D-x033-100</td><td>2 to 10 Vdc[a] Proportional</td><td rowspan="6">6.1</td><td rowspan="6">3.4</td><td rowspan="6">0.12</td><td rowspan="6">1.4</td></tr>
<tr><td>MS4D-x033-120</td><td>0 to 3 Vdc Proportional</td></tr>
<tr><td>MS4D-x033-130</td><td>6 to 9 Vdc Proportional</td></tr>
<tr><td>MS4D-x033-150</td><td>0 to 10 Vdc Proportional</td></tr>
<tr><td>MS4D-x033-160</td><td>4 to 20 mAdc Proportional</td></tr>
<tr><td colspan="7">a. 4 to 20 mAdc with field-installed 500 W resistor.</td></tr>
<tr><td>Connections</td><td colspan="7">Mx4D-703x-1x0 and Mx4D-803x-1x0: 10 ft. (3.05 m) long, plenum cable, 1/2 in. (13 mm) conduit connector. For M20 Metric conduit, use AM-756 adaptor.</td></tr>
<tr><td>Motor Type</td><td colspan="7">Brush DC</td></tr>
<tr><td colspan="8">Outputs</td></tr>
<tr><td rowspan="5">Electrical</td><td colspan="7">Timing:
<table><tr><td>Part Number</td><td colspan="3">Approximate Timing in Sec. @ 70 °F (21 °C)[a]</td></tr><tr><td></td><td>Powered</td><td colspan="2">Spring Return</td></tr><tr><td></td><td></td><td>CCW[b]</td><td>CW[b]</td></tr><tr><td>MA4D-7033-100</td><td>56</td><td>26</td><td>—</td></tr><tr><td>MF4D-7033-100</td><td rowspan="2">85</td><td rowspan="2">21</td><td rowspan="2">—</td></tr><tr><td>MS4D-7033-100</td></tr><tr><td>MA4D-8033-100</td><td>56</td><td>—</td><td>26</td></tr><tr><td>MF4D-8033-100</td><td rowspan="2">85</td><td rowspan="2">—</td><td rowspan="2">21</td></tr><tr><td>MS4D-8033-1x0</td></tr></table>a. Timing was measured with no load applied to actuator.
b. CCW or CW as viewed from cover side of actuator.</td></tr>
<tr><td colspan="7">Position Feedback Voltage: For 0 to 3 Vdc, 0 to 9 Vdc, 2 to 10Vdc, and 0 to 10 Vdc proportional actuators, the feedback signal is the same voltage range as the input signal. The 4 to 20 mA proportional actuators and floating actuators have a 2 to 10 Vdc feedback signal. The feedback signal can supply up to 0.5 mA to operate up to four additional slave actuators.</td></tr>
<tr><td rowspan="3">Mechanical</td><td colspan="7">Stroke: 93° nominal.</td></tr>
<tr><td colspan="7">Manual override: Allows positioning of valve shaft, using a manual crank..</td></tr>
<tr><td colspan="7">Output torque rating: 30 lb-in (3.4 N-m).</td></tr>
</table>

Assemblies with Mx4D-7033/8033 SR SmartX Actuators

Continued

		Inputs
		RA/DA Jumper (Proportional Models): Permits selection of reverse acting or direct acting control.
		Position indicator: Visual indicator.
	Environment	
	Temperature Limits	Shipping and storage: -40 to 160 °F (-40 to 71 °C) ambient. Operating: -22 to 140 °F (-30 to 60 °C) ambient. NOTE: Check the valve operating temperature limit. The minimum valve temperature limit is 20 °F (6.7 °C)
	Humidity	15 to 95% RH, non-condensing.
	Locations	NEMA 1. NEMA 2, UL Type 2 (IEC IP54) with customer-supplied watertight conduit connectors. Enclosure is air plenum rated.
	Agency Listings (Actuator)	
	UL	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment). Plenum rated..
	cUL	Canadian Standards C22.2 No. 24-93.
	European Community	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). This product fits into Installation Category (Overvoltage Category) II per EN 61010-1.
	Australia	This product meets requirements to bear the RCM Mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992.

VB-2xxx 2-Way Assembly Dimesions with Mx4D-7033/8033 SR Actuators

Table-18. 2-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code[a]	Valve Dimensions in inches (millimeters) Refer to Figure 7			
			A	B	C	D
2-Way VA-22x3-815-9-P VA-22x3-817-9-P VA-22x3-821-9-P VA-22x3-831-9-P VF-22x3-821-9-P VF-22x3-831-9-P VS-22x3-821-9-P VS-22x3-831-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	8-1/4 (210)	8-1/4 (210)	3-1/8 (79)
		6	2-5/8 (67)	8-1/4 (210)	8-1/2 (216)	3-3/8 (86)
	3/4	11, 12, 13, 14, 15, 17	2-7/16 (62)	8-1/4 (210)	8-1/4 (210)	3-1/4 (83)
		16, 18	2-3/4 (70)	8-1/4 (210)	8-1/2 (216)	3-3/8 (86)
	1	21, 23	3-1/16 (78)	8-1/4 (210)	8-7/8 (225)	3-5/8 (92)
		22, 25	2-3/4 (70)	8-1/4 (210)	8-1/2 (216)	3-3/8 (86)
		24, 26	4-1/2 (114)	8-7/8 (225)	9-3/8 (238)	3-7/8 (98)
		27	3 (76)	8-1/4 (210)	8-7/8 (225)	3-5/8 (92)

a) To find the corresponding flow coefficients for these port codes, refer to “2-Way Ball Valve Assemblies with SmartX Actuators” on page 6 of this section .

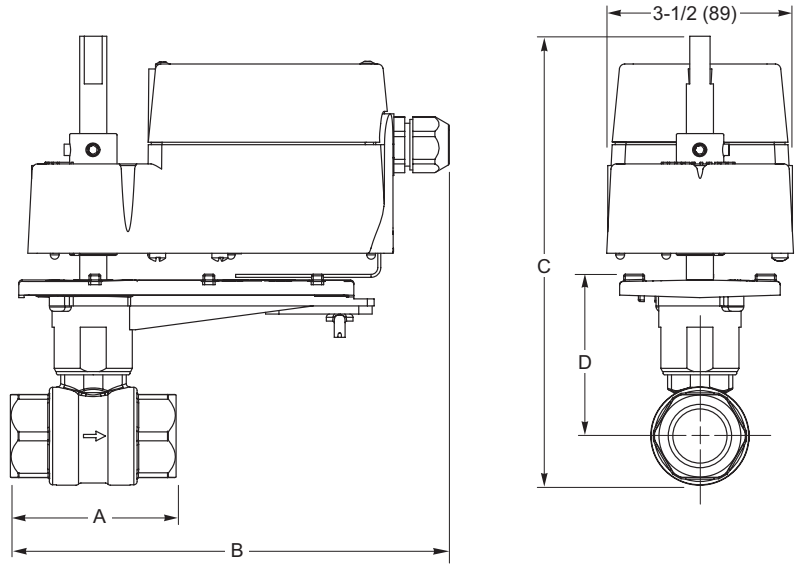


Figure 7. MA4D-7033, MF4D-7033, MS4D-7033, MA4D-8033, MF4D-8033, or MS4D-8033 with 2-Way Ball Valve.

VB-2xxx 3-Way Assembly Dimensions Mx4D-7033/8033 SR Actuators

Table-19. 3-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code[a]	Valve Dimensions in inches (millimeters) Refer to Figure 8				
			A	B	C	D	E
3-Way VA-2313-815-9-P VA-2313-817-9-P VA-2313-821-9-P VA-2313-831-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	8-1/2 (216)	9-3/4 (248)	3-5/16 (84)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-3/4 (70)	8-1/2 (216)	9-3/4 (248)	3-1/4 (83)	2 (51)
	1	21, 22, 23, 24, 25, 28	2-3/4 (70)	8-1/2 (216)	9-13/16 (249)	3-1/4 (83)	2-1/8 (54)
VF-2313-821-9-P VF-2313-831-9-P		27, 30	4-1/4 (108)	8-7/8 (225)	11-5/8 (295)	3-5/8 (92)	3-1/16 (78)
VS-2313-821-9-P VS-2313-831-9-P		26, 29, 31	4-1/4 (108)	9 (229)	11-1/2 (292)	3-1/2 (89)	3-1/8 (79)

a) To find the corresponding flow coefficients for these port codes, refer to “3-Way Ball Valve Assemblies with SmartX Actuators” on page 7of this section .

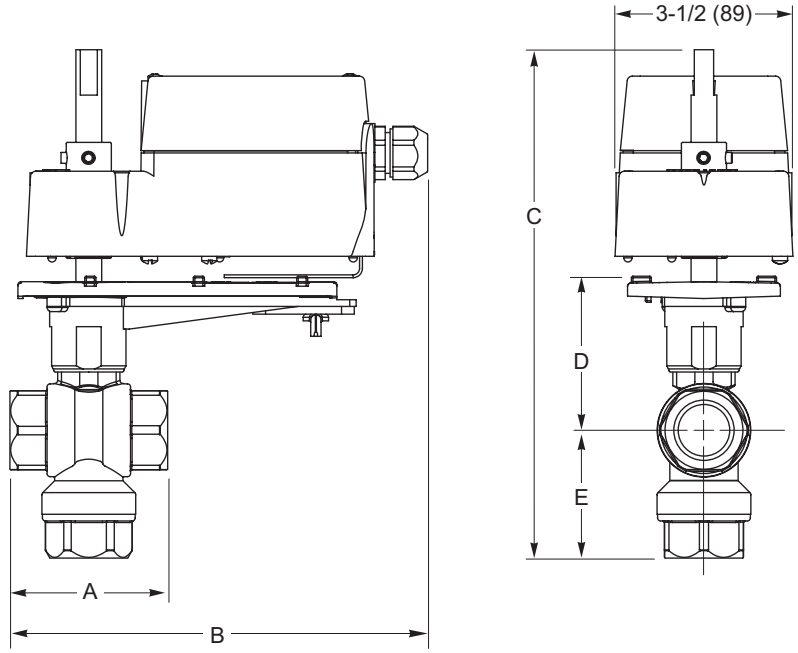


Figure 8. MA4D-7033, MF4D-7033, MS4D-7033, MA4D-8033, MF4D-8033, or MS4D-8033 with 3-Way Ball Valve.

Mounting Angle of Valve Assembly

Be sure to allow the necessary clearance around the valve assembly. The valve assembly must be mounted so that the actuator is horizontally even with, or above, the valve. This ensures that any condensate that forms on the valve body will not travel into the actuator, where it may cause corrosion or electrical malfunction. See Vx-2x13-5xx-9-xx Series Ball Valve Assembly Installation Instructions, F-27087 or Mx4D-xxxxSeries SmartX Rotary Overshaft Actuators General Instructions, F-27170.

Piping

Figure 9 and Figure 10 illustrate 2-way and 3-way ball valve assembly piping.

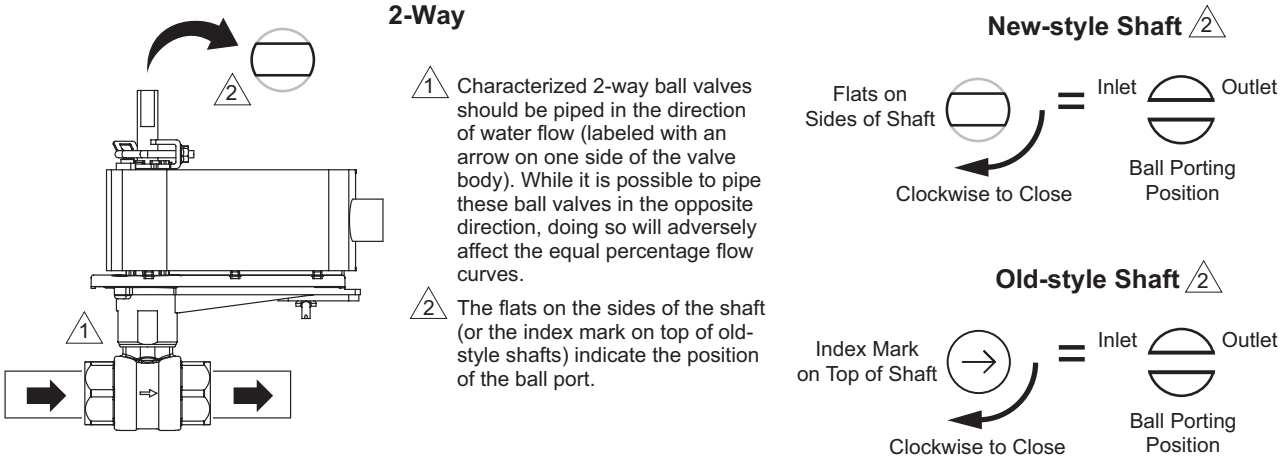


Figure 9. 2-Way Valve Assemblies Piping Diagram.

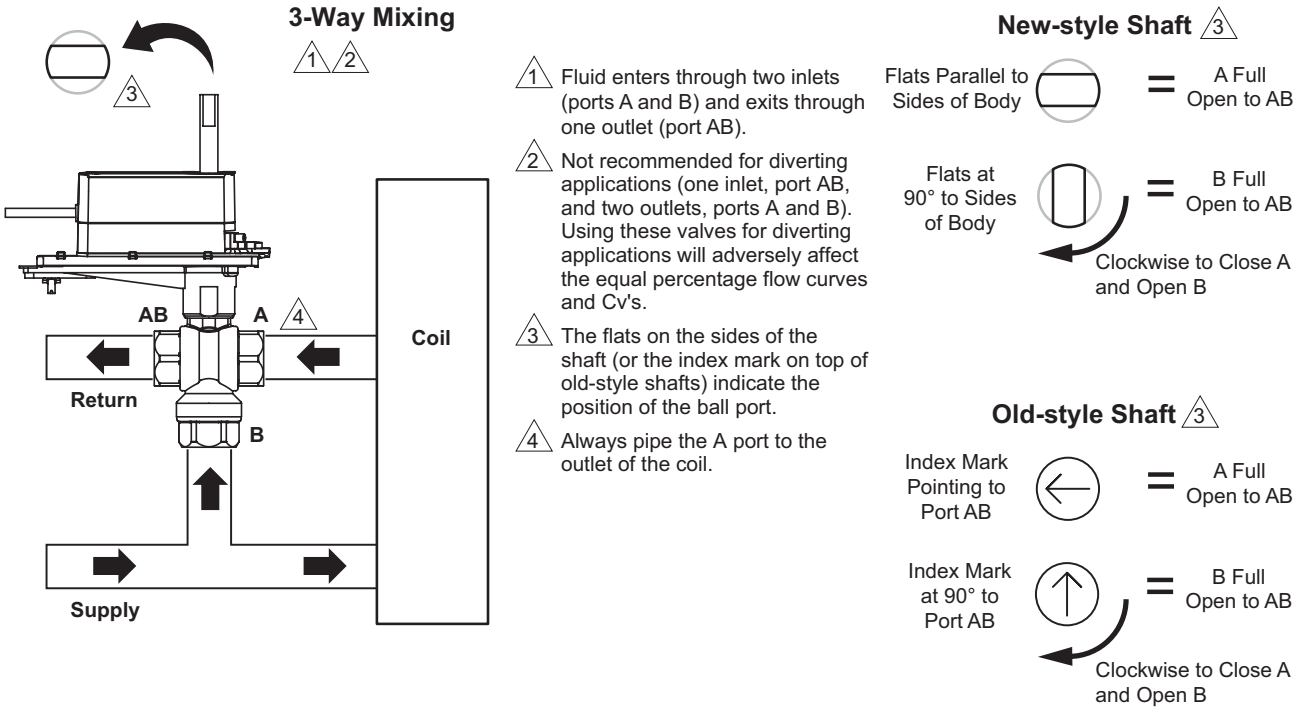


Figure 10. 3-Way Mixing Valve Assemblies Piping Diagram.

Insulation of Ball Valve Assembly

The ball valve should be completely insulated to minimize the effect of heat transfer and condensation at the actuator.

Caution: The actuator itself must not be insulated. Doing so can result in excess heat or condensation within the actuator.

Temperature Limits for Ball Valve Assembly

When installing the ball valve assembly, observe the minimum and maximum temperature limits. Refer to the valve and actuator specifications on page 8, page 13, page 16, page 19, and page 22 of this section.

Water System Maintenance

All heating and cooling systems are susceptible to valve and system problems caused by improper water treatment and system storage procedures. Durability of valve stems and packings is dependent on maintaining non-damaging water conditions. Inadequate water treatment or filtration, not in accordance with chemical supplier or ASHRAE handbook recommendations, can result in corrosion, scale, and abrasive particle formation. Scale and particulates can cause scratches in the stem and packing, and can adversely affect packing life and other parts of the hydronic system. Consult EN-205, Water System Guidelines Engineering Information, F-26080, for further details.

Sizing and Selection

Flow Coefficient (Cv)

When sizing a valve, you must select 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 this formula:

$Cv = \frac{gpm}{\sqrt{\Delta P}}$ where ΔP is measured in psi.

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 in this section can be used to determine what pressure drop to use in calculating a valve Cv. Once you have calculated the Cv, consult Table-1 and Table-2 to select the valve body having the nearest available Cv.

NOTE: Metric equivalent

The metric measure of flow coefficient is kvs, which is calculated according to the formula: $kvs = \frac{m^3/h}{\sqrt{\Delta P}}$ (where ΔP is measured in bar; 1 bar = 100 kPa).

If the Cv is already known, it may be converted directly to its kvs equivalent: $kvs = \frac{Cv}{1.156}$

Two-position Control

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.

Flow Characterization: Proportional/Floating Control

The Vx-2x13-xxx-9-xx series ball valve assemblies provide equal percentage flow, which is achieved with a flow characterizing insert (Figure-11). The parabolic shape of the orifice allows a gradual change in flow, so that equal movements of the valve stem, at any point of the flow range, change the existing flow an equal percentage, regardless of the flow rate. As shown in the graph in Figure-12, a ball valve equipped with the flow insert mirrors the flow characteristic of the coil, resulting in linear heat transfer.

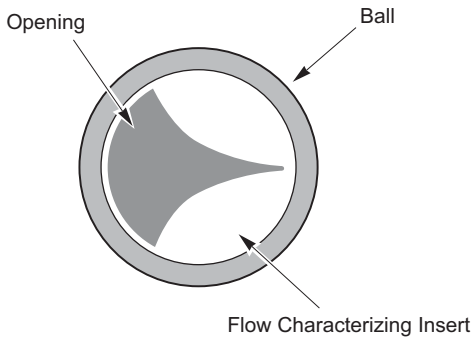


Figure 11. Flow Characterizing Insert.

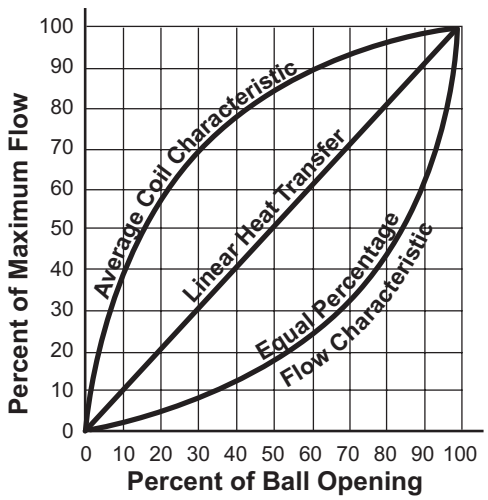


Figure 12. Equal Percentage Flow Control.

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.

Table-20. Conventional Heating System.

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 the booster pump head).

3-Way Mixing Valves

3-way mixing valves used in variable flow applications (Figure 10) should be sized using the preceding guidelines. 3-way mixing valves used in constant flow applications, such as boiler bypass, should be sized to use 20% of “available pressure,” or equal to 25% of the pressure drop through the load at full flow.

Cavitation Limitations on Valve Pressure Drop

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

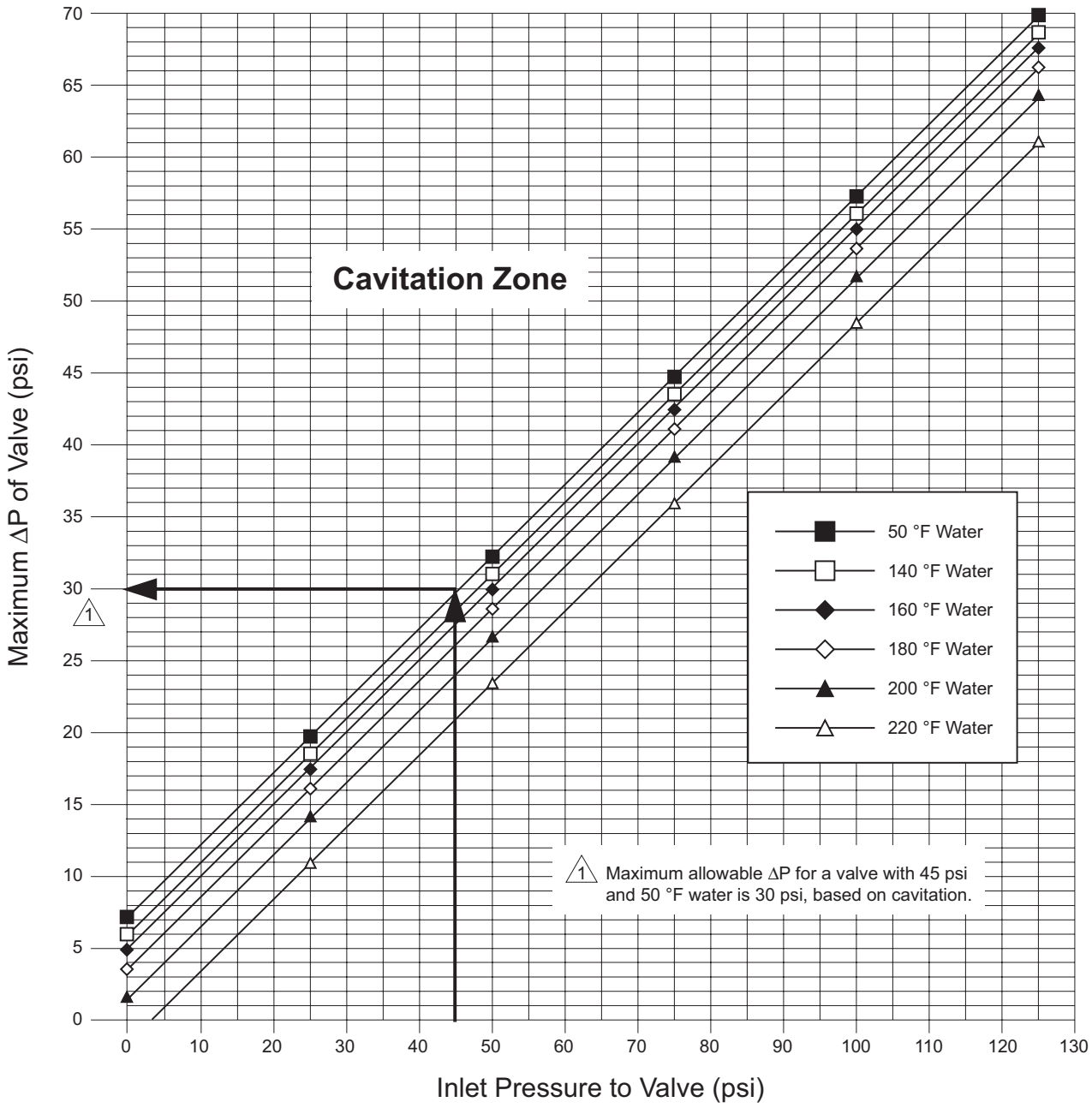


Figure 13. Maximum Allowable Differential Pressure (ΔP) for Water Valves.

Using Pipe Reducers with 2-Way Ball Valve Assemblies

The following table provides estimated effective Cvs when using a 2-way valve assembly on the same or lager pipe size. Use these estimated effective Cvs in place of the rated Cvs along with at least 6 valve size diameters of straight pipe upstream and 3 valve size diameters of straight pipe downstream of the valve body.

WARNING: Do not reduce the valve size to less than one-half the line size, as this may weaken the pipe reduction area. Physical injury can result if the weakened piping fails.

Table-21. Estimated Effective Cv when Using Pipe Reducers with 2-Way Ball Valve Assemblies.

Valve Size in.	P Code	C_v	Estimated Effective Cv (Kvs)									
			Pipe Size - inches (NPT)									
			1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5
1/2	01	0.38	0.38 (0.33)	0.38 (0.33)	0.38 (0.33)	—	—	—	—	—	—	—
	02	0.68	0.68 (0.59)	0.68 (0.59)	0.68 (0.59)	—	—	—	—	—	—	—
	03	1.3	1.3 (1.12)	1.3 (1.12)	1.3 (1.12)	—	—	—	—	—	—	—
	04	2.6	2.6 (2.24)	2.5 (2.16)	2.5 (2.16)	—	—	—	—	—	—	—
	05	4.7	4.7 (4.06)	4.3 (3.71)	4.1 (3.54)	—	—	—	—	—	—	—
	06	8.0	8.0 (6.9)	6.5 (5.6)	5.7 (4.9)	—	—	—	—	—	—	—
	07	11.7[a]	11.7 (10.1)	7.9 (6.8)	6.7 (5.8)	—	—	—	—	—	—	—
3/4	11	0.31	—	0.31 (0.27)	0.31 (0.27)	0.31 (0.27)	0.31 (0.27)	—	—	—	—	—
	12	0.63	—	0.63 (0.54)	0.63 (0.54)	0.63 (0.54)	0.63 (0.54)	—	—	—	—	—
	13	1.2	—	1.2 (1.04)	1.2 (1.04)	1.2 (1.04)	1.2 (1.04)	—	—	—	—	—
	14	2.5	—	2.5 (2.16)	2.5 (2.16)	2.5 (2.16)	2.5 (2.16)	—	—	—	—	—
	15	4.3	—	4.3 (3.71)	4.3 (3.71)	4.2 (3.63)	4.2 (3.63)	—	—	—	—	—
	16	10.1	—	10.1 (8.7)	9.6 (8.3)	9.1 (7.9)	8.8 (7.6)	—	—	—	—	—
	17	14.7[a]	—	14.7 (12.7)	7.1 (6.1)	6.5 (5.6)	6.2 (5.4)	—	—	—	—	—
	18	28.6[a]	—	28.6 (24.7)	21.1 (18.2)	17.1 (14.8)	15.4 (13.3)	—	—	—	—	—
1	21	4.4	—	—	4.4 (3.8)	4.4 (3.8)	4.4 (3.8)	4.4 (3.8)	—	—	—	—
	22	9.0	—	—	9.0 (7.8)	8.9 (7.4)	8.8 (7.6)	8.7 (7.5)	—	—	—	—
	23	15.3	—	—	15.3 (13.2)	14.9 (12.9)	14.4 (12.5)	13.8 (11.9)	—	—	—	—
	24	26.1	—	—	26.1 (22.5)	24.4 (21.1)	22.4 (19.4)	20.3 (17.5)	—	—	—	—
	25	28.4[a]	—	—	28.4 (24.6)	26.2 (22.7)	23.8 (20.6)	21.4 (18.5)	—	—	—	—
	26	43.9[a]	—	—	43.9 (38.0)	36.8 (31.8)	31.0 (26.8)	26.1 (22.6)	—	—	—	—
	27	54.2[a]	—	—	54.2 (46.8)	42.3 (36.6)	34.1 (29.5)	27.9 (24.1)	—	—	—	—

Using Pipe Reducers with 2-Way Ball Valve Assemblies

Estimated Effective Cv con't

Valve Size in.	P Code	C_v	Estimated Effective Cv (Kvs)									
			Pipe Size - inches (NPT)									
			1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5
1-1/4	41	4.4	—	—	—	4.4 (3.8)	4.4 (3.8)	4.4 (3.8)	4.4 (3.8)	—	—	—
	42	8.3	—	—	—	8.3 (7.2)	8.3 (7.2)	8.2 (7.1)	8.2 (7.1)	—	—	—
	43	14.9	—	—	—	14.9 (12.9)	14.8 (12.8)	14.5 (12.5)	14.3 (12.3)	—	—	—
	44	36.5	—	—	—	36.5 (31.6)	35.0 (30.3)	31.5 (27.2)	29.6 (25.6)	—	—	—
	45	41.1[a]	—	—	—	41.1 (35.5)	39.0 (33.7)	34.3 (29.7)	31.9 (27.5)	—	—	—
	46	102.3[a]	—	—	—	102.3 (88.1)	79.1 (68.4)	53.3 (46.1)	45.5 (39.3)	—	—	—
1-1/2	51	22.8	—	—	—	—	22.8 (19.7)	22.4 (19.4)	22.0 (19.0)	21.8 (18.9)	—	—
	52	41.3	—	—	—	—	41.3 (35.7)	39.3 (33.9)	37.2 (32.1)	36.0 (31.1)	—	—
	53	73.9[a]	—	—	—	—	73.9 (63.9)	63.7 (55.1)	55.9 (48.4)	52.0 (45.0)	—	—
	54	171.7[a]	—	—	—	—	171.7 (148.5)	101.2 (87.5)	76.6 (66.3)	67.2 (58.0)	—	—
2	61	41.7	—	—	—	—	—	41.7 (36.1)	41.2 (35.6)	40.6 (35.1)	39.7 (34.3)	—
	63	71.1	—	—	—	—	—	71.1 (61.4)	68.8 (59.5)	65.9 (57.0)	62.4 (53.9)	—
	65	108.0[a]	—	—	—	—	—	108.0 (93.4)	100.3 (86.8)	92.0 (79.6)	83.0 (71.8)	—
	66	210.0	—	—	—	—	—	210.0 (181.7)	165.9 (143.5)	134.6 (116.4)	110.5 (95.6)	—
	67	266.0[a]	—	—	—	—	—	266.0 (229.7)	189.7 (164.1)	146.4 (126.6)	116.7 (100.8)	—
2-1/2	71	45.0	—	—	—	—	—	—	45.0 (38.9)	43.6 (37.7)	42.5 (36.8)	42.0 (36.3)
	72	55.0	—	—	—	—	—	—	55.0 (47.5)	52.5 (45.3)	50.6 (43.7)	49.7 (42.9)
	73	72.3	—	—	—	—	—	—	72.3 (62.5)	66.6 (57.6)	63.0 (54.5)	61.2 (52.9)
	74	101.0	—	—	—	—	—	—	101.0 (87.4)	87.5 (75.7)	79.7 (68.9)	76.2 (65.9)
	75	162.0	—	—	—	—	—	—	162.0 (140.0)	119.0 (102.9)	101.3 (87.6)	94.3 (81.6)
	76	202.0 a	—	—	—	—	—	—	202.0 (174.4)	132.4 (114.5)	109.3 (94.5)	100.6 (87.0)
3	82	63.0	—	—	—	—	—	—	—	63.0 (54.4)	56.7 (49.0)	55.5 (47.9)
	85	145.0[a]	—	—	—	—	—	—	—	145.0 (125.2)	96.8 (83.7)	90.6 (78.4)

a). Denotes a full port valve, without the characterized insert.

Using Pipe Reducers with 3-Way Ball Valve Assemblies

TThe following table provides estimated effective Cvs when using a 3-way valve assembly on the same or lager pipe size. Use these estimated effective Cvs in place of the rated Cvs along with at least 6 valve size diameters of straight pipe upstream and 3 valve size diameters of straight pipe downstream of the valve body.

WARNING: Do not reduce the valve size to less than one-half the line size, as this may weaken the pipe reduction area. Physical injury can result if the weakened piping fails.

Table-22. Estimated Effective Cv when Using Pipe Reducers with 3-Way Ball Valve Assemblies.

Valve Size in.	P Code	Cv	Estimated Effective Cv (kvs)						
			Pipe Size - inches (NPT)						
			1/2	3/4	1	1-1/4	1-1/2	2	2-1/2
1/2	01	0.33	0.33 (0.29)	0.33 (0.29)	0.33 (0.29)	—	—	—	—
	02	0.59	0.59 (0.51)	0.59 (0.51)	0.59 (0.51)	—	—	—	—
	03	1.0	1.0 (0.86)	1.0 (0.86)	1.0 (0.86)	—	—	—	—
	04	2.4	2.4 (2.1)	2.3 (2.0)	2.3 (2.0)	—	—	—	—
	05	4.3	4.3 (3.7)	4.0 (3.5)	3.8 (3.3)	—	—	—	—
	06	8.0[a]	8.0 (6.9)	7.9 (6.8)	5.7 (4.9)	—	—	—	—
3/4	11	0.40	—	0.40 (0.35)	0.40 (0.35)	0.40 (0.35)	0.40 (0.35)	—	—
	12	0.66	—	0.66 (0.57)	0.66 (0.57)	0.66 (0.57)	0.66 (0.57)	—	—
	13	1.3	—	1.3 (1.12)	1.3 (1.12)	1.3 (1.12)	1.3 (1.12)	—	—
	14	2.4	—	2.4 (2.1)	2.4 (2.1)	2.4 (2.1)	2.4 (2.1)	—	—
	15	3.8	—	3.8 (3.3)	3.8 (3.3)	3.74 (3.23)	3.7 (3.2)	—	—
	16	11	—	11 (9.5)	10.4 (9.0)	9.8 (8.5)	9.4 (8.1)	—	—
1	21	0.40	—	—	0.40 (0.35)	0.40 (0.35)	0.40 (0.35)	0.40 (0.35)	—
	22	0.65	—	—	0.65 (0.56)	0.60 (0.52)	0.60 (0.52)	0.60 (0.52)	—
	23	1.3	—	—	1.3 (1.1)	1.3 (1.1)	1.3 (1.1)	1.3 (1.1)	—
	24	2.3	—	—	2.3 (2.0)	2.3 (2.0)	2.3 (2.0)	2.3 (2.0)	—
	25	3.5	—	—	3.5 (3.0)	3.5 (3.0)	3.5 (3.0)	3.5 (3.0)	—
	26	4.5	—	—	4.5 (3.9)	4.5 (3.9)	4.5 (3.9)	4.5 (3.9)	—
	27	8.6	—	—	8.6 (7.4)	8.5 (7.3)	8.4 (7.2)	8.3 (7.2)	—
	28	10.0[a]	—	—	10.0 (8.6)	9.9 (8.6)	9.7 (8.4)	9.6 (8.3)	—
	29	14.9	—	—	14.9 (12.9)	14.6 (12.6)	14.1 (12.2)	13.5 (11.7)	—
	30	22.3 a	—	—	22.3 (19.2)	21.2 (18.3)	19.9 (17.2)	18.4 (15.9)	—
	31	30.8 a	—	—	30.8 (26.6)	28.0 (24.2)	25.2 (21.8)	22.3 (19.3)	—
1-1/4	41	4.1	—	—	—	4.1 (3.5)	4.0 (3.5)	4.0 (3.5)	4.0 (3.5)
	43	8.7	—	—	—	8.7 (7.5)	8.6 (7.4)	8.6 (7.4)	8.5 (7.4)
	44	12.7	—	—	—	12.7 (11.0)	12.6 (10.9)	12.4 (10.7)	12.3 (10.6)
	45	19.4 a	—	—	—	19.4 (16.8)	19.2 (16.6)	18.5 (16.0)	18.1 (15.7)
	46	34.1 a	—	—	—	34.1 (29.4)	32.9 (28.4)	29.9 (25.9)	28.3 (24.4)

Using Pipe Reducers with 3-Way Ball Valve Assemblies

Estimated Effective Cv con't

Valve Size in.	P Code	Cv	Estimated Effective Cv (kvs)						
			Pipe Size - inches (NPT)						
			1/2	3/4	1	1-1/4	1-1/2	2	2-1/2
1-1/2	51	4.0	—	—	—	—	4.0 (3.5)	4.0 (3.5)	4.0 (3.5)
	52	8.3	—	—	—	—	8.3 (7.2)	8.2 (7.1)	8.2 (7.1)
	53	13.4	—	—	—	—	13.4 (11.6)	13.3 (11.5)	13.2 (11.4)
	54	23.5	—	—	—	—	23.5 (20.3)	23.1 (19.9)	22.7 (19.6)
	55	32.0[a]	—	—	—	—	32.0 (27.7)	31.0 (26.8)	30.0 (25.9)
	56	61.1[a]	—	—	—	—	61.1 (52.8)	54.9 (47.5)	49.7 (43.0)
2	61	23.9	—	—	—	—	—	23.9 (20.7)	23.5 (20.3)
	62	38.2	—	—	—	—	—	38.2 (33.0)	37.8 (32.7)
	63	56.7[a]	—	—	—	—	—	56.7 (49.0)	55.5 (47.9)
	64	108.5[a]	—	—	—	—	—	108.5 (93.9)	100.7 (87.1)

a). Denotes a full port valve, without the characterized insert.

12. Zone Valves



Modulating Zone Valve Assembly Ordering

Modulating Zone

V M 2 x x x [3]

Body Type
M = Modulating

Configuration
2 = 2-Way

Valve Size
2 = 1/2"
3 = 3/4"
4 = 1"
5 = 1-1/4"

Connection	Availability
1 = Sweat	1/2", 3/4", 1", 1-1/4"
2 = Threaded NPT	1/2", 3/4", 1"

CV Size

	2-way/3-way	Size	Connection Type
1 =	1.0	1/2"	1, 2
2 =	2.0	1/2"	1, 2
		3/4"	1, 2
3 =	4.0	1/2"	1, 2
		3/4"	1, 2
		1"	1
7 =	7.5	3/4"	1, 2
	8.0	1"	1, 2
		1-1/4"	1

Kvs Size

	2-way/3-way	Size	Connection Type
1 =	0.8	1/2"	1, 2
2 =	1.7	1/2"	1, 2
		3/4"	1, 2
3 =	3.5	1/2"	1, 2
		3/4"	1, 2
		1"	1
7 =	6.5	3/4"	1, 2
	7.0	1"	1, 2
		1-1/4"	1

Life Is On Schneider Electric

Modulating Zone Valve Assembly Ordering

Valve Assemblies

△4 X X X X XX X

Actuator Type
T = Three-wire Floating
P = Proportional, 0-10 Vdc, 0-5 Vdc, 5-10 Vdc or 4-20 mA, Jumper Selectable

Action
1 = Spring Return Normally closed, 2-way or 3-way
2 = Spring Return Normally opened, 2-way only
3 = Non-Spring Return

Temperature Ratings
3 = General Temperature

Voltage
A = 24 Vac Only 50/60 Hz

Electrical Leads
00 = No leads

Options
Non-Spring Return Actuators
0 = No Options
T = Three-Wire Signal Time-Out

Spring Return Actuators
T = Time-Out △1

△1 This feature is standard for floating spring return actuators and must be included in the part number.

△2 Should not be used with thermostats/ controllers unless they have a timeout feature.

△3 When ordering a valve body, use only the first six positions to configure the valve.

△4 When ordering an actuator, use only the last seven positions to configure the actuator. Prefix with the letter A.

Available Actuators

Part Number	Action	Position	Actuator Type	Option
AT13A00T	Spring Return	N.C.	Three Wire Floating	With Time-Out
AT23A00T	Spring Return	N.O.	Three Wire Floating	With Time-Out
AT33A000	Non-Spring Return		Three Wire Floating	None △2
AT33A00T	Non-Spring Return		Three Wire Floating	With Time-Out
AP13A000	Spring Return	N.C.	Proportional	None
AP23A000	Spring Return	N.O.	Proportional	None
AP33A000	Non-Spring Return		Proportional	None

2-Position Zone Valve Assembly Ordering

Two-Position Zone

V x x x x x

[1]

Body Type
T = On/Off General
S = On/Off Steam*

*High temperature actuator must be used.

Configuration
2 = 2-Way
3 = 3-Way

Valve Size
2 = 1/2"
3 = 3/4"
4 = 1"
5 = 1-1/4"

Connection	Availability
1 = Sweat	1/2", 3/4", 1", 1-1/4"
2 = Threaded NPT	1/2", 3/4", 1"

CV Size

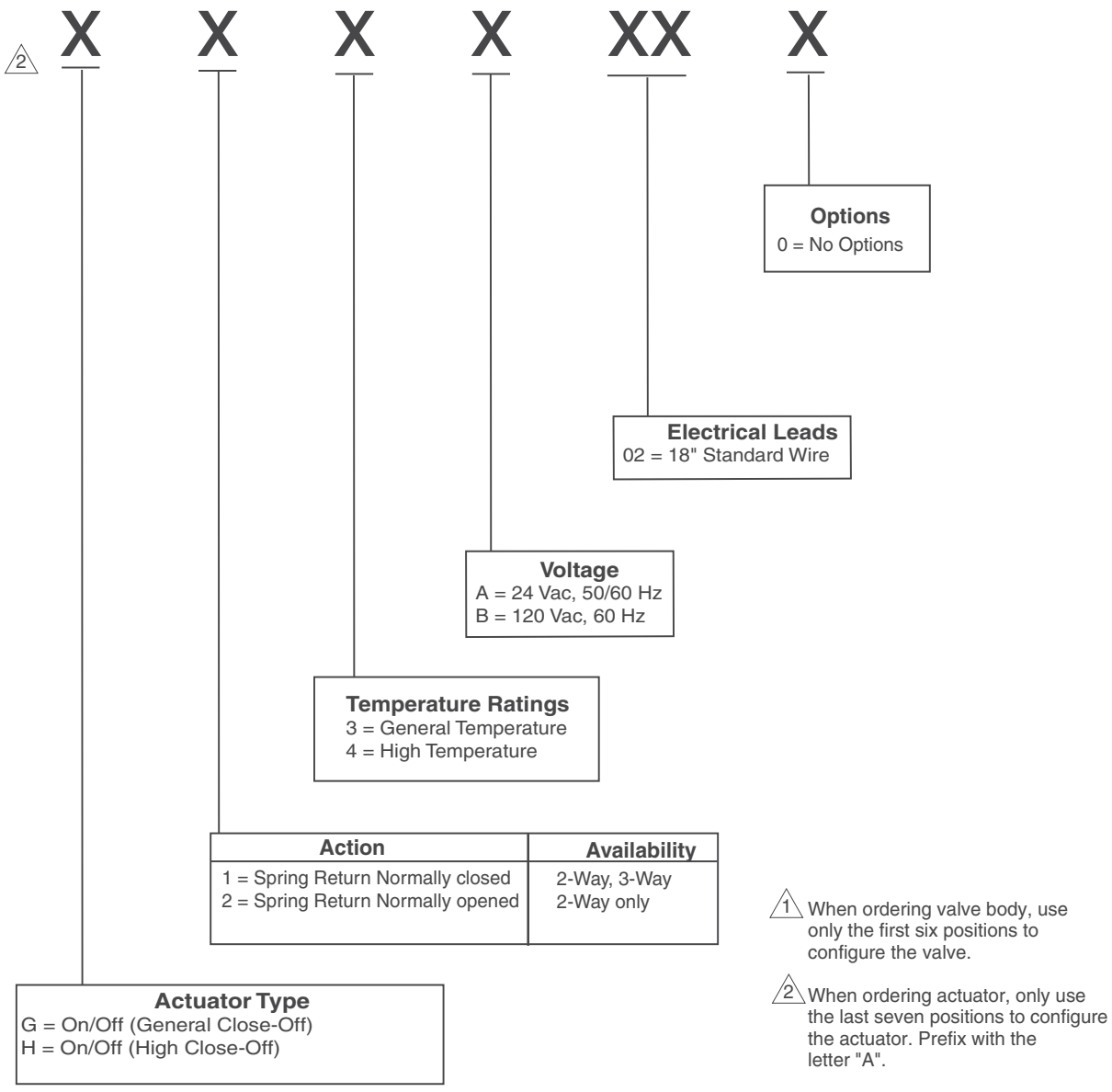
	2-way	3-way	Size	Connection Type
1 =	1.0	1.5	1/2"	1, 2
2 =	2.5	3.0	1/2"	1, 2
			3/4"	1, 2
3 =	3.5	4.0	1/2"	1, 2
			3/4"	1, 2
			1"	1
5 =	5.0	5.0	3/4"	1, 2
			1"	1
7 =	7.5	7.5	3/4"	1, 2
	8.0	8.0	1"	2
			1-1/4"	1

Kvs Size

	2-way	3-way	Size	Connection Type
1 =	0.8	1.0	1/2"	1, 2
2 =	2.2	2.6	1/2"	1, 2
			3/4"	1, 2
3 =	3.0	3.5	1/2"	1, 2
			3/4"	1, 2
			1"	1
5 =	4.3	4.3	3/4"	1, 2
			1"	1
7 =	6.5	6.5	3/4"	1, 2
	6.5	6.5	1"	1"
	7.0	7.0	1"	1, 2
			1-1/4"	1

2-Position Zone Valve Assembly Ordering

Valve Assemblies



1 When ordering valve body, use only the first six positions to configure the valve.

2 When ordering actuator, only use the last seven positions to configure the actuator. Prefix with the letter "A".

Body & Actuator Combination Requirements

Temperature Configurations

Body Configuration

V T X X X X

T = General
S = Steam
If body configuration is T, actuator temp rating can be 3 or 4.
If body configuration is S, actuator temp rating must be 4.

Actuator Spring Return Mode

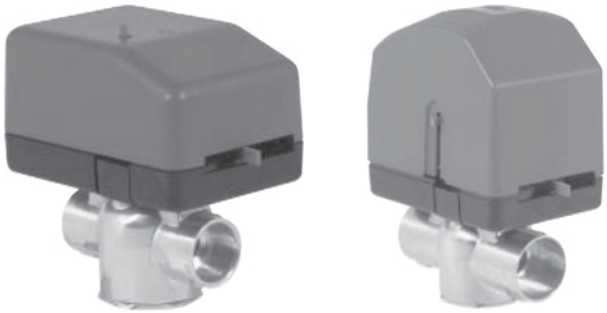
A X X 3 X X X X

3 = General Temperature
4 = High Temperature
If actuator temp rating is 3, body style must be T.
If actuator temp rating is 4, body style can be S or T.

Zone Valves

Modulating Valve
Spring and Non-Spring Return

AT, AP Series



Features

- Magnetic clutch to maximize the life of the motor and gear train.
- Manual operating level position indicator facilitates field setup.
- Easy to use terminal blocks.
- Acutator can be installed after the valve body.
- Three-wire floating and 0 to 10 Vdc or 4 to 20 mA proportional available.
- Spring will return actuator to normal position when the power is lost.

Two Position
Spring and Non-Spring Return

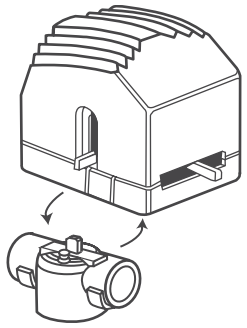
AG, AH Series



Features

- Hysteresis synchronous motor for long life.
- Spring return operation.
- Valve body rated for 300 psig (20.6 bar) static pressure.
- Available in a variety of voltages.
- Actuator mounts directly onto the valve body without the need for linkages or calibration.
- Manual opening lever (normally closed only).
- Actuator can be replaced without any tools, or removal of the valve from the system.
- VS series valves available for low pressure steam.

Erie™ ½"…1¼" Sweat Ends 2-Way Spring Return Modulating N.O.



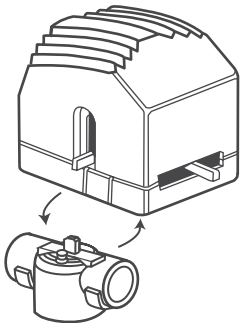
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa)		
		Motor Close	Floating With Timeout 24 Vac	Proportional[a] 0-10 V, 4-20 mA
1/2	1 (0.8)	50 (344)	VM2211T23A00T	VM2211P23A000
	2 (1.7)	50 (344)	VM2212T23A00T	VM2212P23A000
	4 (3.5)	35 (241)	VM2213T23A00T	VM2213P23A000
3/4	2 (1.7)	50 (344)	VM2312T23A00T	VM2312P23A000
	4 (3.5)	35 (241)	VM2313T23A00T	VM2313P23A000
	7.5 (6.5)	35 (241)	VM2317T23A00T	VM2317P23A000
1	4 (3.5)	35 (241)	VM2413T23A00T	VM2413P23A000
	8 (6.9)	35 (241)	VM2417T23A00T	VM2417P23A000
1-1/4	8 (6.9)	35 (241)	VM2517T23A00T	VM2517P23A000

[a] Factory proportional control signal is direct-acting. An increase in control signal will open a N.C. valve and close a N.O. valve.

For wiring and dimensions refer to those sections.

Erie™ ½"…1¼" Sweat Ends 2-Way Spring Return Modulating N.C.



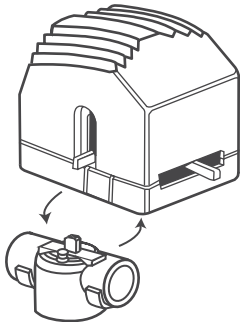
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional[a] 0-10 V, 4-20 mA
		Motor Close	Spring Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM2211T13A00T	VM2211P13A000
	2 (1.7)	50 (344)	20 (138)	VM2212T13A00T	VM2212P13A000
	4 (3.5)	35 (241)		VM2213T13A00T	VM2213P13A000
3/4	2 (1.7)	50 (344)		VM2312T13A00T	VM2312P13A000
	4 (3.5)	35 (241)		VM2313T13A00T	VM2313P13A000
	7.5 (6.5)	35 (241)	15 (103)	VM2317T13A00T	VM2317P13A000
1	4 (3.5)	35 (241)	20 (138)	VM2413T13A00T	VM2413P13A000
	8 (6.9)	35 (241)	15 (103)	VM2417T13A00T	VM2417P13A000
1-1/4	8 (6.9)	35 (241)		VM2517T13A00T	VM2517P13A000

[a] Factory proportional control signal is direct-acting. An increase in control signal will open a N.C. valve and close a N.O. valve.

For wiring and dimensions refer to those sections.

Erie™ ½"…1" NPT 2-Way Spring Return Modulating N.O.



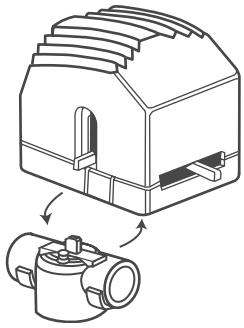
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Proportional[a] 0-10 V, 4-20 mA
1/2	1 (0.8)	50 (344)	VM2221T23A00T	VM2221P23A000
	2 (1.7)	50 (344)	VM2222T23A00T	VM2222P23A000
	4 (3.5)	35 (241)	VM2223T23A00T	VM2223P23A000
3/4	2 (1.7)	50 (344)	VM2322T23A00T	VM2322P23A000
	4 (3.5)	35 (241)	VM2323T23A00T	VM2323P23A000
	7.5 (6.5)	35 (241)	VM2327T23A00T	VM2327P23A000
1	8 (6.9)	35 (241)	VM2427T23A00T	VM2427P23A000

[a] Factory proportional control signal is direct-acting. An increase in control signal will open a N.C. valve and close a N.O. valve.

For wiring and dimensions refer to those sections.

Erie™ ½"…1" NPT 2-Way Spring Return Modulating N.C.



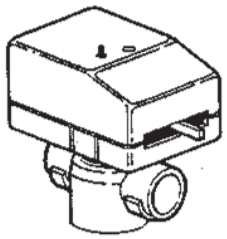
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{VS})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional[a] 0-10 V, 4-20 mA
		Spring Close	Motor Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM2221T13A00T	VM2221P13A000
	2 (1.7)	20 (138)	50 (344)	VM2222T13A00T	VM2222P13A000
	4 (3.5)	20 (138)	35 (241)	VM2223T13A00T	VM2223P13A000
3/4	2 (1.7)	20 (138)	50 (344)	VM2322T13A00T	VM2322P13A000
	4 (3.5)	20 (138)	35 (241)	VM2323T13A00T	VM2323P13A000
	7.5 (6.5)	15 (103)	35 (241)	VM2327T13A00T	VM2327P13A000
1	8 (6.9)	15 (103)	35 (241)	VM2427T13A00T	VM2427P13A000

[a] Factory proportional control signal is direct-acting. An increase in control signal will open a N.C. valve and close a N.O. valve.

For wiring and dimensions refer to those sections.

Erie™ ½"…1¼" Sweat Ends 2-Way Non-Spring Return Modulating



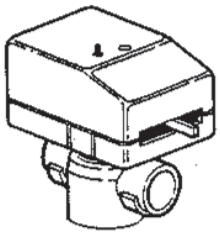
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Floating Requires Thermostat/Controller with Timeout. 24 Vac	Proportional[a] 0-10 V, 4-20 mA
1/2	1 (0.8)	50 (344)	VM2211T33A00T	VM2211T33A000	VM2211P33A000
	2 (1.7)	50 (344)	VM2212T33A00T	VM2212T33A000	VM2212P33A000
	4 (3.5)	35 (241)	VM2213T33A00T	VM2213T33A000	VM2213P33A000
3/4	2 (1.7)	50 (344)	VM2312T33A00T	VM2312T33A000	VM2312P33A000
	4 (3.5)	35 (241)	VM2313T33A00T	VM2313T33A000	VM2313P33A000
	7.5 (6.5)	35 (241)	VM2317T33A00T	VM2317T33A000	VM2317P33A000
1	4 (3.5)	35 (241)	VM2413T33A00T	VM2413T33A000	VM2413P33A000
	8 (6.9)	35 (241)	VM2417T33A00T	VM2417T33A000	VM2417P33A000
1-1/4	8 (6.9)	35 (241)	VM2517T33A00T	VM2517T33A000	VM2517P33A000

[a] Factory proportional control signal is direct-acting. An increase in control signal will open this model.

For wiring and dimensions refer to those sections.

Erie™ ½"…1" NPT 2-Way Non-Spring Return Modulating

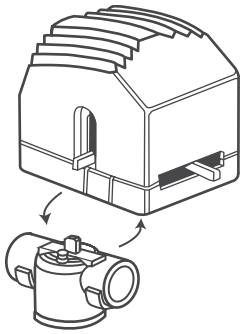


Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Floating Requires Thermostat/Controller with Timeout. 24 Vac	Proportional[a] 0-10 V, 4-20 mA
1/2	1 (0.8)	50 (344)	VM2221T33A00T	VM2221T33A000	VM2221P33A000
	2 (1.7)	50 (344)	VM2222T33A00T	VM2222T33A000	VM2222P33A000
	4 (3.5)	35 (241)	VM2223T33A00T	VM2223T33A000	VM2223P33A000
3/4	2 (1.7)	50 (344)	VM2322T33A00T	VM2322T33A000	VM2322P33A000
	4 (3.5)	35 (241)	VM2323T33A00T	VM2323T33A000	VM2323P33A000
	7.5 (6.5)	35 (241)	VM2327T33A00T	VM2327T33A000	VM2327P33A000
1	8 (6.9)	35 (241)	VM2427T33A00T	VM2427T33A000	VM2427P33A000

[a] Factory proportional control signal is direct-acting. An increase in control signal will open this model.

Erie™ ½"…1¼" Sweat Ends 3-Way Mixing Spring Return Modulating N.C.

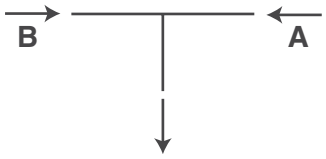


Flow Type		1 to 4 Cv equal % 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional[a] 0-10 V, 4-20 mA
		Spring Close	Motor Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM3211T13A00T	VM3211P13A000
	2 (1.7)	20 (138)	50 (344)	VM3212T13A00T	VM3212P13A000
	4 (3.5)	20 (138)	35 (241)	VM3213T13A00T	VM3213P13A000
3/4	2 (1.7)	20 (138)	50 (344)	VM3312T13A00T	VM3312P13A000
	4 (3.5)	20 (138)	35 (241)	VM3313T13A00T	VM3313P13A000
	7.5 (6.5)	15 (103)	35 (241)	VM3317T13A00T	VM3317P13A000
1	4 (3.5)	20 (138)	35 (241)	VM3413T13A00T	VM3413P13A000
	8 (6.9)	15 (103)	35 (241)	VM3417T13A00T	VM3417P13A000
1-1/4	8 (6.9)	15 (103)	35 (241)	VM3517T13A00T	VM3517P13A000

[a] Factory proportional control signal is direct-acting. An increase in control signal will open B port and close A port.

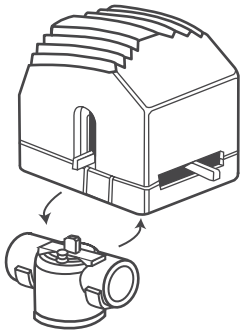
Flow Pattern



For normally open, reverse pipe A and B ports. B port is normally closed.

For wiring and dimensions refer to those sections.

Erie™ ½"…1" NPT 3-Way Mixing Spring Return Modulating N.C. (B Port)

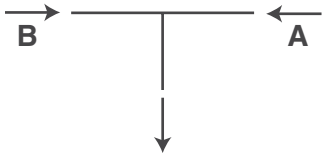


Flow Type		1 to 4 Cv equal % 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{VS})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional[a] 0-10 V, 4-20 mA
		Spring Close	Motor Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM3221T13A00T	VM3221P13A000
	2 (1.7)	20 (138)	50 (344)	VM3222T13A00T	VM3222P13A000
	4 (3.5)	20 (138)	35 (241)	VM3223T13A00T	VM3223P13A000
3/4	2 (1.7)	20 (138)	50 (344)	VM3322T13A00T	VM3322P13A000
	4 (3.5)	20 (138)	35 (241)	VM3323T13A00T	VM3323P13A000
	7.5 (6.5)	15 (103)	35 (241)	VM3327T13A00T	VM3327P13A000
1	8 (6.9)	15 (103)	35 (241)	VM3427T13A00T	VM3427P13A000

[a] Factory proportional control signal is direct-acting. An increase in control signal will open B port and close A port.

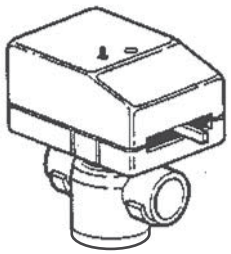
Flow Pattern



For normally open, reverse pipe A and B ports. B port is normally closed.

For wiring and dimensions refer to those sections.

Erie™ ½"…1¼" NPT 3-Way Mixing Spring Return Modulating

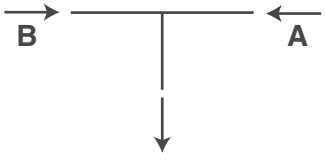


Flow Type		1 to 4 Cv equal % 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV
Fluid Temperature		32 to 200 °F @ 104° F ambient (0 to 93 °C @ 40 °C)

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Floating Requires Thermostat/Controller with Timeout. 24 Vac	Proportional[a] 0-10 V, 4-20 mA, 0-5 Vdc or 5-10 Vdc
1/2	1 (0.8)	50 (344)	VM3211T33A00T	VM3211T33A000	VM3211P33A000
	2 (1.7)	50 (344)	VM3212T33A00T	VM3212T33A000	VM3212P33A000
	4 (3.5)	35 (241)	VM3213T33A00T	VM3213T33A000	VM3213P33A000
3/4	2 (1.7)	50 (344)	VM3312T33A00T	VM3312T33A000	VM3312P33A000
	4 (3.5)	35 (241)	VM3313T33A00T	VM3313T33A000	VM3313P33A000
	7.5 (6.5)	35 (241)	VM3317T33A00T	VM3317T33A000	VM3317P33A000
1	4 (3.5)	35 (241)	VM3413T33A00T	VM3413T33A000	VM3413P33A000
	8 (6.9)	35 (241)	VM3417T33A00T	VM3417T33A000	VM3417P33A000
1-1/4	8 (6.9)	35 (241)	VM3517T33A00T	VM3517T33A000	VM3517P33A000

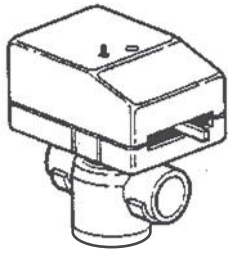
[a] Factory proportional control signal is direct-acting. An increase in control signal will open B port and close A port.

Flow Pattern



For wiring and dimensions refer to those sections.

Erie™ ½"…1" NPT 3-Way Mixing Non-Spring Return Modulating

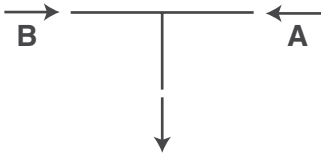


Flow Type		1 to 4 Cv equal % 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Floating Requires Thermostat/Controller with Timeout. 24 Vac	Proportional[a] 0-10 V, 4-20 mA
1/2	1 (0.8)	50 (344)	VM3221T33A00T	VM3221T33A000	VM3221P33A000
	2 (1.7)	50 (344)	VM3222T33A00T	VM3222T33A000	VM3222P33A000
	4 (3.5)	35 (241)	VM3223T33A00T	VM3223T33A000	VM3223P33A000
3/4	2 (1.7)	50 (344)	VM3322T33A00T	VM3322T33A000	VM3322P33A000
	4 (3.5)	35 (241)	VM3323T33A00T	VM3323T33A000	VM3323P33A000
	7.5 (6.5)	35 (241)	VM3327T33A00T	VM3327T33A000	VM3327P33A000
1	8 (6.9)	35 (241)	VM3427T33A00T	VM3427T33A000	VM3427P33A000

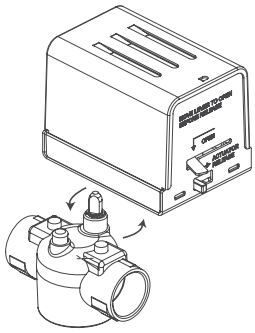
[a] Factory proportional control signal is direct-acting. An increase in control signal will open B port and close A port.

Flow Pattern



For wiring and dimensions refer to those sections.

Erie™ ½"…1¼" Sweat Ends 2-Way SR General Close Off Two Position

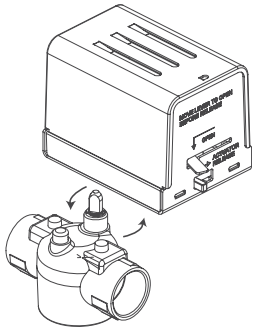


Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water or 15 psi Steam
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{VS})	Close Off Pressure psi (kPa)	Normally Open/Normally Closed	VT Series 32 to 200 °F		VS Series - High Temp 32 to 250 °F	
				24 Vac	120 Vac	24 Vac	120 Vac
1/2	1 (0.8)	60 (413)	NC	VT2211G13A020	VT2211G13B020	VS2211G14A020	VS2211G14B020
			NO	VT2211G23A020	VT2211G23B020	VS2211G24A020	VS2211G24B020
	2.5 (2.2)	40 (275)	NC	VT2212G13A020	VT2212G13B020	VS2212G14A020	VS2212G14B020
			NO	VT2212G23A020	VT2212G23B020	VS2212G24A020	VS2212G24B020
	3.5 (3)	25 (172)	NC	VT2213G13A020	VT2213G13B020	VS2213G14A020	VS2213G14B020
			NO	VT2213G23A020	VT2213G23B020	VS2213G24A020	VS2213G24B020
3/4	2.5 (2.2)	40 (275)	NC	VT2312G13A020	VT2312G13B020	VS2312G14A020	VS2312G14B020
			NO	VT2312G23A020	VT2312G23B020	VS2312G24A020	VS2312G24B020
	3.5 (3)	25 (172)	NC	VT2313G13A020	VT2313G13B020	VS2313G14A020	VS2313G14B020
			NO	VT2313G23A020	VT2313G23B020	VS2313G24A020	VS2313G24B020
	5 (4.3)	20 (138)	NC	VT2315G13A020	VT2315G13B020	VS2315G14A020	VS2315G14B020
			NO	VT2315G23A020	VT2315G23B020	VS2315G24A020	VS2315G24B020
	7.5 (6.5)	17 (117)	NC	VT2317G13A020	VT2317G13B020	VS2317G14A020	VS2317G14B020
			NO	VT2317G23A020	VT2317G23B020	VS2317G24A020	VS2317G24B020
1	5 (4.3)	20 (138)	NC	VT2415G13A020	VT2415G13B020	VS2415G14A020	VS2415G14B020
			NO	VT2415G23A020	VT2415G23B020	VS2415G24A020	VS2415G24B020
	7.5 (6.5)	17 (117)	NC	VT2417G13A020	VT2417G13B020	VS2417G14A020	VS2417G14B020
			NO	VT2417G23A020	VT2417G23B020	VS2417G24A020	VS2417G24B020
1-1/4	8 (6.9)	17 (117)	NC	VT2517G13A020	VT2517G13B020	VS2517G14A020	VS2517G14B020
			NO	VT2517G23A020	VT2517G23B020	VS2517G24A020	VS2517G24B020

For wiring and dimensions refer to those sections.

Erie™ ½"…1" Female NPT 2-Way SR General Close Off Two Position

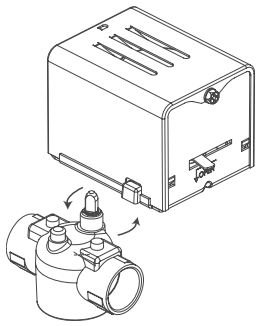


Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water
		VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water or 15 psi Steam
Maximum Static Pressure		400 psi (20.6 bar))
Seat Leakage		ANSI IV

Size in.	Cv (K_{VS})	Close Off Pressure psi (kPa)	Normally Open/Normally Closed	VT Series 32 to 200 °F		VS Series 32 to 250 °F	
				24 Vac	120 Vac	24 Vac	120 Vac
1/2	1 (0.8)	60 (413)	NC	VT2221G13A020	VT2221G13B020	VS2221G14A020	VS2221G14B020
			NO	VT2221G23A020	VT2221G23B020	VS2221G24A020	VS2221G24B020
	2.5 (2.2)	40 (275)	NC	VT2222G13A020	VT2222G13B020	VS2222G14A020	VS2222G14B020
			NO	VT2222G23A020	VT2222G23B020	VS2222G24A020	VS2222G24B020
	3.5 (3)	25 (172)	NC	VT2223G13A020	VT2223G13B020	VS2223G14A020	VS2223G14B020
			NO	VT2223G23A020	VT2223G23B020	VS2223G24A020	VS2223G24B020
3/4	2.5 (2.2)	40 (275)	NC	VT2322G13A020	VT2322G13B020	VS2322G14A020	VS2322G14B020
			NO	VT2322G23A020	VT2322G23B020	VS2322G24A020	VS2322G24B020
	3.5 (3)	25 (172)	NC	VT2323G13A020	VT2323G13B020	VS2323G14A020	VS2323G14B020
			NO	VT2323G23A020	VT2323G23B020	VS2323G24A020	VS2323G24B020
	5 (4.3)	20 (138)	NC	VT2325G13A020	VT2325G13B020	VS2325G14A020	VS2325G14B020
			NO	VT2325G23A020	VT2325G23B020	VS2325G24A020	VS2325G24B020
	7.5 (6.5)	17 (117)	NC	VT2327G13A020	VT2327G13B020	VS2327G14A020	VS2327G14B020
			NO	VT2327G23A020	VT2327G23B020	VS2327G24A020	VS2327G24B020
1	8 (6.9)	17 (117)	NC	VT2427G13A020	VT2427G13B020	VS2427G14A020	VS2427G14B020
			NO	VT2427G23A020	VT2427G23B020	VS2427G24A020	VS2427G24B020

For wiring and dimensions refer to those sections.

Erie™ ½"…1¼" Sweat Ends 2-Way SR High Close Off Two Position

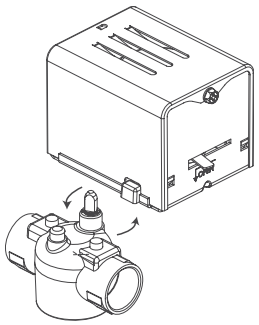


Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water or 15 psi Steam
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa)	Normally Open/Normally Closed	VT Series 32 to 200 °F		VS Series 32 to 250 °F	
				24 Vac	120 Vac	24 Vac	120 Vac
1/2	1 (0.8)	75 (517)	NC	VT2211H13A020	VT2211H13B020	VS2211H14A020	VS2211H14B020
			NO	VT2211H23A020	VT2211H23B020	VS2211H24A020	VS2211H24B020
	2.5 (2.2)	50 (345)	NC	VT2212H13A020	VT2212H13B020	VS2212H14A020	VS2212H14B020
			NO	VT2212H23A020	VT2212H23B020	VS2212H24A020	VS2212H24B020
	3.5 (3)	30 (207)	NC	VT2213H13A020	VT2213H13B020	VS2213H14A020	VS2213H14B020
			NO	VT2213H23A020	VT2213H23B020	VS2213H24A020	VS2213H24B020
3/4	2.5 (2.2)	50 (345)	NC	VT2312H13A020	VT2312H13B020	VS2312H14A020	VS2312H14B020
			NO	VT2312H23A020	VT2312H23B020	VS2312H24A020	VS2312H24B020
	3.5 (3)	30 (207)	NC	VT2313H13A020	VT2313H13B020	VS2313H14A020	VS2313H14B020
			NO	VT2313H23A020	VT2313H23B020	VS2313H24A020	VS2313H24B020
	5 (4.3)	25 (172)	NC	VT2315H13A020	VT2315H13B020	VS2315H14A020	VS2315H14B020
			NO	VT2315H23A020	VT2315H23B020	VS2315H24A020	VS2315H24B020
	7.5 (6.5)	20 (138)	NC	VT2317H13A020	VT2317H13B020	VS2317H14A020	VS2317H14B020
			NO	VT2317H23A020	VT2317H23B020	VS2317H24A020	VS2317H24B020
1	5 (4.3)	25 (172)	NC	VT2415H13A020	VT2415H13B020	VS2415H14A020	VS2415H14B020
			NO	VT2415H23A020	VT2415H23B020	VS2415H24A020	VS2415H24B020
	7.5 (6.5)	20 (138)	NC	VT2417H13A020	VT2417H13B020	VS2417H14A020	VS2417H14B020
			NO	VT2417H23A020	VT2417H23B020	VS2417H24A020	VS2417H24B020
1-1/4	8 (6.9)	20 (138)	NC	VT2517H13A020	VT2517H13B020	VS2517H14A020	VS2517H14B020
			NO	VT2517H23A020	VT2517H23B020	VS2517H24A020	VS2517H24B020

For wiring and dimensions refer to those sections.

Erie™ ½"…1" Female NPT 2-Way SR High Close Off Two Position

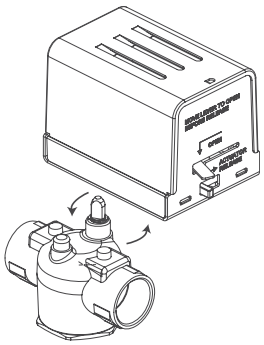


Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water or 15 psi Steam
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa)	Normally Open/Normally Closed	VT Series 32 to 200 °F		VS Series 32 to 250 °F	
				24 Vac	120 Vac	24 Vac	120 Vac
1/2	1 (0.8)	75 (517)	NC	VT2221H13A020	VT2221H13B020	VS2221H14A020	VS2221H14B020
			NO	VT2221H23A020	VT2221H23B020	VS2221H24A020	VS2221H24B020
	2.5 (2.2)	50 (345)	NC	VT2222H13A020	VT2222H13B020	VS2222H14A020	VS2222H14B020
			NO	VT2222H23A020	VT2222H23B020	VS2222H24A020	VS2222H24B020
	3.5 (3)	30 (207)	NC	VT2223H13A020	VT2223H13B020	VS2223H14A020	VS2223H14B020
			NO	VT2223H23A020	VT2223H23B020	VS2223H24A020	VS2223H24B020
3/4	2.5 (2.2)	50 (345)	NC	VT2322H13A020	VT2322H13B020	VS2322H14A020	VS2322H14B020
			NO	VT2322H23A020	VT2322H23B020	VS2322H24A020	VS2322H24B020
	3.5 (3)	30 (207)	NC	VT2323H13A020	VT2323H13B020	VS2323H14A020	VS2323H14B020
			NO	VT2323H23A020	VT2323H23B020	VS2323H24A020	VS2323H24B020
	5 (4.3)	25 (172)	NC	VT2325H13A020	VT2325H13B020	VS2325H14A020	VS2325H14B020
			NO	VT2325H23A020	VT2325H23B020	VS2325H24A020	VS2325H24B020
	7.5 (6.5)	20 (138)	NC	VT2327H13A020	VT2327H13B020	VS2327H14A020	VS2327H14B020
			NO	VT2327H23A020	VT2327H23B020	VS2327H24A020	VS2327H24B020
1	8 (6.9)	20 (138)	NC	VT2427H13A020	VT2427H13B020	VS2427H14A020	VS2427H14B020
			NO	VT2427H23A020	VT2427H23B020	VS2427H24A020	VS2427H24B020

For wiring and dimensions refer to those sections.

Erie™ ½"…1¼" Sweat Ends 3-Way Mixing or Diverting SR N.C. (B Port) General Close Off Two Position

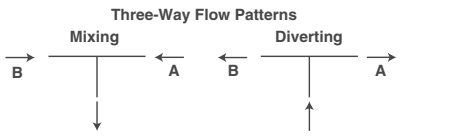


Flow Type		1 to 4 Cv equal % 8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa)	VT Series 32 to 200 °F	VS Series - High Temp 32 to 250 °F	Voltage Vac
1/2	1 (0.8)	60 (413)	VT3211G13A020	VS3211G14A020	24
			VT3211G13B020	VS3211G14B020	120
	3 (2.6)	40 (275)	VT3212G13A020	VS3212G14A020	24
			VT3212G13B020	VS3212G14B020	120
	4 (3.4)	25 (172)	VT3213G13A020	VS3213G14A020	24
			VT3213G13B020	VS3213G14B020	120
3/4	3 (2.6)	40 (275)	VT3312G13A020	VS3312G14A020	24
			VT3312G13B020	VS3312G14B020	120
	4 (3.4)	25 (172)	VT3313G13A020	VS3313G14A020	24
			VT3313G13B020	VS3313G14B020	120
	5 (4.3)	20 (138)	VT3315G13A020	VS3315G14A020	24
			VT3315G13B020	VS3315G14B020	120
	7.5 (6.5)	17 (117)	VT3317G13A020	VS3317G14A020	24
			VT3317G13B020	VS3317G14B020	120
1	5 (4.3)	20 (138)	VT3415G13A020	VS3415G14A020	24
			VT3415G13B020	VS3415G14B020	120
	7.5 (6.5)	17 (117)	VT3417G13A020	VS3417G14A020	24
			VT3417G13B020	VS3417G14B020	120
1-1/4	8 (6.9)	17 (117)	VT3517G13A020	VS3517G14B020	24
			VT3517G13B020	VS3517G14B020	120

Actuator Code Table.

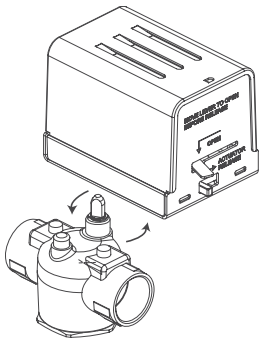
Actuator Model (Reference pages 146 thru 148)	Description
AG13A020, AG14A020	2-Position
AG13B020, AG14B020	2-Position



For normally open, reverse pipe A and B ports. B port is normally closed.

For wiring and dimensions refer to those sections.

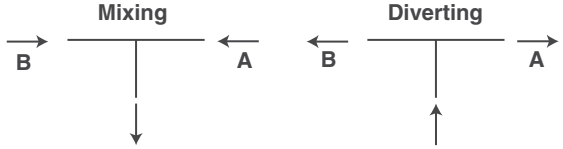
Erie™ ½"…1¼" Female NPT 3-Way Mixing or Diverting SR N.C. (B Port) General Close Off Two Position



Flow Type		1 to 4 Cv equal % 8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VS)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{VS})	Close Off psig (kPa)	VT Series 32 to 200 °F	VS Series - High Temp 32 to 250 °F	Voltage Vac
1/2	1.5 1.3)	60 (413)	VT3221G13A020	VS3221G14A020	24
			VT3221G13B020	VS3221G14B020	120
	3 (2.6)	40 (275)	VT3222G13A020	VS3222G14A020	24
			VT3222G13B020	VS3222G14B020	120
	4 (3.4)	25 (172)	VT3223G13A020	VS3223G14A020	24
			VT3223G13B020	VS3223G14B020	120
3/4	3 (2.6)	40 (275)	VT3322G13A020	VS3322G14A020	24
			VT3322G13B020	VS3322G14B020	120
	4 (3.4)	25 (172)	VT3323G13A020	VS3323G14A020	24
			VT3323G13B020	VS3323G14B020	120
	5 (4.3)	20 (138)	VT3325G13A020	VS3325G14A020	24
			VT3325G13B020	VS3325G14B020	120
	7.5 (6.5)	17 (117)	VT3327G13A020	VS3327G14A020	24
			VT3327G13B020	VS3327G14B020	120
1	8 (6.9)	17 (117)	VT3427G13A020	VS3427G14A020	24
			VT3427G13B020	VS3427G14B020	120

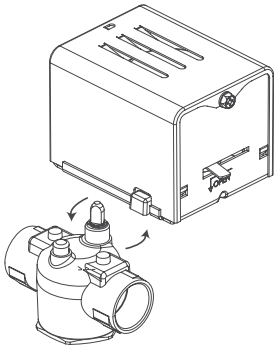
Three-Way Flow Patterns



For normally open, reverse pipe A and B ports. B port is normally closed.

For wiring and dimensions refer to those sections.

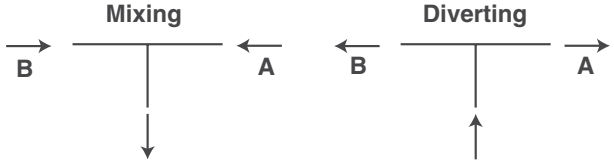
Erie™ ½"…1¼" Sweat Ends 3-Way Mixing or Diverting SR N.C. (B Port) High Close Off Two Position



Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

Size in.	Cv (K_{VS})	Close Off psig (kPa)	VT Series 32 to 200 °F		VS Series - High Temp 32 to 250 °F	
			24 Vac	120 Vac	24 Vac	120 Vac
1/2	1.5 (1.3)	75 (517)	VT3211H13A020	VT3211H13B020	VS3211H14A020	VS3211H14B020
	3 (2.6)	50 (344)	VT3212H13A020	VT3212H13B020	VS3212H14A020	VS3212H14B020
	4 (3.4)	30 (208)	VT3213H13A020	VT3213H13B020	VS3213H14A020	VS3213H14B020
3/4	3 (2.6)	50 (344)	VT3312H13A020	VT3312H13B020	VS3312H14A020	VS3312H14B020
	4 (3.4)	30 (208)	VT3313H13A020	VT3313H13B020	VS3313H14A020	VS3313H14B020
	5 (4.3)	25 (172)	VT3315H13A020	VT3315H13B020	VS3315H14A020	VS3315H14B020
	7.5 (6.5)	20 (137)	VT3317H13A020	VT3317H13B020	VS3317H14A020	VS3317H14B020
1	5 (4.3)	25 (172)	VT3415H13A020	VT3415H13B020	VS3415H14A020	VS3415H14B020
	7.5 (6.5)	20 (137)	VT3417H13A020	VT3417H13B020	VS3417H14A020	VS3417H14B020
1-1/4	8 (6.9)	20 (137)	VT3517H13A020	VT3517H13B020	VS3517H14A020	VS3517H14B020

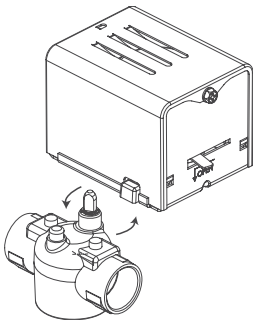
Three-Way Flow Patterns



For normally open, reverse pipe A and B ports. B port is normally closed.

For wiring and dimensions refer to those sections.

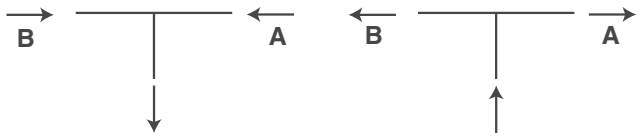
Erie™ ½"…1" Female NPT 3-Way Mixing or Diverting SR N.C. (B Port) High Close Off Two Position



Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C)
Maximum Static Pressure		400 psi (20.6 bar)
Seat Leakage		ANSI IV

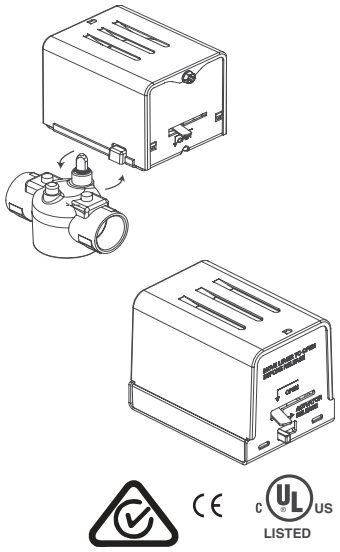
Size in.	Cv (K_{VS})	Close Off psig (kPa)	VT Series 32 to 200 °F		VS Series 32 to 250 °F	
			24 Vac	120 Vac	24 Vac	120 Vac
1/2	1.5 (1.3)	75 (517)	VT3221H13A020	VT3221H13B020	VS3221H14A020	VS3221H14B020
	3 (2.6)	50 (344)	VT3222H13A020	VT3222H13B020	VS3222H14A020	VS3222H14B020
	4 (3.4)	30 (208)	VT3223H13A020	VT3223H13B020	VS3223H14A020	VS3223H14B020
3/4	3 (2.6)	50 (344)	VT3322H13A020	VT3322H13B020	VS3322H14A020	VS3322H14B020
	4 (3.4)	30 (203)	VT3323H13A020	VT3323H13B020	VS3323H14A020	VS3323H14B020
	5 (4.3)	25 (172)	VT3325H13A020	VT3325H13B020	VS3325H14A020	VS3325H14B020
	7.5 (6.5)	20 (137)	VT3327H13A020	VT3327H13B020	VS3327H14A020	VS3327H14B020
1	8 (6.9)	20 (137)	VT3427H13A020	VT3427H13B020	VS3427H14A020	VS3427H14B020

Three-Way Flow Patterns



For normally open, reverse pipe A and B ports. B port is normally closed.
For wiring and dimensions refer to those sections.

Erie™ AG, AH Series SR Actuator 2-Position

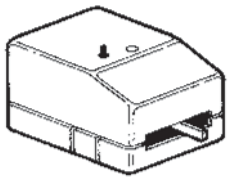


Connections:	18 in. leads.
Housing:	NEMA 1.
Dimensions:	G Series: 2-3/8 H x 2-3/8 W x 3-11/16 D in. (60 x 60 x 96 mm) H Series: 2-7/16 H x 2-5/8 W x 3-11/16 D in. (62 x 67 x 93 mm)
Override:	Manual (normally closed models only).
Motor Type:	Hysteresis synchronous.
Install Instructions	Refer to F-26496.
Agency Listing:	UL-873.Underwriters Laboratories (File #E9429 Category Temperature Indicating and Regulating Equipment). European Community: EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). CUL: UL listed for use in Canada by Underwriters Laboratory. Canadian Standards C22.2 No. 24. Australia: This product meets requirements to bear the RCM Mark according to the terms specified by the Communications Authority under the Radio Communications Act of 1992.

General Close-Off, 2-Position, Power (Open or Close): 9 to 11 Seconds; Spring Return (Open or Close): 4 to 5 Seconds						
Model No.	**Volts AC**	**VA**	**Electrical Position**	**Temperature Range F (C)**	**End Of Travel Switch**	**Wiring**
AG13A020	24	7.5	Normally Closed	32 to 200°F (Fluid) @ 104°F (Ambient) (0 to 93°C @40°C)	No	18 in. (45.7 cm) Leads
AG13B020	120					
AG14A020	24			32 to 250°F (Fluid)@ 169°F (Ambient) (0 to 121°C @ 76°C)		
AG14B020	120					
AG23A020	24		Normally Open (can only be used on 2-way valve)	32 to 200°F (Fluid)@ 104°F (Ambient) (0 to 93°C @40°C)		
AG24A020	24			32 to 250°F (Fluid)@ 169°F (Ambient) (0 to 121°C @ 76°C		
AG23B020	120			32 to 200°F (Fluid)@ 104°F (Ambient) (0 to 93°C @40°C)		
AG24B020	120			32 to 250°F (Fluid)@ 169°F (Ambient) (0 to 121°C @ 76°C		

High Close Off, 2-Position, Power (Open or Close): 13 to 18 Seconds; Spring Return (Open or Close): 4 to 5 Seconds						
AH13A020	24	7.5	Normally Closed	32 to 200°F (Fluid) @ 104°F (Ambient) (0 to 93°C @40°C)	No	18 in. (45.7 cm) Leads
AH13B020	120					
AH14A020	24			32 to 250°F (Fluid) @ 169°F (Ambient) (0 to 121°C @ 76°C)		
AH14B020	120					
AH23A020	24		Normally Open (can only be used on 2-way valve)	32 to 200°F (Fluid) @ 104°F (Ambient) (0 to 93°C @40°C)		
AH23B020	120					
AH24A020	24			32 to 250°F (Fluid) @ 169°F (Ambient) (0 to 121°C @ 76°C)		
AH24B020	120					

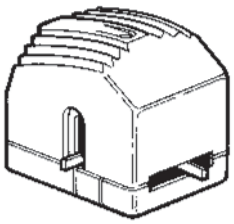
Erie™ APx3, ATx3 Series SR Actuator - Modulating



Connections: Terminal block.
Housing: NEMA 1.
Dimensions: 2-1/4 H x 2-3/4 W x 4-1/4 D in. (57 x 70 x 108 mm)
Switches: None.
Override: Manual.
Motor Type: Stepper motor.
Install Instructions Refer to F-27013.
Agency Listing: UL-873.Underwriters Laboratories (File #E9429 Category Temperature Indicating and Regulating Equipment). European Community: EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). CUL: UL listed for use in Canada by Underwriters Laboratory. Canadian Standards C22.2 No. 24. Australia: This product meets requirements to bear the RCM Mark according to the terms specified by the Communications Authority under the Radio Communications Act of 1992.

Model No.	Maximum Current/Power Requirements 24 Vac mA (VA)	Control Signal	Timeout	Timing (min:sec)	
				60 Hz	50 Hz
AT33A000	40 mA (1.0 VA)	24 Vac, 3-Wire Floating	No	Maximum 2:30	Maximum 3:00
AT33A00T	50 mA (1.2 VA)		Yes		—
AP33A000	65 mA (1.6 VA)	0-10 Vdc or 4-20 mA Field Selectable	N/A	2:30 + 15 sec. Recalibration Time	3:00 +18 sec. Recalibration Time

Erie™ APx3, ATx3 Series SR Actuator - Modulating



Connections: Terminal block.
Housing: NEMA 1.
Dimensions: 3-11/16 H x 2-3/4 W x 4-1/4 D in. (93 x 70 x 108 mm)
Override: Manual.
Motor Type: Stepper motor.
Install Instructions Refer to F-27013.

Agency Listing: UL-873.Underwriters Laboratories (File #E9429 Category Temperature Indicating and Regulating Equipment). European Community: EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
CUL: UL listed for use in Canada by Underwriters Laboratory. Canadian Standards C22.2 No. 24.
Australia: This product meets requirements to bear the RCM Mark according to the terms specified by the Communications Authority under the Radio Communications Act of 1992.

Model No.	Volts AC	Electrical Position	Maximum Current/Power (VA) (Running)[a]	Control Signal
AT13A00T	24	Closed	68 mA (1.6 VA)	24 Vac 3-Wire Floating
AT23A00T		Open		
AP13A000		Closed		0-10 Vdc 4-20 mA 0-5 Vdc 5 to 10 Vdc
AP23A000		Open[b]		

[a] For transformer sizing a minimum of 10 VA per actuator is required to allow for in-rush.
[b] Can only be used on 2-way valve.

Modulating SR/NSR PopTop, 2/3-Way VM Assemblies Flow Pattterns

Modulating Spring and Non-Spring Return PopTop, Two-Way and Three-Way VM Assemblies Flow Patterns

Piping

- The three-way is only configured as normally closed. For normally open configuration to the coil, turn the valve around. For proportional valves, set the control action (direct or reverse accordingly).
- The valve should be used in a closed-loop system.
- All valves must be piped so the plug closes against the direction of flow. For two-way valves, flow is from port B to port A. For normally closed three-way valves, B is the service port and A is the bypass port. For normally open three-way valves, A is the service port and B is the bypass port.
- Three-way VM valves must be piped in a mixing configuration, not diverting.

CAUTION: Do not use VM series valves in "open" systems. Excess make-up water may cause damage to the valve.

Follow proper water treatment practices and system procedures. Refer to document F-26080; EN205, *Water and Steam System Guidelines.*

Note: Normally open actuators are not to be used on three-way valves to achieve normally open configurations. Use a normally closed actuator and pipe as shown in Figure-2.

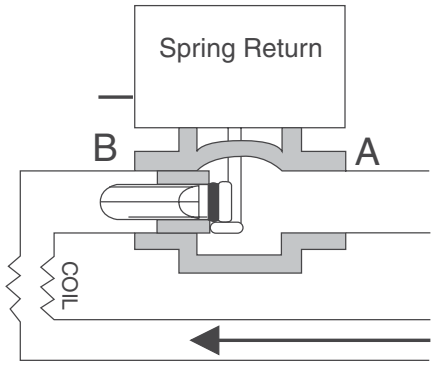


Figure 1 Two-Way Valve Normally Closed.

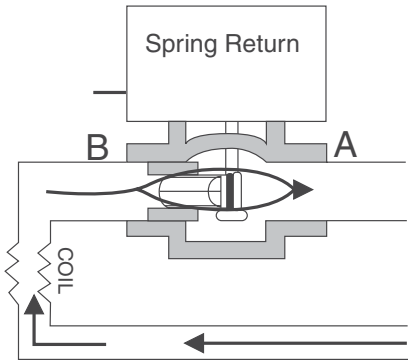


Figure 2 Two-Way Valve Normally Open.

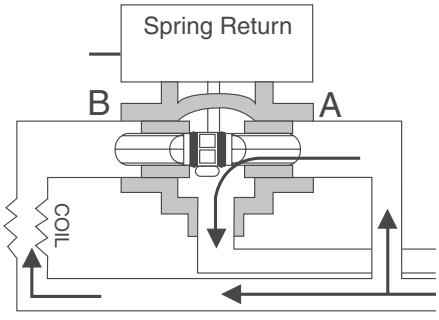


Figure 3 Three-Way Valve B Port Piped to Coil Outlet Normally Closed.

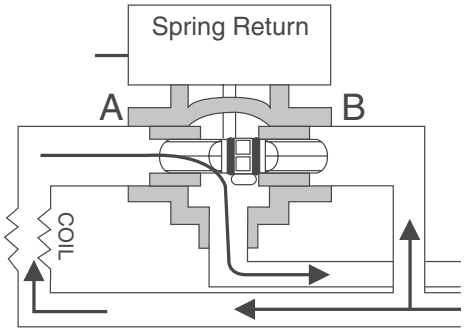


Figure 4 Three-Way Valve A Port Piped to Coil Outlet Normally Open

Two Position SR PopTop, 2/3-Way VT/VS Assemblies Flow Pattterns

Two-Position Spring Return PopTop Two-Way and Three-Way VT/VS Assemblies Flow Patterns

The VT/VS series are two-position spring return valves. When powered, the actuator moves to the desired position, tensing the spring return system. When power is removed the acutator returns to the normal position.

The VT/VS series two-position spring return valves can be purchased with an optional built-in auxiliary SPDT end switch for interfacing or signaling; for example, zone pump burner control.

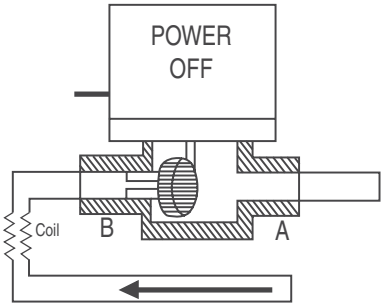


Figure 5 Two-Way Valve with Normally Closed Actuator.

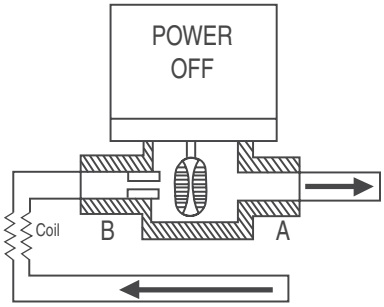


Figure 6 Two-Way Valve with Normally Open Actuator.

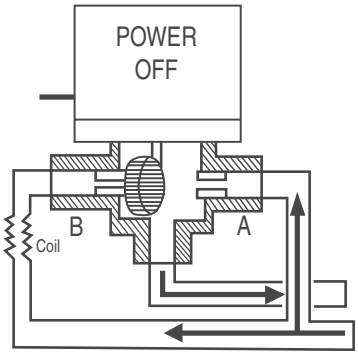


Figure 7 Three-Way Valve in Mixing Configuration Normally Closed to the Coil.

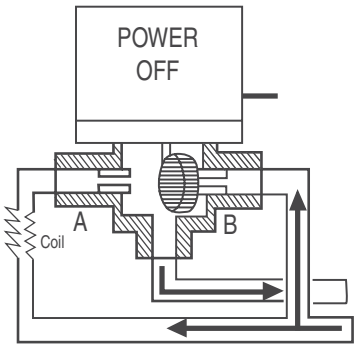


Figure 8 Three-Way Valve in Mixing Configuration Normally Open to the Coil.

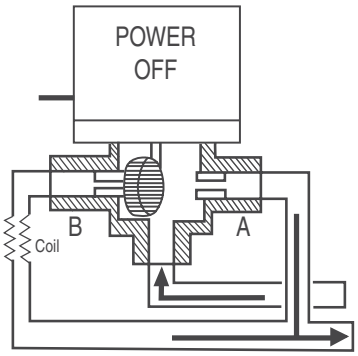


Figure 9 Three-Way Valve in Diverting Configuration Normally Closed to the Coil.

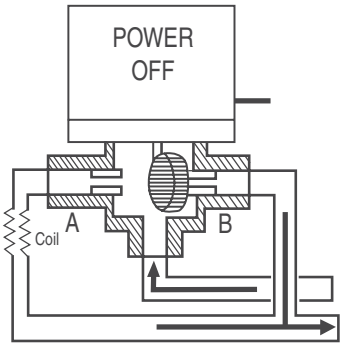


Figure 10 Three-Way Valve in Diverting Configuration Normally Open to the Coil.

13. Butterfly Valve Assemblies



Butterfly Valve Actuators & Assembly Ordering

Product Description

Schneider Electric's butterfly valve line offers a wide range of two- and three-way sizes, along with electric non-spring return, and spring return actuator models that operate with on/off, floating, or proportional control signals.



All assemblies include industry leading butterfly valve features, stainless steel double "D" shafts, nylon 11 coated ductile iron disc machined to provide bubble tight shut off, minimum torque, and longer seat life. The tongue and groove resilient seat design with molded in O-ring eliminates the use of flange gaskets and allows for ease of maintenance or replacement of the resilient seat. These features provide years of optimum performance and reliability.

Applications

Typical applications include data centers, cooling towers, central system shutoff and bypass piping control, thermal storage, and chiller and boiler control.

Features

- 2…18" two-way assemblies and 2…16" three-way assemblies
- Chilled/hot water/glycol applications
- EPDM resilient seats with tongue and groove design and build in O-ring seal
- Stainless steel double D stem, requires no pins or screws to connect the disc and stem
- Extended neck design for temperature isolation and ease of insulation installation
- Nylon 11 coated ductile iron disc
- Wide choice of pneumatic and electric actuators and control signals
- Cast iron lug bodies mate with ANSI class 125/150 flanges
- Bubble tight shut off
- Bidirectional Flow
- Series S70 NEMA 4 actuators available in 24 or 120 Vac

Part Numbering System – Rubber Lined

V x x x – 6 x x x – x x x x – x – x x

Control Signal Type
A = 2-Position
B = Body only
F = Floating (SPDT, center off)
S = Proprotional (Vdc, mAdc)

Disc
F = Full 175 psi close to 12"
U = Undercut 50 psi close

Accessory
S = Auxilary switch
Leave the digit blank for no accessories

Type
6 = Butterfly

Style
2 = 2-Way
3 = 3-Way

Power Loss Action
0 = NSR
1 = NO
2 = NC

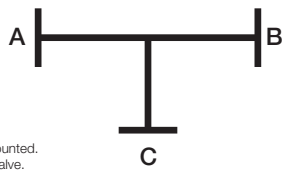
Actuator Code
See Table 1
If actuator code is only three digits, leave the fourth digit blank.

Body Style
L = Nylon disc and lug body
M = AlumBronze Disc*
SS = Stainless Steel Disc*
*Note: (Consult Factory)

Port Code
11 = 2"
12 = 2.5"
13 = 3"
14 = 4"
15 = 5"
16 = 6"
17 = 8"
18 = 10"
19 = 12"
20 = 14"
21 = 16"
22 = 18"
*Note:
Larger Sizes
(Consult Factory)

Flow Pattern[b]
0 = 2-Way
C = 3-Way

Configuration Number	Main Valve[a]	Main Valve Position[c]	Linked Valve
1	A	NC	C
2	B	NC	C
7	B	NO	C
8	A	NO	C



a. The letter indicates the main valve and where the actuator is mounted.
b. The view represented is looking down on the stem side of the valve.
c. Spring return models position on loss of power

Three-way valves are configurable during the order process. When placing an order manually through customer care please note the Configuration Number above. When ordering online through iPortal, please select the proper configuration from the drop-downs on the Cart Page. Refer to flow diagram above.

Butterfly Valve Actuators & Assembly Ordering

Table 1: Actuator Codes and Part Numbers[a]

Actuator Code[b]	**On/Off or Floating SR**	**Actuator Code[b]**	**Modulating (2…10 Vdc, 4…20mA) SR with the addition of a 500 ohm resistor**
556	MA41-7153 (VAx) (On/Off)	556	MS41-7153 (VSx)
556D	2 MA41-7153 (VAx) (On/Off)	556D	2 MS41-7153 (VSx) (Modulating)
556	MF41-7153 (VFx) (Floating)	–	–
556D	2 MF41-7153 (VFx) (Floating)		
Actuator Code[b]	**On/Off or Floating SR with Two SPDT Auxiliary Switches**	**Actuator Code[b]**	**Modulating (2…10 Vdc, 4…20 mA) SR with the addition of a 500 ohm resistor with Two Auxiliary Switches**
556	1 MA41-7153-502 (VAxS) (On/Off)	556	MS41-7153-502 (VSxS) (Modulated)
556D	1 MA41-7153 & 1 MA41-7153-502 (VAxS) (On/Off)	556D	1 MS41-7153 & 1 MS41-7153-502 (VSxS) (Modulated)
556	1 MF41-7153-502 (VFxS) (Floating)	–	–
556D	1 MF41-7153 & 1 MF41-7153-502 (VFxS) (Floating)		
Actuator Code[b]	**On/Off or Floating NSR**	**Actuator Code[b]**	**Modulating (0…10 Vdc, 4…20 mA) NSR**
E24	NR-2216-521 (VFx)	E24	NR-2216-541 (VSx)
E25	NR-2224-521 (VFx)	E25	NR-2224-541 (VSx)
E25D	2 NR-2224-521 (VFx)	E25D	2 NR-2224-541 (VSx)
Actuator Code[b]	**On/Off or Floating NSR with Two SPDT Auxiliary Switches**	**Actuator Code[b]**	**Modulating (0…10 Vdc, 4…20 mA) NSR with Two SPDT Auxiliary Switches**
E24	NR-2216-522 (VFxS)	E24	NR-2216-542 (VSxS)
E25	NR-2224-522 (VFxS)	E25	NR-2224-542 (VSxS)
E25D	1 NR-2224-521 & 1 NR-2224-522 (VFxS)	E25D	1 NR-2224-541 & 1 NR-2224-542 (VSxS)
Actuator Code[c]	**On/Off NSR with Two SPDT Auxiliary Switches and Heater**	**Actuator Code[c]**	**Modulating (0…10 Vdc, 4…20 mA) NSR with Two SPDT Auxiliary Switches and Heater**
E10	S70-120-0061-H (VAxS)	E12	S70-120-0061-SV (VAxS)
E20	S70-120-0121-H (VAxS)	E22	S70-120-0121-SV (VSxS)
E30	S70-120-0201-H (VAxS)	E32	S70-120-0201-SV (VSxS)
E40	S70-120-0301-H (VAxS)	E42	S70-120-0301-SV (VSxS)
E50	S70-120-0501-H (VAxS)	E52	S70-120-0501-SV (VSxS)
E60 (120 Vac only)	S70-120-0651-H (VAxS)	E62 (120 Vac only)	S70-120-0651-SV (VSxS)

a. See Table 2 to verify the correct actuator application for the valve selected.
b. D = Dual actuators
c. For 24 Vac powered change actuator code E to F (F10 = S70-24-0061-H example)

All of these can be ordered as "F" instead of "E" for 24v Power

2 and 3 Way Butterfly Valve Assemblies

Table 2: Two-Way and Three-Way Valve Assemblies

Size	Close Off	Two-Way Butterfly Valve Assemblies[a]			Three-Way Butterfly Valve Assemblies[a]		
		Schneider Electric Smart-X™ SR[b]	Direct Coupled NSR[c]	NEMA 4 with Hand Wheel NSR[c]	Schneider Electric SmartX SR[b]	Direct Coupled NSR[c]	NEMA 4 with Hand Wheel NSR[c]
2”	175	S	S	S	S	S	S
2.5”	175	S	S	S	S	S	S
3”	175	D	S	S	D	S	S
4”	50	D	S	–	D	S	S
	175	–	D	S	–	D	S
5”	50	–	S	S	–	D	S
	175	–	–	S	–	–	S
6”	50	–	D	–	–	D	S
	175	–	–	S	–	–	S
8”	50	–	–	S	–	–	S
	175	–	–	S	–	–	S
10”	50	–	–	S	–	–	S
	175	–	–	S	–	–	S
12”	50	–	–	S	–	–	S
	175	–	–	S	–	–	S
14”	50	–	–	S	–	–	S
	150	–	–	S	–	–	–
16”	50	–	–	S	–	–	S
18”	50	–	–	S	–	–	–

a. S = Single actuator, D = Dual actuators
b. SR = Spring return actuator available as configured for normally open and normally closed butterfly valves.
c. NSR = Non-spring return actuator.

Table 3: Actuator Features

Actuator Family	Spring Return	Available Input Signals	Available Options
Schneider Electric SmartX SR MX41-7153	Yes	24 Vac. Two Position, Floating, 2…10 Vdc, 4…20 mA with the addition of a 500 ohm resistor, Proportional	Auxiliary Switch
Direct Coupled NSR NR-22xx	No	24 Vac. Three Wire Two Position, Floating, 0…10 Vdc, 4…20 mA, Proportional	Auxiliary Switch
NEMA 4 with Hand Wheel NSR S70-xxx-	No	120 Vac. or 24 Vac. Three Wire Two Position, Floating, 0…10 Vdc, 4…20 mA, Proportional	Auxiliary Switch (standard) and Heater (standard)

SmartX 2”…4” 2 and 3-Way Spring Return Actuators

Specifications

Actuator Code 556, 556D (Mx41-7153 Series)

Power Loss Mode	Spring return
Control Signal	On/off, floating, or proportional 2…10 Vdc., 4…20 mA with the addition of a 500 ohm resistor
Power Requirements	24 Vac ± 20%, 22…30 Vdc, 9.7VA.
Environment	NEMA 2
Ambient Temperatures	–22…140 °F (–12…60 °C).
Agency Listings	UL, CUL, CE.
Manual Operator	Provided on single mount units.
Option	Auxiliary switches 7 A @250 Vac.



SmartX Spring Return
Mx41-7153 Actuator

Model Number	Actuator Code	Power	Input Signal	Feedback	Power Loss Mode	Accessories
MA41-7153	556 or 556D[b]	24 Vac	On/off	–	SR	–
MF41-7153			Floating			
MS41-7153			2 to 10 Vdc	2 to 10 Vdc		
MA41-7153-502			On/off	–		Two SPDT Auxiliary Switches[a]
MF41-7153-502			Floating			
MS41-7153-502			2 to 10 Vdc	2 to 10 Vdc		

a. Optional. The first part number field of the valve assembly must call out VxxS-6xxx. Note models with 556D actuator code that require auxiliary switch option will ship with one actuator without switches and one actuator with auxiliary switches.
b 556D = Dual Actuators



Non-Spring Return
NR-22xx-5xx Actuator

NR-22xx 2”…6” 2 and 3-Way Non-Spring Return Actuators

Model Number	Actuator Code	Power	Input Signal	Feedback	Power Loss Mode	Accessories
NR-2216-521	E24	24 Vac	On/off, floating	–	NSR	–
NR-2216-522						Two SPDT Auxiliary Switches[a]
NR-2216-541			0…10 Vdc , 4…20 mA	0…10 Vdc		–
NR-2216-542						Two SPDT Auxiliary Switches[a]
NR-2224-521	E25 or E25D[b]		On/off, floating	–		–
NR-2224-522						Two SPDT Auxiliary Switches[a]
NR-2224-541			0…10 Vdc , 4…20 mA	0…10 Vdc		–
NR-2224-542						Two SPDT Auxiliary Switches[a]

a. Optional. The first part number field of the valve assembly must call out VxxS-6xxx. Note models with E25D actuator code that require auxiliary switch option will ship with one actuator without switches and one actuator with auxiliary switches.
b E25D = Dual Actuators

Specifications

Actuator Code E24, E25, E25D (NR-2000 Series)

Power Loss Mode	Non-spring return.
Control Signal	On/off, floating, or 2 to 10 Vdc, 4…20 mA.
Power Requirements	20 to 30 Vac, 24 Vdc ± 10% NR-2216 6.5VA, NR-2224 7.5VA
Environment	NEMA 2.
Ambient Temperatures	–4 to 122 °F (–2 to 50 °C).
Agency Listings	UL, CSA, CE.
Optional Auxiliary Switch	2 SPDT 24 Vac 1.5 A inductive, 3 A resistive, 35 VA per switch.
Manual Operator	Provided on all models.

S70 2”…18” 2-Way & 2”…16” 3-Way Non-Spring Return Actuators



Non-Spring Return S70-xxxx Actuator

Model Number	Actuator Code	Power[a]	Input Signal	Feedback	Power Loss Mode	Accessories
S70-120-0061-H (VAxS)	E10	E=120 Vac F=24 Vac	On/off, floating	–	NSR	Two SPDT Auxiliary Switches and heater (standard)
S70-120-0121-H (VAxS)	E20					
S70-120-0201-H (VAxS)	E30					
S70-120-0301-H (VAxS)	E40					
S70-120-0501-H (VAxS)	E50					
S70-120-0651-H (VAxS)	E60 (120 Vac Only)					
S70-120-0061-SV (VSxS)	E12		0…10 Vdc, 4…20 mA	0…10 Vdc, 4…20 mA		
S70-120-0121-SV (VSxS)	E22					
S70-120-0201-SV (VSxS)	E32					
S70-120-0301-SV (VSxS)	E42					
S70-120-0501-SV (VSxS)	E52					
S70-120-0651-SV (VSxS)	E62 (120 Vac Only)					

a. For 24 Vac valve assemblies use F in place of E in the third field (VAFS-6200-F10-L-11). E10 becomes F10 for 24 Vac powered. (F10 actuator code=S70-24-0061-H actuator). For additional voltages contact customer service.

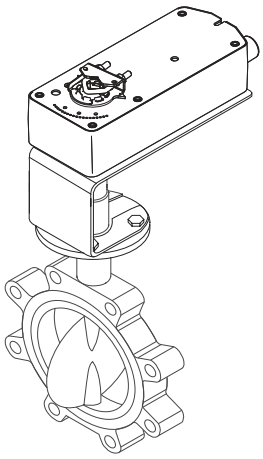
Specifications

Actuator Code (70 Series)

Power Loss Mode	Non-spring return.
Control Signal	
Actuator Code	Ex0 (120 Vac) or Fx0 (24 Vac) On/off, floating
Actuator Code	Ex2 (120 Vac) or Fx2 (24 Vac) Factory configured for 4…20 mA with a 250 W input impedance, field configrable for 0…10 Vdc or 2…10 Vdc.
Power Requirements	120 Vac or 24 Vac, 50/60 Hz.
E1x/F1x	1.5[a]
E2x/F2x,E3x/F3x	2.1[a]
E4x/F4x,E5x/F5x,E6x	3.0[a]
Environment	NEMA 4.
Ambient Temperatures	–40 to 150 °F (–40 to 60 °C).
Agency Listings	UL, CSA, CE.
Standard Auxiliary Switch	(Included) 10 A resistive at 125/250 Vac, 1/2 A at 125 Vdc.
Heater	15 W.
Manual Operator with Disconnect	Hand wheel with power disconnect provided on all S70 actuator models.

For wiring and dimensions refer to those sections.

2"…4" Lug Bodies 2-Way Spring Return N.C.



Flow Type		Equal % bidirectional.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc	Ductile iron nylon 11 coated disc.
Fluid Temperatures		-40 to 250°F (-40 to 121°C).
Close-Off Rating		ANSI VI Bubble tight.
Application		Chilled or hot water up to 60% glycol.

Two-Way

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position	Floating	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VAF-6220-556-L-11	VFF-6220-556-L-11	VSF-6220-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-6220-556-L-12	VFF-6220-556-L-12	VSF-6220-556-L-12	24
3	461 (399)	175 (1207)	VAF-6220-556D-L-13	VFF-6220-556D-L-13	VSF-6220-556D-L-13	24
4	841 (727)	50 (345)	VAU-6220-556D-L-14	VFF-6220-556D-L-14	VSF-6220-556D-L-14	24

Vxxx-6220-556x-L-xx

Actuator Code Table.

Actuator Codes	Model Prefix[a]	Actuator Model	Description
556[b]	VAxx	MA41-7153	24 Vac, on/off, SR
556[bc]	VAxS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches
556[b]	VFxx	MF41-7153	24 Vac, Floating, SR
556[bc]	VFxS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches
556[b]	VSxx	MS41-7153	24 Vac, Modulating, SR
556[bc]	VSxS	MS41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches

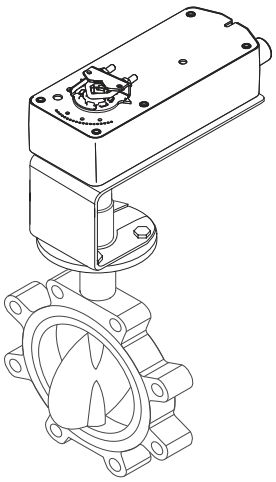
[a] For optional two SPDT auxiliary switch models the letter "S" must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

[c] Dual mounted application. One Mx41-7153 and one Mx41-7153-502 are supplied.

For wiring and dimensions refer to those sections.

2"…4" Lug Bodies 2-Way Spring Return N.O.



Flow Type		Equal % bidirectional.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc	Ductile iron nylon 11 coated disc.
Fluid Temperatures		-40 to 250°F (-40 to 121°C).
Close-Off Rating		ANSI VI Bubble tight.
Application		Chilled or hot water up to 60% glycol.

Two-Way Normally Open Assemblies

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position	Floating	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VAF-6210-556-L-11	VFF-6210-556-L-11	VSF-6210-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-6210-556-L-12	VFF-6210-556-L-12	VSF-6210-556-L-12	24
3	461 (399)	175 (1207)	VAF-6210-556D-L-13	VFF-6210-556D-L-13	VSF-6210-556D-L-13	24
4	841 (727)	50 (345)	VAU-6210-556D-L-14	VFU-6210-556D-L-14	VSU-6210-556D-L-14	24

Vxxx-6210-556x-L-xx

Actuator Code Table.

Actuator Codes	Model Prefix[a]	Actuator Model	Description
556[b]	VAxx	MA41-7153	24vac, on/off, SR
556[bc]	VAxS	MA41-7153-502	24vac, on/off, SR, 2-SPDT aux switches
556[b]	VFxx	MF41-7153	24vac, Floating, SR
556[bc]	VFxS	MF41-7153-502	24vac, Floating, SR, 2-SPDT aux switches
556[b]	VSxx	MS41-7153	24vac, modulating, SR
556[bc]	VSxS	MS41-7153-502	24vac, on/off, SR, 2-SPDT aux switches

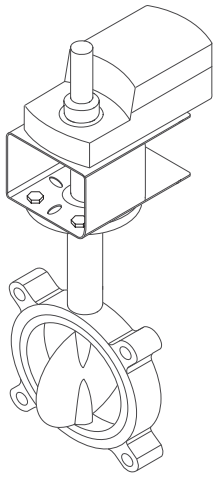
[a] For optional two SPDT auxiliary switch models the letter “S” must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

[c] Dual mounted application. One Mx41-7153 and one Mx41-7153-502 are supplied.

For wiring and dimensions refer to those sections.

2"…6" Lug Bodies 2-Way Non-Spring Return Rubberlined



Flow Type		Equal % bidirectional.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc	Ductile iron nylon 11 coated disc.
Fluid Temperatures		-40 to 250°F (-40 to 121°C).
Close-Off Rating		ANSI VI Bubble tight.
Application		Chilled or hot water up to 60% glycol.

Size in.	Cv (K_{VS}) @ 90°	Close-Off Pressure psi (kPa)	Two Position or Floating	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VFF-6200-E24-L-11	VSF-6200-E24-L-11	24
2.5	282 (244)	175 (1207)	VFF-6200-E24-L-12	VSF-6200-E24-L-12	24
3	461 (399)	175 (1207)	VFF-6200-E25-L-13	VSF-6200-E25-L-13	24
4	841 (727)	175 (1207)	VFF-6200-E25D-L-14	VSF-6200-E25D-L-14	24
		50 (345)	VFU-6200-E25-L-14	VSU-6200-E25-L-14	24
5	1376 (1190)		VFU-6200-E25-L-15	VSU-6200-E25-L-15	24
6	1850 (1600)		VFU-6200-E25D-L-16	VSU-6200-E25D-L-16	24

Actuator Code Table.

Vxxx-6200-E2xx-L-xx

Actuator Codes	Model Prefix[a]	Actuator Model	Description
E24	VFxx	NR-2216-521	24 Vac, Floating, on/off, NSR
E24	VFxS	NR-2216-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux Switch
E24	VSxx	NR-2216-541	24 Vac, Modulated, NSR
E24	VSxS	NR-2216-542	24 Vac, Modulated, NSR, 2 SPDT aux Switch
E25[b]	VFxx	NR-2224-521	24 Vac, Floating, on/off, NSR
E25[bc]	VFxS	NR-2224-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux Switch
E25[b]	VSxx	NR-2224-541	24 Vac, Modulated, NSR
E25[bc]	VSxS	NR-2224-542	24 Vac, Modulated, NSR, 2 SPDT aux Switch

[a] For optional two SPDT auxiliary switch models the letter “S” must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

[c] Dual mounted application. One NR-22xx-5x2 and one NR-22xx-5xx are supplied.

For wiring and dimensions refer to those sections.

Butterfly Valves 2-Way Non-Spring Return

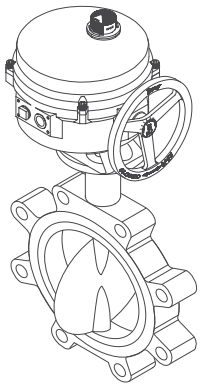
Actuator Code Table
VxxS-6200-Exx-L-xx

Actuator Codes	Model Prefix	Actuator Model	Description
E10	VAxS	S70-0051-H	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override
E20		S70-0121-H	
E30		S70-0201-H	
E40		S70-0301-H	
E50		S70-0501-H	
E60		S70-0651-H	
E12	VSxS	S70-0051-SVH	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override
E22		S70-0121-SVH	
E32		S70-0201-SVH	
E42		S70-0301-SVH	
E52		S70-0501-SVH	
E62		S70-0651-SVH	

Actuator Code Table
VxxS-6200-Fxx-L-xx

Actuator Codes	Model Prefix	Actuator Model	Description
F10	VAxS	S70-24-0051-H	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override
F20		S70-24-0121-H	
F30		S70-24-0201-H	
F40		S70-24-0301-H	
F50		S70-24-0501-H	
E60		S70-24-0651-H	
F12	VSxS	S70-24-0051-SVH	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override
F22		S70-24-0121-SVH	
F32		S70-24-0201-SVH	
F42		S70-24-0301-SVH	
F52		S70-24-0501-SVH	

2"…18" Lug Bodies 2-Way Non-Spring Return w/Hand Wheel



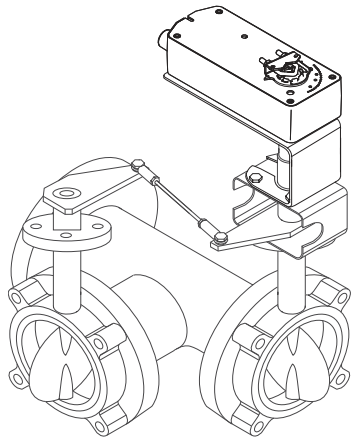
Flow Type		Equal % bidirectional.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc	Ductile iron nylon 11 coated disc.
Fluid Temperatures		-40 to 250°F (-40 to 121°C).
Close-Off Rating		ANSI VI Bubble tight.
Application		Chilled or hot water up to 60% glycol.

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VAFS-6200-E10-L-11	VSFS-6200-E12-L-11	120
2.5	282 (244)	175 (1207)	VAFS-6200-E10-L-12	VSFS-6200-E12-L-12	120
3	461 (399)	175 (1207)	VAFS-6200-E10-L-13	VSFS-6200-E12-L-13	120
4	841 (727)	50 (345)	VAUS-6200-E10-L-14	VSUS-6200-E12-L-14	120
		175 (1207)	VAFS-6200-E10-L-14	VSFS-6200-E12-L-14	120
5	1376 (1190)	50 (345)	VAUS-6200-E10-L-15	VSUS-6200-E12-L-15	120
		175 (1207)	VAFS-6200-E20-L-15	VSFS-6200-E22-L-15	120
6	1850 (1600)	50 (345)	VAUS-6200-E20-L-16	VSUS-6200-E22-L-16	120
		175 (1207)	VAFS-6200-E20-L-16	VSFS-6200-E22-L-16	120
8	3316 (2868)	50 (345)	VAUS-6200-E20-L-17	VSUS-6200-E22-L-17	120
		175 (1207)	VAFS-6200-E30-L-17	VSFS-6200-E32-L-17	120
10	5430 (4697)	50 (345)	VAUS-6200-E30-L-18	VSUS-6200-E32-L-18	120
		175 (1207)	VAFS-6200-E40-L-18	VSFS-6200-E42-L-18	120
12	8077 (6987)	50 (345)	VAUS-6200-E40-L-19	VSUS-6200-E42-L-19	120
		175 (1207)	VAFS-6200-E50-L-19	VSFS-6200-E52-L-19	120
14	10538 (9115)	50 (345)	VAUS-6200-E50-L-20	VSUS-6200-E52-L-20	120
		1750 (1207)	VAFS-6200-E60-L-20	VSFS-6200-E62-L-20	120
16	13966 (12081)	50 (345)	VAUS-6200-E60-L-21	VSUS-6200-E62-L-21	120
18	17214 (14890)	50 (345)	VAUS-6200-E60-L-22	VSUS-6200-E62-L-22	120

* For 24 Vac powered change two-position or proportional "E" code to "F," e.g. VAFS-6200-F10-L-11"

For wiring and dimensions refer to those sections.

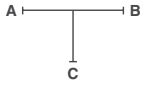
2"…4" Lug Bodies 3-Way Spring Return N.C.



Flow Type		Equal % linear bidirectional. Mixing or diverting configurations.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc	Ductile iron nylon 11 coated disc.
Fluid Temperatures		-40 to 250°F (-40 to 121°C).
Close-Off Rating		ANSI VI Bubble tight.
Application		Chilled or hot water up to 60% glycol.

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position[a]	Floating[a]	Proportional[a]	Voltage Vac
2	144 (125)	175 (1207)	VAF-632x-556-L-11	VFF-632x-556-L-11	VSF-632x-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-632x-556D-L-12	VFF-632x-556D-L-12	VSF-632x-556D-L-12	24
3	461 (399)	175 (1207)	VAF-632x-556D-L-13	VFF-632x-556D-L-13	VSF-632x-556D-L-13	24
4	841 (727)	50 (345)	VAU-632x-556D-L-14	VFU-632x-556D-L-14	VSU-632x-556D-L-14	24

[a] Select 1, 2 or C for the "x".
1 = Actuator is mounted on the main valve at "A" and is NC.
2 = Actuator is mounted on the main valve at "B" and is NC.
The linked valve for 1 and 2 is "C".
C = Configurable option at time of ordering in iPortal.



Actuator Code Table.

Vxxx-632x-556x-L-xx

Actuator Codes	Model Prefix[a]	Actuator Model	Description
556[b]	VAxx	MA41-7153	24 Vac, on/off, SR
556[bc]	VAxS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches
556[b]	VFxx	MF41-7153	24 Vac, Floating, SR
556[bc]	VFxS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches
556[b]	VSxx	MS41-7153	24 Vac, Modulating, SR
556[bc]	VSxS	MS41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches

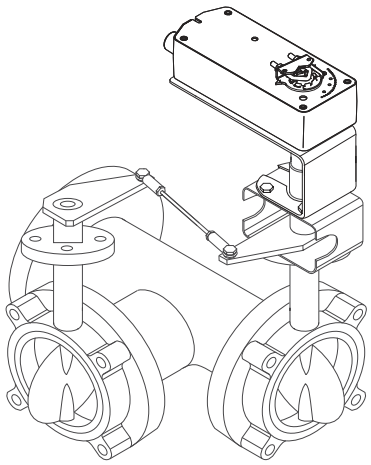
[a] For optional two SPDT auxiliary switch models the letter "S" must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

[c] Dual mounted application. One Mx41-7153 and one Mx41-7153-502 are supplied.

For wiring and dimensions refer to those sections.

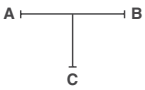
2"…4" Lug Bodies 3-Way Spring Return N.O.



Flow Type		Equal % linear bidirectional. Mixing or diverting configurations.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc	Ductile iron nylon 11 coated disc.
Fluid Temperatures		-40 to 250°F (-40 to 121°C).
Close-Off Rating		ANSI VI Bubble tight.
Application		Chilled or hot water up to 60% glycol.

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position[a]	Floating[a]	Proportional[a]	Voltage Vac
2	144 (125)	175 (1207)	VAF-631x-556-L-11	VFF-631x-556-L-11	VSF-631x-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-631x-556D-L-12	VFF-631x-556D-L-12	VSF-631x-556D-L-12	24
3	461 (399)	175 (1207)	VAF-631x-556D-L-13	VFF-631x-556D-L-13	VSF-631x-556D-L-13	24
4	841 (727)	50 (345)	VAU-631x-556D-L-14	VFU-631x-556D-L-14	VSU-631x-556D-L-14	24

[a] Select 7 or 8 for the "x".
8 = Actuator is mounted on the main valve at "A" and is NO.
7 = Actuator is mounted on the main valve at "B" and is NO.
The linked valve for 7 and 8 is "C".
C = Configurable option at time of ordering in iPortal.



Actuator Code Table.

Vxxx-631x-556x-L-xx

Actuator Codes	Model Prefix[a]	Actuator Model	Description
556[b]	VAxx	MA41-7153	24 Vac, on/off, SR
556[bc]	VAxS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches
556[b]	VFxx	MF41-7153	24 Vac, Floating, SR
556[bc]	VFxS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches
556[b]	VSxx	MS41-7153	24 vac, Modulating, SR
556[bc]	VSxS	MS41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches

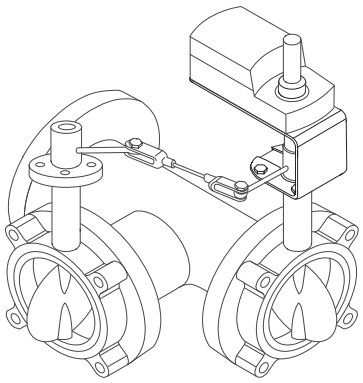
[a] For optional two SPDT auxiliary switch models the letter "S" must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

[c] Dual mounted application. One Mx41-7153 and one Mx41-7153-502 are supplied.

For wiring and dimensions refer to those sections.

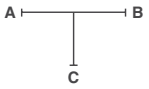
2"…6" Lug Bodies 3-Way Non-Spring Return



Flow Type		Equal % linear bidirectional. Mixing or divering configuration.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc	Ductile iron nylon 11 coated disc.
Fluid Temperatures		-40 to 250°F (-40 to 121°C).
Close-Off Rating		ANSI VI Bubble tight.
Application		Chilled or hot water up to 60% glycol.

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	On/Off or Floating[a]	Proportional[a]	Voltage Vac
2	144 (125)	175 (1207)	VFF-630x-E24-L-11	VSF-630x-E24-L-11	24
2.5	282 (244)	175 (1207)	VFF-630x-E25-L-12	VSF-630x-E25-L-12	24
3	461 (399)	175 (1207)	VFF-630x-E25-L-13	VSF-630x-E25-L-13	24
4	841 (727)	175 (1207)	VFF-630x-E25D-L-14	VSF-630x-E25D-L-14	24
		50 (345)	VFU-630x-E25-L-14	VSU-630x-E25-L-14	24
5	1376 (1190)		VFU-630x-E25D-L-15	VSU-630x-E25D-L-15	24
6	1850 (1600)		VFU-630x-E25D-L-16	VSU-630x-E25D-L-16	24

[a] Select 1 or 2 for the "x".
1 = Actuator is mounted on the main valve at "A" and is NC.
2 = Actuator is mounted on the main valve at "B" and is NC.
The linked valve for 1 and 2 is "C".
C = Configurable option at time of ordering in iPortal.



Actuator Code Table.

Vxxx-E2xx-L-xx

Actuator Codes	Model Prefix[a]	Actuator Model	Description
E24	VFxx	NR-2216-521	24 Vac, Floating, on/off, NSR
E24	VFxS	NR-2216-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux switch
E24	VSxx	NR-2216-541	24 Vac, Modulated, NSR
E24	VSxS	NR-2216-542	24 Vac, Modulated, NSR, 2 SPDT aux switch
E25[b]	VFxx	NR-2224-521	24 Vac, Floating, on/off, NSR
E25[bc]	VFxS	NR-2224-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux switch
E25[b]	VSxx	NR-2224-541	24 Vac, Modulated, NSR
E25[bc]	VSxS	NR-2224-542	24 Vac, Modulated, NSR, 2 SPDT aux switch

For wiring and dimensions refer to those sections.

[a] For optional two SPDT auxiliary switch models the letter "S" must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting (E25D).

[c] Dual mounted application. One NR-22xx-5x1 and one NR-22xx-5x2 are supplied.

2"…6" Lug Bodies 3-Way Non-Spring Return

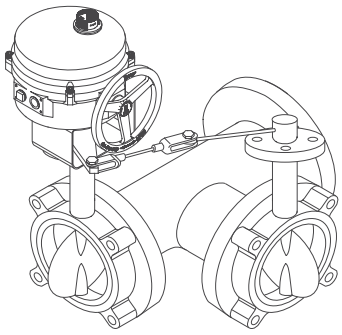
Actuator Code Table
VxxS-630x-Exx-L-xx

Actuator Codes	Model Prefix	Actuator Model	Description
E10	VAxS	S70-0051-H	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override
E20		S70-0121-H	
E30		S70-0201-H	
E40		S70-0301-H	
E50		S70-0501-H	
E60		S70-0651-H	
E12	VSxS	S70-0051-SVH	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override
E22		S70-0121-SVH	
E32		S70-0201-SVH	
E42		S70-0301-SVH	
E52		S70-0501-SVH	
E62		S70-0651-SVH	

Actuator Code Table
VxxS-630x-Fxx-L-xx

Actuator Codes	Model Prefix	Actuator Model	Description
F10	VAxS	S70-24-0051-H	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override
F20		S70-24-0121-H	
F30		S70-24-0201-H	
F40		S70-24-0301-H	
F50		S70-24-0501-H	
E60		S70-24-0651-H	
F12	VSxS	S70-24-0051-SVH	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override
F22		S70-24-0121-SVH	
F32		S70-24-0201-SVH	
F42		S70-24-0301-SVH	
F52		S70-24-0501-SVH	

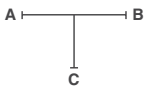
2"…16" Lug Bodies 3-Way Non-Spring Return w/Hand Wheel



Flow Type		Equal % linear bidirectional. Mixing or diverting configurations.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc	Ductile iron nylon 11 coated disc.
Fluid Temperatures		-40 to 250°F (-40 to 121°C).
Close-Off Rating		ANSI VI Bubble tight.
Application		Chilled or hot water up to 60% glycol.

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position[a]	Proportional[a]	Voltage Vac
2	144 (125)	175 (1207)	VAFS-630x-E10-L-11	VSFS-630x-E12-L-11	120
2.5	282 (244)	175 (1207)	VAFS-630x-E10-L-12	VSFS-630x-E12-L-12	120
3	461 (399)	175 (1207)	VAFS-630x-E10-L-13	VSFS-630x-E12-L-13	120
4	841 (727)	50 (345)	VAUS-630x-E10-L-14	VSUS-630x-E12-L-14	120
		175 (1207)	VAFS-630x-E10-L-14	VSFS-630x-E12-L-14	120
5	1376 (1190)	50 (345)	VAUS-630x-E10-L-15	VSUS-630x-E12-L-15	120
		175 (1207)	VAFS-630x-E20-L-15	VSFS-630x-E22-L-15	120
6	1850 (1600)	50 (345)	VAUS-630x-E20-L-16	VSUS-630x-E22-L-16	120
		175 (1207)	VAFS-630x-E20-L-16	VSFS-630x-E22-L-16	120
8	3316 (2868)	50 (345)	VAUS-630x-E20-L-17	VSUS-630x-E22-L-17	120
		175 (1207)	VAFS-630x-E30-L-17	VSFS-630x-E32-L-17	120
10	5430 (4697)	50 (345)	VAUS-630x-E30-L-18	VSUS-630x-E32-L-18	120
		175 (1207)	VAFS-630x-E40-L-18	VSFS-630x-E42-L-18	120
12	8077 (6987)	50 (345)	VAUS-630x-E40-L-19	VSUS-630x-E42-L-19	120
		175 (1207)	VAFS-630x-E50-L-19	VSFS-630x-E52-L-19	120
14	10538 (9115)	50 (345)	VAUS-630x-E50-L-20	VSUS-630x-E52-L-20	120
		1750 (1207)	VAFS-630x-E60-L-20	VSFS-630x-E62-L-20	120
16	13966 (12081)	50 (345)	VAUS-630x-E60-L-21	VSUS-630x-E62-L-21	120

[a] Select 1 or 2 for the "x".
1 = Actuator is mounted on the main valve at "A" and is NC.
2 = Actuator is mounted on the main valve at "B" and is NC.
The linked valve for 1 and 2 is "C".
C = Configurable option at time of ordering in iPortal.



For wiring and dimensions refer to those sections.

Notes

14. Pressure Independant Valves and Actuators



Summary and Applications



actuators are CE c UL us LISTED

Product Description

The SmartX PIBCV range is a comprehensive selection of automatic balancing and control valves that provide flow limitation, with full control authority over hydronic regulation.

Automatic balancing within PIBCV valves provide stable flow regulation regardless of pressure fluctuations in the system and all valves have an adjustable flow limitation set point. The control valve portion of the PIBCV further regulates the water/glycol flow from close-off up to the maximum flow limit setting.

Typical applications are temperature control of chillers, air-handling units, heat exchanges and terminal units such as fan coils, induction units and radiant panels.

Features

- Reduced Energy Consumption
  - Pressure independence ensures no overflow of water/glycol through the valve. Limiting water/glycol flow to the design load of the coil has a significant effect on energy efficiency since systems operate for the majority of the time on a partial load.
  - The overflow of water/glycol causes a degradation in heat transfer at the heat exchanger. Uncontrolled overflow of water/glycol beyond the design flow of the heat exchanger is an extremely wasteful and inefficient use of heat.
  - The correct and maximum design flow ensures a high differential in supply and return temperatures to provide high operational efficiency of the chiller or boiler.
- Improved Comfort
  - The SmartX PIBCV valves are not affected by other valves in the system that may be opening and closing throughout the day or other piping system disturbances providing more constant, comfortable, room temperatures.
- Reduced Pumping Costs
  - A reduction in overflows through the network reduces pumping costs. A smaller pump head and equipment is required compared to traditional configurations.
- Reduced Installation Costs
  - Only one valve needs to be installed rather than two or three since the SmartX PIBCV covers the pressure balancing, flow limitation and control modulation.
- Easy and Quick Commissioning
  - SmartX PIBCV setup time is significantly reduced with a simple and accurate flow setting procedure without the need for flow charts, calculations or measuring equipment.
- Improved Reliability
  - Improved mechanical equipment reliability from reduced actuator movements.

Summary and Applications

SmartX PIBCV Summary

SmartX PIBCV valves and Actuators can be used with actuators for pressure independent balancing and control applications or without actuators for automatic flow limiting balance applications.

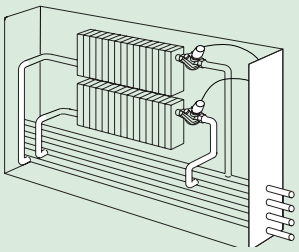
PIBCVs immediately react to all changes in system pressures, providing stable valve control independent from the fluctuating pressures in the piping system. No valve authority, pressure calculations or complicated valve flow setting calculations are required. At partial system load there is no resulting overflow because the valve always limits the flow corresponding to the design flow of the coil.

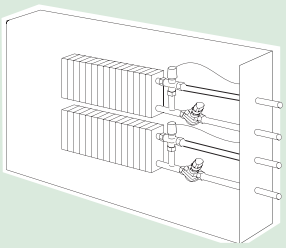
SmartX PIBCV valves with actuators include an integrated control valve with flow regulation for HVAC applications, plus an automatic flow limiting function for energy efficiency. A full range of Schneider Electric actuators are available for every control application including two position, proportional, floating, spring return open, spring return close, and non-spring return.

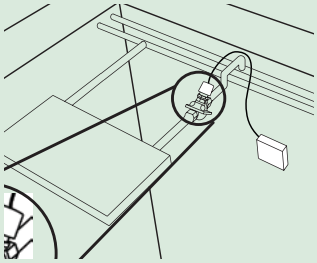
Applications

Variable flow systems: A SmartX PIBCV with a Schneider Electric actuator is used as a control valve for terminal units, like an AHU (Air Handling Unit), FCU (Fan Coil Unit) or radiation panel, and controls the required flow on every terminal unit maintaining hydronic balance in the system.

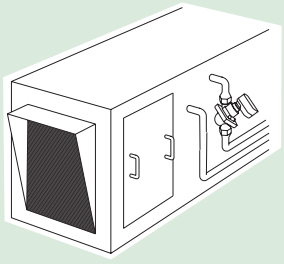
Constant flow systems: There are numerous applications in which SmartX PIBCV can be used. In a constant flow system with FCUs or in a one pipe heating system, SmartX PIBCVs can be installed as an automatic balancing valve in every riser. SmartX PIBCVs limit the flow to the set value, thus automatically achieving hydronic balance. Whenever an automatic flow limiter or a control valve is needed, the advantages of cost-saving properties are inherent with SmartX PIBCVs. This includes systems with (floor) heating/



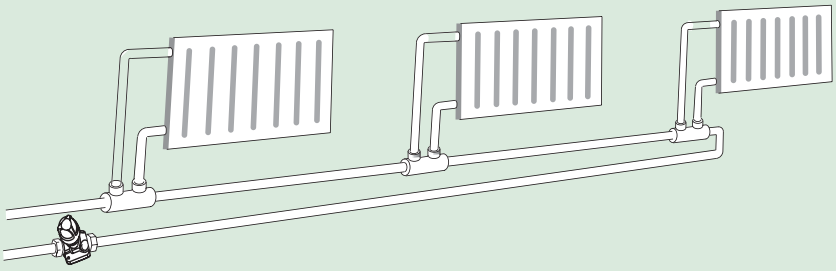




Radiation panel



Air handling unit (AHU)



Theory, Control Performance and Flow Direction

Theory

The SmartX PIBCV valve consists of two parts:

1. Differential Pressure Controller
2. Control Valve

1. Differential Pressure Controller (PC)

The differential pressure controller maintains a constant differential pressure across the control valve. The pressure difference is balanced so that when the differential pressure across the control valve changes (due to a change in available pressure, or movement of the control valve) the pressure regulator automatically aligns to a new position. This brings a new equilibrium and therefore keeps the differential pressure at a constant level.

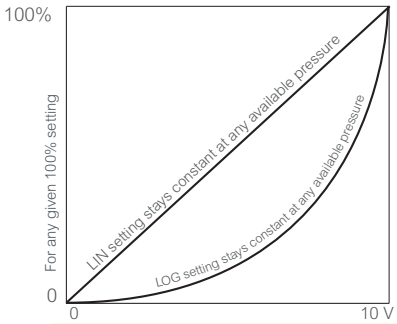
2. Control Valve (CV)

The control valve has a linear characteristic. It features a stroke limitation that allows adjustment of the value. The maximum flow allowed by the control valve can be adjustable to a percentage of the valve's maximum flow rate.

Control Performance

SmartX PIBCV actuators can be used to change the flow response from linear to logarithmic (equal percentage).

This makes the SmartX PIBCV suitable for all applications, including AHUs, where the equal percentage characteristic is needed to get a stable control loop. The actuators can be switched from linear to equal percentage by changing a dipswitch setting.



Easy Implementation

- No Cv or authority calculations needed. Flow is the only parameter to be considered when designing.
- Compact design, essential when only limited space is available such as in fan-coil units.
- Easy commissioning and troubleshooting. No specialized staff or measuring equipment needed.
- Trouble-free segmentation of the building project. SmartX PIBCVs will automatically control the flow, even when sections of the installation are unfinished. There is no requirement to re-adjust the SmartX PIBCV flow setting after finalization of the building project.

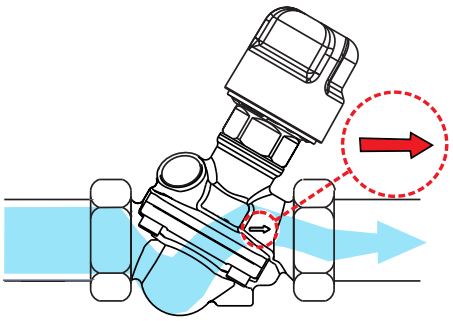
Flow Direction

A SmartX PIBCV valve is mono-directional, meaning the valve operates when the arrow on the valve body is aligned with the flow direction. When this rule is ignored, the valve acts as a variable orifice that causes water/glycol hammer at sudden closing when available pressure has increased, or the valve has been set to a lower value.

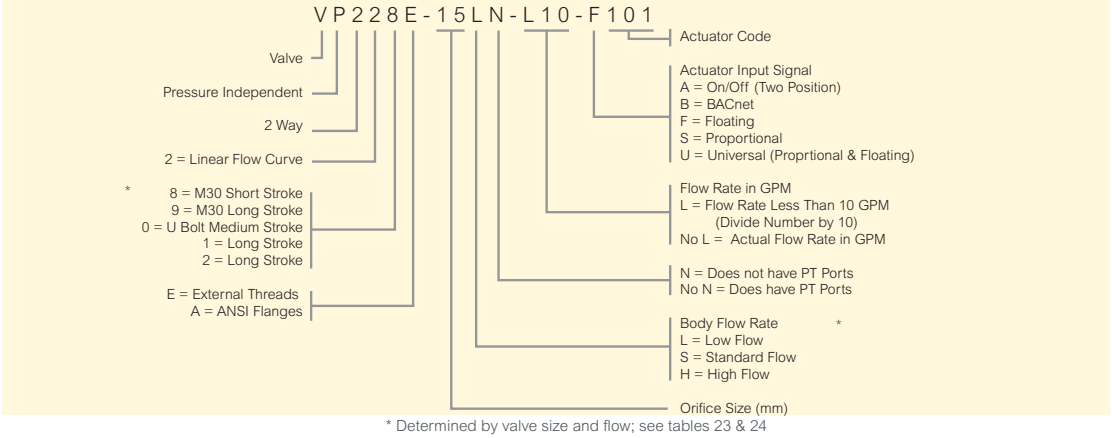
In the case when a system condition allows backflows, it is strongly recommended to use a backflow preventer in order to avoid possible water/glycol hammer that can damage the valve as well as other elements in the system.

It is recommended to fit a strainer upstream of the valve to increase reliability and to follow water/glycol treatment guidelines as detailed in VDI 2035.

The pipework system should be flushed prior to the operation.



Valve Assembly Part Number System



* Determined by valve size and flow; see tables 23 & 24

SmartX PIBCV Selection Options

There are three methods for selecting SmartX PIBCV valves and Actuators:

1: Complete Method: Valve Assembly Selection

2. Custom Method: Valve Body and Actuator Field Assembly

3. Valve Only Method: Automatic Flow Limited Balance

1: Complete Method: Valve Assembly Selection

To select a PIBCV valve assembly select the required flow rate and actuator type. For example, to select a PIBCV valve assembly with a flow rate of 1.5 GPM and a non-spring return proportional actuator refer to Table 1. Valve Assemblies ½…1¼" With Female NPT End Connectors, Without PT Ports on page 6.

Select the 1.5 GPM flow rate with the left column of the table.

Select the actuator from the top row of the table.

The intersecting valve assembly part number from the left column and top row selections shows VP228E-15SN-L15-S101 which includes the set 1.5 GPM flow rate, installed actuator, female NPT end connectors, and metal tag with flow rate.

Specifications for the selected valve body actuators are in Table 3. Specification ½…1¼" Valve Body Actuators on page 7 and for the valve body in Table 12. Specification Threaded Version, ½…2" on page 11.

2. Custom Method: Valve Body and Actuator Field Assembly

Select the individual parts then set the flow rate and field assemble a valve assembly.

Table 12. Specification Threaded Version, ½…2" on page 11 shows the valve body specifications and Table 23. ½…2" Valve Flow Ranges (Qmin to Qnom) on page 19, and Table 24. 2½"…10" Flanged Valve Flow Ranges (Qmin to Qnom) on page 20, show the valve body flow rate ranges.

For example, to select a valve body that can be used in the flow rate range of 1 to 2 GPM, from Table 23. ½…2" Valve Flow Ranges (Qmin to Qnom) on page 19, select the VP-228E-15BQSNT valve body that does not include PT ports, or select the VP-228E-15BSQ valve body if PT Ports are required.

Other larger valves could also provide the 1 to 2 GPM flow rates, but the VP-228E-15BQSNT was selected because it will be using a higher percentage of its flow range (in general, best accuracy is achieved when a higher percentage of flow rate is used).

The ½" to 2" PIBCV valves use convenient valve body tail pieces for connection to the piping system.

From Table 17. Selection: ½"…2" Valve Body Tail Pieces on page 14, select the desired ½" tail piece – part number 9112108015 for Female NPT, 9112110015 for Male NPT, or 9112109015 for Sweat. Each tail piece part number includes two tail pieces.

Table 3. Specification ½…1¼" Valve Body Actuators on page 7 shows the compatible actuators.

Select the MP131-24T for two position control, the MP131-24F for floating control, the MP-131-24MP for proportional control, the MP300-SRU for spring return open universal control, or the MP300-SRD for spring return close universal control. Universal control actuators provide both proportional and floating input functionality. The valve body flow can easily be set before the actuator is installed as shown in the PIBCV Flow Setting on page 5.

3. Valve Body Only: Automatic Flow Limited Balance Example

PIBCV valves can be used without actuators to limit the circuit flow to an adjustable flow rate.

Table 12. Specification Threaded Version, ½…2" on page 11 shows the valve body specifications and Table 23. ½…2" Valve Flow Ranges (Qmin to Qnom) on page 19 and Table 24. 2½"…10" Flanged Valve Flow Ranges (Qmin to Qnom) on page 20 show the valve body flow rate ranges.

For example, to select a valve body that can be used in the flow rate range of 2 to 5 GPM from Table 23 select the VP229E-15BQHNT valve body part number. The ½" to 2" PIBCV valves use convenient valve body tail pieces for connection to the piping system.

From Table 17. Selection: ½"…2" Valve Body Tail Pieces on page 14, select the desired ½" tail piece: part number 9112108015 for Female NPT, 9112110015 for Male NPT, or 9112109015 for Sweat. Each tail piece part number includes two tail pieces.

The 1-½" and larger sized valves require a stem lock when used without an actuator as shown in Table 11. Application: Operation of PIBCV Valve Body Without Actuator on page 10 (which also shows application information for the valve bodies without actuators). The valve body flow can easily be set as shown in the PIBCV Flow Setting Section.

PIBCV Flow Setting

½…1¼" Size Valves

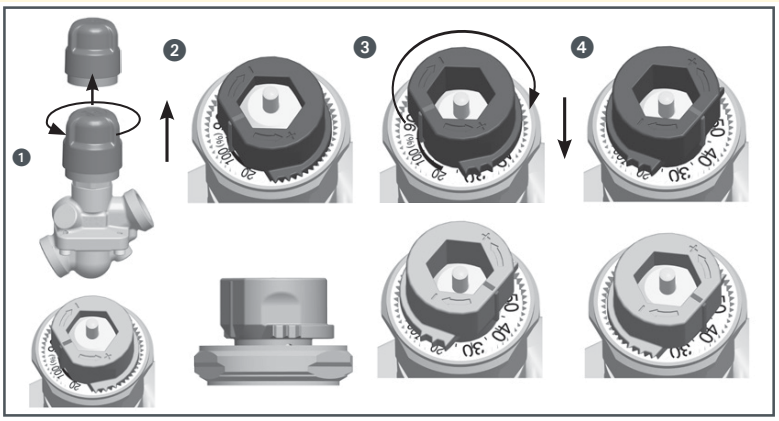
The calculated flow can be adjusted easily without using special tools. To change the presetting (factory setting is 100% for separately purchased PIBCV valve bodies) follow the four steps below:

1. Remove the black protective cover or the mounted actuator.
2. Raise the green pointer.
3. Turn (clock wise to decrease) to the new presetting.
4. Press the pointer back into the lock position. After the pointer is clicked back into place the presetting is locked.

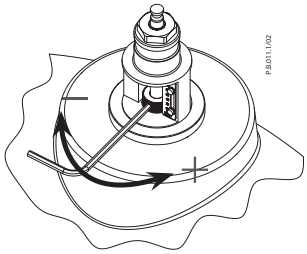
The presetting scale indicates values from 100% flow to 20%.

Clock wise turning would decrease the flow value while counter clock wise would increase it.

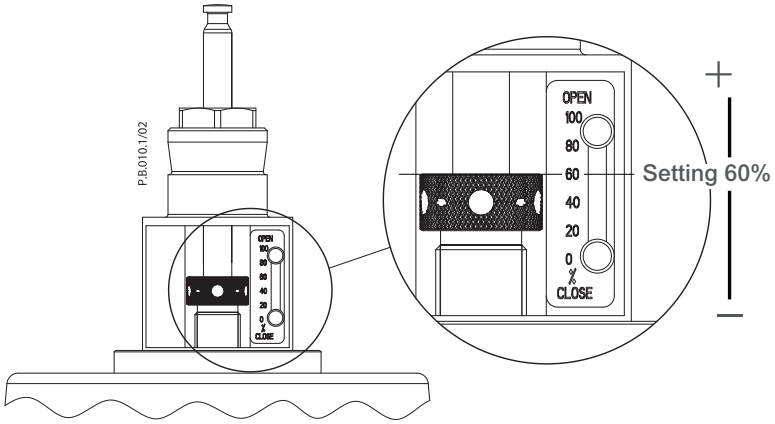
Example: VP229E-15HN
With this ½" valve the nom flow
= 5 gal/min = 100% presetting.
To set a flow of 4 gal/min you have to set: 4/5 = 80%.
Schneider Electric recommends a presetting/flow from 20% to 100%.
To set a PIBCV valve to a Q_{high} setting above 100%, turn the green pointer counter clock wise from 100%. The Q_{high} setting is the scale setting plus 90%. For example, to set the VP229E-15HN to a flow rate of 5.5 gal/min, set 5.5/5.0 = 110% setting. Obtain the 110% setting by turning the green pointer counter clock wise from 100% to 20% (20% and 90% = 110%). As shown on page 11, Q_{high} settings above 100% slightly increase the valve's required minimum differential pressure.



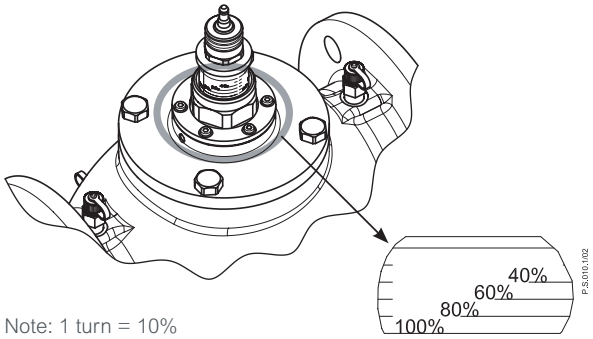
PIBCV Flow Setting 5"…10"



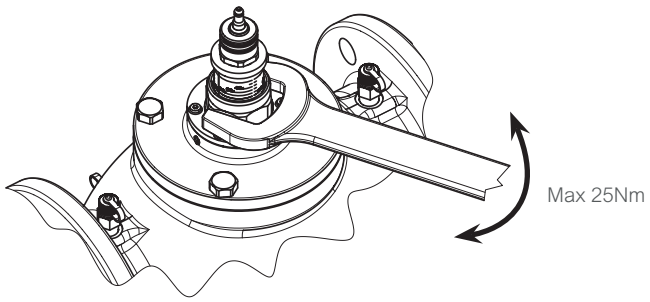
Note:
1 turn = 5%



PIBCV Flow Setting 1½"…4"

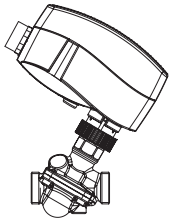
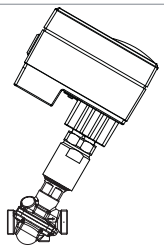
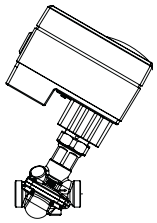


Note: 1 turn = 10%



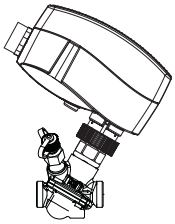
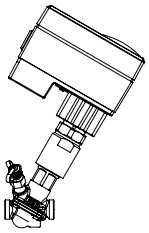
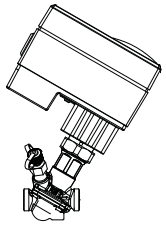
Valve Assembly and Suitable Actuators

Table 1. Valve Assemblies ½…1¼" With Female NPT End Connectors, Without PT Ports

Flow Rate (GPM)[a]	Valve Size (inch)	24 Vac Two Position with Auxiliary Switch (MP131-24T)	24 Vac Three Wire Floating with Auxiliary Switch (MP131-24F)	24 Vac Proportional with Position Output Signal (MP131-24MP)	24 Vac Proportional/Floating with Position Output Signal Spring Return Open (MP300-SRU)	24 Vac Proportional/Floating with Position Output Spring Return Closed (MP300-SRD)
						
0.5	1/2	VP228E-10LN-L05-A101	VP228E-10LN-L05-F101	VP228E-10LN-L05-S101	VP228E-10LN-L05-U201	VP228E-10LN-L05-U301
1.0	1/2	VP228E-15LN-L10-A101	VP228E-15LN-L10-F101	VP228E-15LN-L10-S101	VP228E-15LN-L10-U201	VP228E-15LN-L10-U301
1.5	1/2	b	VP228E-15SN-L15-F101	VP228E-15SN-L15-S101	VP228E-15SN-L15-U201	VP228E-15SN-L15-U301
2.0	1/2	VP228E-15SN-L20-A101	VP228E-15SN-L20-F101	VP228E-15SN-L20-S101	VP228E-15SN-L20-U201	VP228E-15SN-L20-U301
2.5	1/2	b	VP229E-15HN-L25-F101	VP229E-15HN-L25-S101	VP229E-15HN-L25-U201	VP229E-15HN-L25-U301
3.0	1/2	b	VP229E-15HN-L30-F101	VP229E-15HN-L30-S101	VP229E-15HN-L30-U201	VP229E-15HN-L30-U301
3.5	1/2	b	VP229E-15HN-L35-F101	VP229E-15HN-L35-S101	VP229E-15HN-L35-U201	VP229E-15HN-L35-U301
4.0	1/2	b	VP229E-15HN-L40-F101	VP229E-15HN-L40-S101	VP229E-15HN-L40-U201	VP229E-15HN-L40-U301
4.0	3/4	VP228E-20SN-L40-A101	VP228E-20SN-L40-F101	VP228E-20SN-L40-S101	VP228E-20SN-L40-U201	VP228E-20SN-L40-U301
4.5	1/2	b	VP229E-15HN-L45-F101	VP229E-15HN-L45-S101	VP229E-15HN-L45-U201	VP229E-15HN-L45-U301
5.0	1/2	VP229E-15HN-L50-A101	VP229E-15HN-L50-F101	VP229E-15HN-L50-S101	VP229E-15HN-L50-U201	VP229E-15HN-L50-U301
5.5	3/4	b	VP229E-20HN-L55-F101	VP229E-20HN-L55-S101	VP229E-20HN-L55-U201	VP229E-20HN-L55-U301
6.0	3/4	b	VP229E-20HN-L60-F101	VP229E-20HN-L60-S101	VP229E-20HN-L60-U201	VP229E-20HN-L60-U301
6.5	3/4	b	VP229E-20HN-L65-F101	VP229E-20HN-L65-S101	VP229E-20HN-L65-U201	VP229E-20HN-L65-U301
7.0	3/4	b	VP229E-20HN-L70-F101	VP229E-20HN-L70-S101	VP229E-20HN-L70-U201	VP229E-20HN-L70-U301
7.5	3/4	VP229E-20HN-L75-A101	VP229E-20HN-L75-F101	VP229E-20HN-L75-S101	VP229E-20HN-L75-U201	VP229E-20HN-L75-U301
7.5	1	VP229E-25SN-L75-A101	VP229E-25SN-L75-F101	VP229E-25SN-L75-S101	VP229E-25SN-L75-U201	VP229E-25SN-L75-U301
8	1	b	VP229E-25HN-L80-F101	VP229E-25HN-L80-S101	VP229E-25HN-L80-U201	VP229E-25HN-L80-U301
8.5	1	b	VP229E-25HN-L85-F101	VP229E-25HN-L85-S101	VP229E-25HN-L85-U201	VP229E-25HN-L85-U301
9.0	1	b	VP229E-25HN-L90-F101	VP229E-25HN-L90-S101	VP229E-25HN-L90-U201	VP229E-25HN-L90-U301
9.5	1	b	VP229E-25HN-L95-F101	VP229E-25HN-L95-S101	VP229E-25HN-L95-U201	VP229E-25HN-L95-U301
10	1	b	VP229E-25HN-010-F101	VP229E-25HN-010-S101	VP229E-25HN-010-U201	VP229E-25HN-010-U301
11	1	b	VP229E-25HN-011-F101	VP229E-25HN-011-S101	VP229E-25HN-011-U201	VP229E-25HN-011-U301
12	1	VP229E-25HN-012-A101	VP229E-25HN-012-F101	VP229E-25HN-012-S101	VP229E-25HN-012-U201	VP229E-25HN-012-U301
13	1¼	b	VP229E-32SN-013-F101	VP229E-32SN-013-S101	VP229E-32SN-013-U201	VP229E-32SN-013-U301
14	1¼	VP229E-32SN-014-A101	VP229E-32SN-014-F101	VP229E-32SN-014-S101	VP229E-32SN-014-U201	VP229E-32SN-014-U301
15	1¼	b	VP229E-32HN-015-F101	VP229E-32HN-015-S101	VP229E-32HN-015-U201	VP229E-32HN-015-U301
16	1¼	b	VP229E-32HN-016-F101	VP229E-32HN-016-S101	VP229E-32HN-016-U201	VP229E-32HN-016-U301
17	1¼	VP229E-32HN-017-A101	VP229E-32HN-017-F101	VP229E-32HN-017-S101	VP229E-32HN-017-U201	VP229E-32HN-017-U301

a. Factory set. Complete flow ranges shown in tables for 1/2…2" on page 11 and page 19.
b. Assembly not available at this GPM: for this particular combination order the next higher flow rate part number available, then field adjust the flow rate downward.

Table 2. Valve Assemblies ½…1¼" With Female NPT End Connectors, With PT Ports

Flow Rate (GPM)[a]	Valve Size (inch)	24 Vac Two Position with Auxiliary Switch (MP131-24T)	24 Vac Three Wire Floating with Auxiliary Switch (MP131-24F)	24 Vac Proportional with Position Output Signal (MP131-24MP)	24 Vac Proportional/Floating Spring Return Open (MP300-SRU)	24 Vac Proportional/Floating Spring Return Closed (MP300-SRD)
						
0.5	1/2	VP228E-10L-L05-A101	VP228E-10L-L05-F101	VP228E-10L-L05-S101	VP228E-10L-L05-U201	VP228E-10L-L05-U301
1.0	1/2	VP228E-15L-L10-A101	VP228E-15L-L10-F101	VP228E-15L-L10-S101	VP228E-15L-L10-U201	VP228E-15L-L10-U301
1.5	1/2	b	VP228E-15S-L15-F101	VP228E-15S-L15-S101	VP228E-15S-L15-U201	VP228E-15S-L15-U301
2.0	1/2	VP228E-15S-L20-A101	VP228E-15S-L20-F101	VP228E-15S-L20-S101	VP228E-15S-L20-U201	VP228E-15S-L20-U301
4.0	3/4	VP228E-20S-L40-A101	VP228E-20S-L40-F101	VP228E-20S-L40-S101	VP228E-20S-L40-U201	VP228E-20S-L40-U301
7.5	1	VP229E-25S-L75-A101	VP229E-25S-L75-F101	VP229E-25S-L75-S101	VP229E-25S-L75-U201	VP229E-25S-L75-U301
14	1¼	VP229E-32S-014-A101	VP229E-32S-014-F101	VP229E-32S-014-S101	VP229E-32S-014-U201	VP229E-32S-014-U301

a. Factory set. Complete flow ranges shown in tables for 1/2…2" on page 11 and page 19.

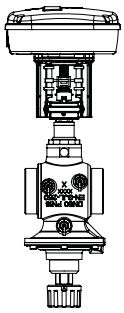
b. Assembly not available at this GPM: for this particular combination order the next higher flow rate part number available, then field adjust the flow rate downward.

Table 3. Specification ½…1¼" Valve Body Actuators

1/2" to 1¼" Valve Body Actuator Part Number (actuator code)	MP131-24T (A101)	MP131-24F (F101)	MP131-24MP (S101)	MP300-SRU (U201)	MP300-SRD (U301)
Input Signal	Two Position, 3 Wire with selectable input jumper signal action selection	Three Wire Floating	Proportional, 0…10 Vdc, 2…10 Vdc, 4…20 mA, sequencing with selectable input signal action, DIP switch selectable	Proportional, 0…10 Vdc, 2…10 Vdc, 4…20 mA, sequencing with selectable input signal action and Floating, DIP switch selectable	
Electrical Connection	Screw terminal with conduit connector				
Position Feedback Output Signal	–	–	0…10 Vdc	0…10 Vdc, 2…10 Vdc	
Spring Return	–	–	–	Open Valve	Close Valve
Auxilary Switch	Yes	Yes	–	–	–
Other Features	–	–	Weekly anti blocking selection, auto calibration, LED indication	Valve stroke length selection, LED indication	
Linear/Equal% Valve Flow Curve Selection	–	–	Yes	Yes	
Actuator Speed s/mm 60 Hz (50 Hz)	20 (24)			11.7 (14)	
Power Consumption	1 VA		1.5 VA	9 VA	
Actuator Weight (lb.)	.9			2.0	1.3
Operating Temperature Limits °F (°C)	32…131 (0…55)				
Regulatory Compliance	cULus according to UL 60730-1A/-2-14 and CAN/CSA E60730-1/-2-14 and CE according to EN 60730-1/-2-14 per EMC [2014/30/EU] and LVD [2014/35/EU]				
Specification Data Sheet	F-27961			F-27962	
Installation Data sheet	F-27938	F-27949	F-27948	F-27954	

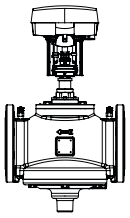
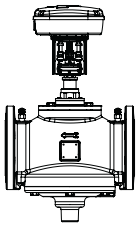
All actuators are 24 Vac. 50/60 HZ with removable conduit connector plate and wiring terminal block, manual override

Table 4. Valve Assemblies 1½"…2" With Female NPT End Connectors, With PT Ports

Flow Rate (GPM)[a]	Valve Size (inch)	24 Vac Proportional with Position Output Signal (MP500C)	24 Vac Proportional/Floating with Position Output Signal Spring Return Open (MP500C-SRU)	24 Vac Proportional/Floating with Position Output Spring Return Closed (MP500C-SRD)
				
18	1½	VP220E-40S-018-U131	VP220E-40S-018-U231	VP220E-40S-018-U331
19	1½	VP220E-40S-019-U131	VP220E-40S-019-U231	VP220E-40S-019-U331
20	1½	VP220E-40S-020-U131	VP220E-40S-020-U231	VP220E-40S-020-U331
22	1½	VP220E-40S-022-U131	VP220E-40S-022-U231	VP220E-40S-022-U331
24	1½	VP220E-40S-024-U131	VP220E-40S-024-U231	VP220E-40S-024-U331
26	1½	VP220E-40S-026-U131	VP220E-40S-026-U231	VP220E-40S-026-U331
28	1½	VP220E-40S-028-U131	VP220E-40S-028-U231	VP220E-40S-028-U331
30	1½	VP220E-40S-030-U131	VP220E-40S-030-U231	VP220E-40S-030-U331
32	1½	VP220E-40S-032-U131	VP220E-40S-032-U231	VP220E-40S-032-U331
34	2	VP220E-50S-034-U131	VP220E-50S-034-U231	VP220E-50S-034-U331
36	2	VP220E-50S-036-U131	VP220E-50S-036-U231	VP220E-50S-036-U331
38	2	VP220E-50S-038-U131	VP220E-50S-038-U231	VP220E-50S-038-U331
40	2	VP220E-50S-040-U131	VP220E-50S-040-U231	VP220E-50S-040-U331
44	2	VP220E-50S-044-U131	VP220E-50S-044-U231	VP220E-50S-044-U331
48	2	VP220E-50S-048-U131	VP220E-50S-048-U231	VP220E-50S-048-U331
52	2	VP220E-50S-052-U131	VP220E-50S-052-U231	VP220E-50S-052-U331

a. Factory set. Complete flow ranges shown in tables for 1/2…2" on page 11 and page 19.

Table 5. Valve Assemblies 2½"…4" with ANSI Standard B16.1 Flanges, With PT Ports

Flow Rate (GPM)[a]	Valve Size (inch)	24 Vac Proportional with Position Output Signal (MP500C)	24 Vac Proportional/Floating with Position Output Signal Spring Return Open (MP500C-SRU)	24 Vac Proportional/Floating with Position Output Signal Spring Return Closed (MP500C-SRD)
				
56	2½	VP220A-65S-056-U131	VP220A-65S-056-U231	VP220A-65S-056-U331
60	2½	VP220A-65S-060-U131	VP220A-65S-060-U231	VP220A-65S-060-U331
65	2½	VP220A-65S-065-U131	VP220A-65S-065-U231	VP220A-65S-065-U331
70	2½	VP220A-65S-070-U131	VP220A-65S-070-U231	VP220A-65S-070-U331
75	2½	VP220A-65S-075-U131	VP220A-65S-075-U231	VP220A-65S-075-U331
80	2½	VP220A-65S-080-U131	VP220A-65S-080-U231	VP220A-65S-080-U331
90	3	VP220A-80S-090-U131	VP220A-80S-090-U231	VP220A-80S-090-U331
100	3	VP220A-80S-100-U131	VP220A-80S-100-U231	VP220A-80S-100-U331
165 (min. 66)	4	VP220A-100S-165-U131	VP220A-100S-165-U231	VP220A-100S-165-U331

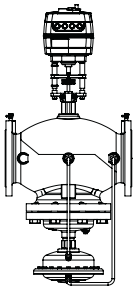
a. Factory set. Complete flow ranges shown in tables for 2-½"…4" on page 12 and page 20.

Table 6. Specification 1½"…4" Valve Body Actuators

1½"…4" Valve Body Actuator Part Number (actuator code)	MP500C (U131)	MP500C-SRU (U231)	MP500C-SRD (U331)
Input Signal	Proportional, 0…10 Vdc, 2…10 Vdc, 4…20 mA, sequencing with selectable input signal action and Floating, DIP switch selectable		
Electrical Connection	Screw terminal with conduit connector		
Position Feedback Output Signal	2…10 Vdc	2…10 Vdc, 0…5 Vdc	
Spring Return	–	Open Valve	Close Valve
Auxilary Switch	Optional Module		
Other Features	Auto calibration, field selectable floating input signal travel time, powered manual override	Auto calibration, field selectable floating input signal travel time	
Linear/Equal% Valve Flow Curve Selection	Yes	Yes	
Actuator Speed Full Stroke 60 Hz (50 Hz)	Proportional 15 (15) Floating 60 or 300 (60 or 300)	Proportional 15 (15) Floating 60 or 300 (60 or 300) Spring Return 13 (13)	
Power Consumption	Running 15 VA, Transformer Sizing 50 VA	Running 30 VA, Transformer Sizing 50 VA	
Operating Temperature Limits °F (°C)	14…122 (-10…50)		
Actuator Weight (lb.)	4.0	6.0	
Regulatory Compliance	Underwriters Laboratory (E9429) compliance as Temperature Indicating & Regulatory Equipment cULus LISTED per UL873 and Canadian Standard C22.2 No. 24. European Community compliance per EMC directive (2014/30/EU) and LVD directive (2014/35/EU). Australian/New Zealand community RCM mark.		
Specification Data Sheet	F-27944	F-27945	
Installation Data sheet	F-27942	F-27943	

All actuators are 24 Vac. 50/60 HZ with conduit connector holes and wiring terminal block, manual override

Table 7. Valve Assemblies 5"…6" With PT Ports with ANSI Standard B16.1 Flanges

Flow Rate (GPM) [a]	Valve Size (inch)	24 Vac Proportional with Position Output Signal (MP2000-NSR)	24 Vac Proportional/Floating with Position Output Signal Spring Return Open (MP2000-SRU)	24 Vac Proportional/Floating with Position Output Spring Return Closed (MP2000-SRD)
				
395 (min. 158)	5	VP220A-125S-395-U161	VP220A-125S-395-U261	VP220A-125S-395-U361
485 (min. 194)	5	VP220A-125H-485-U161	VP220A-125H-485-U261	VP220A-125H-485-U361
640 (min. 256)	6	VP220A-150S-640-U161	VP220A-150S-640-U261	VP220A-150S-640-U361
830 (min. 332)	6	VP220A-150H-830-U161	VP220A-150H-830-U261	VP220A-150H-830-U361

a. Factory set. Complete flow ranges shown in tables for 5"…6" on page 12 and page 20.

Table 8. Specification 5"…6" Valve Body Actuators

5"…6" Valve Body Actuator Part Number (actuator code)	MP2000-NSR (U161)	MP2000-SRU (U261)	MP2000-SRD (U361)
Input Signal	Proportional, 0…10 Vdc, 2…10 Vdc, 0…20 mA, 4…20 mA, with selectable input signal action and Floating, DIP swtich selectable		
Electrical Connection	Screw terminal with conduit connector		
Position Feedback Output Signal	0…10 Vdc, 2…10 Vdc, 0…20 mA, 4…20 mA [a]		
Spring Return	–	Open Valve	Close Valve
Auxilary Switch	Yes		
Other Features	Auto calibration, 3-color LED indication, powered manual override, configurable position outpout signals, selectable speed, adjustable equal percentage flow curve		
Linear/Equal% Valve Flow Curve Selection	Yes		
Actuator Speed s/mm 60 Hz (50 Hz)	3 or 6 (3 or 6)	4 or 6 (4 or 6)	
Power Consumption	15.0 VA		
Operating Temperature Limits °F (°C)	32…131 (0…55)		
Actuator Weight (lb.)	13.8	18.96	
Regulatory Compliance	cULus according to UL 60730-1A/-2-14 and CAN/CSA E60730-1/-2-14 and CE according to EN 60730-1/-2-14 per EMC [2014/30/EU] and LVD [2014/35/EU]		
Specification Data Sheet	F-27976	F-27969	
Installation Data sheet	F-27956		

a. When used with a proportional input signal. All actuators are 24 Vac. 50/60 HZ with conduit connector holes and wiring terminal block, manual override

Table 9. Valve Assembly 8"…10" With PT Ports

Flow Rate (GPM)	* Valve Size (inch)	24 Vac Proportional with Position Output Signal (MP4000)
880 (min. 352)	8	VP222A-200S-880-U181
1188 (min. 475)	8	VP222A-200H-1188-U181
1320 (min. 528)	10	VP222A-250S-1320-U181
1630 (min. 652)	10	VP222A-250H-1630-U181

* Factory set. Complete flow ranges shown in tables for 8"…10" on page 12 and page 20.

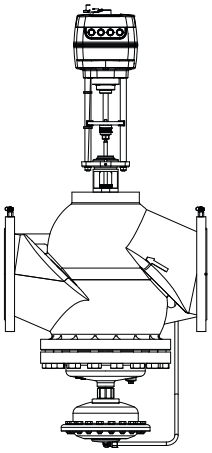


Table 10. Specification 8"…10" Valve Body Actuators

8"…10" Valve Body Actuator Part Number (actuator code)	MP4000 (U181)
Input Signal	Proportional, 0…10 Vdc, 2…10 Vdc, 0…20 mA, 4…20 mA, with selectable input signal action and Floating, DIP swtich selectable
Electrical Connection	Screw terminal with conduit connector
Position Feedback Output Signal	0…10 Vdc, 2…10 Vdc, 0…20 mA, 4…20 mA [a]
Spring Return	–
Auxilary Switch	Yes
Other Features	Auto calibration, LED indication, powered manual override, adjustable speed
Linear/Equal% Valve Flow Curve Selection	Yes
Actuator Speed s/mm 60Hz (50 Hz)	3 or 6 (3 or 6)
Power Consumption	15 VA
Operating Temperature Limits °F (°C)	32…131 (0…55)
Actuator Weight (lb.)	16.53
Regulatory Compliance	cULus according to UL 60730-1A/-2-14 and CAN/CSA E60730-1/-2-14 and CE according to EN 60730-1/-2-14 per EMC [2014/30/EU] and LVD [2014/35/EU]
Specification Data Sheet	F-27971
Installation Data sheet	F-27958

a. When used with a proportional input signal.
All actuators are 24 Vac. 50/60 HZ with conduit connector holes and wiring terminal block, manual override.

Table 11. Application: Operation of PIBCV Valve Body Without Actuator

Operation of the PIBCV valve body without an actuator for an automatic flow limiting balancing application.

PIBCV Valve Size	Valve Body Series	Valve Stem Lock Part Number	Recommended Installation and Valve Shut Off Capability
1/2"…1-1/4"	VP228E-xxxxxxx, VP229E-xxxxxxx	Use black cap provided with VP228E-xxxxxxx or VP229E-xxxxxxx valve body	Install valve in the supply water pipe for best shutoff valve performance. To shutoff valve tighten black cap (max. close off pressure is 14.5 psi). To shut off against a higher differential pressure set the valve flow to 0%.
1-1/2"…2"	VP220E-xxxxx	9114070000 (not included with valve body)	Install valve in either the supply or return water pipe. To shutoff valve tighten bottom knob (max. close off pressure is 232 psi)
2-1/2"…4"	VP220A-xxxxx		Install valve in either the supply or return water pipe. To shutoff valve tighten bottom insert with a 8 mm allen wrench (max. close off pressure is 232 psi)
5"…6"	VP221A-xxxxxx	9114071000 (not included with valve body)	No shut off knob, set the valve to a 0% flow setting to shutoff flow
8"…10"	VP222A-xxxxx	9114072000 (not included with valve body)	

The 9114070000, 9114071000, and 9114072000 Valve Stem Locks are secured to the valve body with a 10 mm allen wrench.
See Table 15. Assembly Valve Body Configurations on page 13 for a listing of all PIBCV valve body part numbers.

Technical Data

Table 12. Specification Threaded Version, ½…2"

Valve Size			1/2"				3/4"		1"		1¼"		1½"	2"
Valve Assembly Part Number without PT Ports [1]			VP228E -10LN-	VP228E -15LN-	VP228E -15SN-	VP229E -15HN-	VP228E -20SN-	VP229E-20HN-	VP229E -25SN-	VP229E-25HN-	VP229E-32SN-	VP229E-32HN-	-	-
Valve Assembly Part Number with PT Ports [1]			VP228E -10L-	VP228E -15L-	VP228E -15S-	-	VP228E -20S-	-	VP229E -25S-	-	VP229E-32S-	-	VP220E-40S-	VP220E-50S-
Flow range	Q_{min}	gal/min	.13	.24	.4	1	.8	1.5	1.5	2.4	2.82	3.5	13.2	22
	Q_{nom} (100%)[2]		.66	1.2	2	5	4	7.5	7.5	12	14.1	17.5	33	55
	Q_{high}		.79	1.45	2.4	5.5	4.75	8.25	8.2	13.2	15.5	19.25	33	55
Setting range [3]		%	20-120%			20-110%	20-120%	20-110%					40-100%	
Diff. pressure [4, 5]	ΔpQ_{nom} (ΔpQ_{high})	psi [kPa]	2.32-58 (2.61-58) [16-400 (18-400)]			5-58 (5.8-58) [35-400 (40-400)]	2.32-58 (2.61-58) [16-400 (18-400)]	5-58 (5.8-58) [35-400 (40-400)]	2.9-58 (3.63-58) [20-400 (25-400)]	5-58 (5.8-58) [35-400 (40-400)]	2.9-58 (3.63-58) [20-400 (25-400)]	5-58 (5.8-58) [35-400 (40-400)]	4.35-58 [30-400]	
Stroke Q_{nom}		in. (mm)	0.09 (2.25)			.157 (4)	0.09 (2.25)	.157 (4)	.177 (4.5)				.39 (10)	
Connection		ext. thread (ISO 228/1)	G ½ A	G ¾ A			G 1 A		G 1¼ A		G 1½ A		G 2 A	G 2½ A
		actuators	MP131-24T, MP131-24F, MP131-24MP, MP300-SRU, MP300-SRD										MP500C, MP500C-SRU/SRD	
Body Pressure Rating		psi	EN 12516-2:2004, 250 psi, PN 16											
Leakage acc. to standard IEC 60534			Class 4, max. 0.01% of Q_{nom}						max. 0.05% of Q_{nom}					
Max. close off differential pressure across the valve			90 psi											
Control range			Acc. to standard IEC 60534 control range is high as flow characteristic is linear (1:1000)											
Control valve's characteristic			Stem up open, Linear (can be converted by actuator to equal percentage)											
For shut off function			Acc. to ISO 5208 class A - no visible leakage											
Flow medium			Water and water mixture for closed heating and cooling systems according to plant type I for DIN EN 14868. When used in plant Type II for DIN EN 14868 appropriate protective measures are taken. The requirements of VDI 2035, part 1 + 2 are observed.											
Medium temperature		°F (°C)	(water/glycol) 15…250 (−10 ... +120)											
Materials in the water/glycol														
Valve bodies			Dezincification Resistant Brass (CuZn36Pb2As - CW 602N) per EN 12420										Grey iron EN-GJL-250 (GG 25) per EN 1561	
Cone (Pc)			Stainless Steel, W.Nr. 1.4305										Wrought copper CuZn40Pb3-CW 614N, Stainless Steel, W.Nr. 1.4305	
Seat (Pc)			EPDM										Stainless Steel, W.Nr. 1.4305	
Seat (Cv)			Dezincification Resistant Brass (CuZn36Pb2As - CW 602N)										Stainless Steel, W.Nr. 1.4305	
Membranes and O-rings			EPDM											
Springs			Stainless Steel, W.Nr. 1.4568, W.Nr. 1.4310											
Cone (Cv)			Wrought copper, CuZn40Pb3 - CW 614N											
Screw			Stainless Steel (A2)											
Flat gasket			NBR											
Sealing agent (only for valves with PT Ports)			Dimethacrylate Ester											
Materials out of the water/glycol														
Plastic parts			PA										POM	
Insert parts and outer screws			CuZn39Pd3 - CW614N										-	

Note: Water/glycol Compatibility: It is the responsibility of the installer or product specifier to verify water/glycol compatibility of the valves construction materials with the supplier of water/glycol treatment/heat transfer solution.

1) See Table 15. Assembly Valve Body Configurations on page 13 for a listing of all PIBCV valve body part numbers.
2) Factory setting of the valve is done at Q_{nom} (100%) or lower depending on flow rate ordered.
3) Regardless of the setting, the valve can modulate below 1% of set flow.
4) Δp = (P1–P3) min~max
5) 87 psi Δp is possible if consideration has been made to the flow velocity, cavitation and noise. For application usage please speak with Product Support

Pc - Pressure controller
Cv - Control valve

Table 13. Specification Flange Version, 2½"…4"

Valve Size			2½"	3"	4"
Part Number			VP220A-65S	VP220A-80S	VP220A-100S
Flow range	Q_{min}	gal/min	34	48	66
	Q_{nom} (100%) [1]		85	120	165
Setting range [2]		%	40-100%		
Diff. pressure [3], [4]	Δp_{Qnom}	psi [kPa]	4.35-58 [30-400]		
Body Pressure Rating psi			Class 125 per ASME B16.1-2010 Material Class B per ASTM A 126-04 (2014), 200 psi to 150°F, 190 psi to 200°F, 180 psi to 225°F, 175 psi to 250°F		
Control valve's characteristic			Stem up open, Linear (can be converted by actuator to equal percentage)		
Leakage acc. to standard IEC 60534			Max. 0.05% of Q_{nom}		
For shut off function			Acc. to ISO 5208 class A - no visible leakage		
Flow medium			Water and water mixture for closed heating and cooling systems according to plant type I for DIN EN 14868. When used in plant Type II for DIN EN 14868 appropriate protective measures are taken. The requirements of VDI 2035, part 1 + 2 are observed.		
Medium temperature		°F (°C)	(water/glycol) 15…250 (−10 ... +120)		
Stroke Q_{nom}		in. (mm)	.59 (15)		
Connection	flange		ANSI Class 125		
	actuators		MP500C, MP500C-SRU, MP500C-SRD		
Materials in the water/glycol					
Valve bodies			Grey iron EN-GJL-250(GG25)		
Membranes / Bellow / O-rings			EPDM		
Springs			Stainless Steel, W.Nr. 1.4568, W.Nr. 1.4310		
Cone (Pc)			Wrought copper, CuZn40Pb3 - CW 614N, Stainless Steel, W.Nr. 1.4305		
Seat (Pc) / Seat (Cv)			W.Nr. 1.4305		
Cone (Cv)			CuZn40Pb3 - CW 614N		
Screw			Stainless Steel (A2)		
Flat gasket			NBR		

Table 14. Specification Flange Version, 5"…10"

Valve Size			5"		6"		8"		10"	
Part Number			VP220A-125S	VP220A-125H	VP220A-150S	VP220A-150H	VP222A-200S	VP222A-200H	VP222A-250S	VP222A-250H
Flow range	Q^{min}	gal / min	158	194	256	332	352	475	528	652
	Q_{nom} (100%) [1]		395	485	640	830	880	1188	1320	1630
Setting range [2]		%	40-110%							
Diff. pressure [3]	Δp_{Qnom}	psi [kPa]	5.8-58 [40-400]	8.7-58 [60-400]	5.8-58 [40-400]	8.7-58 [60-400]	5.8-58 [40-400]	8.7-58 [60-400]	5.8-58 [40-400]	8.7-58 [60-400]
Leakage acc. to standard IEC 60534			Class 4, max. 0.01% of Q_{nom}							
Max. close off differential pressure across the valve			90 psi							
Connection	flange		ANSI Class 125				EN 1092			
	actuators		MP2000-NSR, MP2000-SRU, MP2000-SRD				MP4000			
Flow medium			Water and water mixture for closed heating and cooling systems according to plant type I for DIN EN 14868. When used in plant Type II for DIN EN 14868 appropriate protective measures are taken. The requirements of VDI 2035, part 1 + 2 are observed.							
Body Pressure Rating psi			Class 125 per ASME B16.1-2010 Material Class B per ASTM A 126-04 (2014), 200 psi to 150°F, 190 psi to 200°F, 180 psi to 225°F, 175 psi to 250°F							
Control range			Acc. to standard IEC 60534 control range is high as flow characteristic is linear.							
Control valve's characteristic			Stem up open, Linear (could be converted by actuator to equal percentage)							
Medium temperature		°F (°C)	(water/glycol) 15…250 (−10 ... +120)							
Stroke (Q_{nom})		in. (mm)	1.18 (30)							
Materials in the water/glycol										
Valve bodies			Grey iron EN-GJL-250 (GG 25)							
Membranes/ Bellow / O-Rings			W.Nr.1.4571		EPDM					
Springs			Stainless Steel, W.Nr.1.4401		Stainless Steel, W.Nr.1.4310					
Cone (Pc) / Cone (Cv)			Stainless Steel, W.Nr.1.4404NC		Stainless Steel, W.Nr.1.4021					
Flat gasket			Graphite gasket		Non asbestos					
Seat (Pc) / Seat (Cv)			Stainless Steel, W.Nr.1.4027							
Screw			Stainless Steel, W.Nr.1.1181							

1) Factory setting of the valve is done at Qnom (100%) or lower depending on flow rate ordered.
2) Regardless of the setting, the valve can modulate below 1% of set flow.
3) Δp = (P1–P3) min~max
4) 87 psi Δp is possible if consideration has been made to the flow velocity, cavitation and noise. for application usage please speak with Product Support

Pc - Pressure controller
Cv - Control valve

PIBCV Assembly Valve Body Configurations

Table 15. Assembly Valve Body Configurations

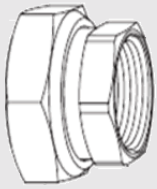
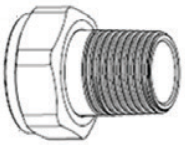
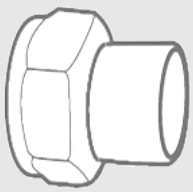
Pipe Size (in.)	Valve Assembly Part Number Series	Complete Valve Body Part Number	Valve Type	Female NPT End Connectors (included with all 1/2" through 2" Valve Actuator Assemblies)	PT Ports	Installation Data Sheet
1/2	VP228E-10LN-	VP228E-10BQLNT	Threaded	911 2108 010		F-27937
1/2	VP228E-10L-	VP228E-10BQL	Threaded	911 2108 010	Yes	
1/2	VP228E-15LN-	VP228E-15BQLNT	Threaded	911 2108 015		
1/2	VP228E-15L-	VP228E-15BQL	Threaded	911 2108 015	Yes	
1/2	VP228E-15SN-	VP228E-15BQSNT	Threaded	911 2108 015		
1/2	VP228E-15S-	VP228E-15BQS	Threaded	911 2108 015	Yes	
1/2	VP229E-15HN-	VP229E-15BQHNT	Threaded	911 2108 015		
3/4	VP228E-20SN-	VP228E-20BQSNT	Threaded	911 2108 020		
3/4	VP228E-20S-	VP228E-20BQS	Threaded	911 2108 020	Yes	
3/4	VP229E-20HN-	VP229E-20BQHNT	Threaded	911 2108 020		
1	VP229E-25SN-	VP229E-25BQSNT	Threaded	911 2108 025		
1	VP229E-25S-	VP229E-25BQS	Threaded	911 2108 025	Yes	
1	VP229E-25HN-	VP229E-25BQHNT	Threaded	911 2108 025		
1-1/4	VP229E-32SN-	VP229E-32BQSNT	Threaded	911 2108 032		
1-1/4	VP229E-32S-	VP229E-32BQS	Threaded	911 2108 032	Yes	
1-1/4	VP229E-32HN-	VP229E-32BQHNT	Threaded	911 2108 032		
1-1/2	VP220E-40S-	VP220E-40CQS	Threaded	911 2108 040	Yes	F-27934
2	VP220E-50S-	VP220E-50CQS	Threaded	911 2108 050	Yes	
2-1/2	VP220A-65S-	VP220A-65CQS	Flanged		Yes	
3	VP220A-80S-	VP220A-80CQS	Flanged		Yes	
4	VP220A-100S-	VP220A-100CQS	Flanged		Yes	
5	VP220A-125S-	VP221A-125CQS	Flanged		Yes	F-27939
5	VP220A-125H-	VP221A-125CQH	Flanged		Yes	
6	VP220A-150S-	VP221A-150CQS	Flanged		Yes	
6	VP220A-150H-	VP221A-150CQH	Flanged		Yes	
8	VP222A-200S-	VP222A-200CQS	Flanged		Yes	
8	VP222A-200H-	VP222A-200CQH	Flanged		Yes	
10	VP222A-250S-	VP222A-250CQS	Flanged		Yes	
10	VP222A-250H-	VP222A-250CQH	Flanged		Yes	

PIBCV Selection Valve Actuator Codes and Tail Pieces

Table 16. Selection: Valve Actuator Codes

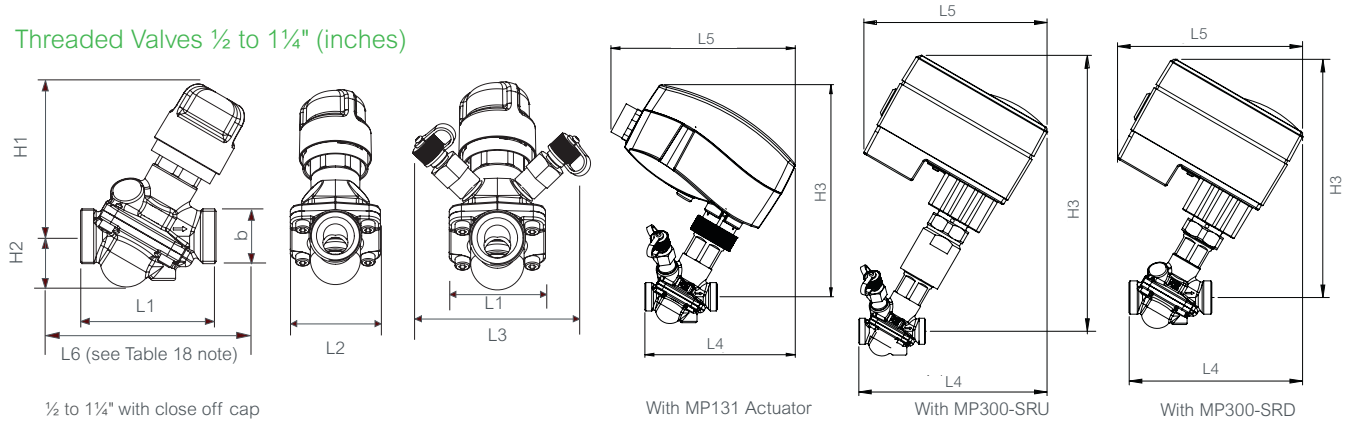
Actuator Part Number	Actuator Code	Valve Sizes	Non Spring Return	Spring Return Open	Sprint Return Close
MP131-24T	A101	½"…1¼"	√		
MP131-24F	F101				
MP131-24MP	S101				
MP300-SRU	U201			√	
MP300-SRD	U301				√
MP500C	U131	1-½"…4"	√		
MP500C-SRU	U231			√	
MP500C-SRD	U331				√
MP2000-NSR	U161	5"…6"	√		
MP2000-SRU	U261			√	
MP2000-SRD	U361				√
MP4000	U181	8"…10"	√		

Table 17. Selection: ½"…2" Valve Body Tail Pieces

	Part Number	Pipe Size	(A) Approximate Length inches (mm)	Approximate Nut Size inches (mm)	(B) Approximate Valve Body Thread Engagement inches (mm)	Comments	Image
Female NPT Two Female NPT Connectors, Two Gaskets	911 2108 010	1/2"	1.1 (28)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	911 2108 015	1/2"	1.1 (28)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	911 2108 020	3/4"	1.26 (32)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	911 2108 025	1"	1.5 (38)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	911 2108 032	1-1/4"	1.65 (42)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	
	911 2108 040	1-1/2"	1.85 (47)	2.52 (63.9)	0.55 (14)	For 1-1/2" valve body	
	911 2108 050	2"	1.93 (49)	3.24 (82.2)	0.69 (17.5)	For 2" valve body	
Male NPT Two Male NPT Connectors, Two Nuts, Two Gaskets	911 2110 010	3/8"	1.24 (31.5)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	911 2110 015	1/2"	1.32 (33.5)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	911 2110 020	3/4"	1.5 (38)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	911 2110 025	1"	1.73 (44)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	911 2110 032	1-1/4"	1.85 (47)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	
	911 2110 040	1-1/2"	2.28 (58)	2.52 (63.9)	0.55 (14)	For 1-1/2" valve body	
	911 2110 050	2"	2.81 (71.5)	3.24 (82.2)	0.69 (17.5)	For 2" valve body	
Female Sweat Two Female Sweat Ends, Two Nuts, Two Gaskets	911 2109 010	3/8" Tubing (with 1/2" OD)	1.06 (27)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	911 2109 015	1/2" Tubing (with 5/8" OD)	1.32 (33.5)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	911 2109 020	3/4" Tubing (with 7/8" OD)	1.5 (38)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	911 2109 025	1" Tubing (with 1-1/8" OD)	1.73 (44)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	911 2109 032	1-1/4" Tubing (with 1-3/8" OD)	1.85 (47)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	
	911 2109 040	1-1/2" Tubing (with 1-5/8" OD)	2.36 (60)	2.52 (63.9)	0.55 (14)	For 1-1/2" valve body	
	911 2109 050	2" Tubing (with 2-1/8" OD)	2.81 (71.5)	3.24 (82.2)	0.69 (17.5)	For 2" valve body	

Dimensions

Threaded Valves ½ to 1¼" (inches)



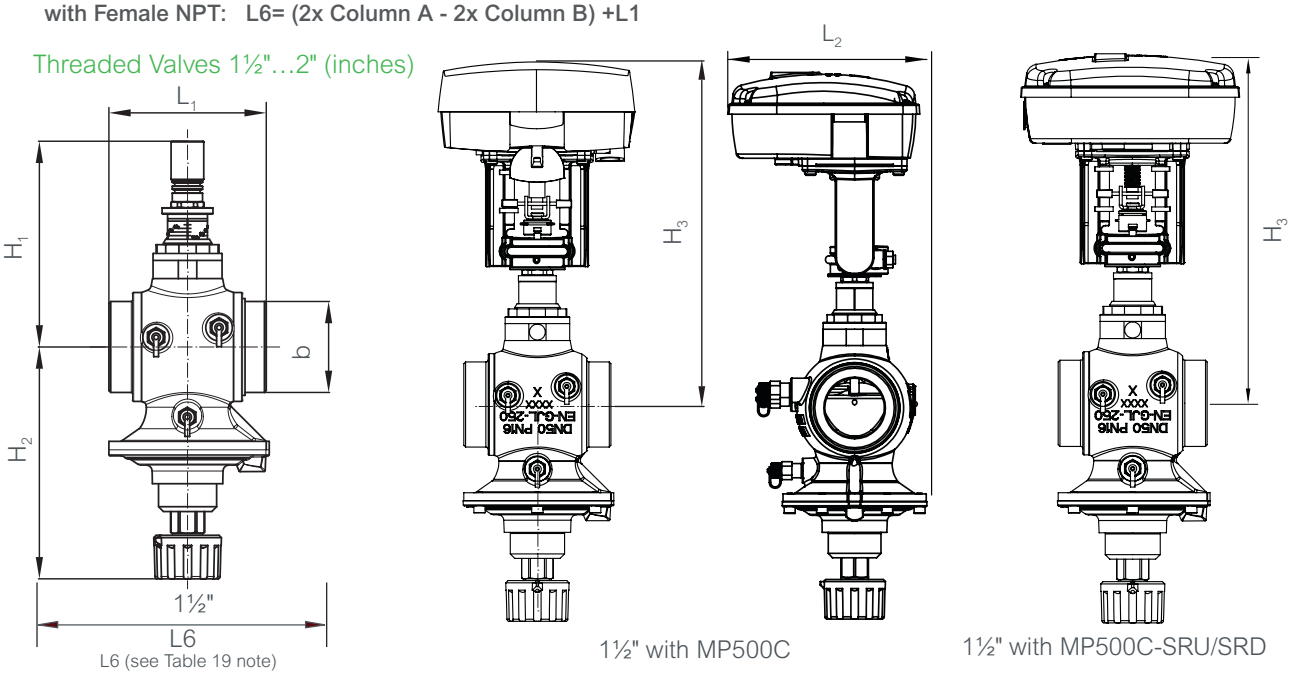
½ to 1¼" with close off cap | With MP131 Actuator | With MP300-SRU | With MP300-SRD

Table 18. Threaded Valves ½ to 1¼" (inches)

Type	L1	L2	L3 (PLUGS)	L4			L5		H1	H2	H3		b ISO 228/1	Valve Body Weight (lb.)
				MP131	MP300 -SRU	MP300 -SRD	MP131	MP300 -SRU/SRD			MP131	MP300 -SRU/SRD		
1/2" VP228E-10Lx	2	1.41	3.11	4.37	5.11	5.90	5.35	5.7	2.9	.78	5.6	7.2	G ½	.83
1/2"	2.5	1.7		4.64	5.39	6.14			3	1	5.7	7.4	G ¾	1
3/4"	3.2	2.2		4.96	5.7	6.53			3	1.2	5.8	7.5	G 1	1.43
1"	4	2.7		5.55	6.3	7.08			3.5	1.5	6.14	7.83	G 1 ¼	3.2
1¼"	5.1	3.5		6.26	7	7.8			3.9	2.3	6.58	8.27	G 1 ½	4.8

NOTE: Valve Body Tail Piece Dimensions: See Columns A and B in Table 17 on page 14: For assemblies with Female NPT: L6= (2x Column A - 2x Column B) +L1

Threaded Valves 1½"…2" (inches)



1½" with MP500C | 1½" with MP500C-SRU/SRD

Table 19. Threaded Valves 1½"…2" (inches)

Type	L_1	L_2	H_1	H_2	H_3	b ISO 228/1	Valve Body Weight lb
1½"	4.33	7.19	6.7	6.85	11	G 2	15.8
2"	5.11					G 2½	18.0

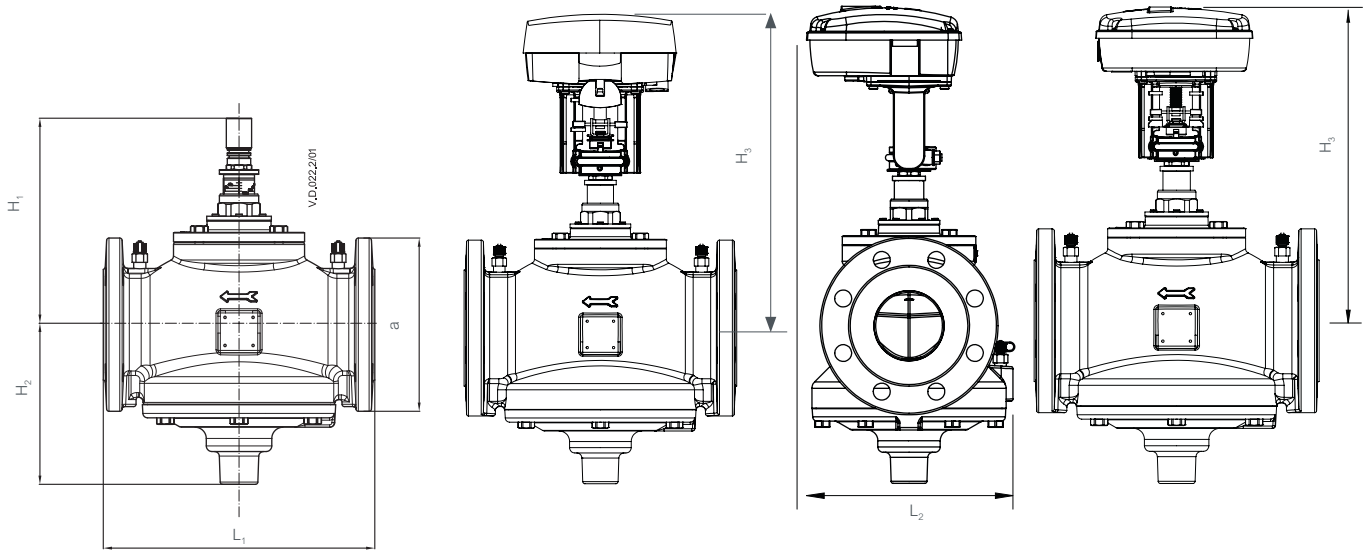
NOTE: Valve Body Tail Piece Dimensions: See Columns A and B in Table 17 on page 14: For assemblies with Female NPT: L6= (2x Column A - 2x Column B) +L1

PIBCV Dimensions - Flanged Valves

Flanged Valves 2½"…4"

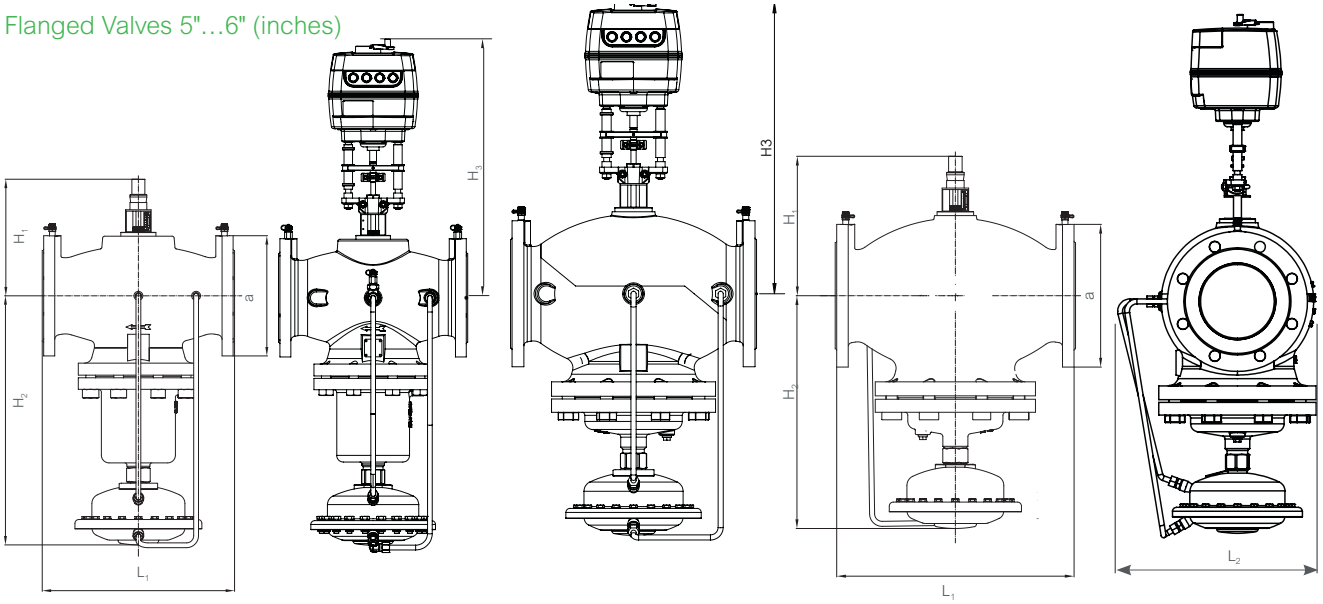
Table 20. Flanged Valves 2½"…4" (inches)

Type	L_1	L_2	H_1	H_2	H_3	a (EN 1092-2)	Valve Body Weight (lb)	No. of Flange Bolt Holes
2½"	11.4	8.76	8.6	6.77	13	7.2	84	4
3"	12.2	8.88	8.9	6.96	13.1	7.87	99	4
4"	13.7	10.07	9.44	7.36	13.7	8.66	126	8



2½"…4" | 2½"…4" with MP500C | 2½"…4" with MP500C-SRU/SRD

Flanged Valves 5"…6" (inches)



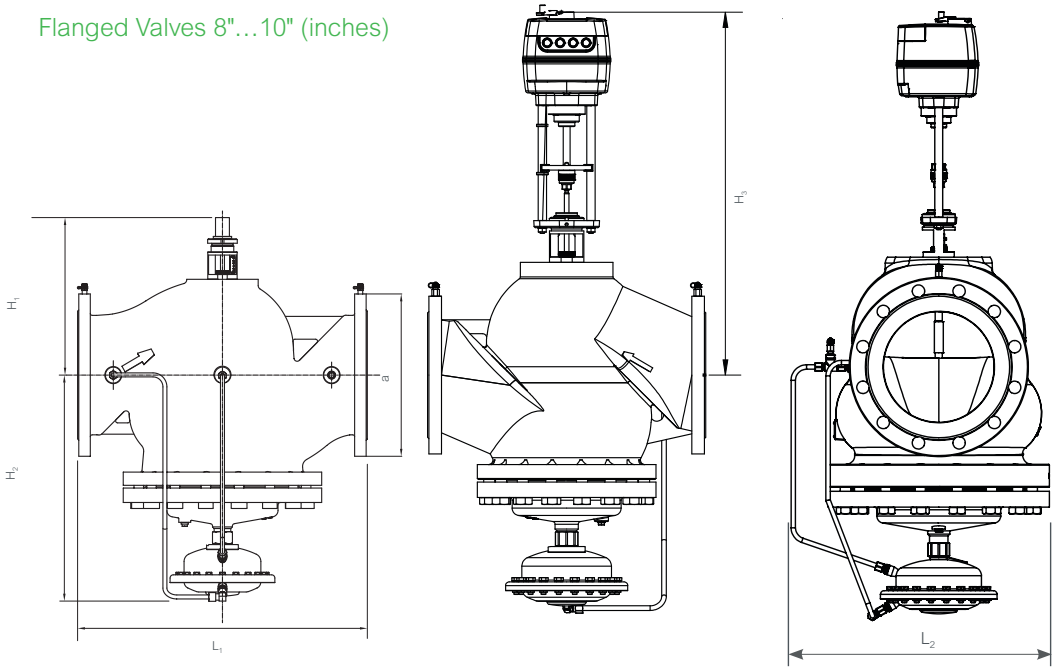
5" with MP2000-SRU/SRD/NSR | 6" MP2000-SRU/SRD/NSR

Table 21. Flanged Valves 5"…6" (inches)

Type	L_1	L_2	H_1	H_2	H_3 MP2000-SRU/SRD/ NSR	a (EN 1092-2)	Valve Body Weight (lb.)	No. of Flange Bolt Holes
5"	15.7	14.45	10.7	21.1	20.94	9.84	188	8
6"	18.9	15.88	12.1	19.6	22.36	11.22	304	8

PIBCV Dimensions - Flanged Valves

Flanged Valves 8"…10" (inches)



8", 10"

8", 10" with MP4000

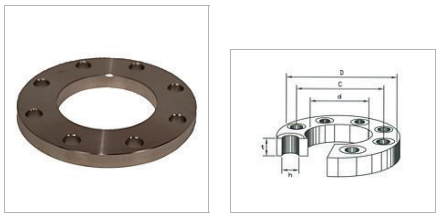
Table 22a. Flanged Valves 8"…10" (inches)

See Table 22b for Valve Flanges

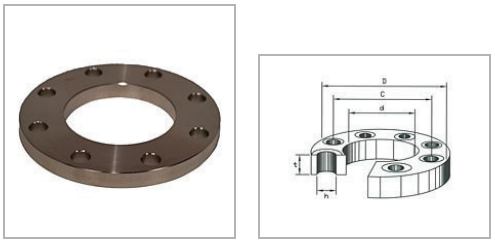
Type	L_1	L_2	H_1	H_2	H_3 MP4000	a (EN 1092-2)	Valve Body Weight (lb.)	No. of Flange Bolt Holes
8"	23.6	19.57	17.0	19.0	24.3	13.38	482	12
10"	28.7	22.98	16.9	20.9	27.8	15.9	753	12

Table 22b. Valve Flanges 8"…10" (inches)

Valve Size	Iron Pipe Flange, Carbon Steel, PN16, Part Number	Outer Diameter	Inner Diameter	Thickness	Bolt Hole Diameter (each for 12 bolts)	Bolt Circle	Weight lb (each)
8”	D2576-16-200	13.39	8.63	1.02	0.87	11.61	23.98
10”	D2576-16-250	15.94	10.75	1.14	1.02	13.98	39.6



Specifications	
Size	200 - 8"
Pressure	PN 16
d	219.1 mm
D	340 mm
C	295 mm
Number of Bolts	12
h	22 mm
t	26 mm
Weight	10.90 kg
Material	Carbon Steel
IMPA/ISSA Code	734554 735564



Specifications	
Size	250 - 10"
Pressure	PN 16
d	273 mm
D	405 mm
C	355 mm
Number of Bolts	12
h	26 mm
t	29 mm
Weight	18.0 kg
Material	Carbon Steel

PIBCV Valve Flow Ranges

Table 23. ½…2” Valve Flow Ranges (Qmin to Qnom)

Flow Rate (GPM)	1/2”				3/4”		1”		1¼”		1½”	2”
Without PT Ports	VP228E-10BQLNT	VP228E-15BQLNT	VP228E-15BQSNT	VP229E-15BQHNT	VP228E-20BQSNT	VP229E-20BQHNT	VP229E-25BQSNT	VP229E-25BQHNT	VP229E-32BQSNT	VP229E-32BQHNT	-	-
With PT Ports	VP228E-10BQL	VP228E-15BQL	VP228E-15BQS	-	VP228E-20BQS	-	VP229E-25BQS	-	VP229E-32BQS	-	VP220E-40CQS	VP220E-50CQS
0.5	1	1	1									
1.0		1	1	1	1							
1.5			1	1	1	1	1					
2.0			1	1	1	1	1					
2.5				1	1	1	1	1				
3.0				1	1	1	1	1	1			
3.5				1	1	1	1	1	1	1		
4.0				1	1	1	1	1	1	1		
4.5				1	(1)	1	1	1	1	1		
5.0				1		1	1	1	1	1		
5.5				(1)		1	1	1	1	1		
6.0						1	1	1	1	1		
6.5						1	1	1	1	1		
7.0						1	1	1	1	1		
7.5						1	1	1	1	1		
8.0						(1)	(1)	1	1	1		
8.5								1	1	1		
9.0								1	1	1		
9.5								1	1	1		
10								1	1	1		
11								1	1	1		
12								1	1	1		
13								(1)	1	1	1	
14									1	1	1	
15									(1)	1	1	
16										1	1	
17										1	1	
18										(1)	1	
19										(1)	1	
20											1	
21											1	
22											1	1
23											1	1
24											1	1
25											1	1
26											1	1
27											1	1
28											1	1
29											1	1
30											1	1
31											1	1
32											1	1
33											1	1
34												1
35												1
36												1
37												1
38												1
39												1
40												1
44												1
48												1
52												1

PIBCV Valve Flow Ranges

Table 24. 2½"…10" Flanged Valve Flow Ranges (Qmin to Qnom)

Size	2½"	3"	4"	5"		6"		8"		10"	
Flow Rate (GPM)	VP220A-65CQS	VP220A-80CQS	VP220A-100CQS	VP221A-125CQS	VP221A-125CQH	VP221A-150CQS	VP221A-150CQH	VP222A-200CQS	VP222A-200CQH	VP222A-250CQS	VP222A-250CQH
35	34										
40	1										
45	1										
50	1	48									
55	1	1									
60	1	1									
65	1	1									
70	1	1	66								
75	1	1	1								
80	1	1	1								
85	85	1	1								
90		1	1								
95		1	1								
100		1	1								
120		120	1								
140			1								
160			165	158							
180				1							
200				1	194						
250				1	1	256					
300				1	1	1					
350				1	1	1	332	352			
400				395	1	1	1	1			
450					485	1	1	1	475		
500						1	1	1	1	528	
550						1	1	1	1	1	
600						640	1	1	1	1	
650							1	1	1	1	652
700							1	1	1	1	1
750							1	1	1	1	1
800							830	1	1	1	1
850								880	1	1	1
900									1	1	1
950									1	1	1
1000									1	1	1
1100									1188	1	1
1200										1	1
1300										1320	1
1400											1
1500											1
1600											1630
1700											

All flanged valves come standard with the PT ports

Specification Submittal Text

SmartX PIBCV has the following specifications:

1. NPS 2 and Smaller: PN 16, stainless steel components.
2. NPS 2-1/2 through 10: Class 125 cast iron body per ASME B16.1-2010, Material class B per ASTM A 126-04 (2014), stainless steel components.
3. Accuracy NPS ¾ and Smaller: The control valves shall accurately control the flow from 0 to 100% rated flow with a differential pressure range of 2.32 to 58 psi for low and standard flow units, 5 to 58 psi for high flow units within 5% of set flow value.
4. Accuracy NPS 1 through 1-1/4: The control valves shall accurately control the flow from 0 to 100% rated flow with a differential pressure range of 2.9 to 58 psi for standard flow units, 5 to 58 psi for high flow units within 5% of set flow value.
5. Accuracy NPS 1-1/2 through 4: The control valves shall accurately control the flow from 0 to 100% rated flow with a differential pressure range of 4.35 to 58 psi within 5% of set flow value.
6. Accuracy NPS 5 through 10: The control valves shall accurately control the flow from 0 to 100% rated flow with a differential pressure range of 5.8 to 58 psi for standard flow units, 8.7 to 58 psi for high flow units within 5% of set flow value.
7. Flow Characteristics: Linear Control, selectable to equal percentage at the proportional valve actuator.
8. Field adjustable flow by means of a percentage of rated valve flow.
9. Position feedback output signal integrated into all proportional actuators.
10. 100% authority with modulating below 1% regardless of flow settings.
11. No cartridges requiring replacement or maintenance.

MP131-24F, -24MP, -24T

Actuators for Floating and Proportional Control



Product Description

MP131 actuators are used together with automatically balanced combination valve type SmartX PIBCV for 1/2" to 1-¼". Typical applications are temperature control and permanent automatic balancing on terminal units (fan-coils, chilled ceilings, air-handling units).

Specifications

Part Numbers	MP131-24F MP131-24MP MP131-24T
Power supply	24 Vac +10… –15 %
Power consumption MP131-24F/T MP131-24MP	 1.0 VA 1.5 VA standby 0.4 W
Frequency	50/60 Hz
Control Input MP131-24MP Feedback Control input Y Control output X	 0…10 (2-10) V Ri = 200 kΩ 0…20 (4-20) mA Ri = 500 Ω 0…10 V Ro (min) = 38 kΩ
Close off force MP131-24T, MP131-24F, MP131-24MP	 130 N
Stroke MP131-24F, MP131-24T, MP131-24MP	 5 mm
Speed MP131-24F, MP131-24T, MP131-24MP	 50 hz: 24 s/mm 60 hz: 20 s/mm
Relative humidity	max. 95%
Max. medium temperature	248 °F (120 °C)
Ambient temperature	32…131 °F (0…55 °C)
Storage and transport temperature	-40…158 °F (–40…70 °C)
Protection class	IP42
Weight	.66 lbs (0.3 kg)
Agency Listings	Underwriters Laboratory (E489326) compliance as Electric Actuators, cULus LISTED per UL60730 and CSA E60730. European Community compliance per EMC directive (2014/30/EU) and LVD directive (2014/35/EU). Australian/New Zealand community RCM mark.

Features

- Gap detection at stem up position
- 3 point version
- Force switch-off at stem down position prevents overload of actuator and valve
- No tools required for mounting
- Maintenance-free lifetime
- Low-noise operation

MP300-SRU/SRD

Spring Return Multi-signal Actuators for VP228E/VP229E SmartX PIBCV, DN10-32 (½"-1¼")



Product Description

MP300-SRU/SRD actuators with Floating and Proportional control are low voltage motoric actuators for the SmartX PIBCV DN10-32 (½"…1¼") Valves. These actuators have a spring return safety function that provides for an open or close valve in the event of power loss. The Spring return safety function should not be used for two position control.

Features

- The advanced design incorporates load related 'switch-off' to ensure that actuators and valves are not exposed to overload.
- The advanced design incorporates a diagnostic LED, operational data capture and self stroking feature.
- Low weight and robust.
- Spring Return operation in the event of power failure.

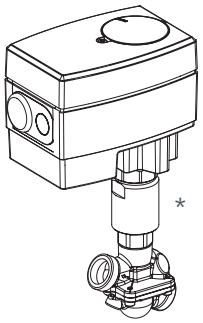
Specifications

Power supply	24 V (–15…+10%) AC
Power consumption	9 VA
Frequency	50/60 Hz
Control input Y	0…10 (2…10) V 0…20 (4…20) mA
Output signal U	0…10 (2…10) V
Closing force	300 N
Max. stroke	5.5 mm
Speed	11.75 (60 hz) s/mm 14 (50 hz) s/mm
Max. medium temperature	120 °C
Ambient temperature	0 … 55 °C
Storage and transport temp.	–40 … 70 °C
Grade of enclosure	IP 54
Weight	0.8 kg
CE marking in accordance with standards	Low voltage directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3

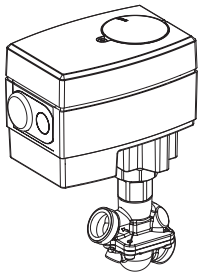
Actuator Valve Combinations

MP300-SRU/SRD for a normally open valve.

MP300-SRU/SRD for a normally closed valve.



MP300-SRU + VP228E, VP229E



MP300-SRD + VP228E, VP229E

Part Numbers

Part Number	Spring Return Direction	Linkage (included with actuator)
MP300-SRU/SRD	Up - Normally Open	Adapter *
MP300-SRU/SRD	Down - Normally Closed	Spacer

* Total height of the valve/actuator assembly increases with the use of the Adapter model.

MP500C, 500C-SRU/SRD

Multi-Signal Non-Spring/Spring Return Actuators for VP220x SmartX PIBCV, DN40…100 (1½…4”)



MP500C-SRU/SRD



MP500C

Product Description

MP500C are linear electro-mechanical actuators for use with VP220x SmartX PIBCV valves, DN40…100, controlled by either an increase/decrease floating signal or by a range of modulating control signals in the range 0…10V. SRU/SRD models have a spring return feature. The U-Bolt connection allows quick and easy direct mounting onto the SmartX PIBCV VP220 valves.

Features

- Brushless DC motor.
- High resolution control board allows precise fluid control.
- Working range and end point switches adjusted automatically to the stroke of the valve.
- When driven electrically, firmware calibrates a consistent running time regardless of the valve stroke.
- During power loss SRU/SRD spring return drives the motor, generating power to the board, controlling braking speed which avoids mechanical stress and system water hammer.
- Actuators can be configured for either 3 point increase/decrease signal or various modulating control signals including sequencing.
- Stroke Indicators on the yoke provide clear visual indication of the valve opening/stroke status.

Specifications

MP500C MP500C-SRU MP500C-SRD	Non-Spring Return Stem up (retract) Stem down (extend)
Voltage supply	24 Vac ±20% 50-60Hz 24 Vdc ±20%
Power consumption MP500C-SRU/SRD: Running Rest MP500C	 30 VA (21 W) 7 W average 15 VA
Running Time Modulating Increase/decrease MP500C-SRU/SRD Spring Return:	 15 sec. 60/300 sec. (selectable) 13 sec.
Transformer Sizing	50 VA
Stroke	2…35 mm
Force, nominal	500 N
Duty cycle	20%/60 minutes (full load, high amb. temp.) 80%/60 min. (half load, room temp.)
Analog input Voltage range (selectable)	0…10, 2…10, 0…5, 2…6, 5…10, 6…10 Vdc
Impedance	Min. 100 k Ohm
Digital inputs Voltage across open input Current through closed input Pulse time	 24 Vac 5 mA min. 20 ms
Position Feedback MP500C MP500C SRU/SRD	 2…10 Vdc 2-10 Vdc or 0-5 Vdc (0-100%) - Load 2 mA
Environmental Operation Temperature Storage Temperature Ambient Humidity	 14…122°F (-10…50 °C) -13…149°F (-25…65 °C) max 90% RH (non-condensing)
Enclosure rating	IP54 (NEMA 2)

Sound power level MP500-SRU/SRD MP500C	 43 dba 32 dba
Standards Emission/Immunity Heat Humidity Cold Vibration	 EMC 2004/108/CE according to EN 61326-1:2006 IEC-68-2-2 IEC-68-2-3 IEC-68-2-1 IEC-68-2-6
Material Housing Max cable core diameter Cover MP500C SRU/SRD MP500C	 Aluminum 2.5 mm² Aluminum ABS/PC plastic
S2 Auxillary Switch Relay (optional accessory)	SPDT, 24 Vac 4A AC1: contacts made at 1) 5% and 2) 95% of end stroke
Weight MP500C-SRU/SRD: MP500C	 2.8 Kg (6.17 lbs) 1.8 Kg (3.96 lbs)

Part Numbers & Accessories

Part Number	Description	On Power Loss
MP500C	Non-Spring Return Actuator	-
MP500C-SRU	Spring return stem up	Valve Open
MP500C-SRD	Spring return stem down	Valve Closed
880-0104-000	S2 auxiliary end point switches	-

MP2000-NSR

Non-Spring Return Multi-Signal Actuators for VP221 SmartX PIBCV, DN125-150 (5”…6”)



Product Description

MP2000 NSR Actuators are for fine regulation of large control valves under the demand of the HVAC controller. MP2000 NSR Actuators can be controlled by either a modulating or a 3-point control signal and are used specifically with the VP221x SmartX PIBCV valves.

Features

- Manual operation mechanical and/or electrical
- Position indication, LED signalization
- Selectable speed 3 or 6 s/mm
- Automatic Stroke Calibration
- Integrated external switch
- Linear to EQ% Curve Adaptation
- Anti-oscillation function
- Voltage or current output signal U
- External reset button
- Auto detection of Y signal
- Floating or modulating control selection
- Thermal and overload protection
- Precise regulation and fast response on floating signal (0.01 s)

Specifications

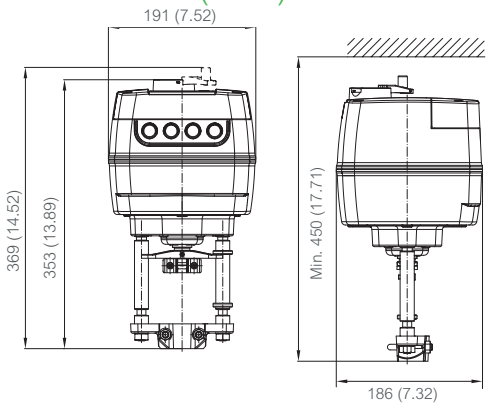
Nominal voltage	24 Vac/Vdc, 50 Hz/60 Hz
Power consumption	15 VA (24 V)
Control input signal	Modulating or 3-point floating
Power Supply Frequency	24 Vac/dc; +10 … –15 %; 50/60 Hz
Control input Y	0 … 10 V (2 … 10 V) Ri = 40 kΩ, 0 … 20 mA (4 … 20 mA) Ri = 500 Ω
Output (Position Feedback) U	0 … 10 V (2 … 10 V) 10kΩ 0…20 mA (4…20 mA) 510 Ω
Force	2000 N (450 lbf)
Stroke	50 mm (2”)
Speed (selectable)	3 or 6 s/mm
Max. medium temperature	200 °C (392 °F)
Ambient temperature	0 … + 55 °C (32…131 °F)
Storage and transport temperature	−40 … +70 °C (-40…158 °F) (storing for 3 days)
Humidity	5…95%
Protection class	III safety extra-low voltage
Grade of enclosure	IP 54, NEMA 2
Weight	6.3 kg (13.8 lbs)
Safety function	No
Manual operation	Electrical and Mechanical
Power failure response MP2000-NSR	Non-spring return

CE marking in accordance with the standards	Low Voltage Directive 2006/95 EEC EMC Directive 2004/108 EEC cULus according to UL 60730-1A/-2-14 and CAN/CSA E60730-1/-2-14 and CE according to EN 60730-1/-2-14 per EMC [2014/30/EU] and LVD [2014/35/EU]

Part Numbers

Part No.	Spring Return Direction
MP2000-NSR	Non-Spring Return

Dimensions mm (inch)



MP2000-SR

Spring Return Multi-Signal Actuators for VP221 SmartX PIBCV, DN125-150 (5”…6”)



Product Description

MP2000 SR Actuators are for fine regulation of large control valves under the demand of the HVAC controller. MP2000 SR Actuators can be controlled by either a modulating or a 3-point control signal and are used specifically with the VP221x SmartX PIBCV valves.

Specifications

Nominal voltage	24 Vac/Vdc, 50 Hz/60 Hz
Power consumption	15 VA (24 V)
Control input signal	Modulating or 3-point floating
Power Supply Frequency	24 Vac/dc; +10 … –15 %; 50/60 Hz
Control input Y	0 … 10 V (2 … 10 V) Ri = 40 kΩ 0 … 20 mA (4 … 20 mA) Ri = 500 Ω
Output U (Position Feedback)	0 … 10 V (2 … 10 V) 10kΩ 0…20 mA (4…20 mA) 510 Ω
Force	2000 N (450 lbf)
Stroke	50 mm (2”)
Speed (selectable)	4 or 6 s/mm
Max. medium temperature	200 °C (392 °F)
Ambient temperature	0 … + 55 °C (32…131 °F)
Storage and transport temperature	−40 … +70 °C (-40…158 °F) (storing for 3 days)
Humidity	5…95%
Protection class	III safety extra-low voltage
Grade of enclosure	IP 54, NEMA Type 2
Weight	8.6 kg (18.96 lbs)
Safety function	Yes
Safety fuction runtime/50mm stroke	120 s
Manual operation	Electrical and Mechanical
Power failure response MP2000-SRD MP2000-SRU	 Safety function: stem extends down Safety function: stem retracts up

Features

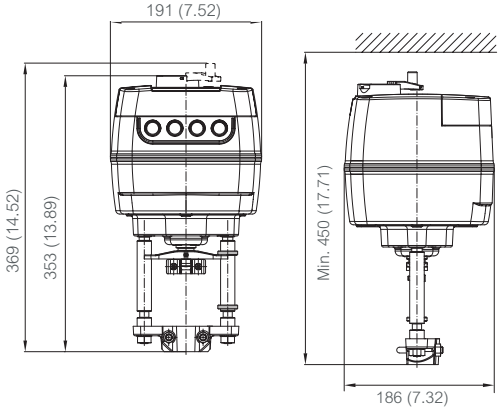
- Manual operation mechanical and/or electrical
- Position indication, LED signalization
- Selectable speed 4 or 6 s/mm
- Automatic Stroke Calibration
- Integrated external switch
- Linear to EQ% Curve Adaptation
- Anti-oscillation function
- Voltage or current output signal U
- External reset button
- Auto detection of Y signal
- 3-point or modulating control selection
- Thermal and overload protection
- Precise regulation and fast response on floating signal (0.01 s)

CE marking in accordance with the standards	Low Voltage Directive 2006/95 EEC EMC Directive 2004/108 EEC cULus according to UL 60730-1A/-2-14 and CAN/CSA E60730-1/-2-14 and CE according to EN 60730-1/-2-14 per EMC [2014/30/EU] and LVD [2014/35/EU]

Part Numbers

Part No.	Spring Return Direction
MP2000-SRD	Stem down, extends (valve closed)
MP2000-SRU	Stem up, retracts (valve open)

Dimensions mm (inch)



MP4000

Multi-signal Control Actuators for VP222x SmartX PIBCV, DN200…250 (8…10”)



Product Description

The MP4000 Actuator is primarily designed to regulate valves in response to the demand of a controller in HVAC systems. MP4000 can be controlled by electronic controllers with modulating or 3-point control output.

Specifications

Please check power supply and power consumption prior connection.

Part Number	MP4000
Power supply	24 Vac/Vdc (+10, -15%)
Power consumption	15 VA (24 V)
Frequency (Hz)	50/60 Hz
Control input Y	0…10 Vdc (2…10 Vdc) Ri = 100kΩ, 0…20 mA (4…20 mA) Ri = 500Ω
Control output U (Position Feedback)	0…10 Vdc (2…10 Vdc) 2kΩ, 0…20 mA (4…20 mA) 550Ω
Close off force	4000 N (899.23 lbf)
Max. stroke	80 mm (3.14 in.)
Speed (selectable)	3 s/mm or 6 s/mm
Max. spindle travel	80 mm (3.14 in.)
Max. medium temperature	200 °C (392°F)
Ambient temperature	0 … + 55 °C (32…131 °F)
Storage and transport temperature	−40 … +70 °C (-40…158 °F) (storing for 3 days)
Humidity	5…95%
Protection class	II
Grade of enclosure	IP 54, NEMA 2
Electrical connection	conduit
Weight (kg)	7.5 (16.53 lbs)
Manual operation	Electrical and mechanical
Power failure response	Stem remains in last position
CE marking in accordance with the standards	Low Voltage Directive 2006/95/EEC EMC Directive 2004/108/EEC
UL	cULus according to UL 60730-1A/-2-14 and CAN/CSA E60730-1/-2-14 and CE according to EN 60730-1/-2-14 per EMC [2014/30/EU] and LVD [2014/35/EU]

Features

- Manual operation mechanical and/or electrical
- Position indication, LED signalization
- Selectable speed 3 s/mm or 6 s/mm
- Automatic adaptation of stroke to valve’s end positions that reduces commissioning time (self-stroking)
- Integrated external switch
- Characteristic optimization
- Adjustable stroke limitation
- Anti-oscillation function
- Pulse or continuous output signal (K2, K4)
- Voltage or current output signal U
- External reset button
- Auto detection of Y signal
- 3-point floating or modulating control selection
- Galvanic isolation Y, U and output terminal K2, K4
- Thermic and overload protection
- Precise regulation and fast response on 3-point signal (0.01 s)

15. Wiring Diagrams

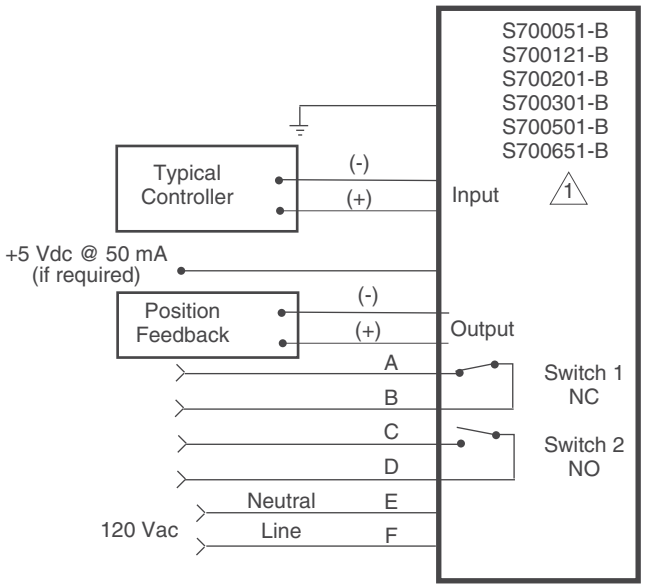


Wiring Diagrams

Actuator	Figure
700xx1	1, 2
M131A01	69
M132A01	69
M112A01	70
M122A01	70
M13xA01	71
M1x2A01	71
M133A01	67
M113A01	68
M123A01	68
MA40-7043	11
MA40-7170	10
MA40-7173	10
MA41-7073	12, 76
MA41-7150	12
MA41-7153	12, 22, 76
MA51-7100	14
MA51-7103-100	14
MA51-7200	14
MA51-7203	14
MA61-7200	14
MA61-7203	14
MA4D-7033-100	13
MA4D-8033-100	13
MF40-7043	21, 23 to 24
MF40-7173	17 to 18
MF41-60x3	19
MF41-6153	20
MF41-6343	17
MF41-7073	21 to 24, 76
MF41-7153	21 to 24, 76
MF51-7103-100	32 to 35
MF51-7203	32 to 35
MF61-7203	32 to 35
MF4D-7033-100	25 to 28
MF4D-8033-100	25 to 28
MS40-7043	40 to 42
MS40-7170	43 to 44
MS40-7173	45 to 48
MS41-6043	49-50
MS41-6083	50
MS41-6153	51 to 52
MS41-6340	53 to 54
MS41-6343	53 to 54

Actuator	Figure
MS41-7073	22, 55, 57, 76
MS41-7153	22, 55, 57, 76
MS51-7103-100	60 to 62
MS51-7203	61, 63 to 66
MS61-7203	61, 63 to 66
MS4D-6083-100	58, 59
MS4D-7033-100	58, 59
MS4D-8083-100	58, 59
AG13A020	3
AG14A020	3
AG23A020	3
AG24A020	3
AG13B020	3
AG14B020	3
AG23B020	3
AG24B020	3
AH13A020	3
AH14A020	3
AH23A020	3
AH24A020	3
NR-22xx-52x	72, 73
NR-22xx-54x	74
NR-2216-5X2	75
NR-2224-5x2	75
Mx41-7xxxx-50x	76
M210A01 M220A01	Fig. 77

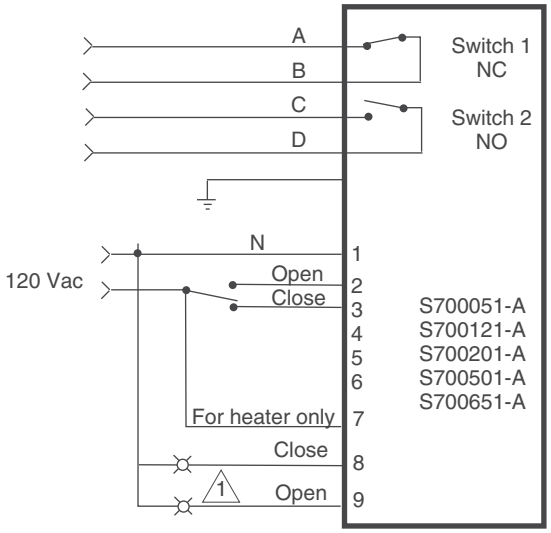
Wiring Diagrams



1 Switches shown for 4-20 mA input and Output.
Fail in closed position upon loss of signal, and forward acting mode.

	Command Input				Command Output			Forward	Reverse	Fail In Last	Fail Enable	Fail Close	Fail Open
Switch	4-20 mA	0-5V	0-10V	2-10V	4-20 mA	0-5 V	0-10 V						
1	ON	OFF	OFF	OFF									
2	OFF	OFF	ON	ON									
3	OFF	OFF	OFF	ON									
4					ON	OFF	OFF						
5					OFF	ON	ON						
6					OFF	ON	OFF						
7								OFF	ON				
8										OFF	ON		
9												OFF	ON
10	OFF	ON	ON	ON									

Figure 1 700xx1 Modulating Actuators.



1 Remote indicator for On/Off position.

Figure 2 700xx1 Two-Position Actuators.

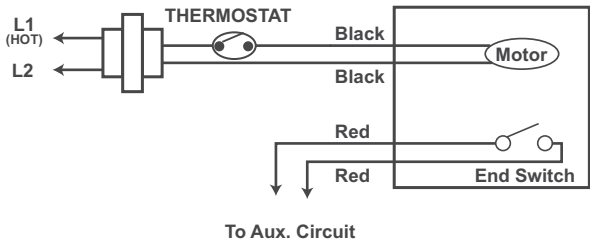
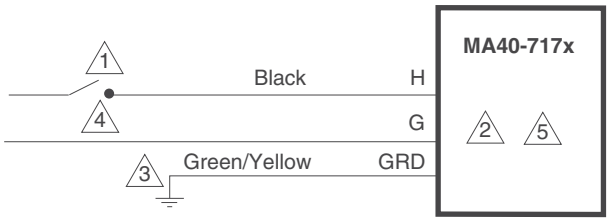


Figure 3 AG/AH Schneider Electric PopTop with Wire Leads.



1 SPST or Triac Controller. Multiple MA40-7173 actuators may be powered by a single 24 Vac transformer.

2 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

3 Ground wire may be Green on some models.

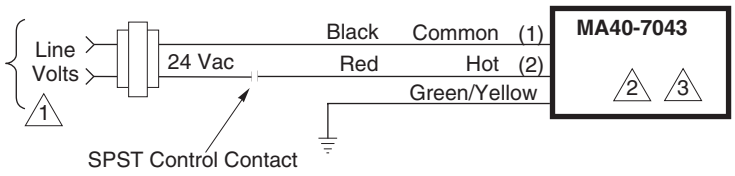
4

Voltage	Wire (H) or L1)	Wire (G) or L2)
24 V	Black	Black/Blue
120 V	Black	White

5 As viewed from "L" side power drives clockwise.

Figure 10 MA40-717x.

Wiring Diagrams

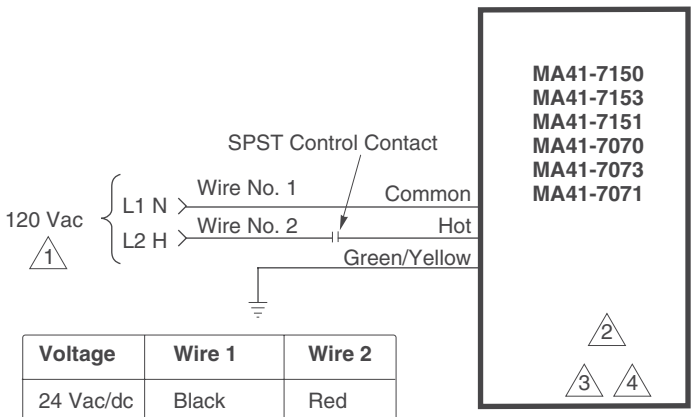


1 Provide overload protection and disconnect as required.

2 Actuators may be wired in parallel. Power consumption must be observed. Actuator may also be powered by 24 Vdc.

4 As viewed from "L" side power drives clockwise.

Figure 11 MA40-7043 and MA40-7043-501 for 24 Vac Basic.



Voltage	Wire 1	Wire 2
24 Vac/dc	Black	Red
120 Vac	Black	Black

1 Provide overload protection and disconnect as required.

2 Actuators may be wired in parallel. All actuator common wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.

3 For end position indication, interlock control, fan startup, etc., MA41-7153-502 and MA41-7073-502 models incorporate two built-in auxiliary switches.

4 As viewed from "L" side power drives clockwise.

Figure 12 MA41-7xxx Basic.

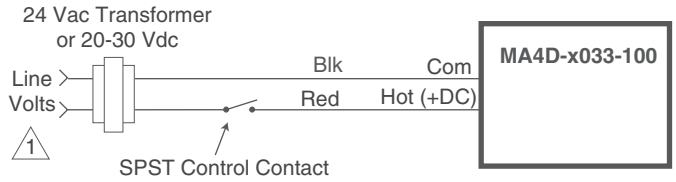
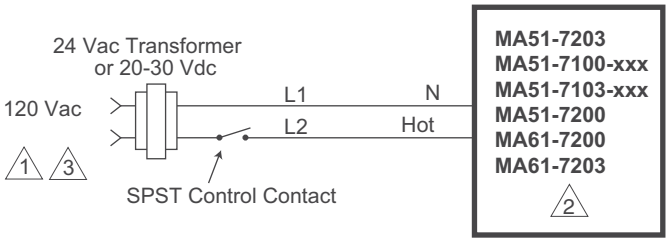


Figure 13 MA4D-x033-100.



Voltage	L1 N	L2 Hot
24 Vac	Black	Red
120 Vac	White	Black

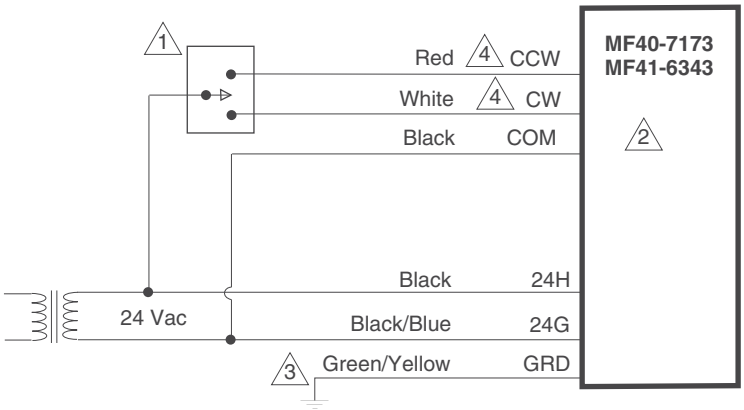
1 Provide overload protection and disconnect as required.

2 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

3 Applied power extends actuator. Spring returns when power is removed.

Figure 14 MA51-7x0x, MA61-720x Two Position Actuators.

Wiring Diagrams



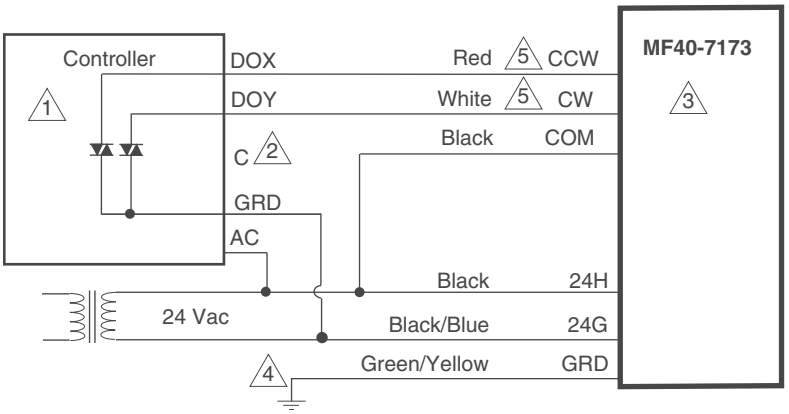
1 SPDT Floating or Switch/Controller or 2 SPST.

2 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

3 Ground wire may be Green on some models.

4 As viewed from "L" side.
MF40-7173: spring return CCW.

Figure 17 MF40-7173, MF41-6343 SPDT Controller.



1 Triacs switching to 24G.

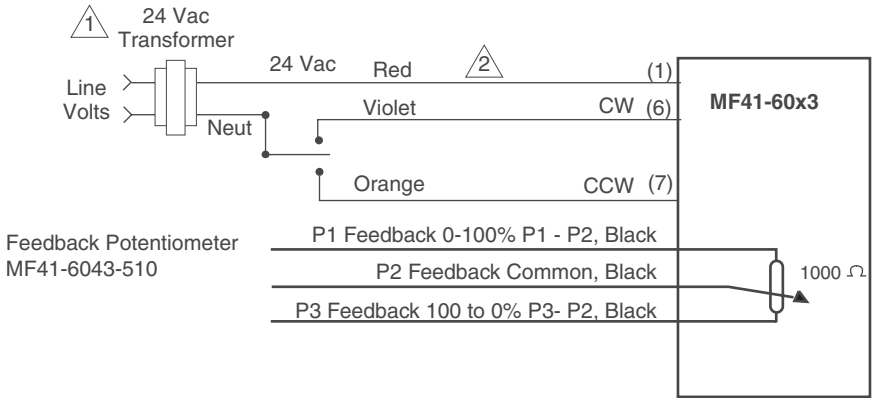
2 Do not connect drive wiring to C terminal of controller.

3 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

4 Ground wire may be Green on some models.

5 As viewed from "L" side.
Spring return CCW

Figure 18 MF40-7173 Triacs Switching to 24G.



1 Provide overload protection and disconnect as required.

Earth Ground isolating class 2 Transformer.

CE: Safety Isolating Transformer per EM 60742

2 Actuators are provided with color coded wires. Wire numbers are provided for reference.

Figure 19 MF41-60x3.

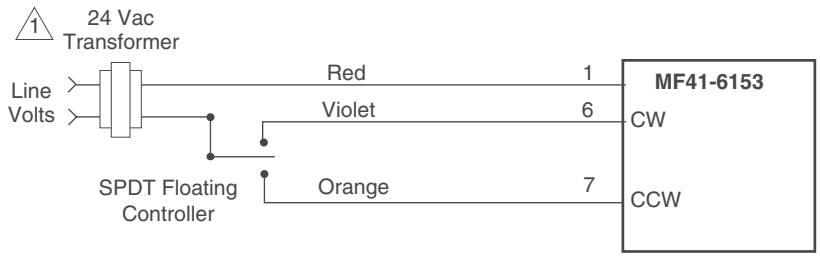


Figure 20 MF41-6153.

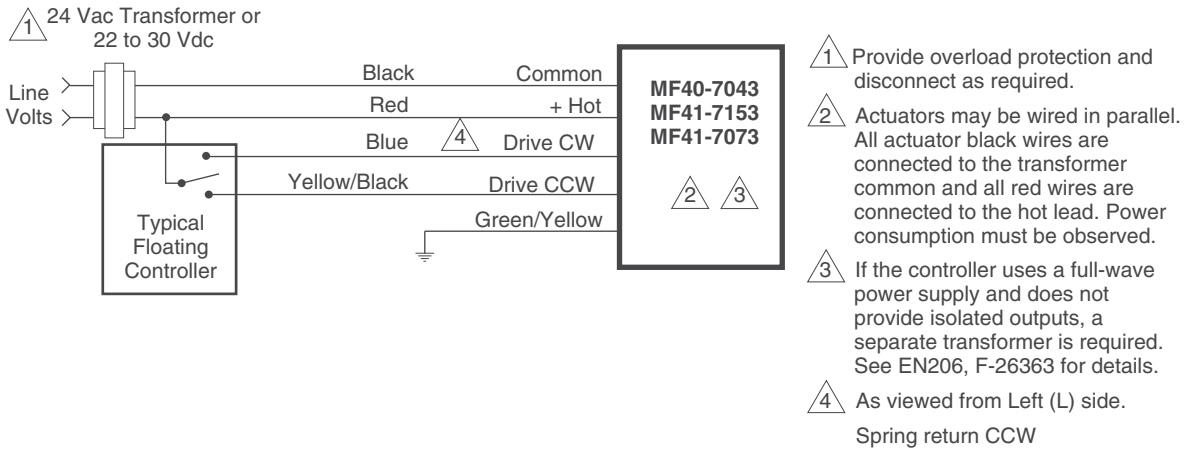
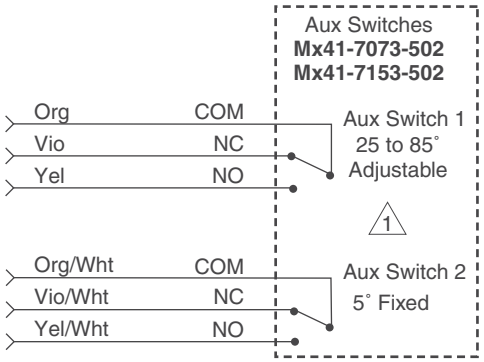


Figure 21 MF4x-7xx3.

Optional Auxiliary Switches



1 For end position indication, interlock control fan startup, etc., Mx41-7xx3-50x models incorporate one or two built-in auxiliary switches. See Specifications section for details.

Mx40-707x-502 and Mx40-715x-502 units manufactured prior to the date code 0141 (October 6, 2001) used the following color coding for the auxiliary switches:

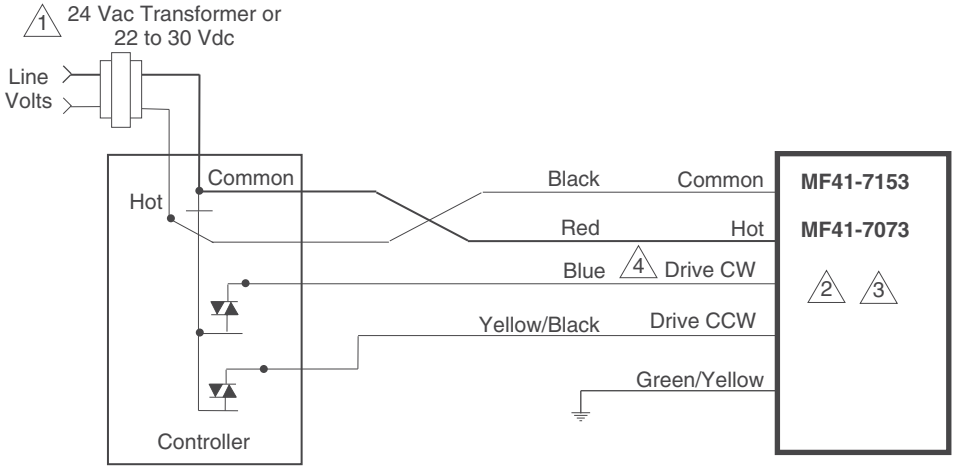
Auxiliary Switch 1

Orange:	Fixed auxiliary switch common (com)
Yellow:	Fixed auxiliary switch normally closed (NC)
Violet:	Fixed auxiliary switch normally open (NO)

Auxiliary Switch 2

Orange/white:	Fixed auxiliary switch common (com)
Yellow/white:	Fixed auxiliary switch normally closed (NC)
Violet/white:	Fixed auxiliary switch normally open (NO)

Figure 22 Mx41-7073-502 and Mx41-7153-502 Optional Auxiliary Switches.



1 Provide overload protection and disconnect as required.

2 The Common connection from the actuator must be connected to the Hot connection of the controller. The actuator Hot must be connected to the controller Common.

3 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.

4 As viewed from Left (L) side. Spring return CCW

Figure 23 MF4x-7xx3 with Triac Sink.

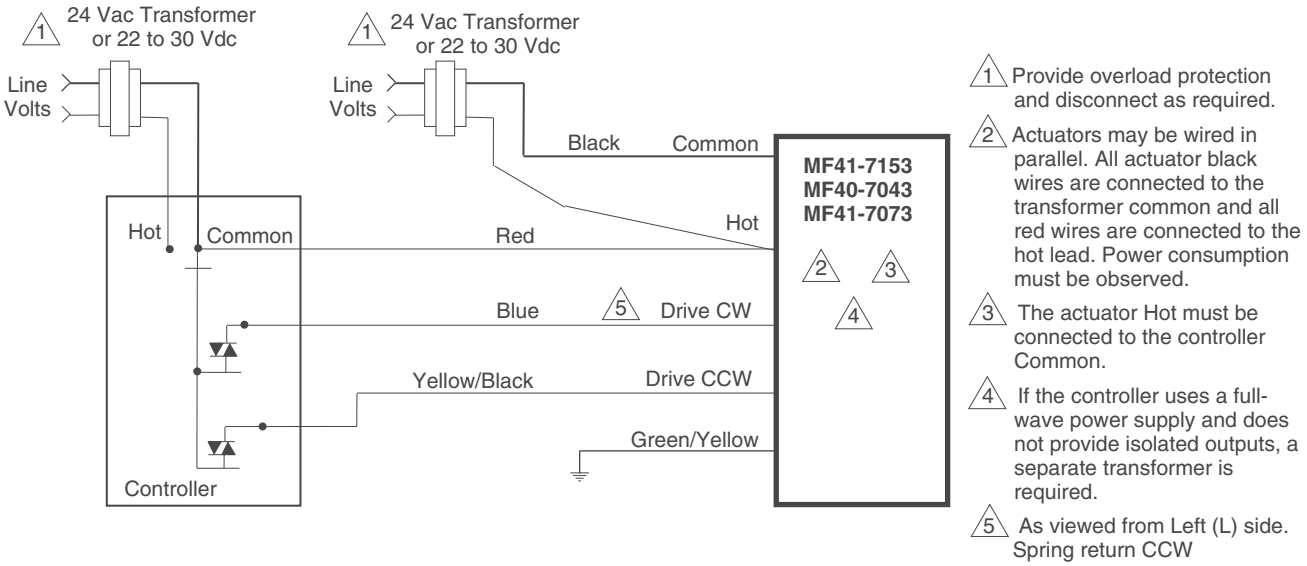


Figure 24 MF4x-7xx3 with Triac Sink and Separate Transformers.

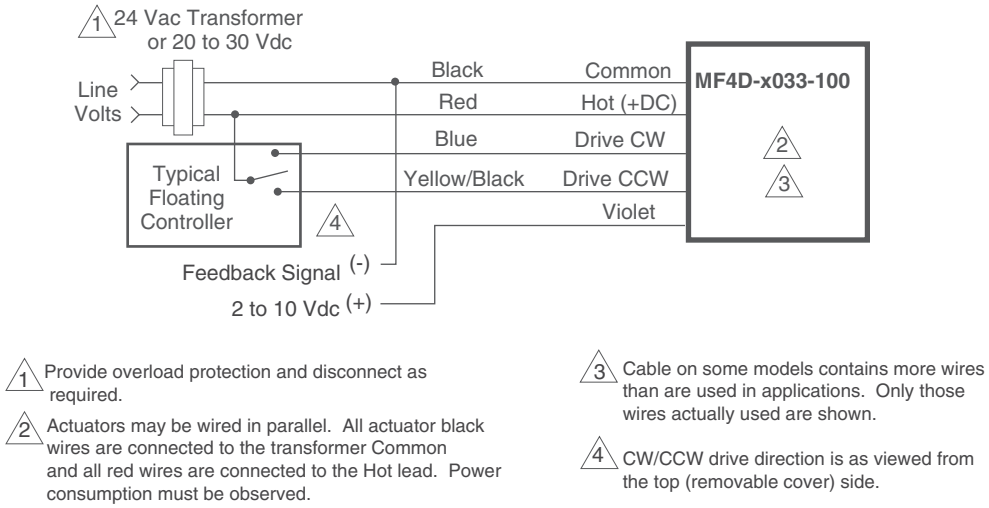
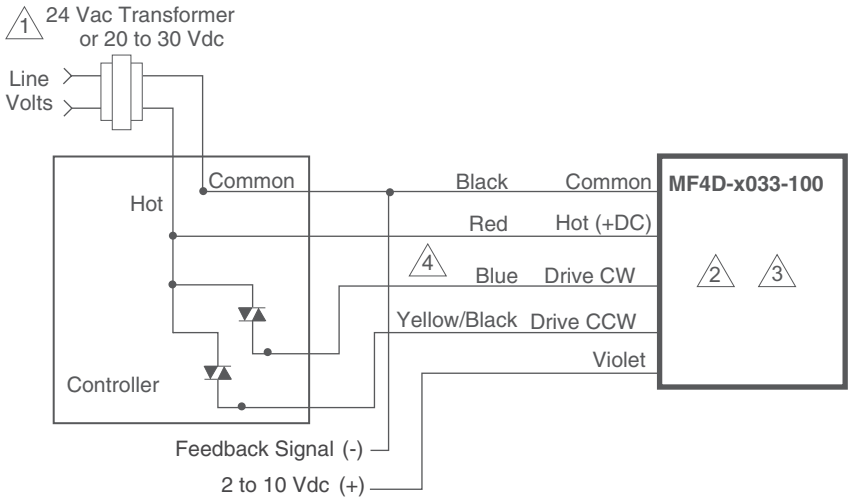


Figure 25 MF4D-x033-100.



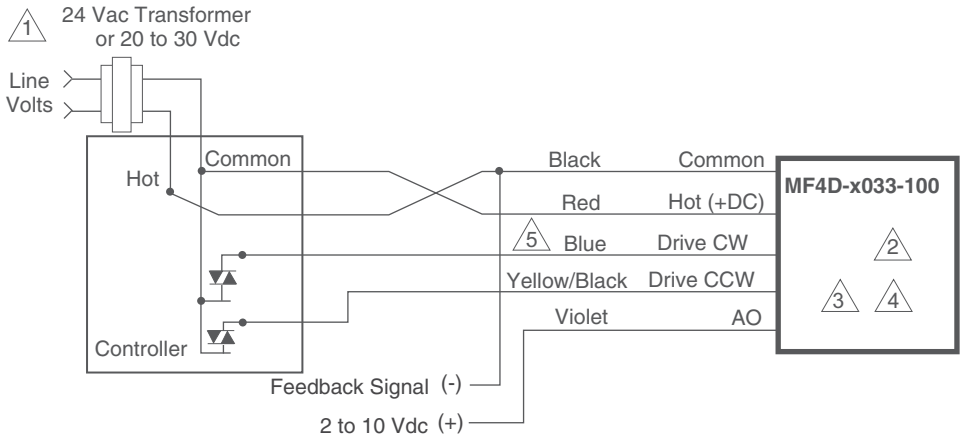
1 Provide overload protection and disconnect as required.

2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer Common and all red wires are connected to the Hot lead. Power consumption must be observed.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 CW/CCW drive direction is as viewed from the top (removable cover) side.

Figure 26 MF4D-x033-100 Triac Source.



1 Provide overload protection and disconnect as required.

2 The Common connection from the actuator must be connected to the Hot connection of the controller. The actuator Hot must be connected to the controller Common.

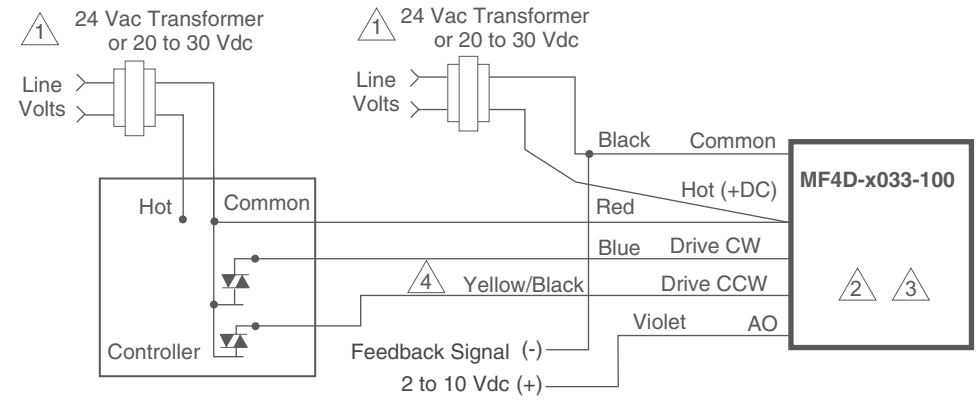
3 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required. See EN206, F-26363.

4 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

5 CW/CCW drive direction is as viewed from the top (removable cover) side.

Figure 27 MF4D-x033-100 Triac Sink.

Wiring Diagrams



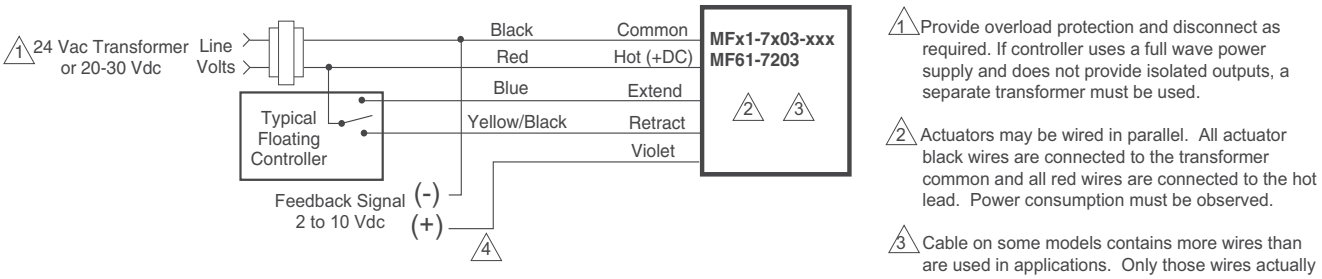
1 Provide overload protection and disconnect as required.

2 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required. See EN206, F-26363.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 CW/CCW drive direction is as viewed from the top (removable cover) side.

Figure 28 MF4D-x033-100 Triac Sink with Separate Transformers.



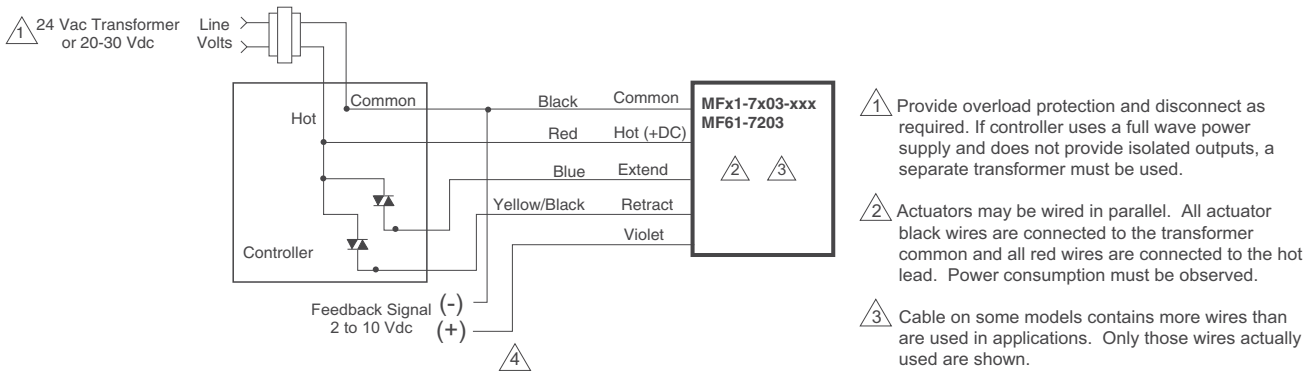
1 Provide overload protection and disconnect as required. If controller uses a full wave power supply and does not provide isolated outputs, a separate transformer must be used.

2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 Feedback only available on MF51-7103 models.

Figure 32 MF51-7x03-xxx and MF61-7203.



1 Provide overload protection and disconnect as required. If controller uses a full wave power supply and does not provide isolated outputs, a separate transformer must be used.

2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 Feedback only available on MF51-7103 models.

Figure 33 MF51-7x03-xxx, MF61-7203 Triac Source.

Wiring Diagrams

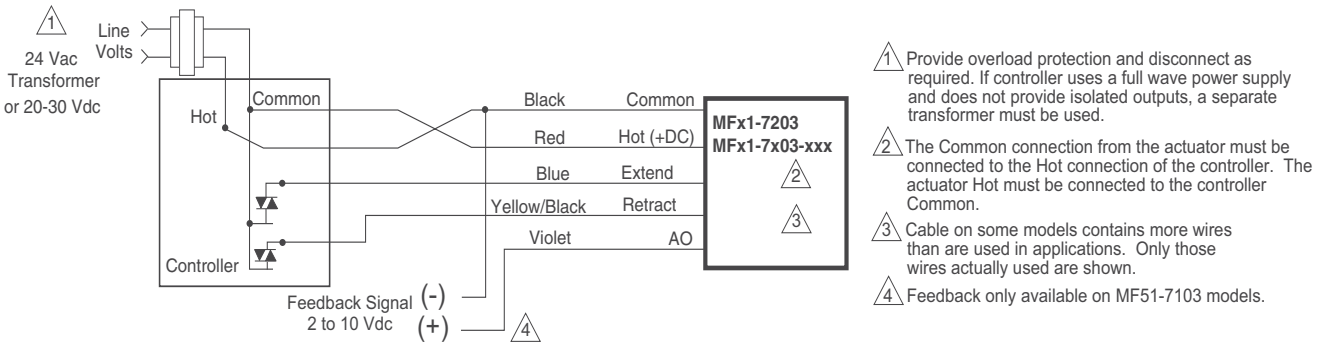


Figure 34 MF51-7x03-xxx, MF61-7203 Triac Sink.

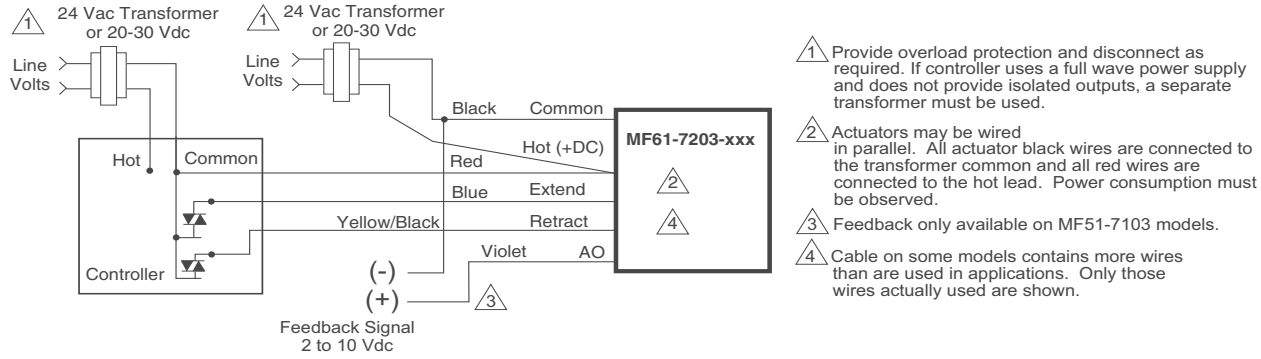


Figure 35 MF51-7x03-xxx, MF61-7203 Triac Sink with Separate Transformers.

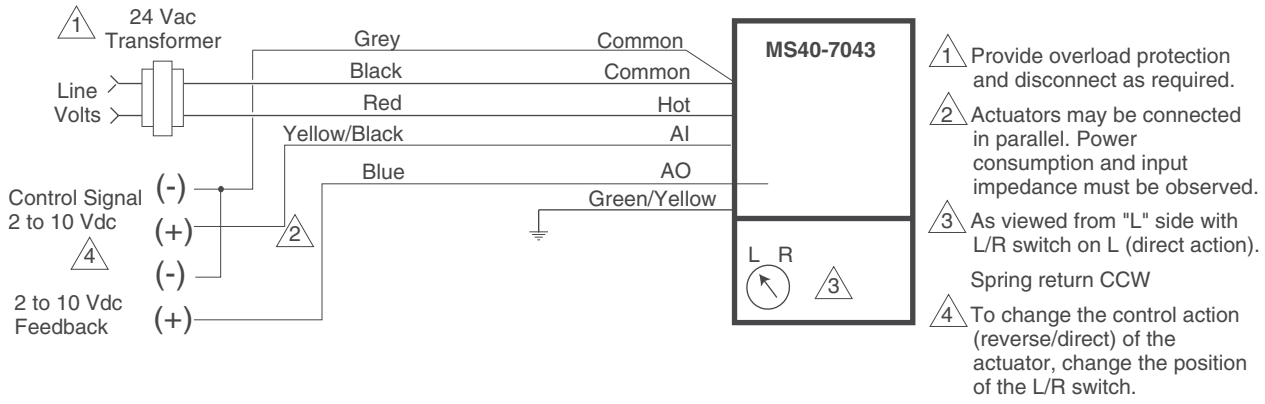
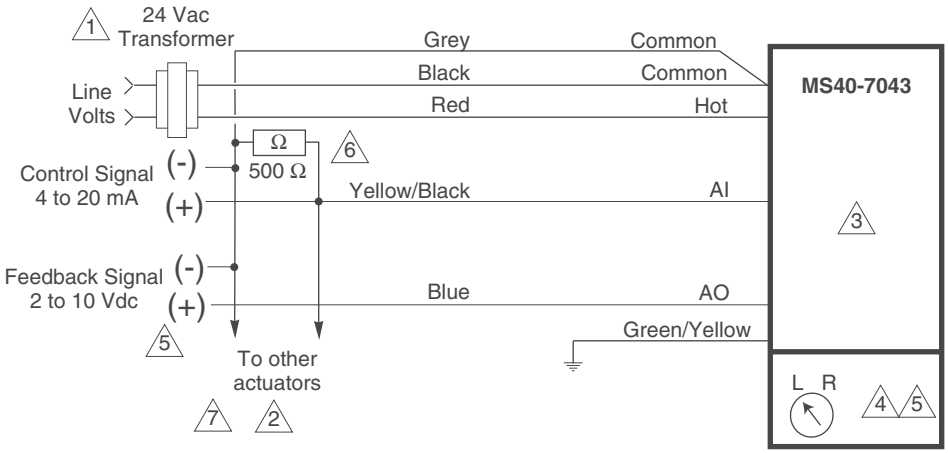


Figure 40 MS40-7043 2 to 10 Vdc Control.



1 Provide overload protection and disconnect as required.

2 For unison operation in 4 to 20 mA applications, up to four actuators, mounted on separate shafts may be wired in parallel. With four actuators wired to one 500 ohm resistor, a +2% shift of the control signal may be required. Power consumption and input impedance limits must be observed. Actuator input impedance is 80 k ohm.

3 For end position indication, interlock control, fan startup, etc., MS40-7043-501 model incorporates one built-in auxiliary switch.

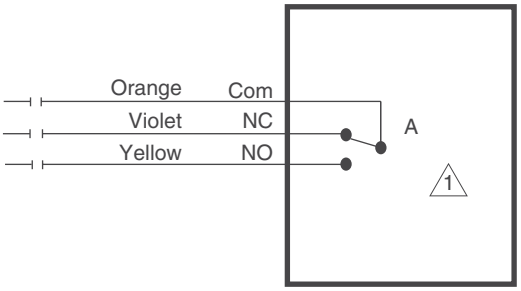
4 As viewed from "L" side with L/R switch on L. (direct action) Spring return CCW

5 To change the control action (reverse/direct) of the actuator change the position of the L/R switch.

6 A field supplied 500 ohm resistor (AM-708) is required between the gray and yellow/black leads to convert the 4 to 20 mAdc control signal to 2 to 10 Vdc.

7 Only connect common to negative (-) leg of control circuits.

Figure 41 MS40-7043 4 to 20 mA Control with 2 to 10 Vdc Feedback Control.



1 For end position indication, interlock control fan startup, etc., MS40-7XX3-50X models incorporate one or two built-in auxiliary switches. See Specifications section for details.

Model #	Switch	Switch Type
MS40-7043-501	A	Adjustable, 0 - 1 scale
	B	None

Figure 42 MS40-7043-501 Optional Auxiliary Switches.

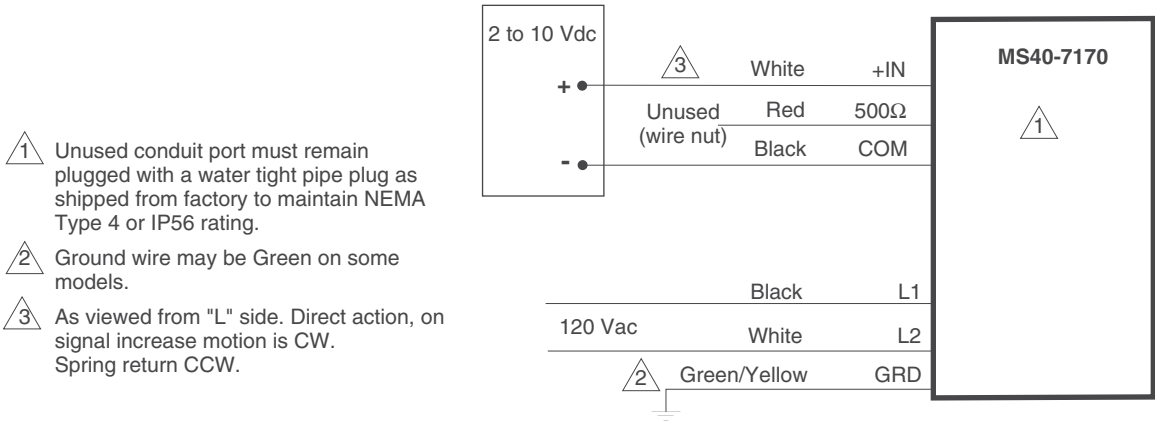


Figure 43 MS40-7170 2 to 10 Vdc (120 Vac).

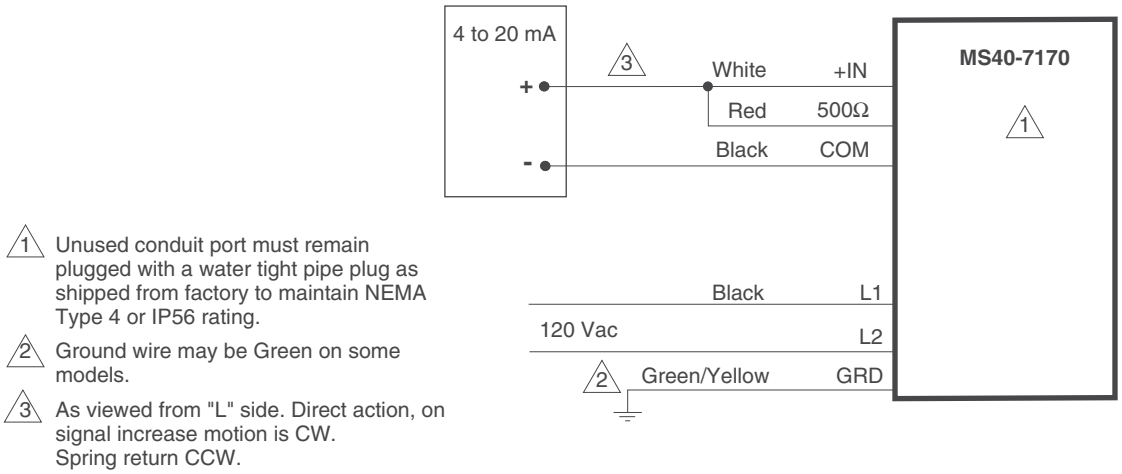


Figure 44 MS40-7170 4 to 20 mA (120 Vac).

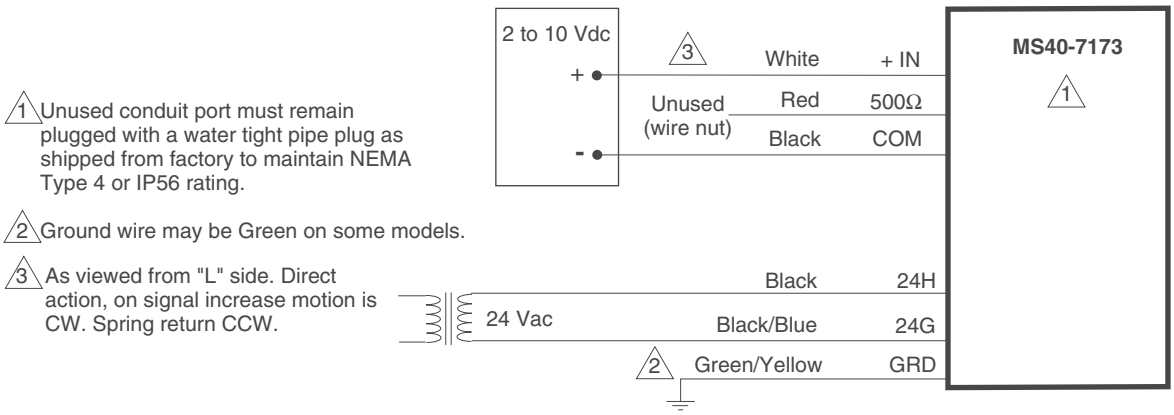


Figure 45 MS40-7173 2 to 10 Vdc.

Wiring Diagrams

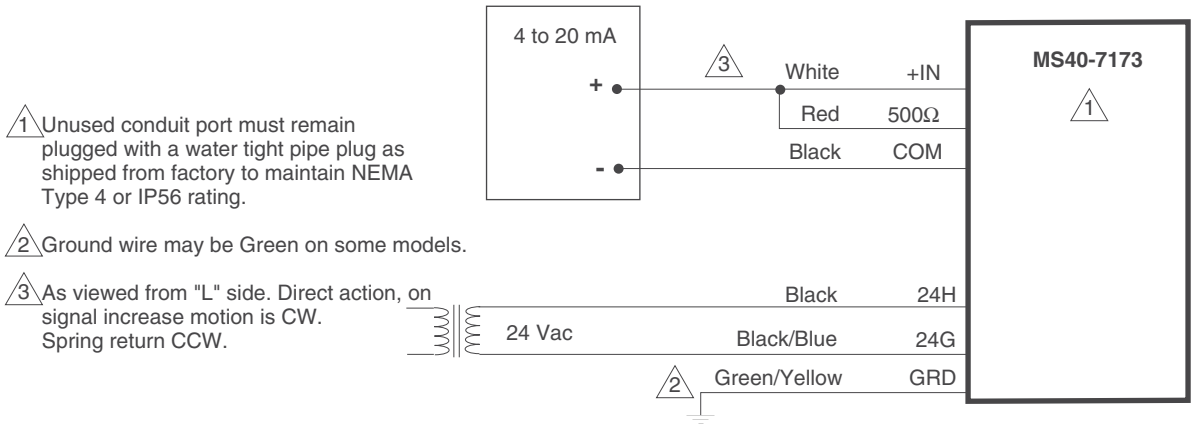
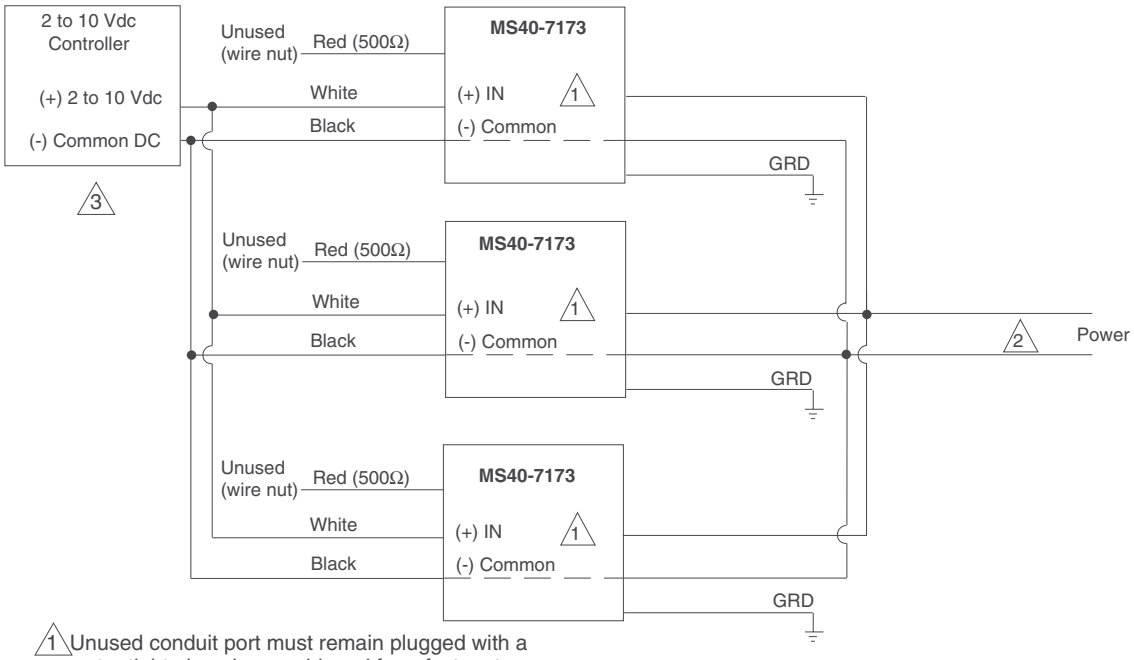
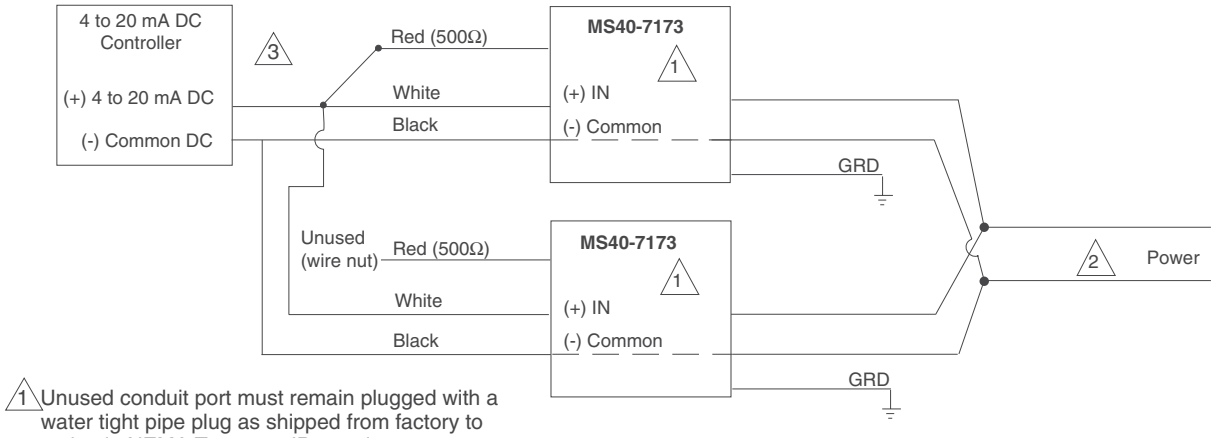


Figure 46 MS40-7173 4 to 20 mA.



Voltage	Designation	Wire Color
24	24H	Black
	24G	Black/Blue

Figure 47 MS40-7173 2 to 10 Vdc Control using Multiple Actuators.



1 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

2 See table for power wire designations. Ground wire may be Green or Green/Yellow on some models.

3 As viewed from "L" side. Direct action, on signal increase motion is CW. Spring return CCW.

Voltage	Designation	Wire Color
24	24H	Black
	24G	Black/Blue

Figure 48 MS40-7173 4 to 20 mAdc Control using Multiple Actuators.

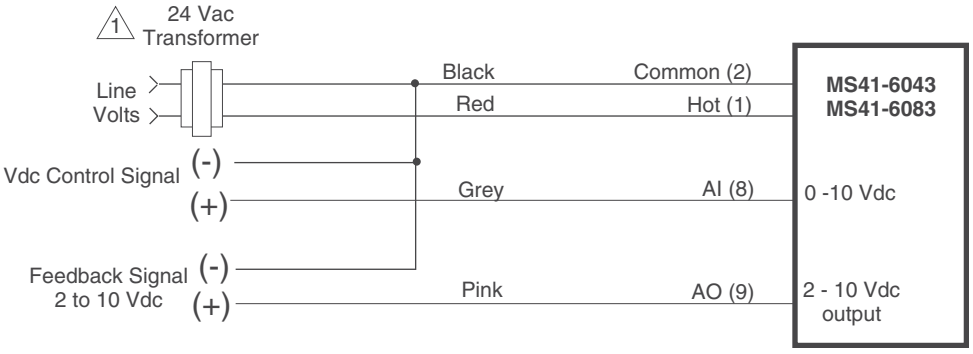


Figure 49 MS41-6043 and MS41-6083 24 Vac 0-10 Vdc Input.

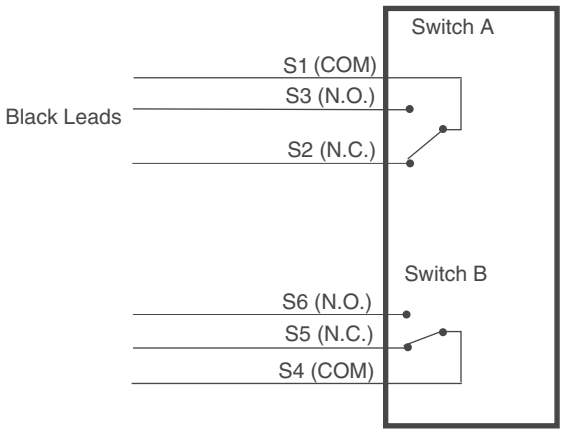


Figure 50 MS-6083-502 Auxiliary Switch Models.

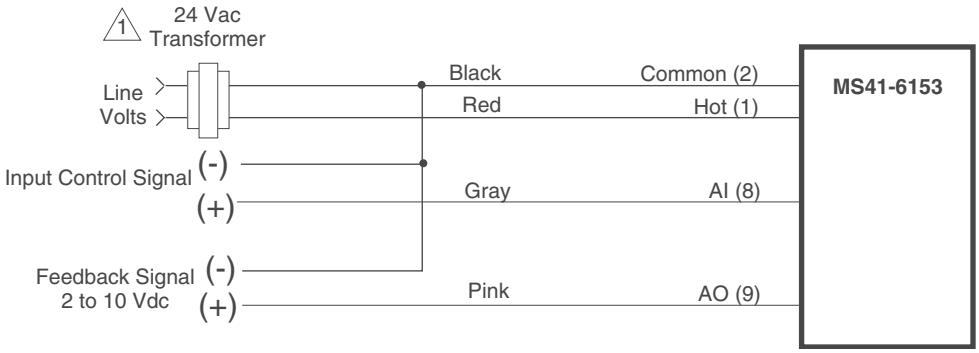


Figure 51 MS41-6153 24 Vac 0-10 Vdc Input Standard.

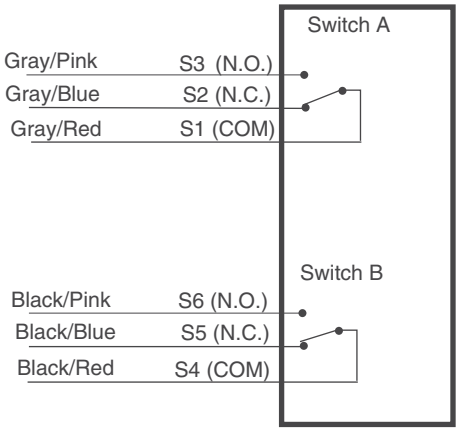


Figure 52 MS41-6153-502 Auxiliary Switch Models.

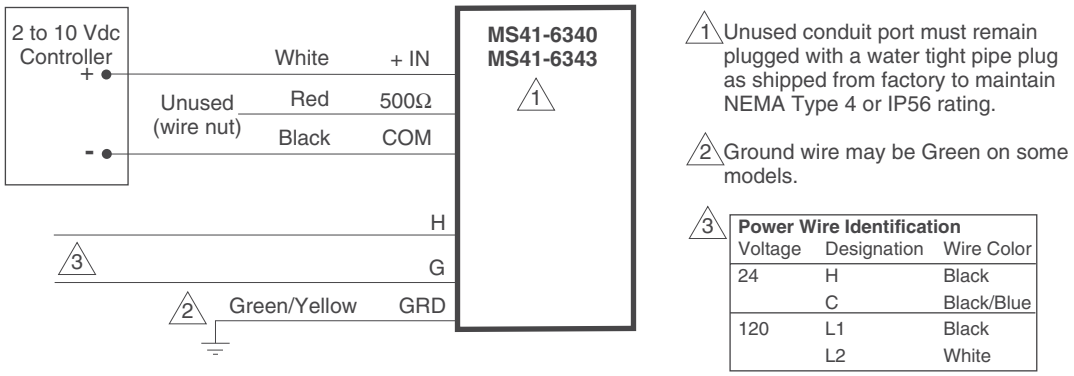


Figure 53 MS41-634x for 2 to 10 Vdc Controller with a 24 or 120 Vac Actuator.

Wiring Diagrams

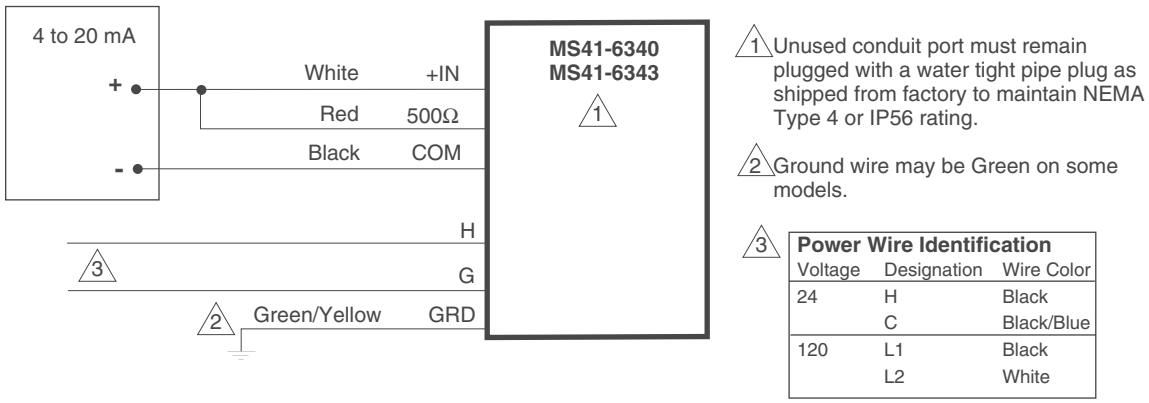


Figure 54 MS41-634x for 4 to 20 mA Controller with a 24 or 120 Vac Actuator.

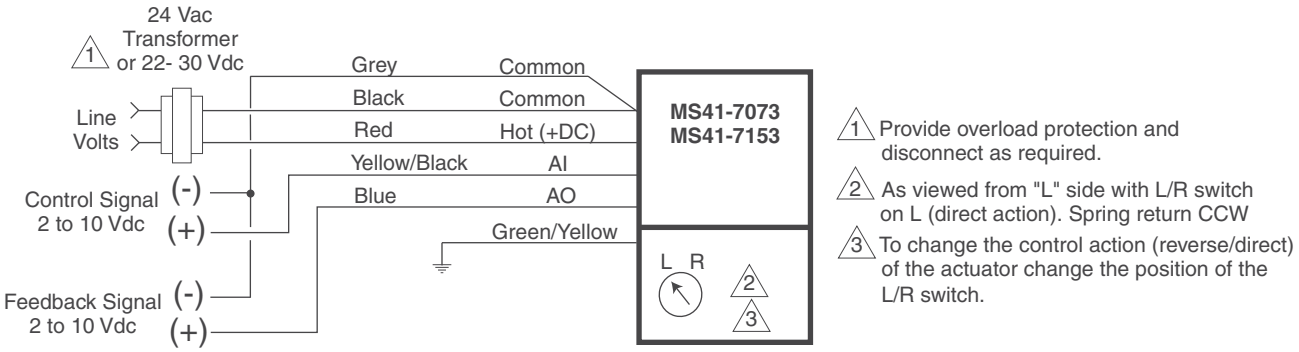
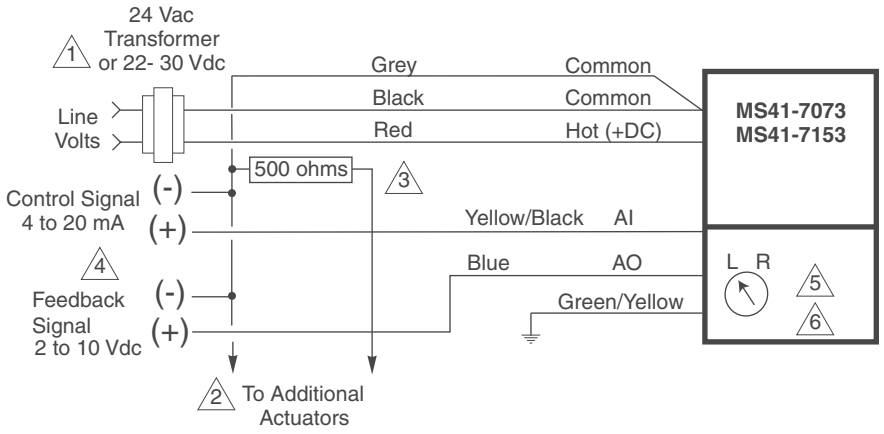


Figure 55 MS41-7xx3 2 to 10 Vdc.

Wiring Diagrams



1 Provide overload protection and disconnect as required.

2 With four actuators wired to one 500 ohm resistor, a +2% shift of the control signal may be required. (Actuator input impedance is 80 k ohm.)

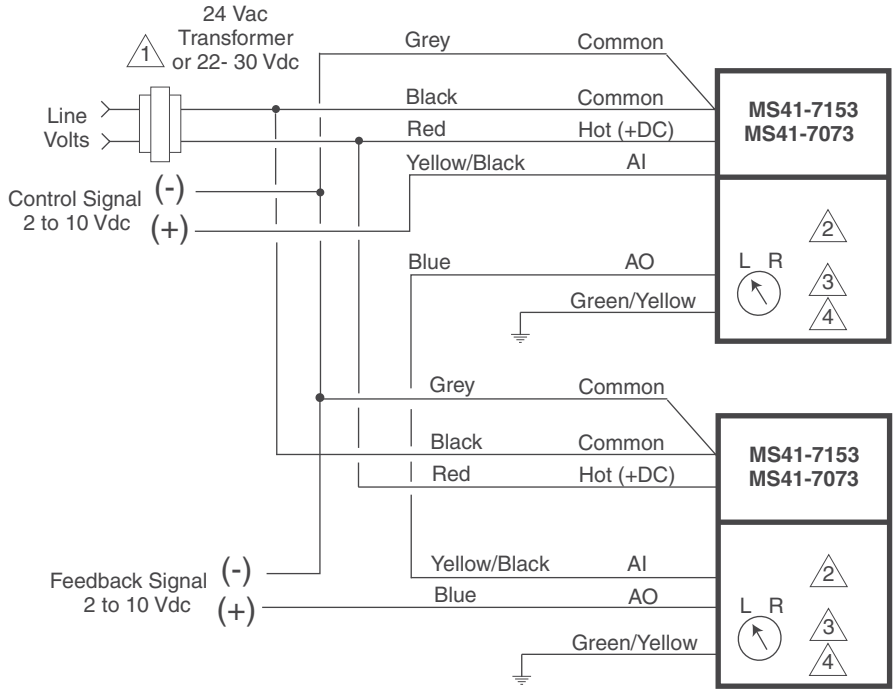
3 A field-supplied 500 ohm resistor (AM-708) is required between the gray and yellow/black leads to convert the 4 to 20 mAdc control signal to 2 to 10 Vdc.

4 Only connect common to negative (-) leg of control circuits.

5 As viewed from "L" side with L/R switch on L (direct action). Spring return CCW

6 To change the control action (reverse/direct) of the actuator change the position of the L/R switch.

Figure 56 MS41-7xx3 4 to 20 mAdc.



1 Provide overload protection and disconnect as required.

2 As viewed from "L" side with L/R switch on L (direct action). Spring return CCW.

3 To change the control action (reverse/direct) of the actuator change the position of the L/R switch.

4 Both actuators must be set to operate in the same direction.

Figure 57 Two MS41-7xx3 Actuators on the Same Damper Shaft.

Wiring Diagrams

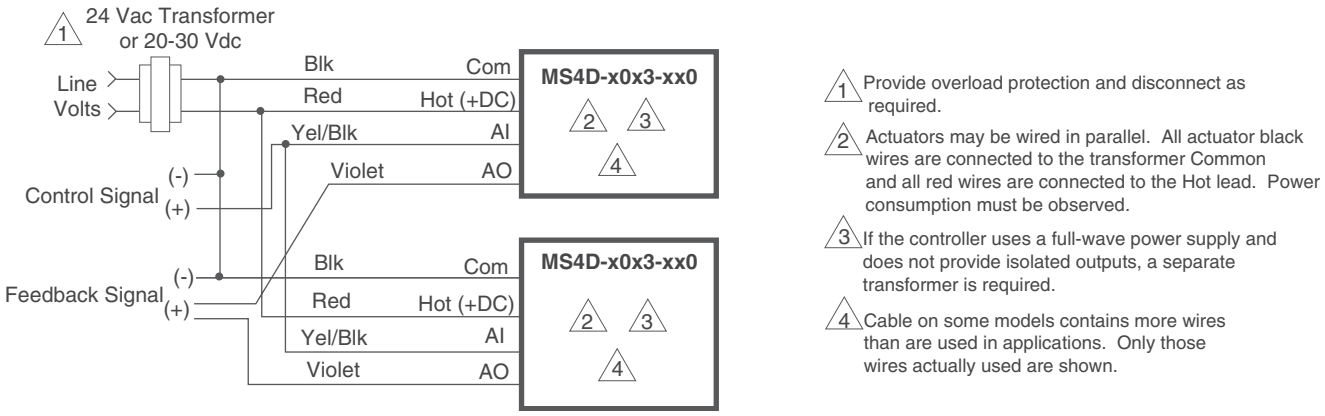


Figure 58 MS4D-x0x3-xx0 for Proportional Control 24 Vac Models Wired in Parallel.

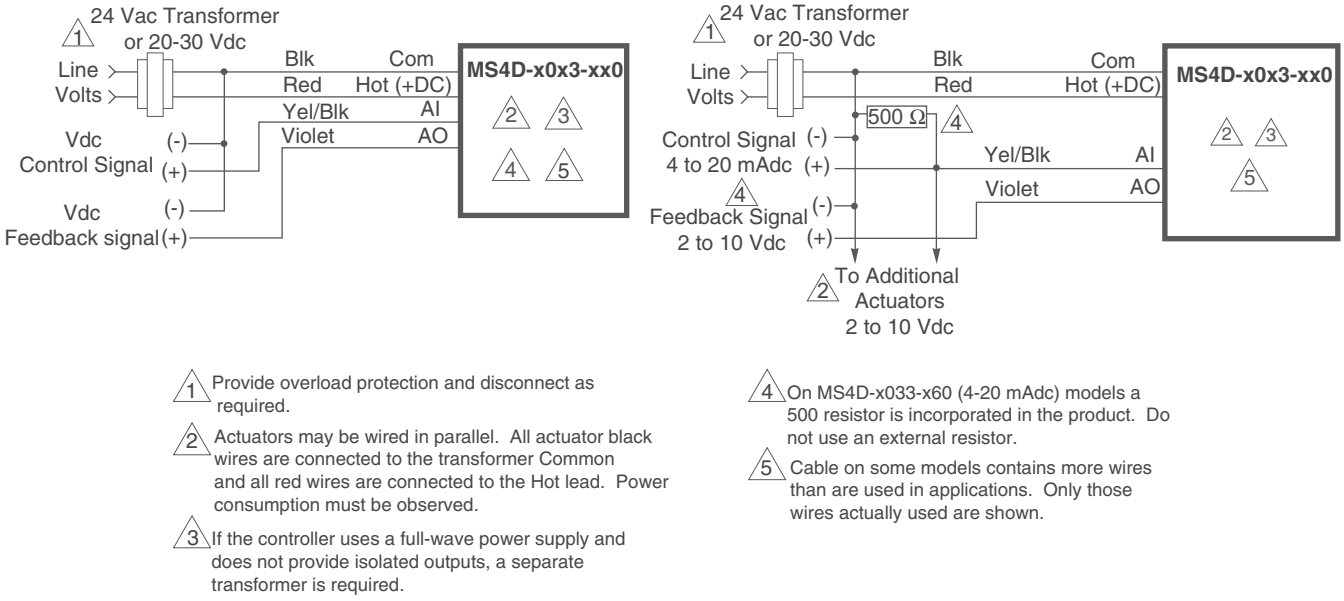
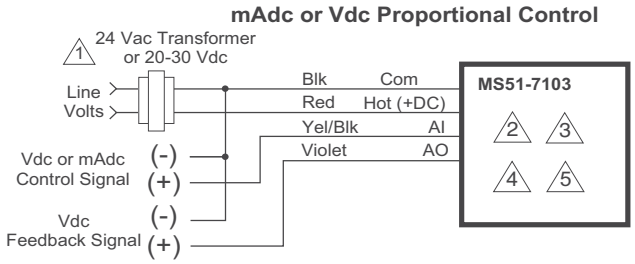


Figure 59 MS4D-x0x3-xx0 for Proportional Control 24 Vac Basic Models.



1 Provide overload protection and disconnect as required.

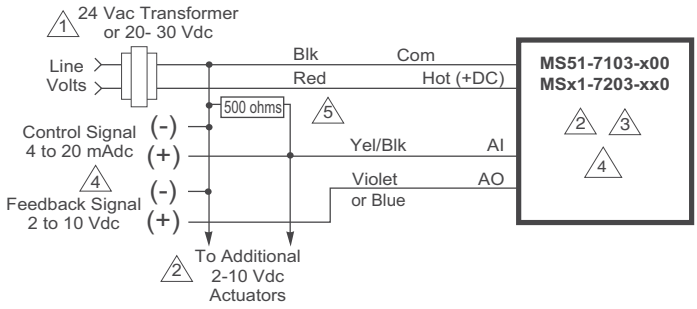
2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.

3 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.

4 On MS51-7103-x60 (4-20 mAdc) models a 500 ohm resister is incorporated in the product. Do not use an external resistor.

5 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

Figure 60 MS51-7103.



1 Provide overload protection and disconnect as required.

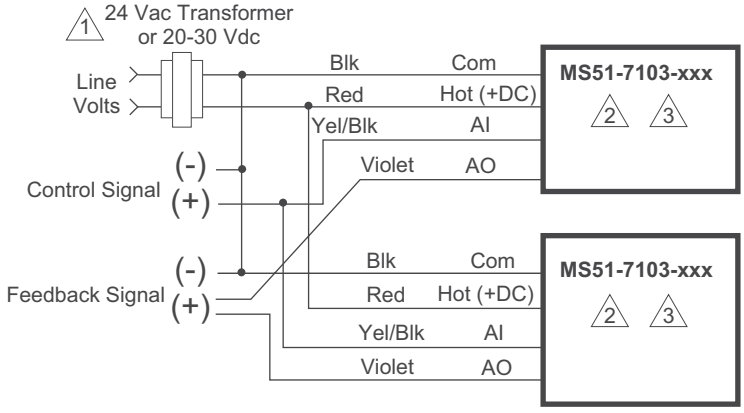
2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.

3 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.

4 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

5 AM-708 load resistor to convert signal to 2 to 10 Vdc.

Figure 61 MS51-7103-xx0, MSx1-7203-xx0 4 to 20 mAdc with 2 to 10 Vdc Actuators.



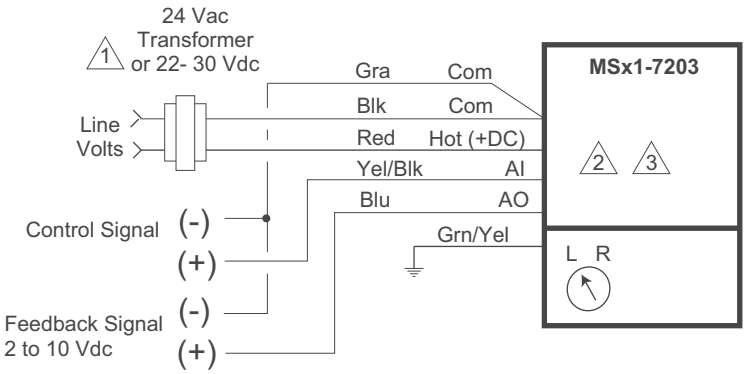
1 Provide overload protection and disconnect as required.

2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

Figure 62 MS51-7103-xxx Wired in Parallel.

Wiring Diagrams

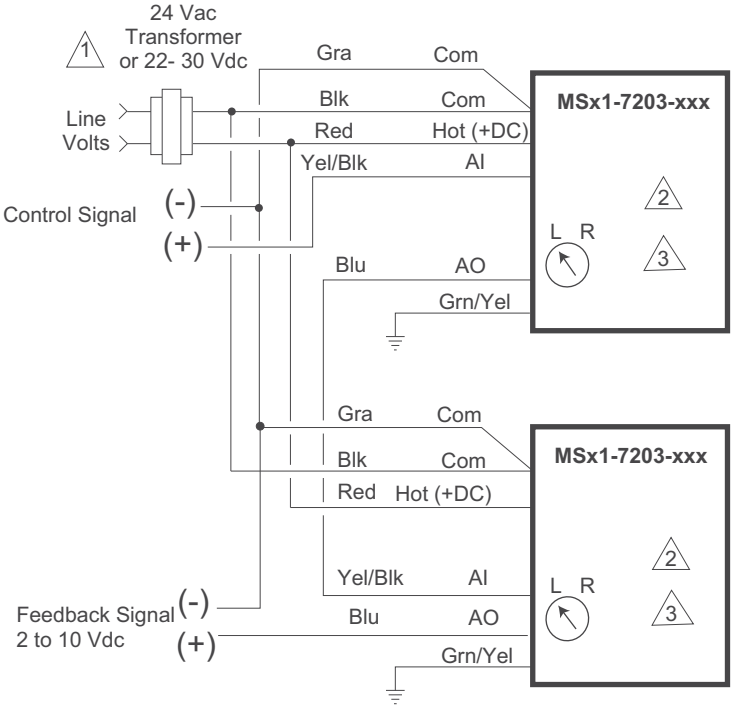


1 Provide overload protection and disconnect as required.

2 To reverse actuator control function (direct/reverse action), change the L/R switch position.

3 If the controller uses a full wave power supply and does not provide isolated outputs, a separate transformer is needed.

Figure 63 MSx1-7203 for 4 to 20 mAdc Proportional Control.

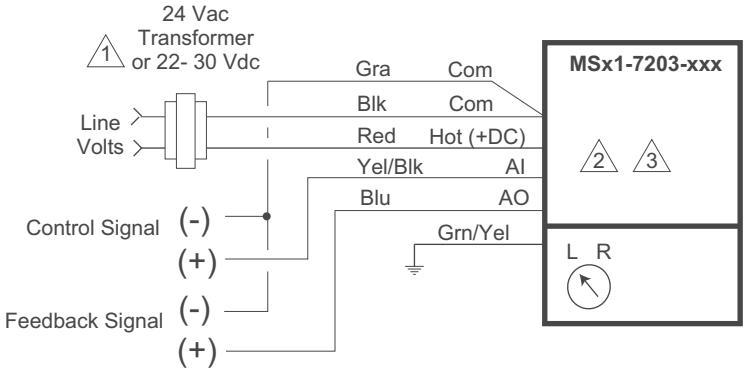


1 Provide overload protection and disconnect as required.

2 To reverse actuator control function (direct/reverse action), change the L/R switch position.

3 If the controller uses a full wave power supply and does not provide isolated outputs, a separate transformer is needed.

Figure 64 MSx1-7203 2 to 10 Vdc Proportional Control Wired in Parallel.

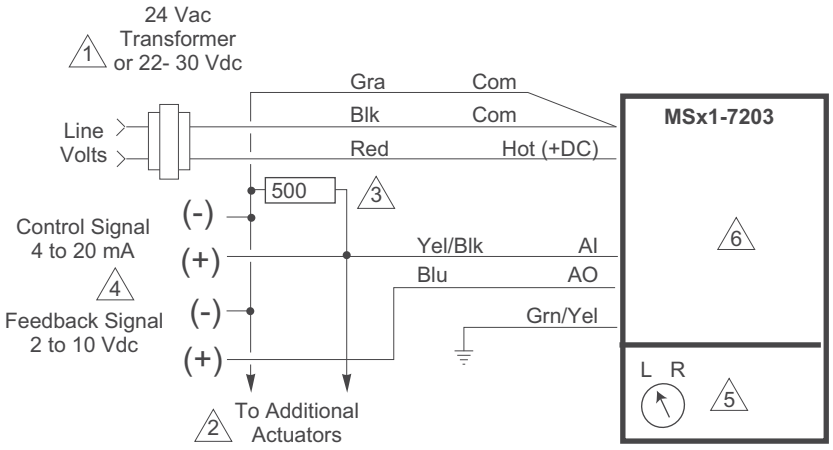


1 Provide overload protection and disconnect as required.

2 To reverse actuator control function (direct/reverse action), change the L/R switch position.

3 If the controller uses a full wave power supply and does not provide isolated outputs, a separate transformer is needed.

Figure 65 MSx1-7203-xxx 4 to 20 mAdc Proportional Control



1 Provide overload protection and disconnect as required.

2 With four actuators wired to one 500 ohm resistor, a +2% shift of the control signal may be required. (Actuator input impedance is 80 k ohm.)

3 A field-supplied 500 ohm resistor (AM-708) is required between the gray and yellow/black leads to convert the 4 to 20 mAdc control signal to 2 to 10 Vdc.

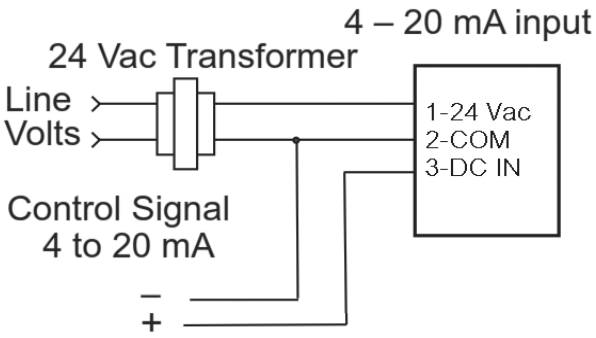
4 Only connect common to negative (-) leg of control circuits.

5 To reverse actuator control function (direct/reverse action), change the L/R switch position.

6 If the controller uses a full wave power supply and does not provide isolated outputs, a separate transformer is needed.

Figure 66 MSx1-7203 4 to 20 mA Converted to 2 to 10 Vdc.

Wiring Diagrams



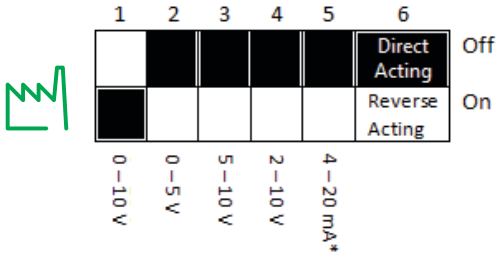
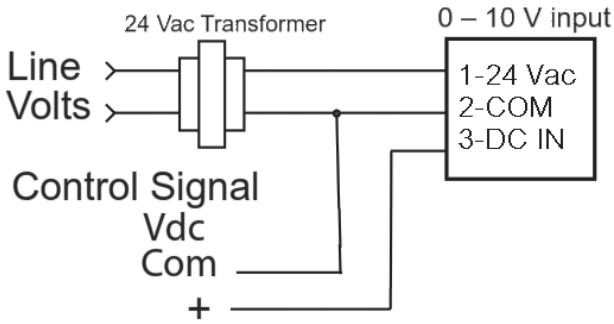


Figure 67 M133A01 Proportional Non-Spring Return.



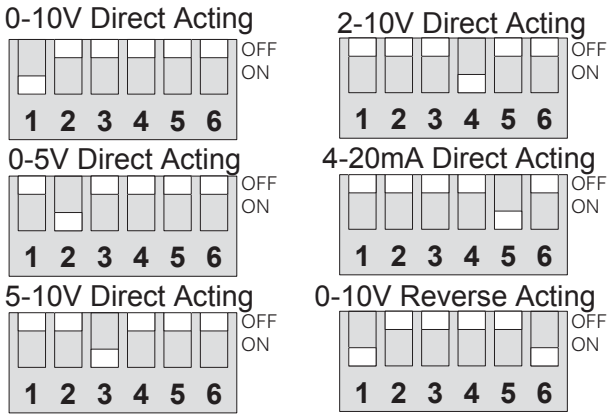


Figure 68 M113A01 and M123A01 Proportional Spring Return.

SPDT Floating or (2) SPST Controller

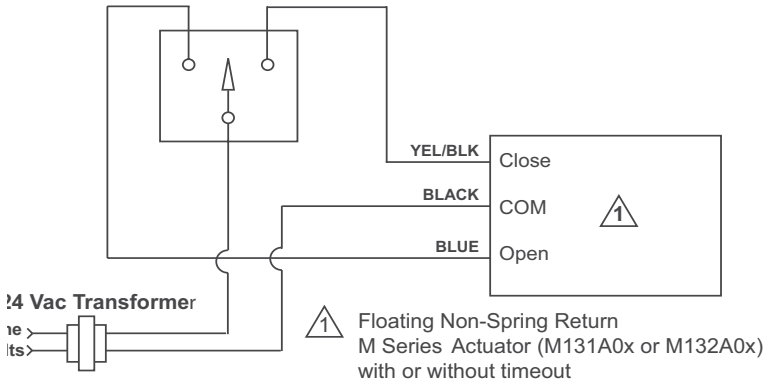
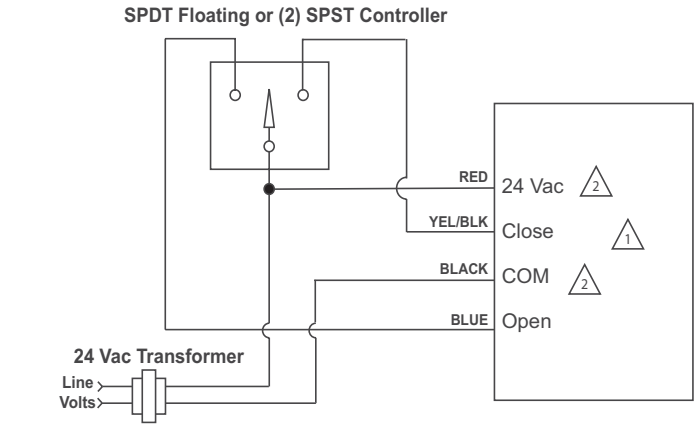


Figure 69 M131A01 or M132A01 Floating Non-Spring Return.



1 Floating Spring Return M Series Actuator (M131A0x or M132A0x)

2 The 24 Vac/COM supply must be maintained continuously for valve operation. The valve returns to normal position whenever this supply is interrupted.

Figure 70 M112A01 or M122A01 Floating.

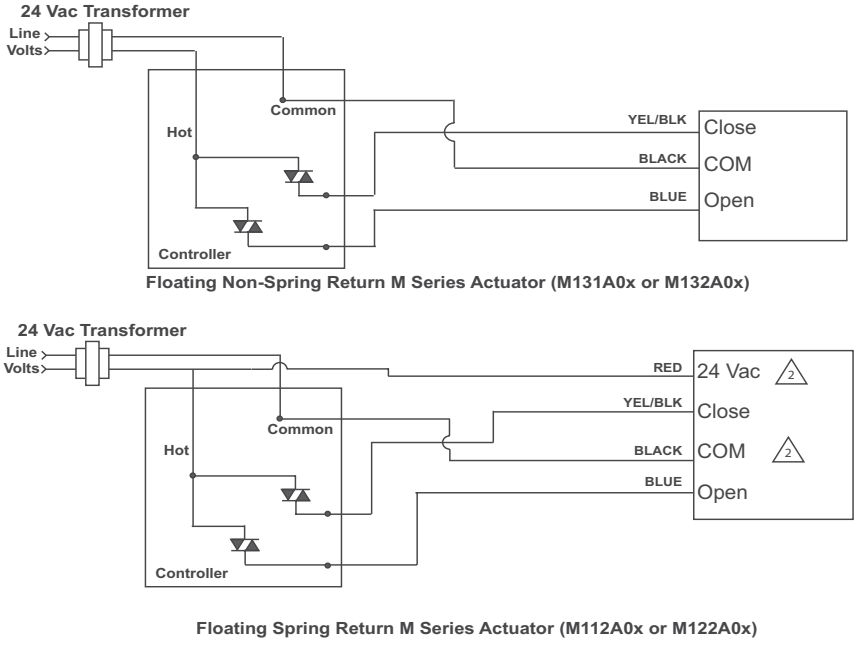


Figure 71 M13xA01 and M1x2A01 Triac Source Wiring.

Wiring Diagrams

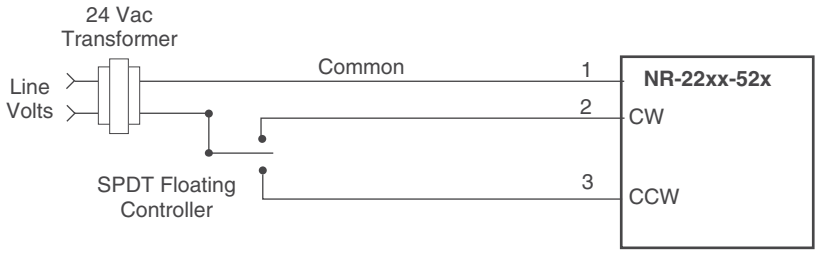


Figure 72 NR-22xx-52x Floating.

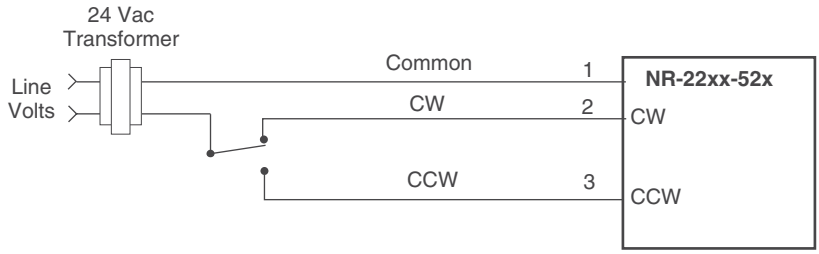


Figure 73 NR-22xx-52x Two Position.

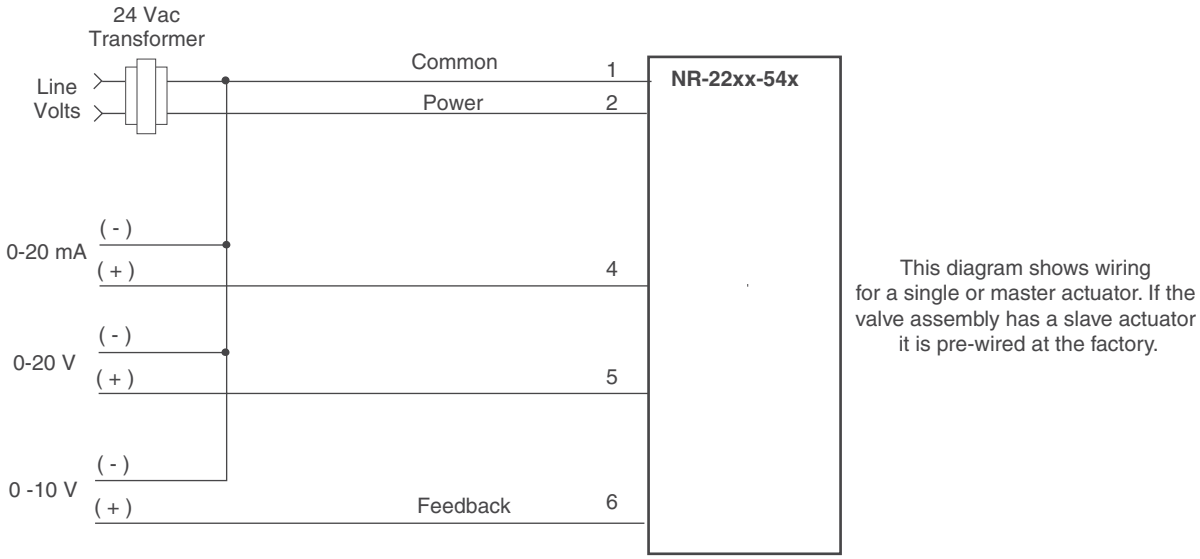


Figure 74 NR-22xx-54x Proportional NSR.

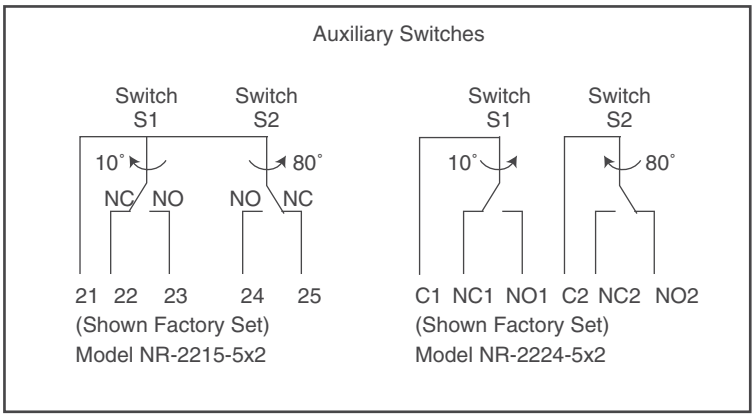
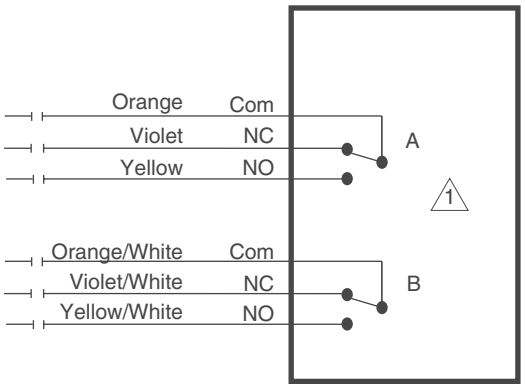


Figure 75 NR-2216-5x2 and NR-2224-5x2 Auxiliary Switches.

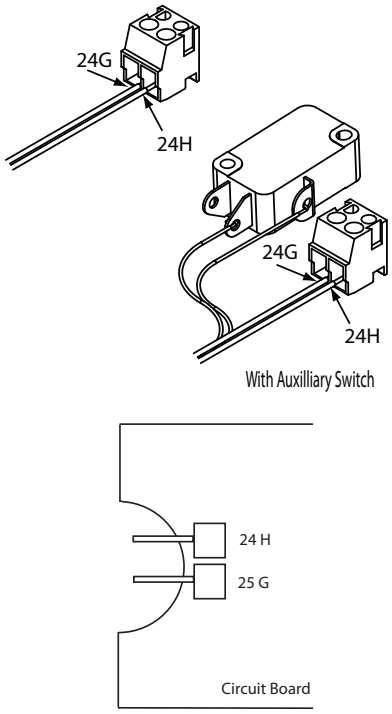


1 For end position indication, interlock control fan startup, etc., MS41-7XX3-50X models incorporate one or two built-in auxiliary switches. See Specifications section for details.

Model #	Switch	Switch Type
Mx41-7153-502 Mx41-7073-502	A	Adjustable, 25° - 85°
	B	Fixed at 5°

Figure 76 Mx41-7xxx-50x Auxiliary Switches.

Wiring Diagrams



Power Action (Two-Position)

Control Signal	Spring Return Open Actuator	Spring Return Closed Actuator
Power On	A to AB Closed	A to AB Open
Power Off	A to AB Open	A to AB Closed

* Two-Way valve operation described. For a three-way valve, A to AB operation is the same. B to AB operation is opposite that of A to AB operation.

Wiring Terminals			
Board Marking	**Terminal Marking**	**AC Control Signal**	**DC Control Signal**
24H	2	24v	+
24G	1	24v	-

24V Wiring (M2x0Axx)

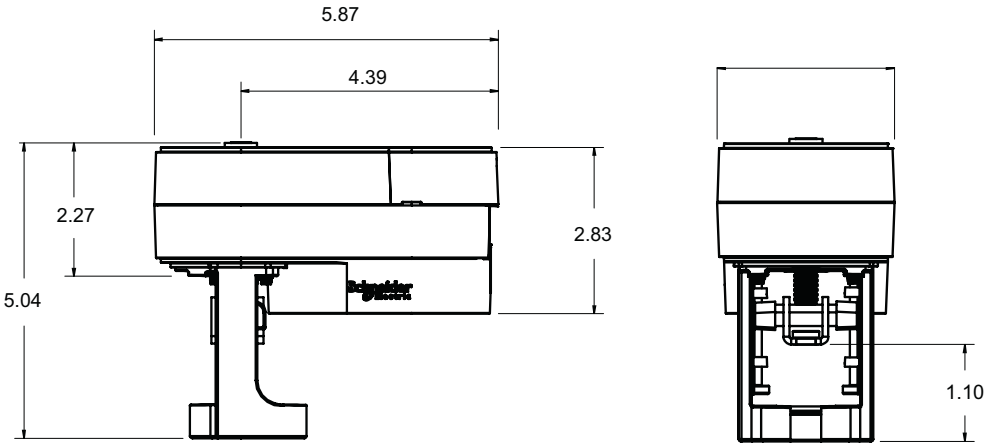
Terminal Marking	AC Input 50/60 Hz	DC Input 50/60 Hz	Lead Colors
1	24 Vac	-24 Vdc	Black
2	24 Vac	+24 Vdc	Red
SPST Aux Switch			Orange
			Yellow

Fig. 77 M210A01 and M220A01 Two-Position Spring Return



16. Assembly Dimensions

1"…2" 2-Way Globe Valve Assemblies: MG350V



1"…2" 2-Way Globe Valve Assemblies

Dimensions — 1 to 2" 2-Way Globe Valve Assemblies										
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)								
		Two-Way (Refer to Figure 76)					Three-Way (Refer to Figure 77)			
		A	B	C	D	E	A	B	C	D
NPT Two-Way Vx-7213-505-4-P	1	4-5/8 (117)	N/A	1-3/16 (30)	1-13/16 (46)	7-1/16 (179)	4-5/8 (118)	1-3/4 (44)	1-3/16 (30)	6-7/16 (164)
	1-1/4	4-5/8 (117)	N/A	1-3/8 (35)	1-13/16 (46)	7-1/16 (179)	4-5/8 (118)	1-3/4 (44)	1-7/16 (37)	6-11/16 (170)
	1-1/2	5-3/8 (136)	N/A	1-1/2 (138)	1-7/8 (48)	7-1/8 (181)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	6-13/16 (173)
	2	6-1/8 (156)	N/A	1-9/16 (40)	2-1/8 (54)	7-3/8 (187)	6-1/8 (156)	2-1/4 (57)	2-1/4 (57)	7-1/2 (190)

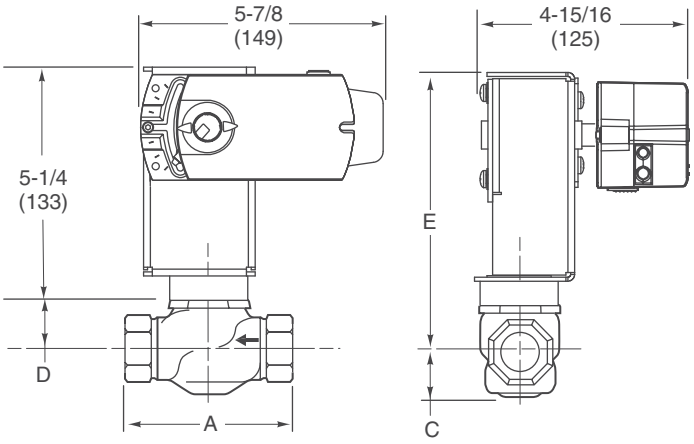


Figure 76 MF41-6043 and MS41-60x3 With 1 to 2" Two-Way Globe Valve.

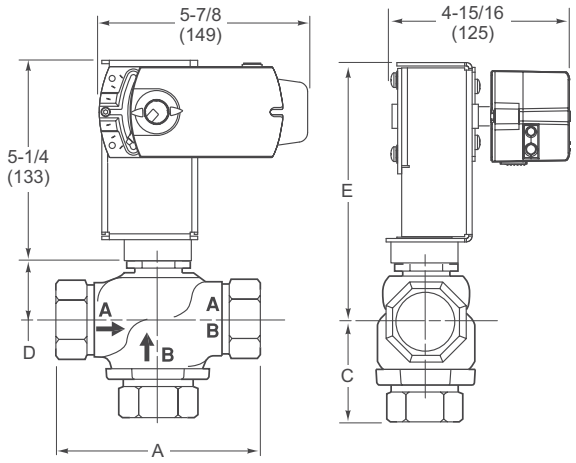
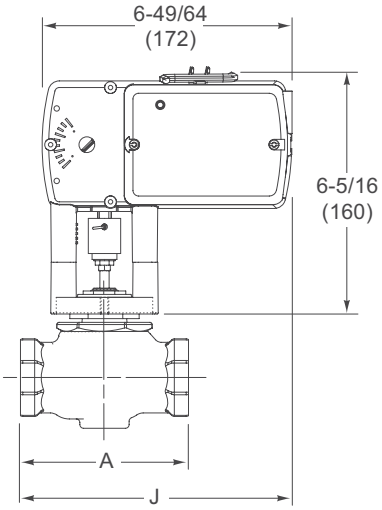


Figure 77 Mx41-60x3 with 2" Three-Way Globe Valve.

½"…2" Globe Valve Assemblies

Dimensions — 1/2" to 2" Globe Valve Assemblies

Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimetres)							
		2-Way (Refer to Figure 80				3-Way (Refer to Figure 81)			
		A	C	E	J	A	C	E	J
NPT 2-Way (N.C.) Vx-7223-8xx-4-P Vx-7263-8xx-4-P Vx-7283-8xx-4-P 3-Way Vx-731x-8xx-4-P Vx-732x-8xx-4-P	1/2	3-1/16 (78)	1-3/16 (30)	7-7/16 (189)	6-5/8 (168)	3-1/16 (78)	1-3/4 (44)	7-7/16 (189)	6-5/8 (168)
	3/4	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)	1-3/4 (44)	7-1/2 (190)	7-3/8 (187)	4-5/8 (118)	1-3/4 (44)	7-1/2 (191)	7-3/8 (187)
	1-1/4	4-5/8 (118)	1-3/4 (44)	7-3/4 (197)	7-3/8 (187)	4-5/8 (118)	1-3/4 (44)	7-3/4 (197)	7-3/8 (187)
	1-1/2	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)	2-1/4 (57)	8-9/16 (217)	8-5/32 (208)	6-1/8 (156)	2-1/4 (57)	8-9/16 (217)	8-5/32 (208)
NPT 2-Way (N.O.) Vx-7213-8xx-4-P Vx-7253-8xx-4-P Vx-7273-8xx-4-P	1/2	3-1/16 (78)	1-3/16 (30)	7-7/16 (189)	6-5/8 (168)	—			
	3/4	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)				
	1-1/4	4-5/8 (118)	1-3/8 (35)	8-1/8 (206)	7-3/8 (187)				
	1-1/2	5-3/8 (137)	1-1/2 (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)				



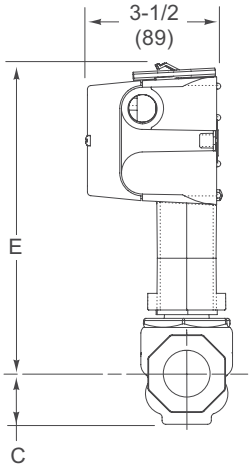
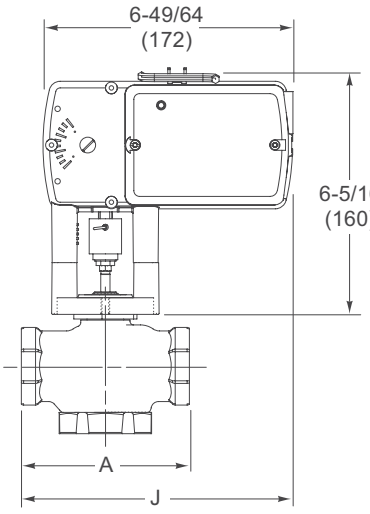


Figure 80 Mx51-710x with 1/2 to 2" 2-Way Globe Valve.



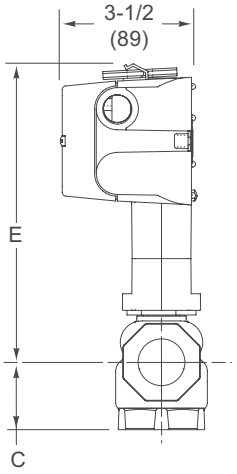


Figure 81 Mx51-710x with 1/2 to 2" 3-Way Globe Valve.

2" 2-Way Globe Valve Assemblies

Dimensions — 2" Globe Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimetres)							
		2-Way (Refer to Figure 84)				3-Way (Refer to Figure 85)			
		A	C	D	E	A	C	D	E
NPT 3-Way VX-73XX-508-4-P	2	—				6-1/8 (156)	2-1/4 (57)	2-1/4 (57)	7-1/2 (190)
NPT 2-Way (N.O.) VX-7213-508-4-P	2	6-1/8 (156)	1-9/16 (40)	2-1/8 (54)	7-3/8 (187)	—			

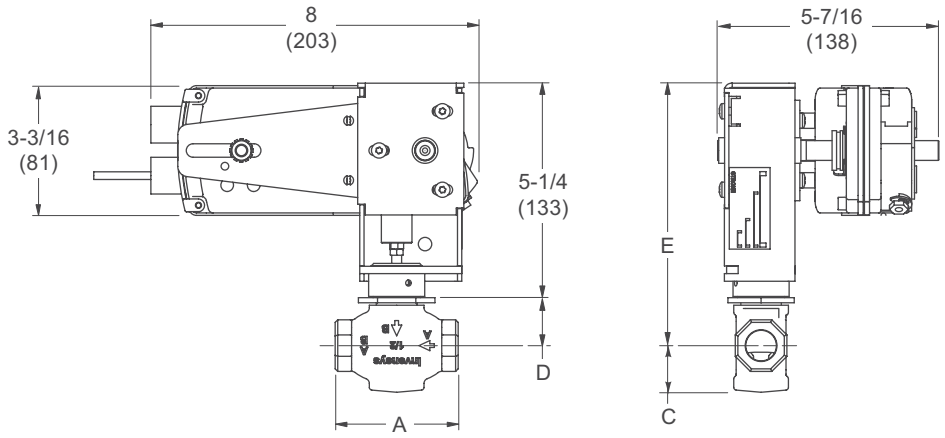


Figure 84 MX41-6153 with 2" 2-Way Globe Valve.

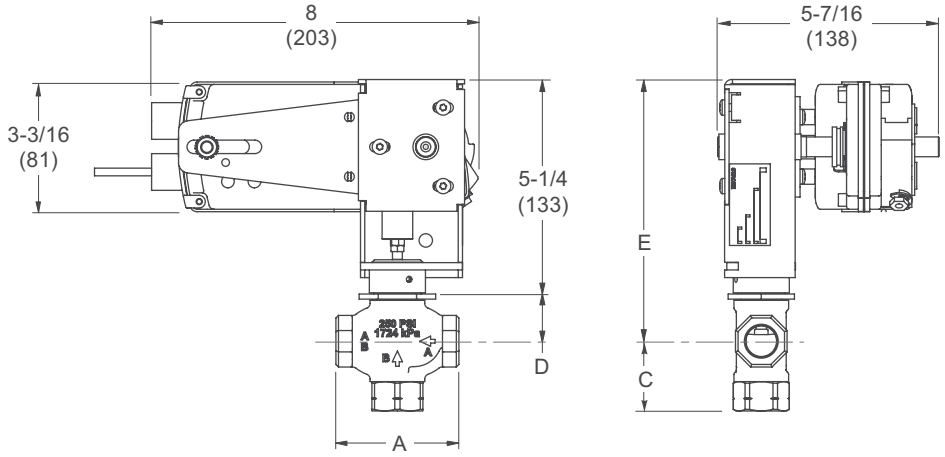


Figure 85 MX41-6153 with 2" 3-Way Globe Valve.

1¼"…2" Globe Valve Assemblies

Dimensions — 1-1/4" to 2" Globe Valve Assemblies

Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimetres)							
		2-Way (Refer to Figure 82)				3-Way (Refer to Figure 83)			
		A	C	E	J	A	C	E	J
NPT 2-Way (N.C.) Vx-7223-59x-4-P Vx-7263-59x-4-P Vx-7283-59x-4-P 3-Way Vx-73xx-59x-4-P	1-1/4	4-5/8 (117)	1-3/4 (44)	8-3/8 (213)	11-11/16 (297)	4-5/8 (117)	1-3/4 (44)	8-3/8 (213)	11-11/16 (297)
	1-1/2	5-3/8 (137)	1-13/16 (46)	8-1/2 (216)	12-1/16 (306)	5-3/8 (137)	1-13/16 (46)	8-1/2 (216)	12-1/16 (306)
	2	6-1/8 (156)	2-1/4 (57)	9-3/16 (233)	12-7/16 (316)	6-1/8 (156)	2-1/4 (57)	9-3/16 (233)	12-7/16 (316)
NPT 2-Way (N.O.) Vx-7213-59x-4-P Vx-7253-59x-4-P Vx-7273-59x-4-P	1-1/4	4-5/8 (117)	1-3/8 (35)	8-3/4 (222)	11-11/16 (297)	—			
	1-1/2	5-3/8 (137)	1-1/2 (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)				

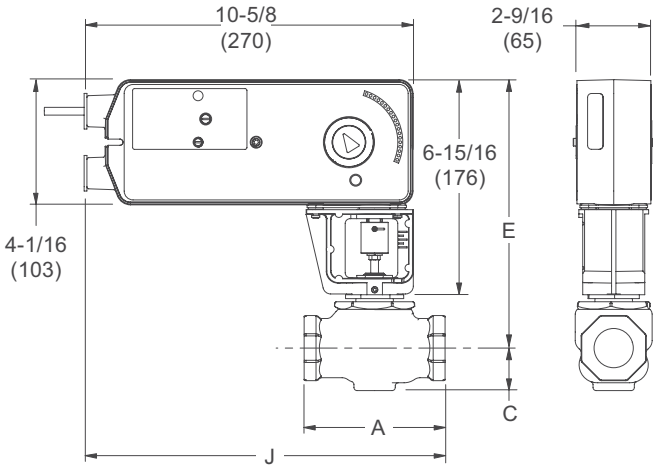


Figure 82 Mx51-720x with 1-1/4 to 2" 2-Way Globe Valve.

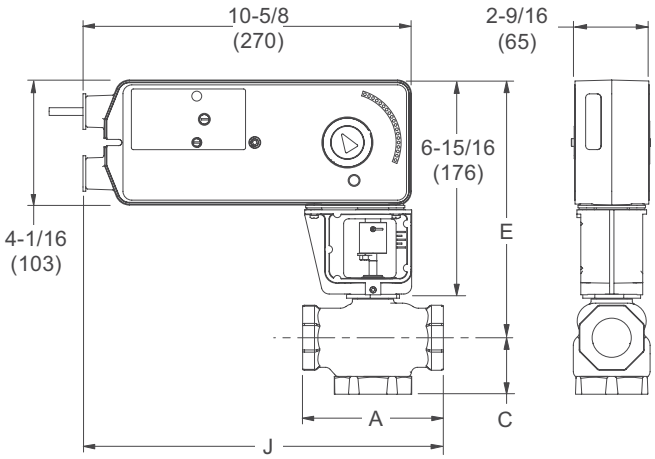


Figure 83 Mx51-720x with 1-1/4 to 2" 3-Way Globe Valve.

5"…6" Flanged Globe Valve Assemblies

Dimensions — 5" to 6" Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimeters)											
			2-Way (Refer to Figure 88)						3-Way (Refer to Figure 89)					
			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	5	15	13 (330)	6-15/16 (176)	18-3/16 (462)	10 (254)	8-1/2 (216)	10-1/16 (256)	13 (330)	8-13/16 (224)	17-1/4 (464)	10 (254)	8-1/2 (216)	10-1/16 (256)
	6	16	14 (356)	7-1/2 (190)	19-15/16 (507)	11 (280)	9-1/2 (241)	12 (305)	14 (356)	9-3/4 (248)	20-1/4 (515)	11 (280)	9-1/2 (241)	12 (305)
2-Way Vx-8223-57x-5-P	5	15	13 (330)	5-7/16 (138)	19-3/8 (492)	10 (254)	8-1/2 (216)	10-1/16 (256)	—	—	—	—	—	—
	6	16	14 (356)	6-1/4 (159)	21-3/8 (543)	11 (280)	9-1/2 (241)	12 (305)	—	—	—	—	—	—

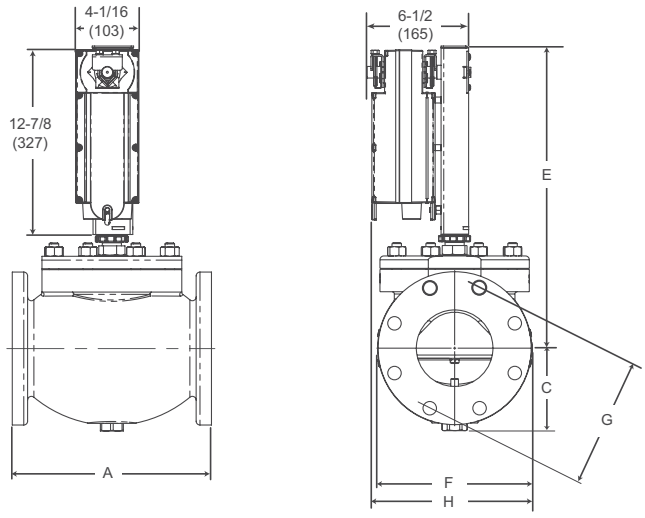


Figure 88 Mx40-717x with 5 to 6" Flanged 2-Way Globe Valves.

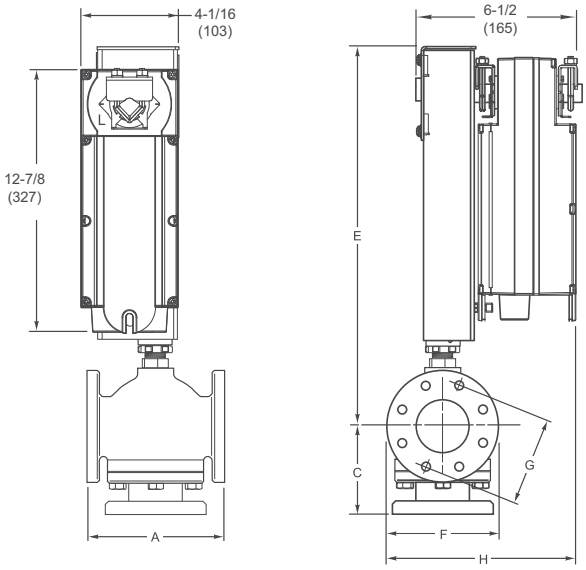


Figure 89 Mx40-717x with 5 to 6" Flanged 3-Way Globe Valves.

6" Flanged Globe Valve Assemblies

Dimensions — 6" Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimeters)											
			2-Way (Refer to Figure 92)						3-Way (Refer to Figure 93)					
			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	6”	16	14 (356)	7-1/2 (190)	19-15/16 (507)	11 (280)	9-1/2 (241)	12 (305)	14 (356)	9-3/4 (248)	20-9/16 (522)	11 (280)	9-1/2 (241)	12 (305)
2-Way Vx-8223-55x-5-P	6”	16	14 (356)	6-1/4 (159)	21-3/8 (543)	11 (280)	9-1/2 (241)	12 (305)	—	—	—	—	—	—

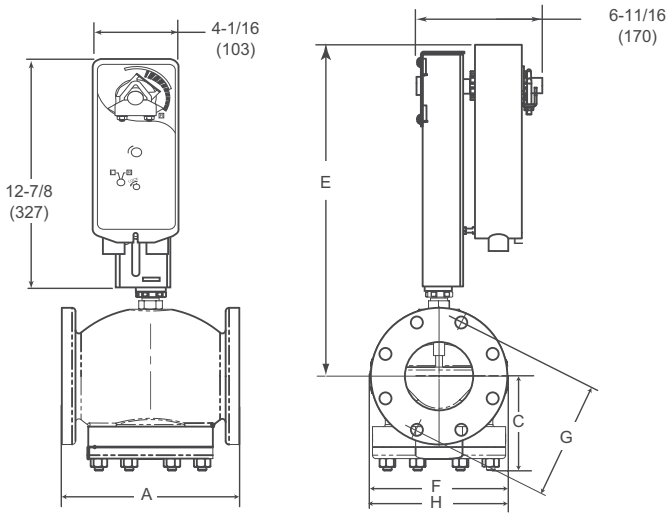


Figure 92 Mx41-715x with 6" Flanged 2-Way Globe Valves.

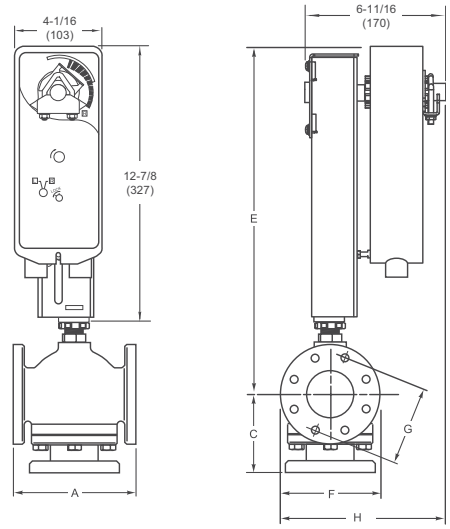


Figure 93 Mx41-715x with 6" Flanged 3-Way Globe Valves.

6" Flanged Globe Valve Assemblies

Dimensions - 6" Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)											
		2-Way (Refer to Figure 90)						3-Way (Refer to Figure 91)					
		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)	7-1/2 (190)	19-15/16 (507)	11 (280)	9-1/2 (241)	12 (305)	14 (356)	9-3/4 (248)	20-1/4 (515)	11 (280)	9-1/2 (241)	12 (305)
2-Way Vx-8223-516-5-16	6	14 (356)	6-1/4 (159)	21-3/8 (543)	11 (280)	9-1/2 (241)	12 (305)	—	—	—	—	—	—

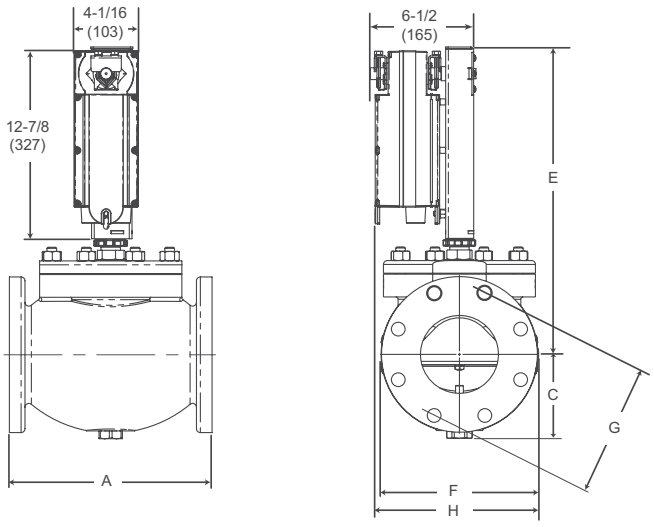


Figure 90 Mx41-634x with 6" Flanged 2-Way Globe Valves.

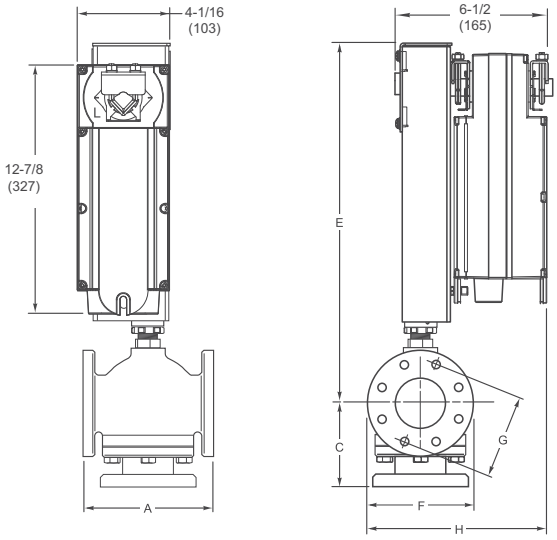


Figure 91 Mx41-634x with 6" Flanged 3-Way Globe Valves.

2½"…5" Flanged Globe Valve Assemblies

Dimensions - 2-1/2" to 5" Flanged Globe Valve Assemblies

Valve Assembly Part Number	Valve Size	P Code	Valve Dimensions in inches (millimeters)									
			2-Way (Refer to Figure 94)					3-Way (Refer to Figure 95)				
			A	C	E	F	G	A	C	E	F	G
2-Way Vx-8213-59x-5-P 3-Way Vx-8303-59x-5-P	2-1/2"	12	8-9/16 (217)	4 (102)	12-3/8 (314)	7 (178)	5-1/2 (140)	8-9/16 (217)	5-7/16 (138)	13-3/4 (349)	7 (178)	5-1/2 (140)
	3"	13	9-1/2 (241)	4-5/8 (117)	12-5/8 (320)	7-1/2 (191)	6 (152)	9-1/2 (241)	6-3/8 (162)	14 (356)	7-1/2 (191)	6 (152)
	4"	14	11-1/2 (292)	5-1/2 (140)	13-3/8 (340)	9 (229)	7-1/2 (191)	11-1/2 (292)	8-7/16 (214)	14-3/4 (375)	9 (229)	7-1/2 (191)
	5"	15	13 (330)	6-15/16 (176)	15-1/8 (384)	10 (254)	8-1/2 (216)	13 (330)	8-13/16 (224)	15-1/8 (384)	10 (254)	8-1/2 (216)
2-Way Vx-8223-59x-5-P	2-1/2"	12	8-9/16 (217)	4 (102)	13 (330)	7 (178)	5-1/2 (140)	—	—	—	—	—
	3"	13	9-1/2 (241)	4-1/4 (108)	14-1/2 (368)	7-1/2 (191)	6 (152	—	—	—	—	—
	4"	14	11-1/2 (292)	4-15/16 (125)	15-3/8 (391)	9 (229)	7-1/2 (191)	—	—	—	—	—
	5"	15	13 (330)	5-7/16 (138)	16-5/16 (415)	10 (254)	8-1/2 (216)	—	—	—	—	—

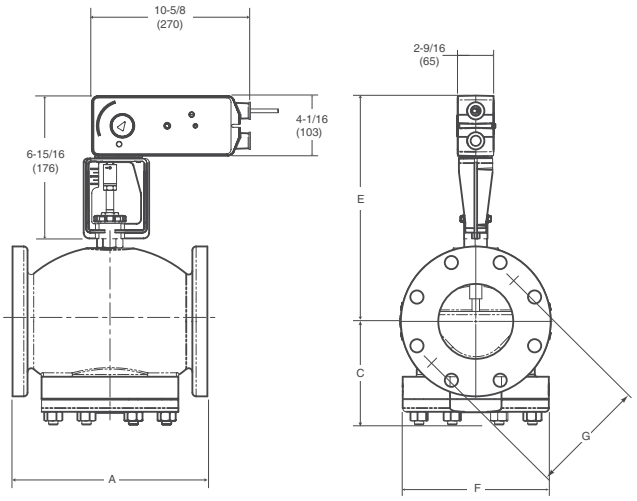


Figure 94 Mx61-720x with 2-1/2" to 5" Flanged 2-Way Globe Valves

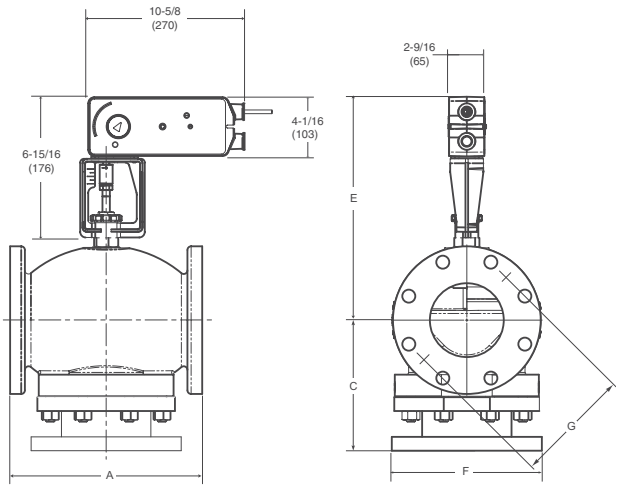


Figure 95 Mx61-720x with 2-1/2" to 5" Flanged 3-Way Globe Valves

1¼"…3" 2-Way 2000 Series Ball Valve Assemblies

Dimensions — 1-1/4" to 3" 2-Way 2000 Series Ball Valve Assemblies						
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 98)			
			A	B	C	D
2-Way VA-2213-526-9-P VA-2213-536-9-P VF-2213-526-9-P VF-2213-536-9-P VS-2213-526-9-P VS-2213-536-9-P	1-1/4	41, 42, 43, 45	3 (76)	7-1/4 (184)	8-7/16 (215)	3-1/8 (79)
		44, 46	3-5/8 (92)	7-1/4 (184)	9-1/8 (231)	3-1/4 (82)
	1-1/2	51, 53	4-11/16 (119)	8-1/16 (205)	9-1/8 (231)	3-1/4 (82)
		52, 54	4-1/16 (103)	7-1/2 (190)	9-5/8 (244)	3-3/4 (95)
	2	61, 65	4-21/32 (118)	8 (203)	9-5/8 (244)	3-3/4 (95)
		63, 66, 67	4-15/16 (125)	7-7/8 (200)	10-3/8 (264)	4-1/16 (103)
	2-1/2	71, 72, 76, 73, 74, 75	4-3/4 (121)	8 (203)	10-3/8 (264)	4-1/16 (103)
	3	82, 85	5-1/16 (129)	8-1/4 (210)	10-9/16 (268)	4-1/16 (103)

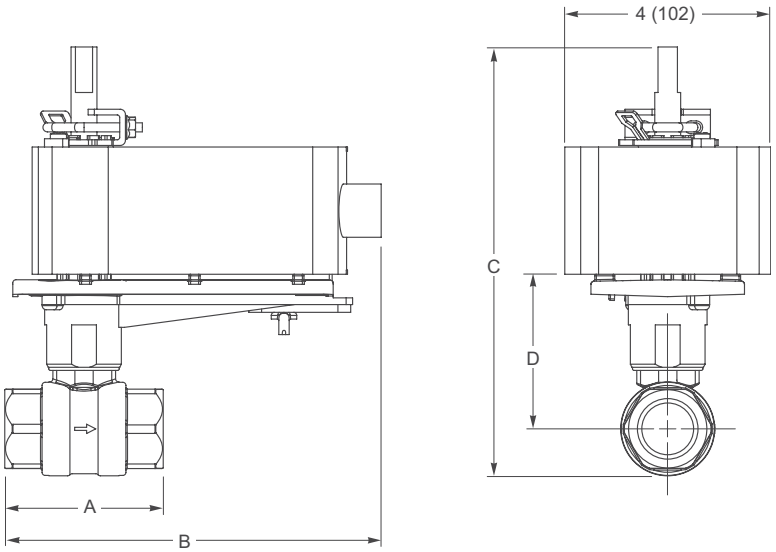


Figure 98 Mx40-704x with 1-1/4 to 3" 2-Way Ball Valve.

½"…3" 2-Way 2000 Series Ball Valve Assemblies

Dimensions — 1/2" to 3" 2-Way 2000 Series Ball Valve Assemblies

Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 101)			
			A	B	C	D
2-Way VF-2213-880-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	7-1/8 (181)	8 (203)	2-3/4 (69)
		6	3-11/32 (85)	6-7/8 (175)	8-3/16 (208)	2-7/8 (72)
	3/4	11, 12, 13, 14, 15, 17	2-3/8 (60)	7 (170)	8 (203)	2-3/4 (69)
		16, 18	2-5/8 (67)	7 (170)	8-3/16 (208)	2-7/8 (72)
	1	21, 23	3-1/16 (78)	7-1/4 (184)	8-1/2 (216)	3 (76)
		22, 25	3-3/4 (95)	7-9/16 (192)	8-3/16 (208)	2-7/8 (72)
		24, 26	4-5/16 (110)	7-7/8 (200)	9-1/8 (231)	3-1/4 (82)
		27	3-1/16 (78)	8 (203)	8-1/2 (216)	3 (76)
	1-1/4	41, 42, 43, 45	3 (76)	7-1/4 (184)	8-7/16 (215)	3-1/8 (79)
		44, 46	3-5/8 (92)	7-1/4 (184)	9-1/8 (231)	3-1/4 (82)
	1-1/2	51, 53	4-11/16 (119)	7-9/16 (192)	9-1/8 (231)	3-1/4 (82)
		52, 54	4-1/16 (103)	7-1/16 (179)	9-5/8 (244)	3-3/4 (95)
	2	61, 65	4-21/32 (118)	7-1/2 (191)	9-5/8 (244)	3-3/4 (95)
		63, 66, 67	4-15/16 (125)	7-7/16 (189)	10-3/8 (264)	4-1/16 (103)
	2-1/2	71, 72, 76, 73, 74, 75	4-3/4 (121)	7-9/16 (192)	10-3/8 (264)	4-1/16 (103)
	3	82, 85	5-1/16 (129)	7-3/4 (197)	10-9/16 (268)	4-1/16 (103)

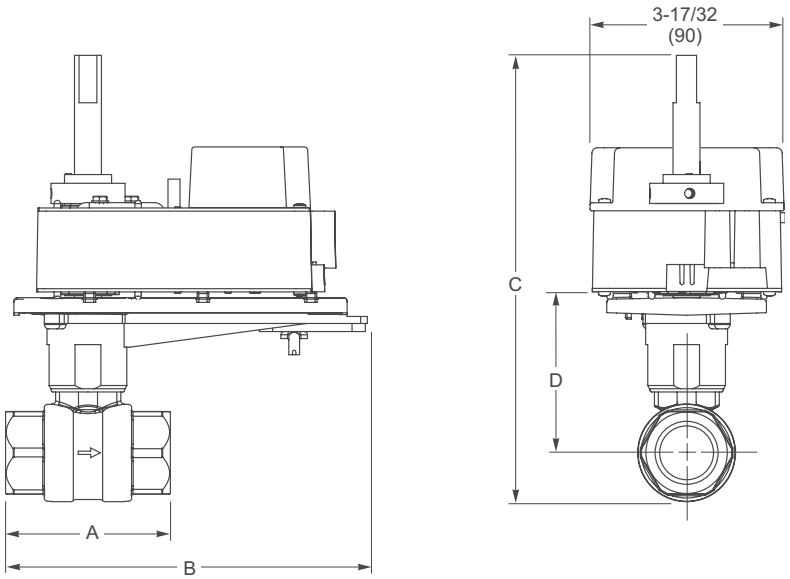


Figure 101 MF4E-60830-100 with 1/2 to 3" 2-Way Ball Valve.

½"…1" 2-Way 2000 Series Ball Valve Assemblies

Dimensions — 1/2" to 1" 2-Way 2000 Series Ball Valve Assemblies						
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 100)			
			A	B	C	D
2-Way VA-2213-821-9-P VA-2213-831-9-P VF-2213-821-9-P VF-2213-831-9-P VS-2213-821-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	6-7/8 (175)	8 (203)	2-3/4 (69)
		6	3-11/32 (85)	7 (178)	8-3/16 (208)	2-7/8 (72)
	3/4	11, 12, 13, 14, 15, 17	2-5/8 (67)	6-7/16 (163)	8 (203)	2-3/4 (69)
		16, 18	2-5/8 (67)	6-5/8 (168)	8-3/16 (208)	2-7/8 (72)
	1	21, 23	3-1/16 (78)	7 (178)	8-1/2 (216)	3 (76)
		22, 25	3-3/4 (95)	7-3/8 (188)	8-3/16 (208)	2-7/8 (72)
		24, 26	4-5/16 (110)	7-5/8 (194)	9-1/8 (231)	3-1/4 (82)
		27	3-1/16 (78)	7-13/16 (200)	8-1/2 (216)	3 (76)

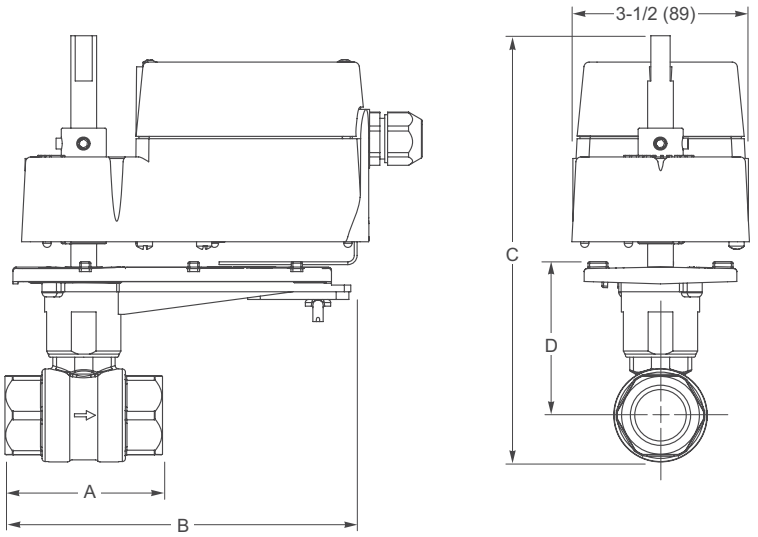


Figure 100 Mx4D-x03x with 1/2 to 1" 2-Way Ball Valve.

½"…1" 3-Way 2000 Series Ball Valve Assemblies

Dimensions — 1/2" to 1" 3-Way 2000 Series Ball Valve Assemblies							
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 103)				
			A	B	C	D	E
3-Way VA-2313-821-9-P VA-2313-831-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	6-3/4 (171)	9-5/16 (237)	2-7/8 (72)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-5/8 (67)	6-7/8 (175)	9-5/16 (237)	2-7/8 (72)	2 (51)
VF-2313-821-9-P VF-2313-831-9-P	1	21, 22, 23, 24, 25, 28	3-3/4 (95)	7-1/2 (191)	9-1/2 (238)	2-7/8 (72)	2-1/16 (52)
VS-2313-821-9-P thru VS-2313-839-9-P		27, 30	3-1/16 (78)	7 (178)	9-7/8 (251)	3 (76)	2-7/16 (62)
		26, 29, 31	4-5/16 (110)	7 (178)	10-7/8 (275)	3-1/4 (82)	3-1/8 (80)

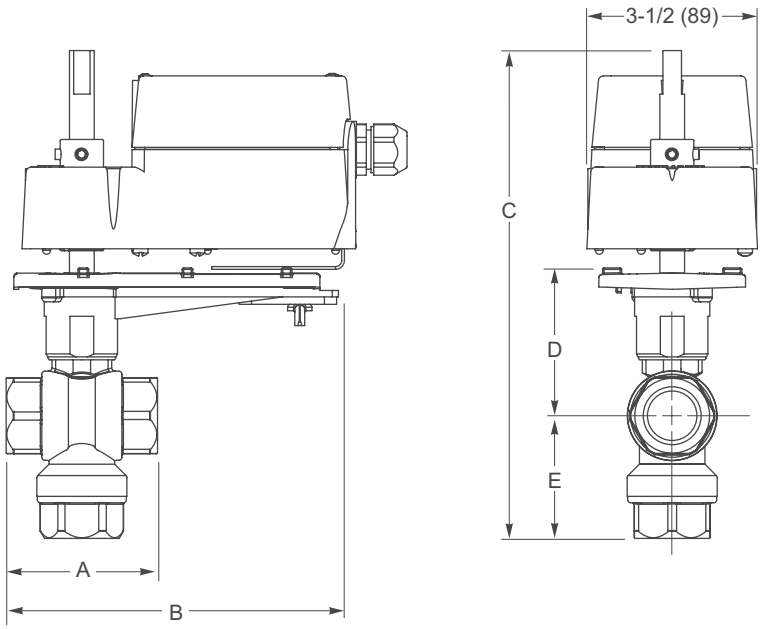


Figure 103 Mx4D-x03x with 1/2 to 1" 3-Way Ball Valve.

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½"…2" 3-Way 2000 Series Ball Valve Assemblies

Dimensions — 1/2" to 2" 3-Way 2000 Series Ball Valve Assemblies							
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 102)				
			A	B	C	D	E
3-Way VA-2313-526-9-P VA-2313-536-9-P VF-2313-526-9-P VF-2313-536-9-P VS-2313-526-9-P VS-2313-536-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	7 (178)	9-5/16 (237)	2-7/8 (72)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-5/8 (67)	7 (178)	9-5/16 (237)	2-7/8 (72)	2 (51)
	1	21, 22, 23, 24, 25, 28	3-3/4 (95)	7-11/16 (195)	9-1/2 (238)	2-7/8 (72)	2-1/16 (52)
		27, 30	3-1/16 (78)	7-1/4 (184)	9-7/8 (251)	3 (76)	2-7/16 (62)
		26, 29, 31	4-5/16 (110)	8-1/4 (210)	10-7/8 (275)	3-1/4 (82)	3-1/8 (80)
	1-1/4	45	3 (76)	7-1/4 (184)	9-7/8 (251)	3 (76)	2-7/16 (61)
		41, 43, 44, 46	3-5/8 (92)	7-5/8 (194)	10-1/2 (267)	3-1/4 (82)	2-13/16 (72)
	1-1/2	51, 52, 53, 55	4-1/2 (114)	8-1/4 (210)	10-3/8 (264)	3-1/4 (82)	2-3/4 (69)
		54, 56	4-1/16 (103)	7-1/16 (179)	11-3/8 (288)	3-3/4 (95)	3-3/16 (81)
	2	61, 63	3-15/16 (100)	7-9/16 (192)	11-1/4 (287)	3-3/4 (95)	3-1/8 (79)
		62, 64	5 (127)	8-1/4 (210)	12-1/4 (314)	4-1/16 (103)	3-7/8 (98)

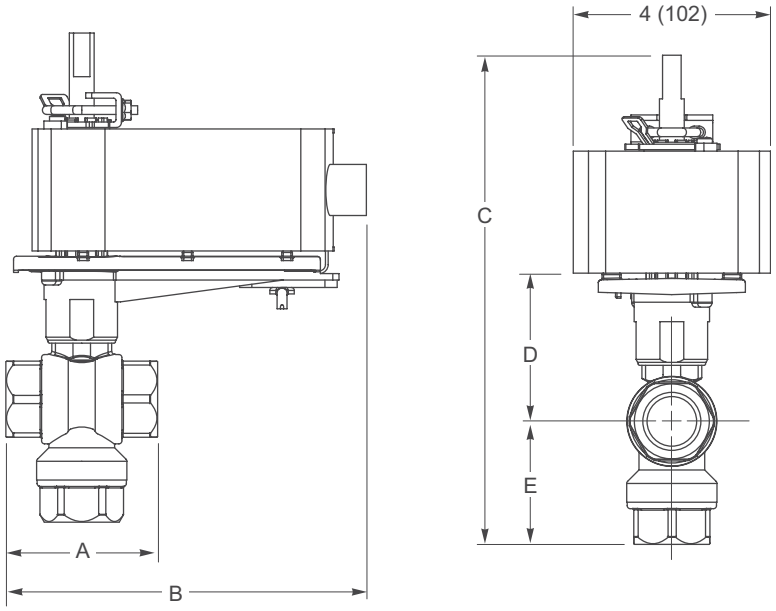


Figure 102 Mx40-704x with 1/2 to 2" 3-Way Ball Valve.

Dimensions — 1/2" to 2" 3-Way 2000 Series Ball Valve Assemblies							
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 104)				
			A	B	C	D	E
3-Way VS-2313-841-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	6-3/4 (171)	9-5/16 (237)	2-7/8 (72)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-5/8 (67)	6-7/8 (175)	9-5/16 (237)	2-7/8 (72)	2 (51)
	1	21, 22, 23, 24, 25, 28	3-3/4 (95)	7-1/2 (191)	9-1/2 (238)	2-7/8 (72)	2-1/16 (52)
		27, 30	3-1/16 (78)	7 (178)	9-7/8 (251)	3 (76)	2-7/16 (62)
		26, 29, 31	4-5/16 (110)	7 (178)	10-7/8 (275)	3-1/4 (82)	3-1/8 (80)
	1-1/4	45	3 (76)	7 (178)	9-7/8 (251)	3 (76)	2-7/16 (61)
		41, 43, 44, 46	3-5/8 (92)	7-3/8 (188)	10-1/2 (267)	3-1/4 (82)	2-13/16 (72)
	1-1/2	51, 52, 53, 55	4-1/2 (114)	7-3/4 (197)	10-3/8 (264)	3-1/4 (82)	2-3/4 (69)
		54, 56	4-1/16 (103)	7-1/4 (184)	11-3/8 (288)	3-3/4 (95)	3-3/16 (81)
	2	61, 63	3-15/16 (100)	8-7/16 (214)	11-1/4 (287)	3-3/4 (95)	3-1/8 (79)
		62, 64	5 (127)	7-1/2 (191)	12-1/4 (314)	4-1/16 (103)	3-7/8 (98)

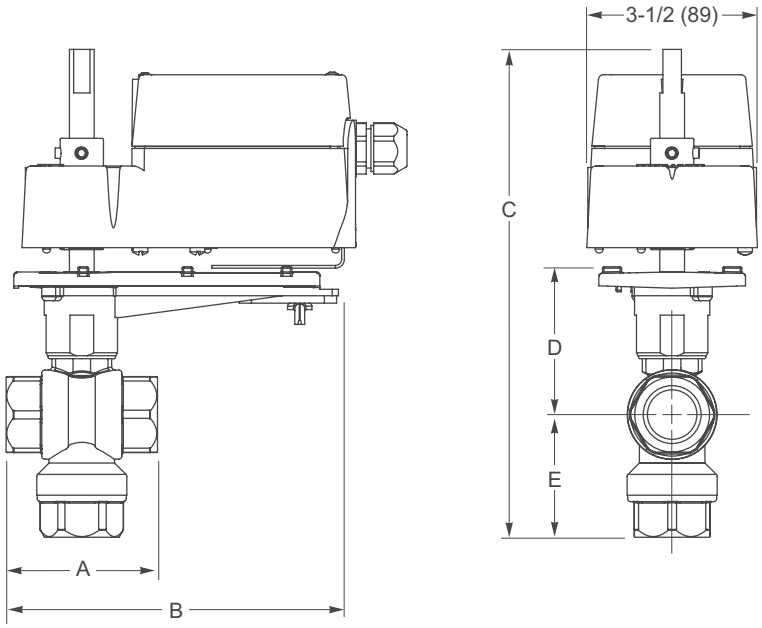


Figure 104 MS4D-608x with 1/2 to 3" 3-Way Ball Valve.

2"…4" 2-Way Butterfly Valve Assemblies

Dimensions — 2" to 4" SmartX Butterfly Valve Assemblies										
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimetres) (Refer to Figure 106)								
		A	B	C	D	E	F	G	H	K
VxFx-62x0-556-L-11	2	3.69 (94)	1.62 (41)	2.00 (51)	2.30 (59)	5.50 (140)	6 (152)	—	4 (102)	12.5 (318)
VxFx-62x0-556-L-12	2-1/2	4.19 (106)	1.75 (45)	2.50 (64)	2.57 (65)	6.00 (152)	6 (152)	—	4 (102)	12.5 (318)
VxFx-62x0-556D-L-13	3	4.88 (124)	1.75 (45)	3.00 (76)	2.81 (71)	6.25 (159)	11.75 (298)	19 (483)	4 (102)	—
VxUx-62x0-556D-L-14	4 U	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (179)	11.75 (298)	19 (483)	4 (102)	—

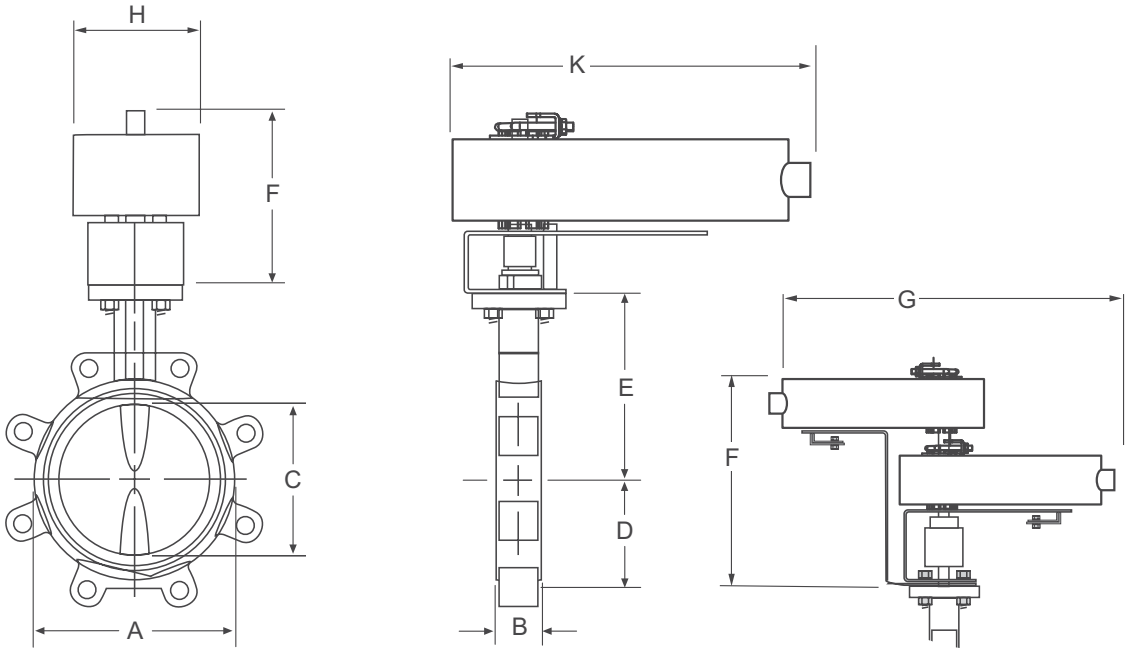


Figure 106 Mx41-7153 with 2" to 4" 2-Way Butterfly Valves.

Dimensions — 2" to 4" SmartX Butterfly Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimetres) (Refer to Figure 107)							
		A	B	C	D	E	F	G	H
VxFx-63xx-556-L-11	2	2.00 (51)	4.50 (114)	3.00 (76)	1.62 (41)	5.50 (140)	7.5 (190.5)	—	12 (305)
VxFx-63xx-556D-L-12	2-1/2	2.50 (64)	5.00 (127)	3.50 (89)	1.80 (46)	6.00 (152)	13.25 (336)	19 (483)	13 (330)
VxFx-63xx-556D-L-13	3	3.00 (76)	5.50 (140)	3.80 (97)	1.80 (46)	6.20 (157)	13.25 (336)	19 (483)	13.5 (343)
VxUx-63xx-556D-L-14	4 U	4.00 (102)	6.50 (1.65)	4.50 (114)	2.00 (51)	7.00 (179)	13.25 (336)	19 (483)	14.5 (368)

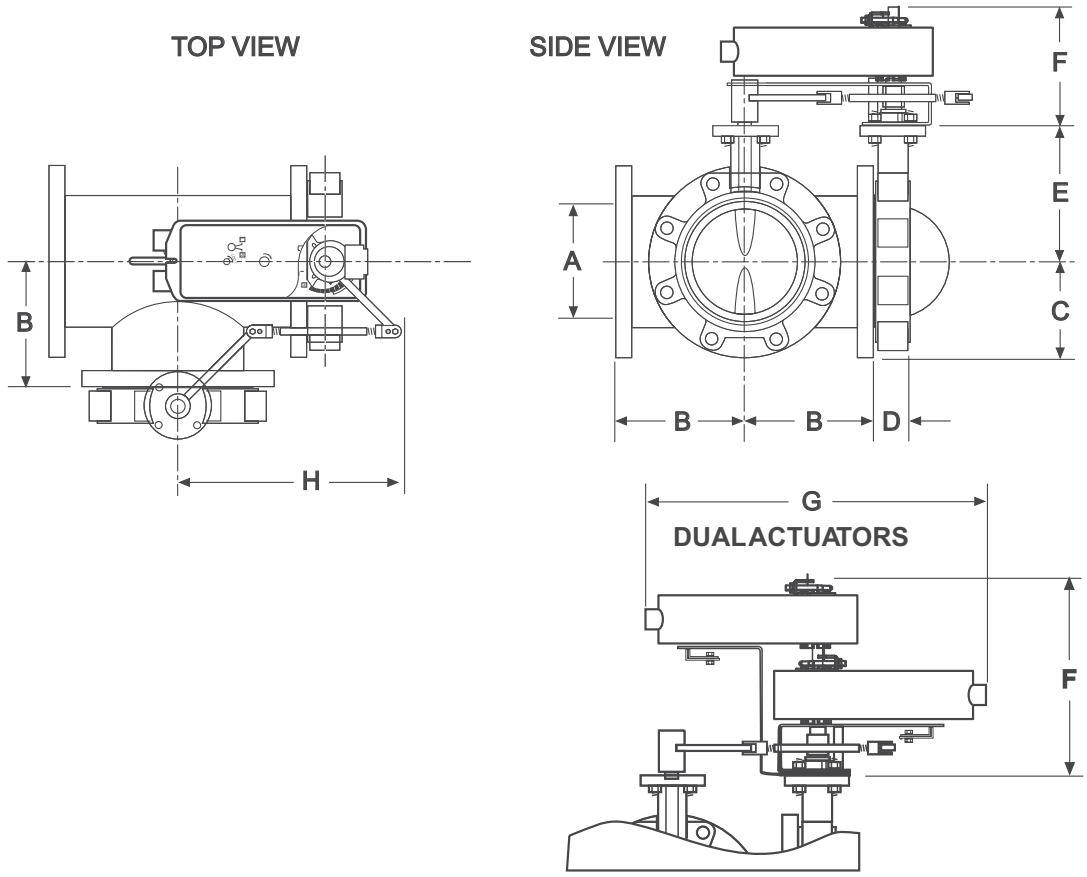


Figure 107 Mx41-7153 with 2" to 4" 3-Way Butterfly Valves.

2"…6" 2-Way Butterfly Valve Assemblies

Dimensions — 2" to 6" 2-Way Butterfly Valve Assemblies											
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimetres) (Refer to Figure 108)									
		A	B	C	D	E	F	G	H	J	K
VxFx-6200-E24-L-11	2	3.69 (94)	1.62 (41)	2.00 (51)	2.30 (59)	5.50 (140)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxFx-6200-E24-L-12	2-1/2	4.19 (106)	1.75 (45)	2.50 (64)	2.57 (65)	6.00 (152)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxFx-6200-E25-L-13	3	4.88 (124)	1.75 (45)	3.00 (76)	2.81 (71)	6.25 (159)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxUx-6200-E25-L-14	4 U	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (179)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxFx-6200-E25D-L-14	4 F	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (179)	11.75 (298)	16 (404)	5 (127)	2 (51)	—
VxUx-6200-E25-L-15	5 U	7.06 (179)	2.12 (54)	5.00 (127)	4.61 (117)	7.50 (190)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxUx-6200-E25D-L-16	6 U	8.12 (206)	2.12 (54)	5.75 (146)	5.06 (129)	8.00 (203)	11.75 (298)	16 (404)	5 (127)	2 (51)	—

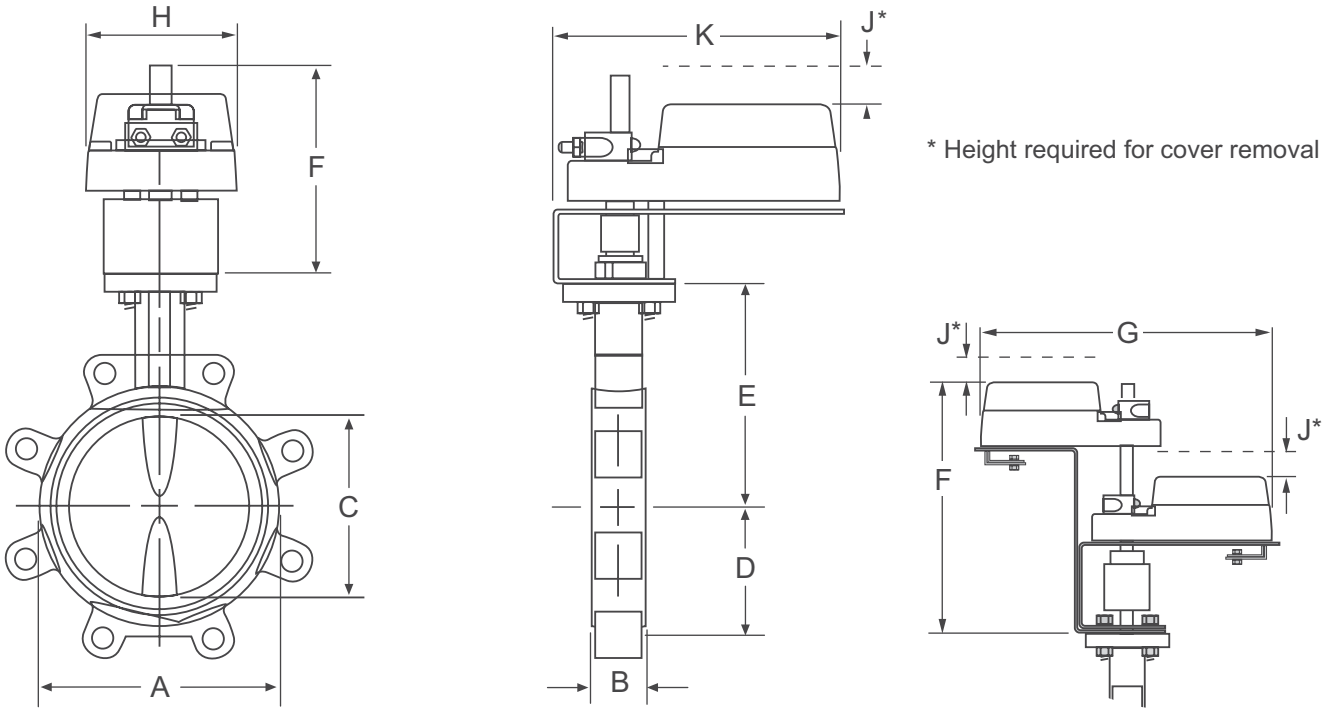


Figure 108 NR-22xx with 2" to 6" 2-Way Butterfly Valves.

2"…6" 3-Way Butterfly Valve Assemblies

Dimensions — 2" to 6" 3-Way Butterfly Valve Assemblies

Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimetres) (Refer to Figure 109)							
		A	B	C	D	E	F	G	H
VxFx-630x-E24-L-11	2	2.00 (51)	4.50 (114)	3.00 (76)	1.62 (41)	5.50 (140)	7.5 (191)	—	12.00 (305)
VxFx-630x-E24-L-12	2-1/2	2.50 (64)	5.00 (127)	3.50 (89)	1.80 (46)	6.00 (152)	7.5 (191)	—	13.00 (330)
VxFx-630x-E25-L-13	3	3.00 (76)	5.50 (140)	3.80 (97)	1.80 (46)	6.20 (157)	7.5 (191)	—	13.50 (343)
VxUx-630x-E25-L-14	4 U	4.00 (102)	6.50 (165)	4.50 (114)	2.00 (51)	7.00 (179)	7.5 (191)	—	14.50 (368)
VxFx-630x-E25D-L-14	4 F	4.00 (102)	6.50 (165)	4.50 (114)	2.00 (51)	7.00 (179)	7.5 (191)	—	14.50 (368)
VxUx-630x-E25D-L-15	5 U	5.00 (127)	7.50 (190)	5.00 (127)	2.12 (54)	7.50 (190)	13.25 (337)	16 (406)	15.50 (394)
VxUx-630x-E25D-L-16	6 U	5.80 (147)	8.00 (203)	5.50 (140)	2.12 (54)	8.00 (203)	13.25 (337)	16 (406)	16.25 (413)

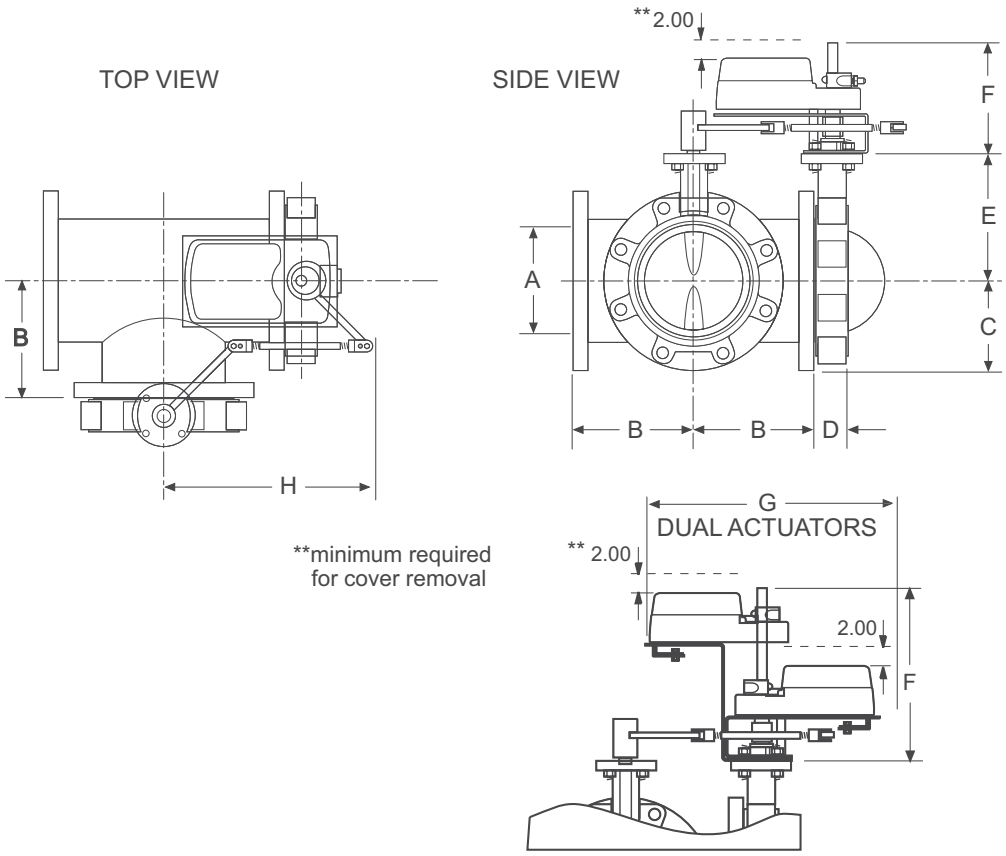


Figure 109 NR-22xx with 2" to 6" 3-Way Butterfly Valves.

2"…18" 2-Way Butterfly Valve Assemblies

Dimensions — 2" to 18" 2-Way Butterfly Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimeters) (Refer to Figure 108)							
		A	B	C	D	E	F	G	H
VxFS-6200-E1x-L-11	2	3.69 (94)	1.62 (41)	2.00 (51)	2.30 (58)	5.50 (140)	6.7 (170)	7.5 (191)	5.8 (147)
VxFS-6200-E1x-L-12	2-1/2	4.19 (106)	1.75 (44)	2.50 (63)	2.57 (65)	6.00 (152)	6.7 (170)	7.5 (191)	5.8 (147)
VxFS-6200-E1x-L-13	3	4.88 (124)	1.75 (44)	3.00 (76)	2.81 (71)	6.25 (159)	6.7 (170)	7.5 (191)	5.8 (147)
VxUS-6200-E1x-L-14	4 U	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (178)	6.7 (170)	7.5 (191)	5.8 (147)
VxFS-6200-E1x-L-14	4 F	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (178)	6.7 (170)	7.5 (191)	5.8 (147)
VxUS-6200-E1x-L-15	5 U	7.06 (179)	2.12 (54)	5.00 (127)	4.61 (117)	7.50 (190)	6.7 (170)	7.5 (191)	5.8 (147)
VxFS-6200-E2x-L-15	5 F	7.06 (179)	2.12 (54)	5.00 (127)	4.61 (117)	7.50 (190)	8.1 (206)	10.1 (257)	7.8 (198)
VxUS-6200-E2x-L-16	6 U	8.12 (206)	2.12 (54)	5.75 (146)	5.06 (129)	8.00 (203)	8.1 (206)	10.1 (257)	7.8 (198)
VxFS-6200-E2x-L-16	6 F	8.12 (206)	2.12 (54)	5.75 (146)	5.06 (129)	8.00 (203)	8.1 (206)	10.1 (257)	7.8 (198)
VxUS-6200-E2x-L-17	8 U	10.50 (267)	2.50 (63)	7.75 (199)	6.05 (154)	9.50 (241)	8.1 (206)	10.1 (257)	7.8 (198)
VxFS-6200-E3x-L-17	8 F	10.50 (267)	2.50 (63)	7.75 (199)	6.05 (154)	9.50 (241)	8.1 (206)	10.1 (257)	7.8 (198)
VxUS-6200-E3x-L-18	10 U	12.75 (324)	2.50 (63)	9.75 (248)	7.69 (195)	10.75 (273)	8.1 (206)	10.1 (257)	7.8 (198)
VxFS-6200-E4x-L-18	10 F	12.75 (324)	2.50 (63)	9.75 (248)	7.69 (195)	10.75 (273)	8.8 (224)	12.1 (307)	9.5 (241)
VxUS-6200-E4x-L-19	12 U	14.88 (378)	3.00 (76)	11.75 (298)	9.02 (229)	12.25 (311)	8.8 (224)	12.1 (307)	9.5 (241)
VxFS-6200-E5x-L-19	12 F	14.88 (378)	3.00 (76)	11.75 (298)	9.02 (229)	12.25 (311)	8.8 (224)	12.1 (307)	9.5 (241)
VxUS-6200-E5x-L-20	14 U	17.05 (433)	3.00 (76)	13.25 (337)	9.93 (252)	13.62 (346)	8.8 (224)	12.1 (307)	9.5 (241)
VxFS-6200-E6x-L-20	14 F	17.05 (433)	3.00 (76)	13.25 (337)	9.93 (252)	13.62 (346)	8.8 (224)	12.1 (307)	9.5 (241)
VxUS-6200-E6x-L-21	16 U	19.21 (488)	4.00 (102)	15.25 (338)	11.30 (287)	14.75 (375)	8.8 (224)	12.1 (307)	9.5 (241)
VxUS-6200-E6x-L-22	18 U	21.12 (536)	4.25 (108)	17.25 (438)	12.16 (309)	16.00 (406)	8.8 (224)	12.1 (307)	9.5 (241)

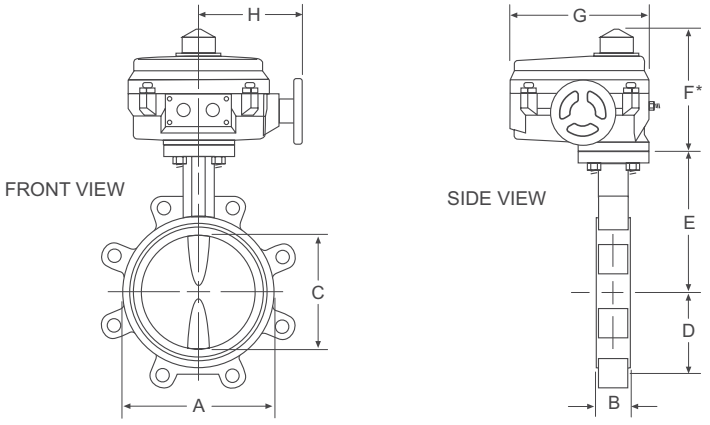


Figure 110 S70-0xxx with 2" to 18" 2-Way Butterfly Valves.

Dimensions — 2" to 16" 3-Way Butterfly Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimeters) (Refer to Figure 111)							
		A	B	C	D	E	F	G	H
VxFS-630x-E1x-L-11	2	2.00 (51)	4.50 (114)	3.00 (76)	1.62 (41)	5.50 (140)	9.7 (246)	5.8 (147)	11 (279)
VxFS-630x-E1x-L-12	2-1/2	2.50 (63)	5.00 (127)	3.50 (89)	1.80 (46)	6.00 (152)	9.7 (246)	5.8 (147)	11.6 (295)
VxFS-630x-E1x-L-13	3	3.00 (76)	5.50 (140)	3.80 (97)	1.80 (46)	6.20 (157)	9.7 (246)	5.8 (147)	12 (305)
VxUS-630x-E1x-L-14	4 U	4.00 (102)	6.50 (165)	4.50 (114)	2.00 (51)	7.00 (179)	9.7 (246)	5.8 (147)	13.9 (353)
VxFS-630x-E2x-L-14	4 F	4.00 (102)	6.50 (165)	4.50 (114)	2.00 (51)	7.00 (179)	11.1 (282)	7.8 (198)	15.2 (386)
VxUS-630x-E1x-L-15	5 U	5.00 (127)	7.50 (190)	5.00 (127)	2.12 (54)	7.50 (190)	9.7 (246)	5.8 (147)	14.29 (363)
VxFS-630x-E2x-L-15	5 F	5.00 (127)	7.50 (190)	5.00 (127)	2.12 (54)	7.50 (190)	11.1 (282)	7.8 (198)	16.3 (414)
VxUS-630x-E2x-L-16	6 U	5.80 (147)	8.00 (203)	5.50 (140)	2.12 (54)	8.00 (203)	11.1 (282)	7.8 (198)	16.8 (427)
VxFS-630x-E2x-L-16	6 F	5.80 (147)	8.00 (203)	5.50 (140)	2.12 (54)	8.00 (203)	11.1 (282)	7.8 (198)	16.8 (427)
VxUS-630x-E2x-L-17	8 U	7.80 (198)	9.00 (229)	6.80 (173)	2.50 (63)	9.50 (241)	11.1 (282)	7.8 (198)	18 (457)
VxFS-630x-E3x-L-17	8 F	7.80 (198)	9.00 (229)	6.80 (173)	2.50 (63)	9.50 (241)	11.1 (282)	7.8 (198)	18 (457)
VxUS-630x-E3x-L-18	10 U	9.80 (249)	11.00 (279)	8.00 (203)	2.50 (63)	10.80 (274)	11.1 (282)	7.8 (198)	20 (508)
VxFS-630x-E5x-L-18	10 F	9.80 (249)	11.00 (279)	8.00 (203)	2.50 (63)	10.80 (274)	12.8 (325)	9.5 (241)	21.5 (546)
VxUS-630x-E5x-L-19	12 U	11.80 (300)	12.00 (305)	9.50 (241)	3.00 (76)	12.20 (310)	12.8 (325)	9.5 (241)	22.74 (578)
VxFS-630x-E6x-L-19	12 F	11.80 (300)	12.00 (305)	9.50 (241)	3.00 (76)	12.20 (310)	12.8 (325)	9.5 (241)	22.74 (578)
VxUS-630x-E5x-L-20	14 U	13.20 (335)	14.00 (356)	10.50 (267)	3.00 (76)	13.60 (345)	12.8 (325)	9.5 (241)	24.74 (628)
VxFS-630x-E6x-L-21	16 U	15.20 (386)	15.00 (381)	11.80 (300)	4.00 (102)	14.80 (376)	12.8 (325)	9.5 (241)	26.25 (667)

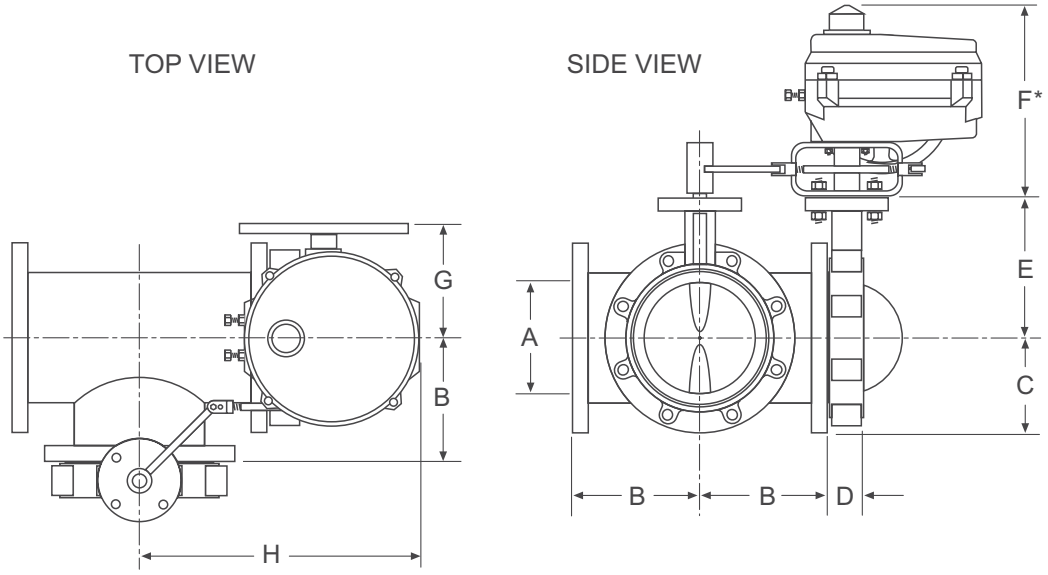


Figure 111 S70-0xxx with 2" to 16" 3-Way Butterfly Valves.

VB-2000 Spring and Non-Spring Return Ball Valve Assemblies

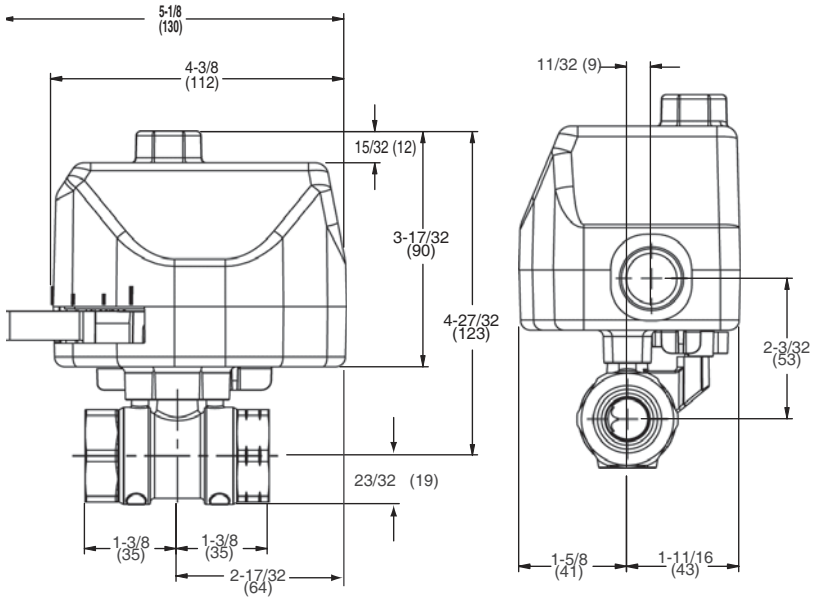


Figure 112 VBB/VBS Series 2Nxx+M11xA01 and 2Nxx+M12xA01 Spring Return Ball Valves.

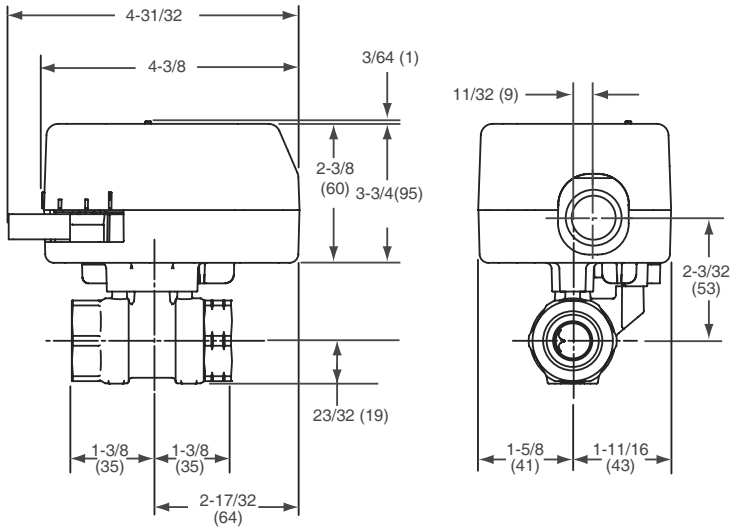


Figure 113 VBB/VBS Series 2Nxx+M13xA01 Non-Spring Return Ball Valves

Dimensions — 1/2" to 1-1/4" Zone Valve Assemblies			
Valve Body Size inches	Valve Dimensions in inches (millimeters) (Refer to Figure 114)		
	A	B 2-Way	C 3-Way
1/2" Sweat	1-5/16 (33)	15/16 (23)	1-5/16 (33)
3/4" Sweat	1-3/8 (35)	15/16 (23)	1-11/16 (43)
1" Sweat	1-11/16 (43)	15/16 (23)	1-11/16 (43)
1-1/4" Sweat	1-7/8 (47)	1 (25)	1-13/16 (46)
1/2" NPT	1-3/8 (35)	15/16 (23)	1-5/16 (33)
3/4" NPT	1-11/16 (43)	15/16 (23)	1-7/16 (37)
1" NPT	1-7/8 (47)	1 (25)	1-11/16 (43)

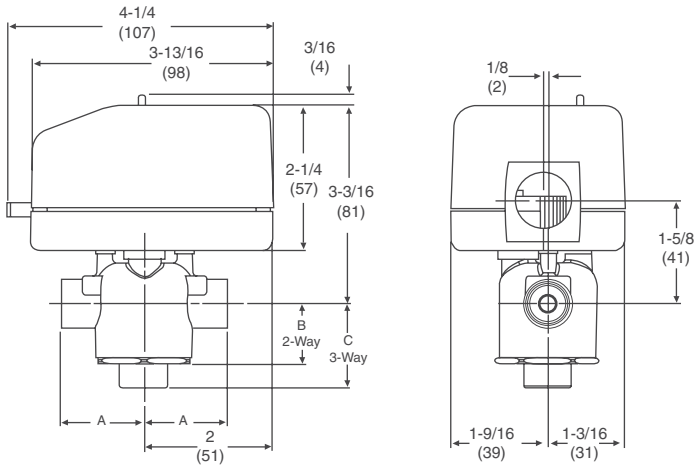


Figure 114 VM Modulating Ax33A00x Non-Spring Return.

Dimensions — 1/2" to 1-1/4" Zone Valve Assemblies			
Valve Body Size inches	Valve Dimensions in inches (millimeters) (Refer to Figure 115)		
	A	B 2-Way	C 3-Way
1/2" Sweat	1-5/16 (33)	15/16 (23)	1-5/16 (33)
3/4" Sweat	1-3/8 (35)	15/16 (23)	1-11/16 (43)
1" Sweat	1-11/16 (43)	15/16 (23)	1-11/16 (43)
1-1/4" Sweat	1-7/8 (47)	1 (25)	1-13/16 (46)
1/2" NPT	1-3/8 (35)	15/16 (23)	1-5/16 (33)
3/4" NPT	1-11/16 (43)	15/16 (23)	1-7/16 (37)
1" NPT	1-7/8 (47)	1 (25)	1-11/16 (43)

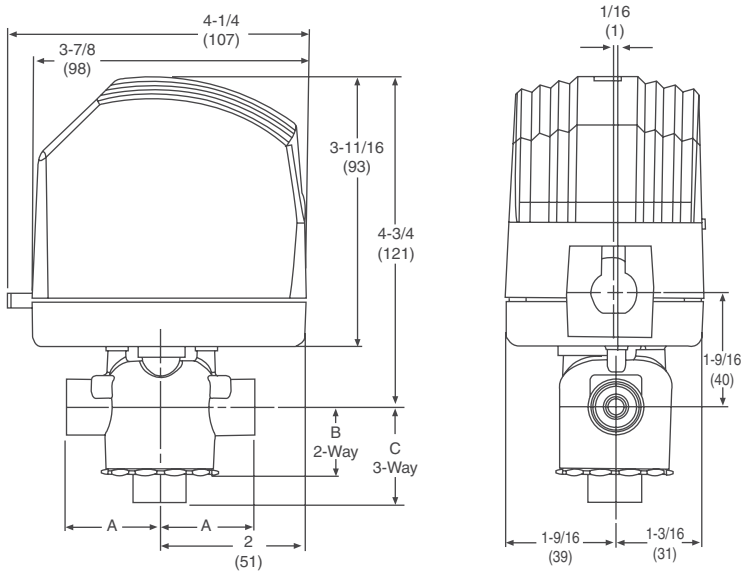
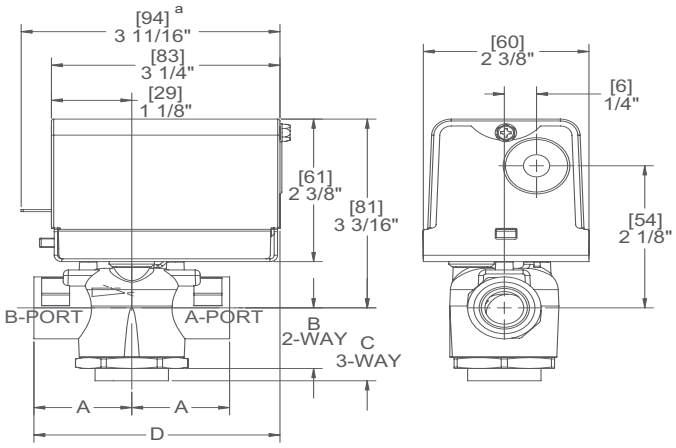


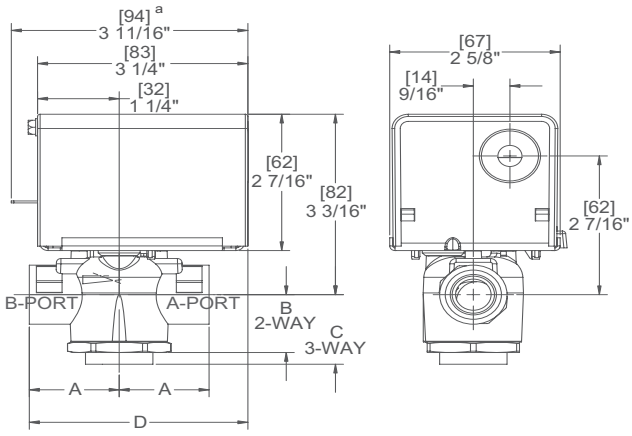
Figure 115 VM Modulating Axx3A00x Spring Return.

Dimensions — 1/2" to 1-1/4" Zone Valve Assemblies					
Valve Body Size inches	Valve Dimensions in inches (millimeters)				
	A	B 2-Way	C 3-Way	D (General Close-Off) (Refer to Figure 116)	D (High Close-off) (Refer to Figure 117)
1/2" Sweat	1-5/16 (33)	15/16 (23)	1-5/16 (33)	3-5/16 (84)	3-5/8 (92)
3/4" Sweat	1-3/8 (35)	15/16 (23)	1-11/16 (43)	3-3/8 (86)	3-3/4 (95)
1" Sweat	1-11/16 (43)	15/16 (23)	1-11/16 (43)	3-5/8 (92)	4 (102
1-1/4" Sweat	1-7/8 (47)	1 (25)	1-13/16 (46)	3-11/16 (94)	4-1/8 (105)
1/2" NPT	1-3/8 (35)	15/16 (23)	1-5/16 (33)	3-3/8 (86)	3-3/4 (95)
3/4" NPT	1-11/16 (43)	15/16 (23)	1-7/16 (37)	3-5/8 (92)	4 (102
1" NPT	1-7/8 (47)	1 (25)	1-11/16 (43)	3-11/16 (94)	4-1/8 (105)



[a] Normally closed model only.

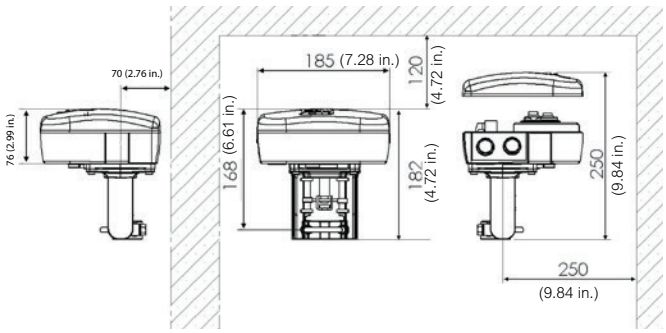
Figure 116 VT/VS AG Series General Close-Off.



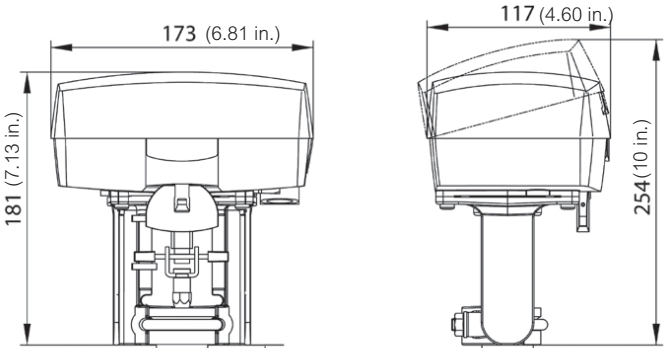
[a] Normally closed model only.

Figure 117 VT/VS AH Series High Close-Off.

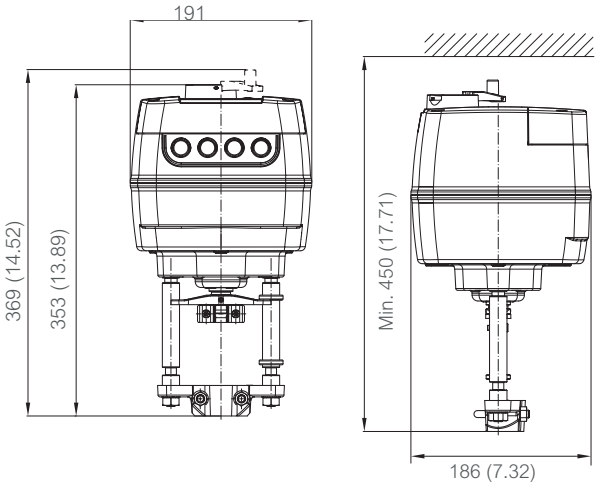
PIBCV Actuator Dimensions



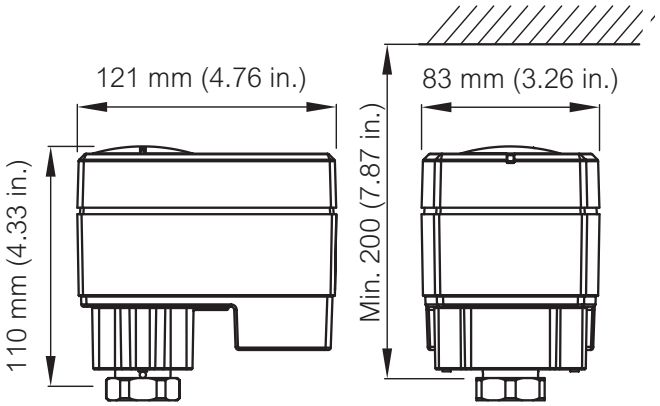
MP500C-SRU/SRD mm (inches)



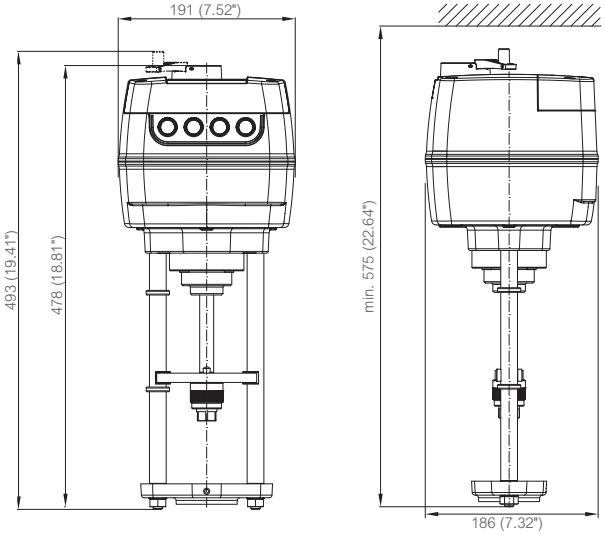
MP500C mm (inches)



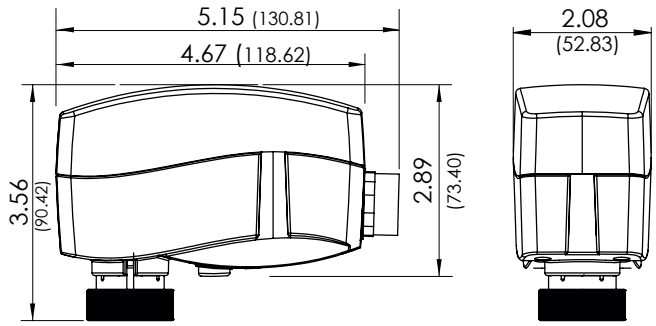
MP2000-NSR/SR
mm (inches)



MP300-SRU/SRD
mm (inches)



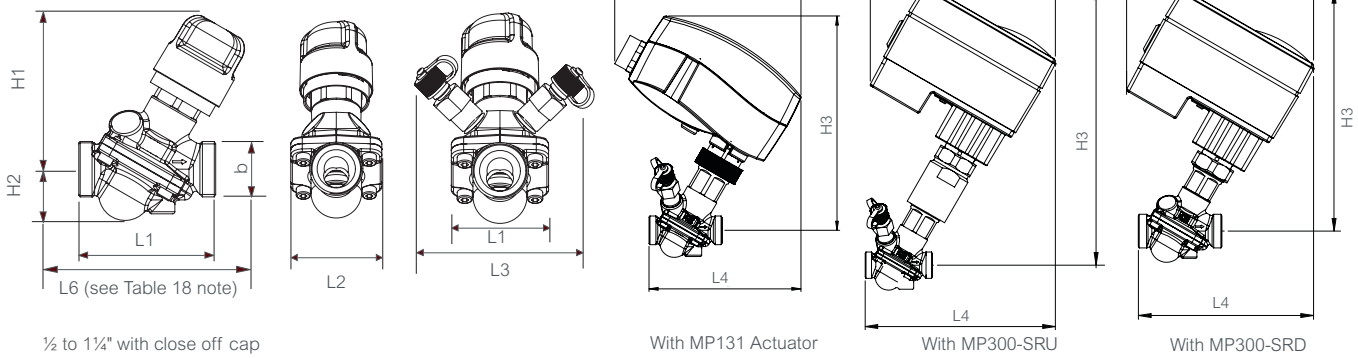
MP4000 mm (inches)



MP131-24F/24T/24MP
(inches)

PIBCV Actuator Dimensions

Threaded Valves ½ to 1¼" (inches)



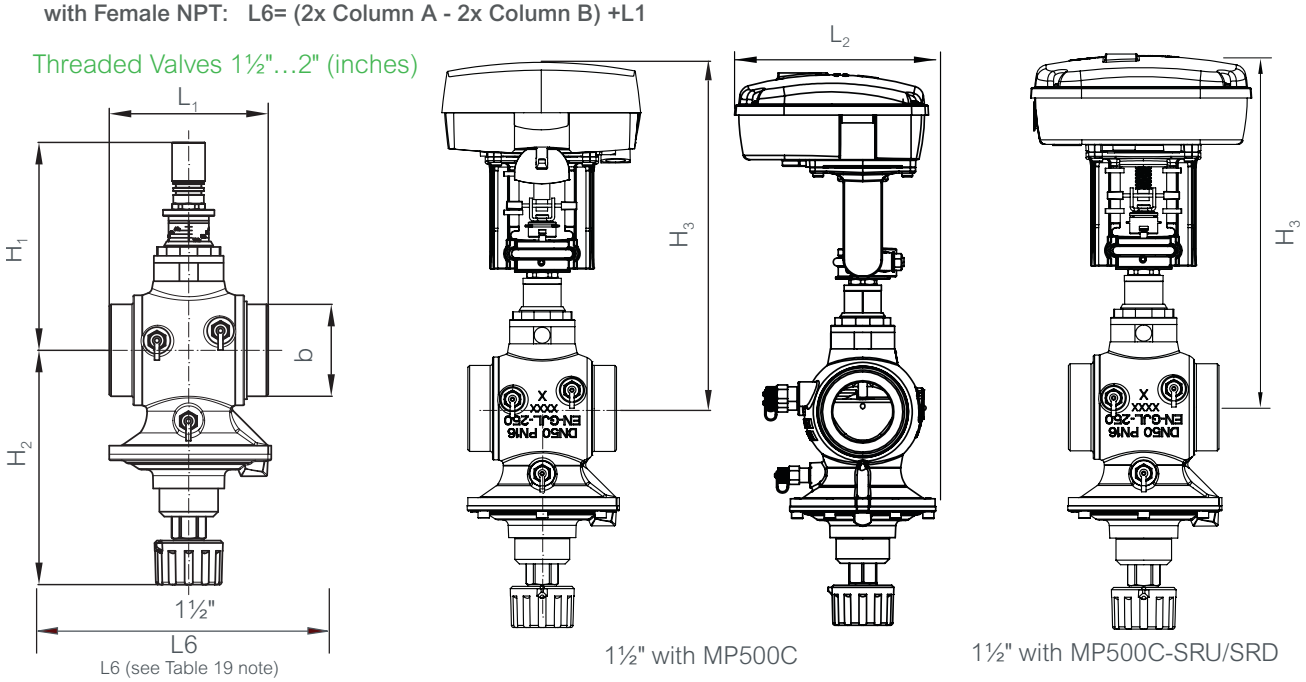
½ to 1¼" with close off cap | With MP131 Actuator | With MP300-SRU | With MP300-SRD

Table 18. Threaded Valves ½ to 1¼" (inches)

Type	L1	L2	L3 (PLUGS)	L4			L5		H1	H2	H3		b ISO 228/1	Valve Body Weight (lb.)
				MP131	MP300 -SRU	MP300 -SRD	MP131	MP300 -SRU/SRD			MP131	MP300 -SRU/SRD		
1/2" VP228E-10Lx	2	1.41	3.11	4.37	5.11	5.90	5.35	5.7	2.9	.78	5.6	7.2	G ½	.83
1/2"	2.5	1.7		4.64	5.39	6.14			3	1	5.7	7.4	G ¾	1
3/4"	3.2	2.2		4.96	5.7	6.53			3	1.2	5.8	7.5	G 1	1.43
1"	4	2.7		5.55	6.3	7.08			3.5	1.5	6.14	7.83	G 1 ¼	3.2
1¼"	5.1	3.5		6.26	7	7.8			3.9	2.3	6.58	8.27	G 1 ½	4.8

NOTE: Valve Body Tail Piece Dimensions: See Columns A and B in Table 17 on page 14: For assemblies with Female NPT: L6= (2x Column A - 2x Column B) +L1

Threaded Valves 1½"…2" (inches)



1½" with MP500C | 1½" with MP500C-SRU/SRD

Table 19. Threaded Valves 1½"…2" (inches)

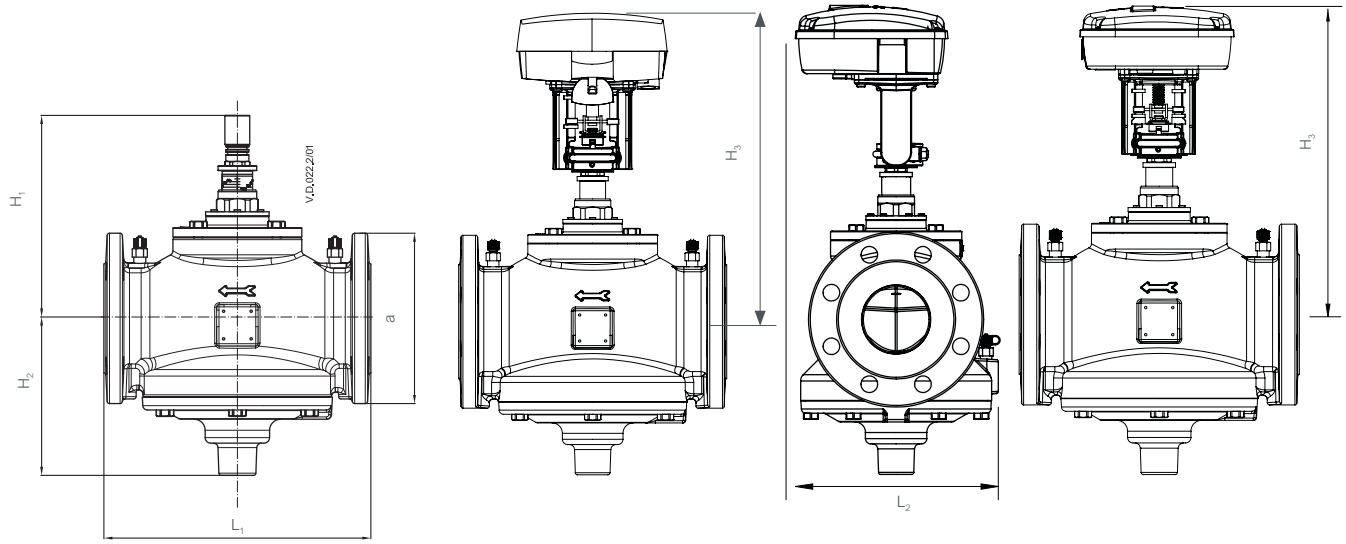
Type	L_1	L_2	H_1	H_2	H_3	b ISO 228/1	Valve Body Weight lb
1½"	4.33	7.19	6.7	6.85	11	G 2	15.8
2"	5.11					G 2½	18.0

NOTE: Valve Body Tail Piece Dimensions: See Columns A and B in Table 17 on page 14: For assemblies with Female NPT: L6= (2x Column A - 2x Column B) +L1

Flanged Valves 2½"…4"

Table 20. Flanged Valves 2½"…4" (inches)

Type	L_1	L_2	H_1	H_2	H_3	a (EN 1092-2)	Valve Body Weight (lb)	No. of Flange Bolt Holes
2½"	11.4	8.76	8.6	6.77	13	7.2	84	4
3"	12.2	8.88	8.9	6.96	13.1	7.87	99	4
4"	13.7	10.07	9.44	7.36	13.7	8.66	126	8



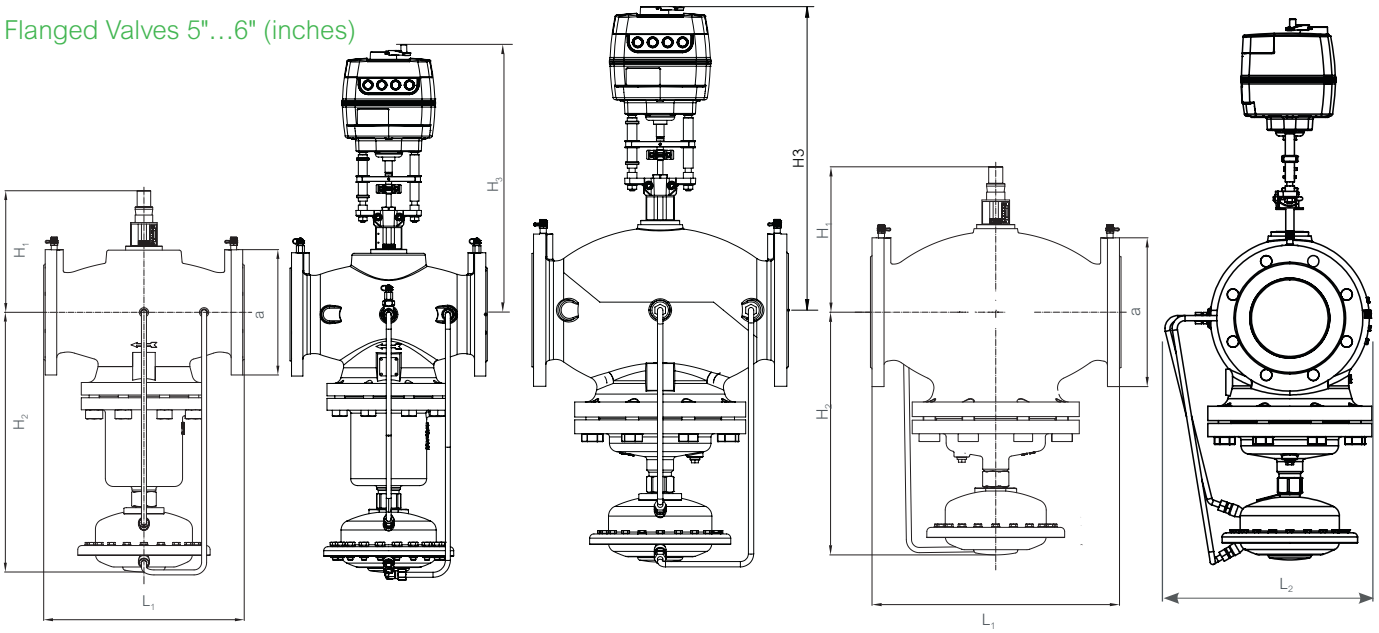
2½"…4"

2½"…4" with MP500C

2½"…4" with MP500C-SRU/SRD

PIBCV Actuator Dimensions

Flanged Valves 5"…6" (inches)



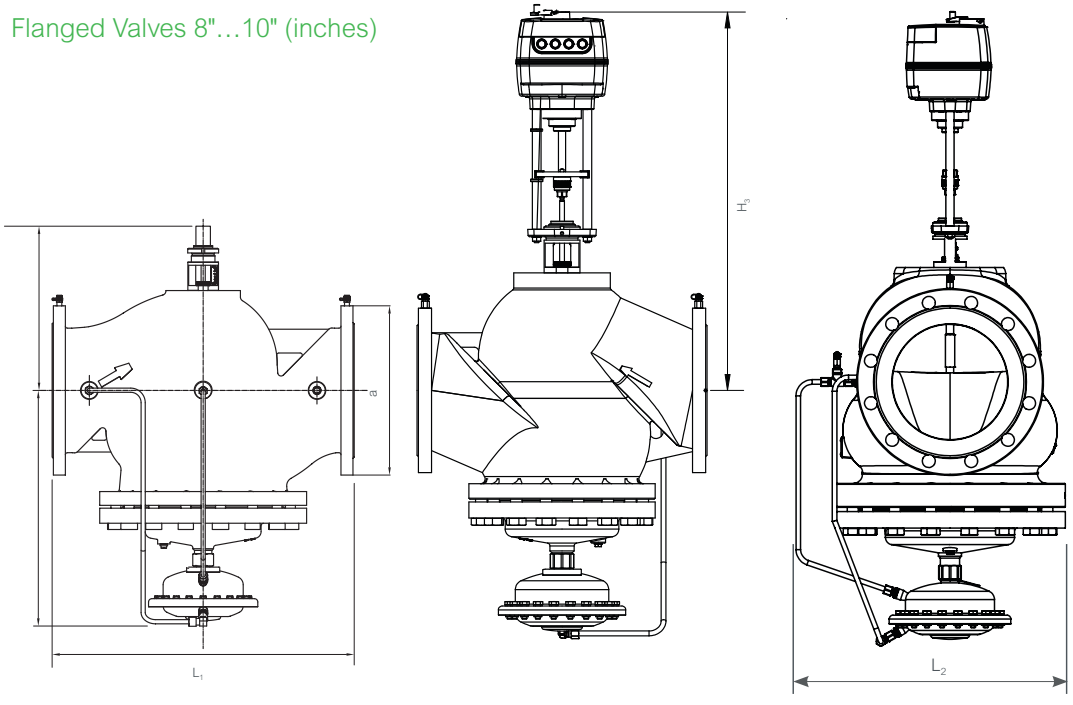
5" with MP2000-SRU/SRD/NSR

6" MP2000-SRU/SRD/NSR

Table 21. Flanged Valves 5"…6" (inches)

Type	L_1	L_2	H_1	H_2	H_3 MP2000-SRU/SRD/ NSR	a (EN 1092-2)	Valve Body Weight (lb.)	No. of Flange Bolt Holes
5"	15.7	14.45	10.7	21.1	20.94	9.84	188	8
6"	18.9	15.88	12.1	19.6	22.36	11.22	304	8

Flanged Valves 8"…10" (inches)



8", 10"

8", 10" with MP4000

Table 22a. Flanged Valves 8"…10" (inches)

See Table 22b for Valve Flanges

Type	L_1	L_2	H_1	H_2	H_3 MP4000	a (EN 1092-2)	Valve Body Weight (lb.)	No. of Flange Bolt Holes
8"	23.6	19.57	17.0	19.0	24.3	13.38	482	12
10"	28.7	22.98	16.9	20.9	27.8	15.9	753	12

Notes

17. Reference and Additional Information



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).

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 car-

Specification VB-7000 Bronze Body Valves ½" to 2”

tridge, 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

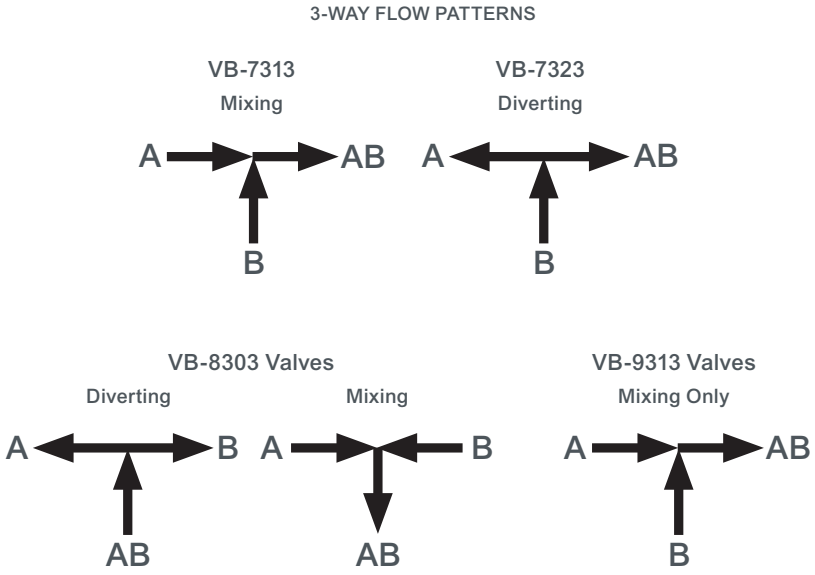
When possible on water systems, install valves downstream after the outlet from the coil.
Chilled-water valves downstream of the coil have the least condensation and corrosion.
Hot water valves downstream of the coil are where the temperatures are lowest, avoiding high temperatures on electric/electronic 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.

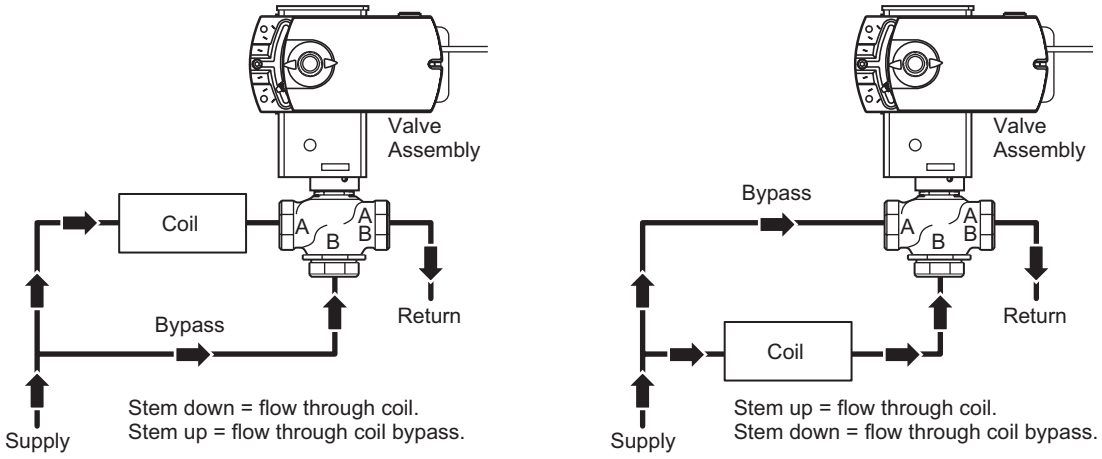
3-Way Valves
VB-7300 and VB-9300: Always follow the mixing arrows on the body. Backwards flow causes water hammer and damage.
VB-732x Diverting valves and V8-83xx balanced valves can be piped with flow reversed.
VB-830x Mixing valves are piped with two inlet ports "A" and "B" and the outlet port is AB 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)

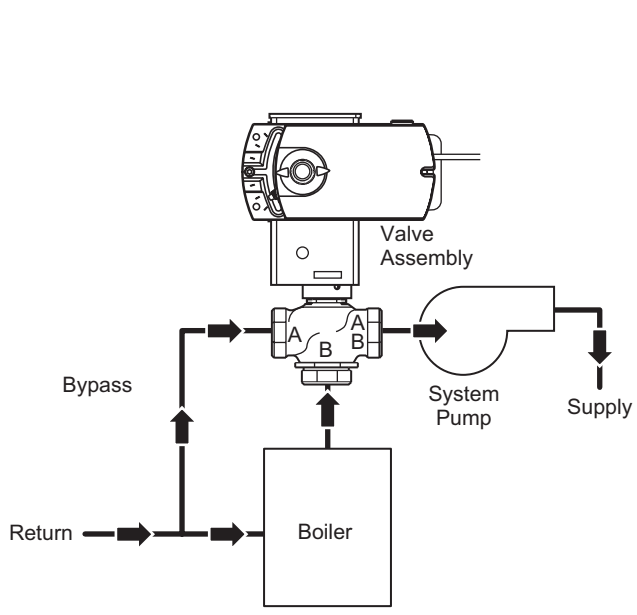
When 3-Way proportional linked globe valve assemblies are used to control flow through a heating or cooling coil, the valve assembly is piped on the outlet side of the load to throttle the water flow through the load, and therefore control the heat output of the load as diagramed below.



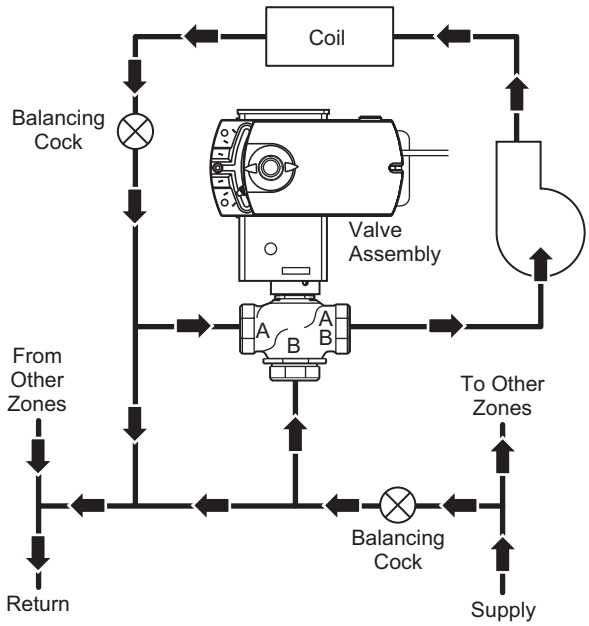
Typical Piping of 3-Way Mixing Valve for Control of Heating or Cooling Coil.

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.

Electric/Electronic Linkages and 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"		AV-600						AV-308	AV-600a	
VB-202-0-1-x & 2-x	½…2"	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"				AV-352			AV-352			
VB-212-0-1-x	½…2"	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"				AV-333						
VB-260-0-1-x	1 to 1½"				AV-300, AV-30						
VB-262-0-1-x	½…1½"				AV-300, AV-30			AV-300, AV-30			
VB-314 to 3x4	½…1"		AV-600						AV-308	AV-600a	
VB-804-0-1-x, -2x	½…2"	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"				AV-352			AV-352			
VB-807-0-1-x, 817*	½…2"	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"				AV-352		AV-352	AV-352			
VB-7211-0-4-x, 7212	½…1¼"		AV-7600-1			AV-671			AV-308-0-0-1	AV-7600-1a	
VB-7213-0-4-x	½…2"	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	½…2"	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"		AV-7600-1						AV-308-0-0-1	AV-7600-1a	
VB-7253-0-4-x	½…2"	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"		AV-7600-1						AV-308-0-0-1	AV-7600-1a	
VB-7273-0-4-x	½…2"	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"		AV-7600-1						AV-308-0-0-1	AV-7600-1a	
VB-7313-0-4-x	½…2"	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"	AV-391	AV-7600-1	AV-391	AV-393		AV-391	AV-393	AV-308-0-0-1	AV-7600-1a	AV-391
VB-7323-0-4-x	½…2"	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" O.D.								AV-308-0-0-1	AV-7600-1a	
VB-9211-0-4-x, 9212	½…1¼"		AV-600-0-0-1			AV-671			AV-308-0-0-1	AV-600-0-0-1a	
VB-9213-0-4-x	½…1¼"	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

Electric/Electronic Linkages and 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"	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9213-0-4-x, -5-x	2½ & 3"	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"				AV-352			AV-352			
VB-9214-0-4-x	½…1¼"	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"	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"		AV-600						AV-308-0-0-1	AV-600a	
VB-9223-0-5-4	5 to 6"				AV-352			AV-352			
VB-9224-0-4-x	½…1¼"		AV-600						AV-308-0-0-1	AV-600a	
VB-9253-0-4-x	½…1¼"	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"	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9263-0-4-x	½…1¼"		AV-600						AV-308-0-0-1	AV-600a	
VB-9273-0-4-x	½…1¼"	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"	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9283-0-4-x, 9312-0-4-x	½…1¼"		AV-600						AV-308-0-0-1	AV-600a	
VB-9313-0-4-x	½…1¼"	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"	AV-392		AV-392	AV-394	c	AV-392	AV-394			AV-392
VB-9313-0-4,5-x	2½…4"	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"				AV-352			AV-352			
VB-9314-0-4-x	½…1¼"	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"	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"	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"	AV-392		AV-392	AV-394		AV-392	AV-394			AV-392

Electric/Electronic Linkages and 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"	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"				AV-352		AV-352	AV-352			
VB-9332-0-4-x	5/8" O.D.								AV-308-0-0-1	AV-600a	
OYBB-233	½ & ¾"		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.

Electric/Electronic Linkages and 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"				AV-611	AV-602		AV-821	AV-821	
VB-9xxx-0-4-x	½…1¼"				AV-611			AV-821	AV-821	
VB-111-0-x-x	½…1¼"				AV-611			AV-821	AV-821	
VB-121-0-x-x	½" 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"				AV-611			AV-821	AV-821	
VB-202-0-1-x	½…2"	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"	AV-300, AV-30	AV-300, AV-29	AV-300, AV-30		AV-607-1				AV-822
VB-202-0-2-x	5 & 6"	AV-352		AV-352		AV-609-1				AV-822
VB-212-0-1-x	½…2"	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"				AV-611			AV-821	AV-821	
VB-252-0-2-x	2½…4"					AV-607-1		AV-821	AV-821	
VB-260-0-1-x	½ & ¾"				AV-611			AV-821	AV-821	
VB-260-0-1-x	1 to 1½"				AV-611			AV-821	AV-821	
VB-262-0-1-x	½…1½"	AV-300, AV-30		AV-300, AV-30	AV-611			AV-821	AV-821	
VB-314-0-1-x	½…1"				AV-611			AV-821	AV-821	
VB-324-0-5-4	½" O.D.				AV-611			AV-821	AV-821	
VB-334-0-5-4	½" 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"	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"	AV-300, AV-30	AV-300, AV-29	AV-300, AV-30		AV-607-1				AV-822
VB-804-0-2-x	5 & 6"	AV-352		AV-352		AV-609-1				AV-822
VB-807-0-1-x	½…2"	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"	AV-300, AV-30	AV-300, AV-29	AV-300, AV-30				AV-821	AV-821	
VB-817-0-x-x	4 to 6"	AV-352		AV-352		AV-609-1				AV-822
VB-8213-0-5-x	2½…5"					AV-607-1				AV-822
VB-8213-0-5-x	6"					AV-609-1				AV-822
VB-8223-0-5-x	2½…5"					AV-607-1				AV-822
VB-8223-0-5-4	6"					AV-609-1				AV-822
VB-8313-0-5-x	2½…5"					AV-607-1				AV-822
VB-8313-0-5-x	6"					AV-609-1				AV-822
VB-9211-0-4-x	½…1¼"	AV-430	AV-401		AV-611			AV-821	AV-821	
VB-7222-0-4-x	5/8" O.D.				AV-611	AV-602		AV-821	AV-821	
VB-7223-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7224-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7253-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7263-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7273-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7283-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7312-0-4-x	5/8" O.D.				AV-611	AV-602		AV-821	AV-821	
VB-7313-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7314-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7323-0-4-x	½…2"	AV-393	AV-391	AV-393	AV-611	AV-602		AV-821	AV-821	
VB-7332-0-4-x	5/8" 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.

Electric/Electronic Linkages and 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"				AV-611			AV-821	AV-821	
VB-9212-0-4-x	5/8" O.D.				AV-611			AV-821	AV-821	
VB-9213-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9213-0-4-x	1½ & 2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9213-0-4-x	2½ & 3"	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9213-0-5-x	2½…4"	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9213-0-5-x	5 & 6"	AV-352		AV-352		AV-609-1				AV-822
VB-9214-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9214-0-4-x	1½ & 2"	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"				AV-611			AV-821	AV-821	
VB-9222-0-4-x	5/8" O.D.				AV-611			AV-821	AV-821	
VB-9223-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9223-0-4-x	1½…2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9223-0-4-x	2½ & 3"	AV-396	AV-395	AV-396		AV-607-1				AV-822
VB-9223-0-5-x	2½…4"	AV-396	AV-395	AV-396		AV-607-1				AV-822
VB-9223-0-5-4	5 to 6"	AV-352		AV-352		AV-609-1				AV-822
VB-9224-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9224-0-4-x	1½ & 2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9253-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9253-0-4-x	1½ & 2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9263-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9263-0-4-x	1½ & 2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9273-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9273-0-4-x	1½ & 2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9283-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9283-0-4-x	1½ & 2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9313-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9313-0-4-x	1½ & 2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9313-0-4-x	2½ & 3"	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9313-0-5-x	2½…4"	AV-396, AV-352	AV-395	AV-396, AV-352		AV-607-1				AV-822
VB-9313-0-5-x	5 to 6"	AV-352		AV-352		AV-609-1				AV-822
VB-9314-0-4-x	½…1¼"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9314-0-4-x	1½ & 2"	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"	AV-393	AV-391	AV-393	AV-611			AV-821	AV-821	
VB-9323-0-4-x	1½ & 2"	AV-394	AV-392	AV-394		AV-602		AV-821	AV-821	
VB-9323-0-5-x	2½ & 3"	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"	AV-352		AV-352		AV-609-1				AV-822
VB-9332-0-4-x	5/8" O.D.				AV-611			AV-821	AV-821	

[a]VB prefix indicates that the actuator fits directly onto VB-7xxx valve bodies.

Pneumatic Linkages and 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" stroke)	MK-68x1 (MK-69x1 is only used on VB-817 & VB-9323, 4 to 6")	MK-88xx MK-89xx (5 & 6") (2½…4")
VB-111-0-x-x	½…1¼"	AV-400	AV-404					
VB-121-0-x-x	½" 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"	AV-400	AV-401					
VB-202-0-1-x	½…2"			AV-430			AV-430	
VB-202-0-2-x	2½…4"						AV-430	AV-496
VB-202-0-2-x	5 & 6"							AV-496
VB-212-0-1-x	½…2"			AV-430			AV-430	
VB-252-0-1-x	½…2"			AV-430			AV-430	
VB-252-0-2-x	2½…4"						AV-430	AV-496
VB-314-0-1-x	½…1"	AV-400	AV-401					
VB-324-0-5-4	½" O.D.	AV-400	AV-401					
VB-334-0-5-4	½" 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"			AV-430			AV-430	
VB-804-0-2-x	2½…4"						AV-430	AV-496
VB-804-0-2-x	5 & 6"							AV-496
VB-807-0-1-x	½…2"			AV-430			AV-430	
VB-817-0-x-x	½ to 3"						AV-430	
VB-817-0-x-x	4 to 6"						AV-430	
VB-7211-0-4-x	½…1¼"	AV-7400	AV-401					
VB-7212-0-4-x	5/8" O.D.	AV-7400	AV-401					
VB-7213-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7214-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7221-0-4-x	½…1¼"	AV-7400	AV-401					
VB-7222-0-4-x	5/8" O.D.	AV-7400	AV-401					
VB-7223-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7224-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7253-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7263-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7273-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7283-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7312-0-4-x	5/8" O.D.	AV-7400	AV-401					
VB-7313-0-4-x	½…2"	AV-7400	AV-401	AV-430				
VB-7314-0-4-x	½…2"	AV-7400	AV-401	AV-430				
VB-7323-0-4-x	½…2"	AV-7400	AV-401	AV-430				
VB-7332-0-4-x	5/8" O.D.	AV-7400	AV-401					
VB-8213-0-5-x	2½…5"						AV-495	AV-496
VB-8213-0-5-x	6"							AV-496
VB-8223-0-5-x	2½…5"						AV-495	AV-496
VB-8223-0-5-4	6"							AV-496
VB-8313-0-5-x	2½…5"						AV-495	AV-496
VB-8313-0-5-x	6"							AV-496
VB-9211-0-4-x	½…1¼"	AV-430	AV-401					
VB-9212-0-4-x	5/8" O.D.	AV-400	AV-401					

Pneumatic Linkages and 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" stroke)	MK-68x1 (MK-69x1 is only used on VB-817 & VB-9323, 4 to 6")	MK-88xx MK-89xx (5 & 6") (2½…4")
VB-111-0-x-x	½…1¼"	AV-400	AV-404					
VB-121-0-x-x	½" 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"	AV-400	AV-401					
VB-202-0-1-x	½…2"			AV-430			AV-430	
VB-202-0-2-x	2½…4"						AV-430	AV-496
VB-202-0-2-x	5 & 6"							AV-496
VB-212-0-1-x	½…2"			AV-430			AV-430	
VB-252-0-1-x	½…2"			AV-430			AV-430	
VB-252-0-2-x	2½…4"						AV-430	AV-496
VB-314-0-1-x	½…1"	AV-400	AV-401					
VB-324-0-5-4	½" O.D.	AV-400	AV-401					
VB-334-0-5-4	½" 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"			AV-430			AV-430	
VB-804-0-2-x	2½…4"						AV-430	AV-496
VB-804-0-2-x	5 & 6"							AV-496
VB-807-0-1-x	½…2"			AV-430			AV-430	
VB-817-0-x-x	½ to 3"						AV-430	
VB-817-0-x-x	4 to 6"						AV-430	
VB-7211-0-4-x	½…1¼"	AV-7400	AV-401					
VB-7212-0-4-x	5/8" O.D.	AV-7400	AV-401					
VB-7213-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7214-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7221-0-4-x	½…1¼"	AV-7400	AV-401					
VB-7222-0-4-x	5/8" O.D.	AV-7400	AV-401					
VB-7223-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7224-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7253-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7263-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7273-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7283-0-4-x	½…2"	AV-7400	AV-401			AV-430		
VB-7312-0-4-x	5/8" O.D.	AV-7400	AV-401					
VB-7313-0-4-x	½…2"	AV-7400	AV-401	AV-430				
VB-7314-0-4-x	½…2"	AV-7400	AV-401	AV-430				
VB-7323-0-4-x	½…2"	AV-7400	AV-401	AV-430				
VB-7332-0-4-x	5/8" O.D.	AV-7400	AV-401					
VB-8213-0-5-x	2½…5"						AV-495	AV-496
VB-8213-0-5-x	6"							AV-496
VB-8223-0-5-x	2½…5"						AV-495	AV-496
VB-8223-0-5-4	6"							AV-496
VB-8313-0-5-x	2½…5"						AV-495	AV-496
VB-8313-0-5-x	6"							AV-496
VB-9211-0-4-x	½…1¼"	AV-430	AV-401					
VB-9212-0-4-x	5/8" O.D.	AV-400	AV-401					

Pneumatic Linkages and 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" stroke)	MK-68x1 (MK-69x1 is used only on VB-817 & VB-9323, 4 to 6")	MK-88xx MK-89xx (5 & 6") (2½…4")
VB-9213-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9213-0-4-x	1½ & 2"			AV-430	AV-420		AV-430	
VB-9213-0-4-x	2½ & 3"						AV-495	AV-496
VB-9213-0-5-x	2½…4"						AV-495	AV-496
VB-9213-0-5-x	5 & 6"							AV-496
VB-9214-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9214-0-4-x	1½ & 2"			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"	AV-400	AV-401					
VB-9222-0-4-x	5/8" O.D.	AV-400	AV-401					
VB-9223-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9223-0-4-x	1½…2"			AV-430	AV-420		AV-430	
VB-9223-0-4-x	2½ & 3"						AV-495	AV-496
VB-9223-0-5-x	2½…4"						AV-495	AV-496
VB-9223-0-5-4	5 to 6"							AV-496
VB-9224-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9224-0-4-x	1½ & 2"			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"	AV-400	AV-401			AV-430		
VB-9253-0-4-x	1½ & 2"			AV-430	AV-420		AV-430	
VB-9263-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9263-0-4-x	1½ & 2"			AV-430	AV-420		AV-430	
VB-9273-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9273-0-4-x	1½ & 2"			AV-430	AV-420		AV-430	
VB-9283-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9283-0-4-x	1½ & 2"			AV-430	AV-420		AV-430	
VB-9312-0-4-x	5/8" O.D.	AV-400	AV-401					
VB-9313-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9313-0-4-x	1½ & 2"			AV-430	AV-420		AV-430	
VB-9313-0-4-x	2½ & 3"						AV-495	AV-496
VB-9313-0-5-x	2½…4"						AV-495	AV-496
VB-9313-0-5-x	5 to 6"							AV-496
VB-9314-0-4-x	½…1¼"	AV-400	AV-401			AV-430		
VB-9314-0-4-x	1½ & 2"			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"	AV-400	AV-401	AV-430				
VB-9323-0-4-x	1½ & 2"			AV-430	AV-420		AV-430	
VB-9323-0-5-x	2½ & 3"						AV-430	
VB-9323-0-5-x	4 to 6"						AV-430	
VB-9332-0-4-x	5/8" O.D.	AV-400	AV-401					

Recommended Schneider Electric Actuators

Refer to tables below for complete actuator information. Only use the Schneider Electric actuators shown 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.

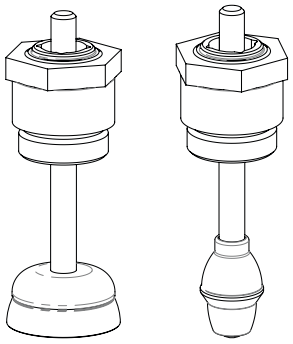
AV-821/AV-822 — Actuator, Linkage, and Close-Off Information for Two- and 3-Way Barber-Colman VB-9xxx Valves (Schneider Electric Forta Non-Spring Return Actuators)

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.

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.

Applicable Literature

VB-7xxx Installation Instructions	F-27651
VB-8213 Installation Instructions	F-27193
VB-8223 Installation Instructions	F-27194
VB-8303 Installation Instructions	F-27197
VB-9313 Installation Instructions	F-24393
VB-7200 Specification Sheet	F-27649
VB-7300 Specification Sheet	F-27650
VB-7263 Specification Sheet	F-27687
YBA-622/YBA-635 Installation Instructions	F-17324
YBA-652 Installation Instructions	F-24185
EN205 Water and Steam Systems	F-26080

Vx-7xxx Bronze Globe Valves ½"…2" 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 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.

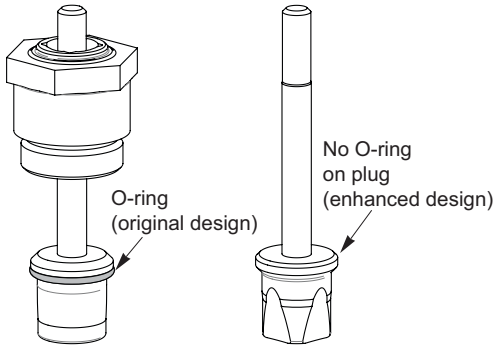
   Rebuild kits for 1” (25 mm) through 2” (50 mm) valves contain a single replacement plug that can be used for either original-design or enhanced-design valves.
3. On normally open 1” (25 mm) through 2” (50 mm) valves, apply Loctite pipe sealent #592 or equivalent on the male threads of the bonnet, and 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.

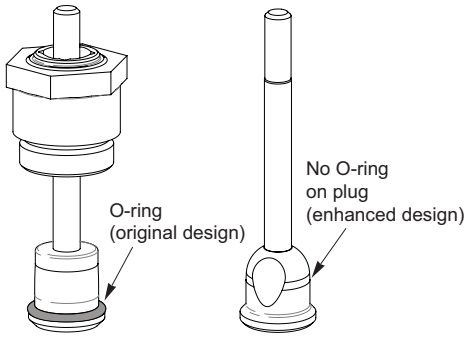
Valve Body	Cv	Rebuild Kit	Stem and Plug Assy
Vx-721x-0-x-01	0.4	RYB-721-01	2 [b]
Vx-721x-0-x-02	1.3	RYB-721-02	2 [b]
Vx-721x-0-x-03	2.2	RYB-721-03	2 [b]
Vx-721x-0-4-04	4.4	RYB-721-04	2 [b]

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)

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

a. These kits consist of one stem and plug assembly.

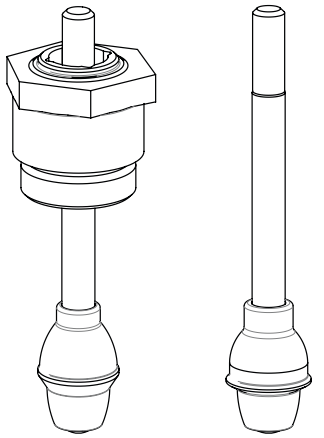
b. These kits consist of one original-design plug and one enhanced-design plug. Original-design plugs include an O-ring. There is no O-ring on enhanced-design plugs. Enhanced-design valves have an O-ring in the valve seat, which must be intact and functional in order to ensure proper valve performance.

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) | Enhanced Design (Stainless Steel)

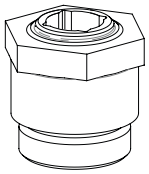
RYB-731 (-2, -4)

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

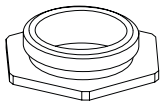
a. These kits consist of one stem and plug assembly.

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.

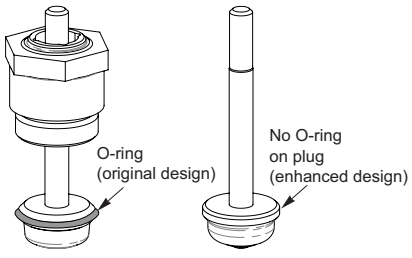
b. The grease kit is included in Plug Rebuild Kit RYB-732-xx but can be ordered separately by the part number listed in this table.

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



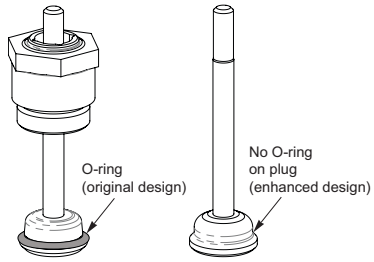
RYB-721 (-5, -6)
RYB-725 (-5, -6)

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 [bc]
Vx-721x-0-3-06	8.5	RYB-721-06	2 [bc]

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)

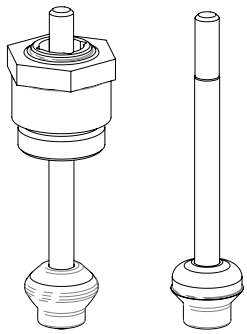
Note: The actual shape of the plug varies with Cv.

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]

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



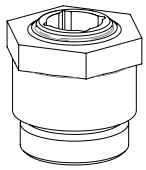
RYB-731 (-6)

Note: The actual shape of the plug varies with Cv.

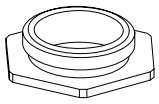
Valve Body	Cv	Rebuild Kit	Stem and Plug Assy
Vx-731x-0-4-06	7.5	RYB-731-06	2 b
Vx-732x-0-4-06	7.5	RYB-732-06	1 a

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

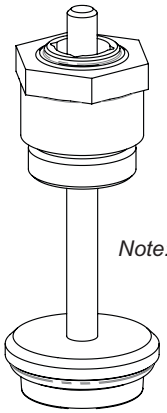
Part Number	Description
YBA-514-1[a]	Actuator mounting nut, silver-colored (original-design valves)
YBA-520[a]	Actuator mounting nut, gold-colored (enhanced-design valves)
YBA-622-2[c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25[c]	Packing Cartridge, Quantity 25 with TOOL-020-1

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



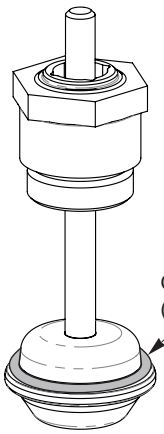
Note: The actual shape of the plug varies with Cv.

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.

3-Way



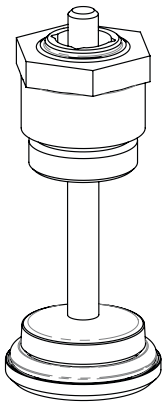
Note: The actual shape of the plug varies with Cv.

RYB-731 (-8)

Valve Body	Cv	Rebuild Kit
Vx-731x-0-4-08	14	RYB-731-08[a]

a. 3-Way mixing valve rebuild kits include a plug with an O-ring on the “A” port side.

2-Way Normally Closed

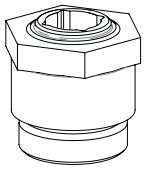


Note: The actual shape of the plug varies with Cv.

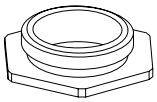
RYB-722 (-7, -8 -51, -52)

Valve Body	Cv	Rebuild Kit
Vx-722x-0-4-07	10	RYB-722-07
Vx-722x-0-4-08	14	RYB-722-08
Vx-728x-0-4-08	12	

Vx-7xxx Accessories



YBA-622-2



YBA-520
YBA-514-1

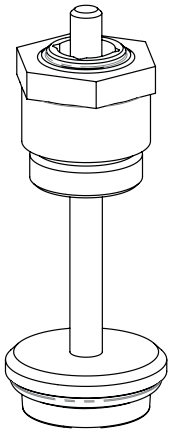
Part Number	Description
YBA-514-1[a]	Actuator mounting nut, silver-colored
YBA-520[a]	Actuator mounting nut, gold-colored
YBA-622-2[c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25[c]	Packing Cartridge, Quantity 25 with TOOL-020-1

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



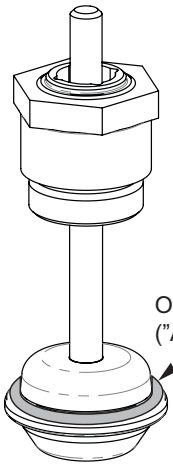
RYB-721 (-9)

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



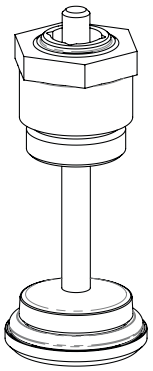
RYB-731 (-9)

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]

a. 3-Way mixing valve rebuild kits include a plug with an O-ring on the "A" port side.

2-Way Normally Closed

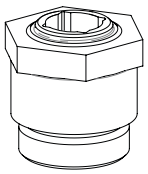


RYB-722 (-9)

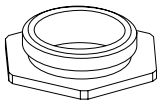
Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit
Vx-722x-0-4-09	20	RYB-722-09

Vx-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.

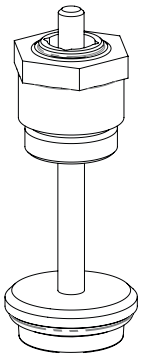
b. The grease kit is included in Plug Rebuild Kit RYB-732-xx but can be ordered separately by the part number listed in this table.

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

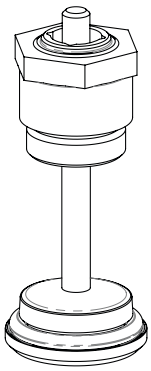


RYB-721 (-10)

Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit
Vx-721x-0-4-10	28	RYB-721-10

2-Way Normally Closed

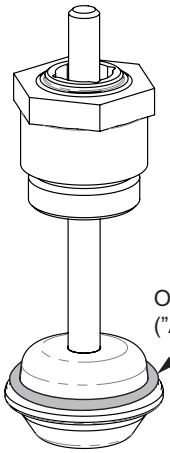


RYB-722 (-10,

Note: The actual shape of the plug varies with Cv.

Valve Body	Cv	Rebuild Kit
Vx-722x-0-4-10	28	RYB-722-10

3-Way



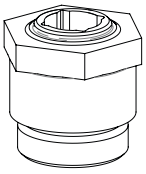
RYB-731 (-10)

Note: The actual shape of the plug varies with Cv.

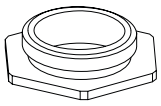
Valve Body	Cv	Rebuild Kit
Vx-731x-0-4-10	28	RYB-731-10[a]

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

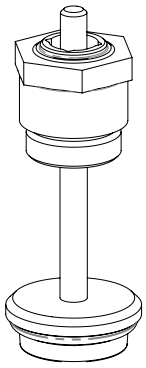
Part Number	Description
YBA-514-1[a]	Actuator mounting nut, silver-colored
YBA-520[a]	Actuator mounting nut, gold-colored
NYBA-67[b]	Grease Kit (included in Rebuild Kit RYB-732)
YBA-622-2[c]	Packing Cartridge (included in Rebuild Kit)
YBA-622-25[c]	Packing Cartridge, Quantity 25 with TOOL-020-1

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

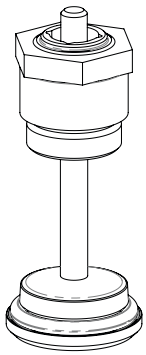


Note: The actual shape of the plug varies with Cv.

RYB-721 (-11)
RYB-725 (-11)

Valve Body	Cv	Rebuild Kit
Vx-721x-0-4-11	40	RYB-721-11

2-Way Normally Closed

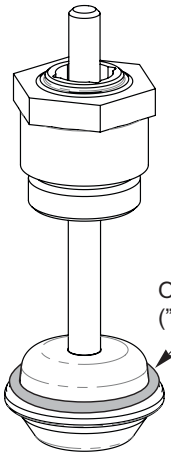


Note: The actual shape of the plug varies with Cv.

RYB-722 (-11)

Valve Body	Cv	Rebuild Kit
Vx-722x-0-4-11	40	RYB-722-11

3-Way



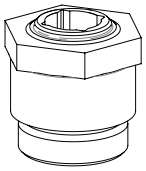
Note: The actual shape of the plug varies with Cv.

RYB-731 (-11)

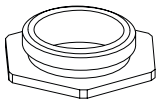
Valve Body	Cv	Rebuild Kit
Vx-731x-0-4-11	41	RYB-731-11[a]

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
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-7223-0-4-xx	Stem Up Closed (N.C.), NPT Threaded	½"…2"	**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-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" 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 N-m).
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 N-m).
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

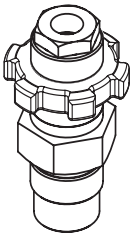
Rebuild Kit Instructions for Vx-8xxx / 9xxx Globe Valves

Vx-8xx3 Flanged Body Iron Globe Valves (Blue Finish) – 2½"…6" Rebuild Kits

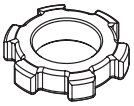
Vx-8xx3 Accessories



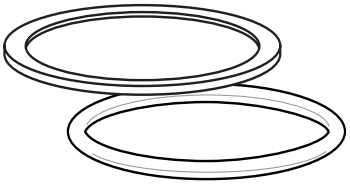
NYBA-67



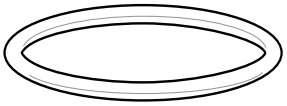
YBA-652-2



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

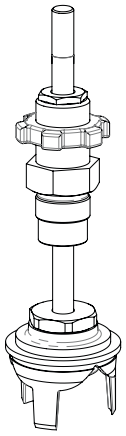
Part Number	Description
BYRZ-197-1x-KIT[a]	O-ring (Face Seal) and Gasket Kit
NYBA-8303-104-0-1x[a]	O-ring (Internal)

a. Provided with RYB-8xx-xx rebuild kit but may be ordered separately.

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)

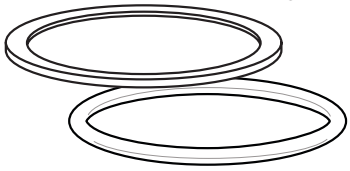
Note: The actual shape of the plug varies with Cv.

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

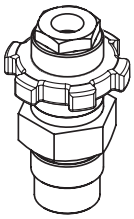
a. Some kits are used in more than one style of valve body. In that case, the Cv capacity is determined by the combination of the plug and the valve body style.

b. Threaded bronze bodies.

Vx-9xx3 Accessories



BYRZ-197-1x-KIT



YBA-652-2

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)
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, Glossary

Flow Terminology and Actuator Part Numbers

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.

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

Glossary

Absolute Pressure 14.7 psi + gauge pressure (psi).

Actuators

- 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.

Ambient Temperature Rating: Temperature surrounding an actuator or valve body.

Angled Body: A two-way valve body that has end fittings at right angles to each other.

Booster Pump: Pump used in secondary loops of hydronic systems to raise pressure for that section of the system.

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.

Capacity Index: See Flow Coefficient, Cv.

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. The forming and imploding of vapor bubbles in a liquid due to decreased, then increased, pressure as the liquid flows through a restriction.

Close-Off: The maximum allowable pressure drop to which a valve may be subjected while fully closed.

Close-Off Rating: Maximum allowable pressure drop (inlet to outlet) that the valve body will tolerate when fully closed; the power available from the actuator usually determines the close-off rating.

Contoured Plug: Shaped end of valve disc that controls the flow of the medium through the valve. Used for smaller sized equal percentage valves.

Controlled Medium: Whatever fluid is being controlled - hot water, chilled water or steam.

Critical Pressure Drop: The pressure drop across a valve which causes the maximum possible velocity of steam though the valve.

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)

Design Conditions: Space temperature conditions that require the full heating or cooling requirements of a system.

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.

Diverting Valve: Three-way valve that has one inlet and two outlets. Water entering the inlet port is diverted to either of the two outlet ports in any proportion desired by moving the valve stem.

End Fitting: Part of the valve body that connects to the piping. Union, screwed, flared, sweat, and flanged are typical examples of end fittings.

Equal Percentage: Valve Equal changes in the valve stem changes the existing flow by an equal percentage.

FPM (Feet Per Minute): A unit of measure to quantify the velocity of air flow.

Flow Characteristic: Relation between flow through the valve as the stem travel is varied between 0 and 100%.

Flow Coefficient, Cv: The quantity of water, in gallons per minute at 60°F, that will flow through a given value with a pressure drop of 1 psig. (Also called capacity index.)

Flow Rate: The amount of fluid passing a given point per unit of time. Units are gallons per minute (gpm) for water and pounds per hour for steam.

Full Port; Maximum flow capacity possible for particular end fitting size.

Gauge Pressure Pounds per square inch (psi) as read on a gauge.

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.

Flow Terminology, Glossary

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.

Load: The demand on the mechanical equipment in a HVAC system.

Load Change: A change in building heating or cooling requirements as a result of lights, machinery, people, outside air temperature variations, solar effect, wind, etc.

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.

Mixing Valve: Three-way valve, has two inlets and one outlet. The proportion of the fluid entering each of the two outlets can be varied by moving the valve stem. Not suitable for Diverting applications.

Monoflo* Fittings Connect rises to main, diverts water to heating units for single pipe systems. (*Trademark of the Bell & Gossett Co.)

Normally Closed (N.C.) Condition of the valve upon a loss of power or control signal to the actuator.

Normally Open (N.O.) Condition of the valve upon a loss of power or control signal to the actuator.

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.

Packing: Material used to seal the valve stem so that the controlled medium will not leak. Teflon “V” rings and graphite rings are typical materials used.

Port: Flow controlling opening between the seat and disc when the valve is wide open.

Positive Positioner: Device that eliminates the actuator shaft positioning error due to load on the valve or damper.

Pressure Drop (ΔP) The difference in pressure between inlet and outlet of a control valve.

PSI: Pounds per square inch.

PSIG: Pounds per square inch gauge.

Rangeability: Ratio of maximum to minimum controllable flow.

Reduced Port: Smaller flow capacity that is possible for particular end fitting. See Full Port.

Saturated Steam: The maximum amount of vapor that can exist at a specific temperature and pressure.

Seat: The stationary portion of the valve which, when in contact with the movable portion (valve disc, stem, etc.), stops flow completely.

Self-contained: Valve Terminal control valves that derive all of the energy to open or close from the sensed ambient temperature.

Static Pressure Rating: Maximum pressure (inside to outside the body) that valve will tolerate before leaking. Pressure varies with temperature.

Stem: The cylindrical shaft which is moved manually or by an actuator and to which the throttling plug is attached.

Straightway Body: A two-way valve body that has end fittings on opposite sides.

Stroke: The total distance a valve stem travels or moves. Also known as lift.

Superheated Steam: Steam at a temperature higher than saturation temperature at the given pressure.

System Pressure Drop (ΔP): The difference in pressure between supply and return mains in a hydronic system.

Three-Way Valve: Valve with one inlet and two outlets or two inlets and one outlet. See Mixing or Diverting Valves.

Trim: All parts of the valve which are in contact with the flow agent but are not part of the valve shell or casting. Disc, stem, throttling range packing rings, etc., are all trim components.

Turndown Ratio: between maximum usable flow and minimum controllable flow. The ratio is usually less than rangeability.

Two-Way Valve: Valve with single flow path - one inlet and one outlet.

Valve: A controlled device which will vary the rate of flow of a controlled agent such as water or steam.

Valve Body: The portion of the valve through which the controlled agent flows.

Valve Disc: A movable part of the valve which makes contact with the valve seat when the valve is closed. Typical disc materials used are teflon and composition.

Valve Guide: The part of the valve throttling plug which keeps the disc aligned with the valve seat.

Valve Size: See Flow Coefficient, Cv. Sometimes referred to as end fitting size - 1/2”, 1”, 1-1/4”, etc.

Wiring Drawing: A small eroded area or thin slit on a valve seat or plug. This is the result of a high velocity fluid acting on the surfaces when the valve is just above the seat.

Zone Valve: Terminal control valve for a zone loop of radiation.

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.

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	

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?

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 and 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.

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.

Available Types

- NPT threaded English ½"…2", 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).

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

- Robert Shaw
  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.
- ASHRAE 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.

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414 YBA-652-2a
414 NYBA-8303-104-0-1xa
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Note this section has individual page numbering.

Overview

This Guide Specification is specifically designed to empower specifiers with a tool that enables fast and simple specification of Schneider Electric valves and actuators. This comprehensive guide details both product and application specific information that assists specifiers in the selection process.

Want more valve and actuator specification horsepower? Test drive our Valve, Assembly and Damper Actuator Selection Tool here.

Visit us at Schneider Electric.com

Or

Contact your local Sales Representative

Section 230900 – INSTRUMENTATION AND CONTROL FOR HVAC

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Note: Delete text and components not required for project.

Application engineer bidding notes in this document are shown in green text.

2.15 ACTUATORS

A. Electronic Direct Couple Damper (and valves) Actuators

[Schneider Electric SmartX Actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric
2. Direct-coupled type non-hydraulic designed for minimum 100,000 full-stroke cycles at rated torque.
3. Direct-coupled damper actuators must have a five-year warrantee.
4. Size for torque required for damper seal at maximum design conditions and valve close-off pressure for system design.
5. Direct-coupled damper actuators should accommodate 3/8", ½" 1.05" round or 3/8"…½" and ¾" square damper shafts.
6. Actuator operating temperature minimum requirements:44, 88 and 133 lb.-in. are –25°F…130°F (–32°C…55°C). The 30, 35, 60, 150 and 300 lb.-in. are -25°…140°F (-30°C… 60 °C).
7. Overload protected electronically throughout rotation except for selected Floating actuators the have a mechanical clutch.
8. Spring Return Actuators: Mechanical fail safe shall incorporate a spring-return mechanism.
9. Non-Spring Return Actuators shall stay in the position last commended by the controller.
10. Power Requirements: 24Vac/dc [120Vac] [230Vac]
11. Proportional Actuators controller input range from 0…10 Vdc, 2…10 Vdc or 4…20 mA models.
12. Housing: Minimum requirement NEMA type 2
13. Actuators with a microprocessor should not be able to be modified by an outside source (cracked or hacked).
14. Actuators of 133 and 270 lb.-in. of torque or more should be able to be tandem mount or "gang" mount.
15. Agency Listings: ISO 9001, cULus, CE and CSA

B. ½"…¾" Ball Valve Electronic Actuators

[Schneider Electric VBB/VBS ball valves actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Size for torque required for valve close-off pressure for system design.
3. Coupling: Direct coupled to the valve body without the use of external devices or tools (snap-on).
4. Auxiliary End Switch (optional) is to be SPST 24 Vac/Vdc,101 mA to 5 mA maximum on selected two-position models.
5. Controller Signal Two-position, Floating or Proportional (0…5 Vdc, 0…10 Vdc, 5…10 Vdc, or 4…20 mA dc). The design allows for changing selections via DIP switches without removal of cover.
6. Manual operating lever and position indicator must be standard on all models.
7. Power Requirements: 24 Vac for floating, proportional, and 110…230 Vac for two position multi-voltage types
8. Actuators must be available with either Spring Return (SR) or Non-Spring Return (NSR) models.
9. Operating Temperature Limit Floating is to be 32…140°F (0…60°C) Proportional 32…140°F (0…60°C) Two-Position 32…169°F (0…76°C)

10. Wiring (depending on model) Removable Terminal Block, 10 ft. (3.05 m) Plenum Cable, 18 in. (45 cm) Appliance Wire
11. Locations must be rated NEMA 2, IEC IP31. (Indoor Use Only.) Actuators with terminal block or plenum cable leads are plenum rated per UL file number E9429.
12. Agency Listings: ISO 9001, cULus, and CE.
13. Schneider Electric shall warrant all components for a period of 5 years from the date of production.

C. 2-way (½"…3") and 3-way (½"…2") Ball Valve Actuators

[Schneider Electric VB-2000 ball valves actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Size for torque required for valve close-off pressure for system design.
3. Actuators are to be available in spring return (SR) and non-spring return (NSR) models. Spring Return (SR) actuators are to provide a choice to return direction.
4. Actuators are to be available in models for two-position, floating and proportional control.
5. All actuator models are to be equipped with pigtail leads
6. Actuators must be available in models with manual override.
7. Actuators must be available in models with auxiliary switch(es).
8. Operating temperatures' Floating Non-Spring Return (NSR) with 33 lb.-in. of torque must be -25 to 130 °F (-32 to 55°C). All other actuators are to -22 to 140 °F (-30 to 60 °C)
9. Actuators must be NEMA 2 rated.
10. All actuators are to have a five-year warranty.
11. Agency Listings: ISO 9001, cULus, and CE.

D. Zone Valve Actuators-Two-position Spring Return (SR)

[Schneider Electric Erie Zone Valve PopTop™ Two-position valve actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Valves are to be two-position (On-Off), spring return (SR) with general or High Close Off models.
3. Actuator Voltage Models are 24 Vac @ 50/60 Hz, 110 Vac @ 50 Hz and 120 Vac @ 60 Hz, 230 Vac @ 50 Hz, 240 Vac @ 60 Hz, 208 Vac @ 50/60 Hz., 277 Vac @50/60 Hz.
4. End (auxiliary) Switch, 24 -240 Vac Models: 24…250 Vac/101 mA min. to 5 A max. and 9…30 Vdc @ 100 mA max. 277 Vac.
5. Actuators are to have manual override on normally closed (NC) models and assembles to valves without the use of tools, linkages or calibration.
6. Actuators are to have a hysteresis synchronous motor.
7. North America Agency Listings: UL873: Underwriters laboratories (Category Temperature Indicating and Regulating Equipment). CUL: UL Listed for use in Canada by Underwriters Laboratory. Canadian Standards C22.2 No. 24.

E. 2”…18” Two-Way and 2”…16” Three-Way Butterfly Valve Non-Spring Return (NSR) Linear Electronic Valve Actuators with linkage Butterfly Valve Actuators

[Schneider Electric S70 red w/hand wheel, w/heater actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. The butterfly valve actuators are to be Non-Spring Return (NSR) two-position and proportional taking 0…10 Vdc or 4…20 mA models. All Actuators are to be NEMA 4, manual override (hand wheel) two auxiliary switches, and built-in heater.
3. Actuator close-offs and Cvs must be appropriate for the valve size in a typical HVAC application.
4. Actuators must be available in 24 Vac and 120 Vac models.
5. Actuators must have [Internal wiring isolation for parallel wiring multiple units that eliminates the risk of feedback from one actuator to another.
6. Proportional models must have feedback of 0…10 Vdc or 4…20 mA.
7. Actuator operating temperature shall be -40…150°F (-40…60°C).
8. Actuator agency listings (North America) UL, CSA and CE.

F. 2”…4” Two-Way and Three-Way Butterfly Valve Spring Return (SR) Electronic Valve Actuators

[Schneider Electric SmartX Mx-41-7153 actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. The butterfly valve actuators are to be Spring Return (SR) two-position and proportional taking 2…10 Vdc or 4…20 mA models. All Actuators are to be NEMA 2.
3. Actuator close-offs and Cvs must be appropriate for the valve size in a typical HVAC application.
4. Actuators must be available in 24 Vac models.
5. Actuators shall have two SPDT auxiliary switch models.
6. Actuators must have [Internal wiring isolation for parallel wiring multiple units that eliminates the risk of feedback from one actuator to another.
7. Proportional models must have feedback of 2…10 Vdc or 4…20 mA.
8. Actuator operating temperature shall be -22…140°F (-12…60°C)
9. Actuators are to have a 5-year warranty.
10. Actuator agency listings (North America) UL, CSA and CE

G. 2”…6” Two-Way and Three-Way Butterfly Valve Non-Spring Return (NSR) Electronic Valve Actuators

[Schneider Electric SmartX NR-22xx-5xx actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric
2. The butterfly valve actuators are to be Non-Spring Return (NSR) two-position and proportional taking 0…10 Vdc or 4…20 mA models. All Actuators are to be NEMA 2.
3. Actuator close-offs and CVs must be appropriate for the valve size in a typical HVAC application.
4. Actuators must be available in 24 Vac models.
5. Actuators shall have two SPDT auxiliary switch models.
6. Actuators must have Internal wiring isolation for parallel wiring multiple units that eliminates the risk of feedback from one actuator to another.
7. Proportional models must have feedback of 2…10 Vdc or 4…20 mA.

8. Actuator operating temperature shall be -22…140°F (-12…60°C)
9. Actuators are to have a 5-year warranty.

   Actuator agency listings (North America) UL, CSA and CE

H. ½"…2" Bronze Body, Linear Electronic Valve Actuators with 67 or 78 lbs. of force. Globe Valve Actuators

[Schneider Electric MG350V]

1. Manufactured, brand labeled and distributed by Schneider Electric.
2. Actuator must have bi-color LED status indication for motion indication, auto calibration and alarm notification.
3. When the actuator is properly mounted must have a minimum of a NEMA 2 (IP53) rating.
4. Actuators are to be non-spring return.
5. Actuators are to be floating (used for two-position) or proportional models.
6. Proportional models will have optional models with a position output signal with field selectable 2…10 Vdc and 0…10 Vdc input signals and selectable input signal direct or reverse acting.
7. Actuator must have auto calibration which provides precise control by scaling the input signal to match the exact travel of the valve stem
8. Actuators must come in models with Pulse Width Modulated (PWM) with field-selectable 0.59 to 2.93 sec and 0.1 to 25.5 sec input signal ranges with a position output signal
9. Actuators must have manual override with automatic release.
10. Models with position feedback output signal include field selectable 2…10 Vdc or 0…5 Vdc output signal
11. Removable wiring screw terminal with ½" conduit opening.
12. Actuator operating temperature ranges:
    a. When controlling fluid up to 266°F (130°C) = ambient air temperature is to be 23…131°F (-5…55°C)
    b. Fluid up to 281°F (138°C) = 23…127°F (-5…53°C)
    c. Fluid up to 340°F (171°C) = 23…115°F (-5…46°C)
    d. Fluid up to 400°F (204°C) = 23…102°F (-5…39°C)
13. Actuator agency Listings (North America)
    a. cUL-us LISTED mark, per UL 60730-1 and -2-14 and CAN/CSA E60730-1 and -2-14 Automatic Electric Controls
    b. NEMA 2
    c. NEC class 2 FCC part-15 class B
    d. Canadian ICES-003
    e. ESA registered
    f. Plenum rated per UL 20430

I. ½"…2" Bronze Body, Linear Electronic Valve Actuators with 105 lbs. of force Globe Valve Actuators

[Schneider Electric SmartX Mx51-7103 Series Linear SR Valve Actuator]

1. Manufactured, brand labeled and distributed by Schneider Electric.
2. Actuators must have Two- Position, Floating, and Proportional models.
3. Proportional models will a controller input signal of either a 0…10 Vdc, 2…10 Vdc, 4…20 mAdc, 0…3 Vdc, or 6…9 Vdc. Control function direct/reverse action is switch selectable on most models.
4. Actuator force is to be 105 lb. (467 newton) with ½" (13 mm) nominal linear stroke
5. Power requirements 24 Vac, 120 Vac or 230 Vac depending on model.
6. Actuator housings rated for up to NEMA 2/ IP54.
7. Actuator is to have overload protection throughout stroke.
8. Actuator Operating temperature -22…140°F (-30…60°C).
9. Actuator must automatically set input span to match valve travel.
10. Actuator must have manual override to allow positioning of valve and preload.
11. Actuator is to be spring return.
12. Actuator is to mount directly to valves without separate linkage.
13. Actuator is to have a 5-year warranty.
14. Actuator agency Listings (North America)
    a. UL 873: Underwriters Laboratories (File #E9429 Category Temperature-Indicating and Regulating Equipment).
    b. CUL: UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93.

J. ½"…2" Bronze Body (and other valves) Linear Electronic Valve Actuators with 220 of force Globe Valve Actuators

[Schneider Electric SmartX Mx51-720x Series Linear SR Valve Actuator]

1. Manufactured, brand labeled and distributed by Schneider Electric.
2. Actuators must have Two- Position for a SPST controller, Floating for a SPST controller, and Proportional models will a controller input signal of either a 0…10 Vdc, 2…10 Vdc, 4…20 mAdc, or 6…9 Vdc. Control function direct/reverse action is jumper selectable
3. Actuator is to be spring return.
4. Actuator will have 220 lb. force (979 newton) with ½" (13 mm) or 1" (25 mm) nominal linear stroke
5. Feedback on proportional model with 2…10 Vdc (max. 0.5 mA) output signal or to operate up to four like additional slave actuators.
6. Actuator operating temperature is 0…140°F (-18…60°C).
7. Actuator must automatically set input span to match valve travel
8. Actuator is to have a 24 Vac power supply on Two-position and Proportional models and 120 Vac on Two-position models.
9. Actuator is to be spring return.
10. Actuator housings rated for up to NEMA 2/ IP54
11. Actuator must have manual override to allow positioning of valve and preload
12. Actuator is to mount directly to vales without separate linkage.
13. Actuator is to have a 5-year warranty.
14. Actuator agency Listings (North America)

a. UL 873: Underwriters Laboratories (File #E9429 Category Temperature-Indicating and Regulating Equipment).
b. CUL: UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93. 0

K. ½"…2" Bronze Body, Spring Return (SR) Linear Electronic Valve Actuators with linkage Globe Valve Actuators

[Schneider Electric SmartX Actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Actuators with 35, 60, 133, or 150 lb.-in of force depending on model.
3. Actuator housings rated for up to NEMA 2/ IP54 with a 150 lb.-in. rated a NEMA 4.
4. Actuators are to be spring return.
5. Actuators are to have Two-position, Floating and Proportional models.
6. Actuators must have overload protection throughout rotation.
7. Actuator have an optional built-in auxiliary switch to provide for interfacing or signaling on selected models.
8. Actuators are to have a 5-year warranty.
9. Actuator agency listings (North America)
   a. UL-873 Underwriters Laboratories
   b. Canadian Standards C22-2 No.24-83, CUL0

L. ½"…2" Bronze Body, Spring Return (SR) Linear Electronic Globe Valve Actuators with linkage. Non-Spring Return (NSR) Linear Valve Actuator with Linkage.

[Schneider Electric Forta M400A-VB, M800A-VB, M900A and M1500x-VB Screw Mounted on Venta VB-7000s]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Actuators are to be either floating SPDT control or proportional control 0…10, 2…10 Vdc or 4…20 mA with a 500-ohm resistor included.
3. Actuators are to be direct/reverse with selectable DIP switches.
4. Actuators are to have 90 lb. (400N), 180 lb. (800N), or 337 lb. (1500N) of force on Non-Spring Return (NSR) 157 lb. of force on the Spring Return model. Note: Not every actuator is for every valve.
5. Actuators are to be powered with 24 Vac or 24 Vdc.
6. All Non-Spring Return (NSR) actuators are to be NEMA 2, vertical mount only. Spring Return (SR) actuators are to have NEMA 4 models.
7. Actuators must have manual override to allow positioning of the valve.
8. Actuators must have selectable valve sequencing and flow curves of either equal percentage or linear.
9. Actuators must have feedback.
10. Actuators must have internal torque protection throughout stroke.
11. The operating temperature is to be:
    a. 122°F (50°C) For chilled water applications
    b. 113°F (45°C) ambient at 281°F (138°C) fluid temperature
    c. 107°F (42°C) ambient at 300°F (149°C) fluid temperature
    d. 100°F (38°C) ambient at 340°F (171°C) fluid temperature
12. 90°F (32°C) ambient at 366°F (186°C) fluid temperature
13. Actuator agency listings (North America) UL873, cULus, RCM, CE

M. 2 ½"…6" Cast Iron Flanged Globe Valve Body (and other valves) Non-Spring Return (NSR) Linear Electronic Valve Actuators with linkage

[Schneider Electric Forta M800A and M1500A Tall U-Bolt Actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Actuators are to be either floating SPDT control or proportional control 0…10, 2…10 Vdc or 4…20 mA with a 500-ohm resistor included.
3. Actuators are to direct/reverse acting with selectable DIP switch.
4. Actuators are to have 180 lb. (800N) or 337 lb. (1500N) of force.
5. Actuators will need a 24 Vac or Vdc power supply.
6. Actuators are to be rated NEMA 2, vertical mount only.
7. Actuators must have manual override to allow positioning of the valve.
8. Actuators must have selectable valve sequencing and flow curves of either equal percentage to linear. A 2…10 Vac feedback.
9. Actuators must have [Internal torque protection throughout stroke.
10. The operating temperature is to be:
    a. 122°F (50°C) For chilled water applications
    b. 113°F (45°C) ambient at 281°F (138°C) fluid temperature
    c. 107°F (42°C) ambient at 300°F (149°C) fluid temperature
    d. 100°F (38°C) ambient at 340°F (171°C) fluid temperature
11. 90°F (32°C) ambient at 366°F (186°C) fluid temperature
12. Actuator agency listings (North America) UL873, cULus, RCM, CE

N. Pneumatic Globe Valve Actuators

[Schneider Electric MK Series die-cast aluminum housing actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Pneumatic actuators must have field replaceable neoprene diaphragms.
3. All actuators shall be Spring Return (SR) with the spring retracting actuator shaft and raising the valve stem on loss of are pressure.
4. Actuators must have an operating temperature of -20…220°F (-29…104°C)
5. Actuators shall be models with 6 sq. in. 11, 50 and 100 sq. in effective area for the psi to push against.
6. Actuators may not "spark" under normal conditions.
7. Actuators must except an optional positive pilot positioning relay.
8. Actuators will have a maximum air pressure of 30 psig.
9. Actuators must have models with spring ranges for typical HVAC applications.

O. Pneumatic Damper Actuators

[Schneider Electric MK-0000 die-cast aluminum housing actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Pneumatic actuators must have field replaceable neoprene diaphragms.
3. All actuators shall be Spring Return (SR) with the spring retracting actuator shaft on loss of are pressure.
4. Actuators must have an operating temperature of -20…160°F (-29…71°C)
5. Actuators shall be models with 8 sq. in. 11, 20 and 40 sq. in. (dual mounted) effective area for the psi to push against.
6. Actuators may not "spark" under normal conditions.

7. Actuators must except an optional positive pilot positioning relay. Relay is to be standard on 20 sq. in. models.
8. Actuators will have a maximum air pressure of 30 psig.
9. Actuators must have models with spring ranges for typical HVAC applications.

2.16 CONTROL VALVES

A. Zone Valves, Two-Position, Control Valves

[Schneider Electric Erie zone valves]

1. Manufactured, brand labeled or distributed by Schneider Electric
2. Valve application are for hot and chilled water models, up to 50% glycol. Steam models up to 15 psi
3. Valve seat leakage is to ANSI class IV (0.01%) with pressure at inlet (B-port/A-port, if 3-way).
4. Valves are to be: Body 300 psi rated forged brass, Stem-Nickel plated, Seat-brass, Paddle-Buna N or highly saturated nitrile.
5. Valves are to be two-way or three-way with connections options of NPT (threaded female), Sweat (SW), Inverted flare (IFL), Society Automotive Engineers male (SAE) Rp Metric threaded female, depending on models, with end switch option on general temperature models.
6. Actuators are to be Spring Return (SR) normally open (NO) and normally closed (NC) models. Actuators are to have “High Close-off” models.
7. Valve line sizes are ¾”, ½”, ¾”, 1”, and 1¼” depending on model.
8. Valve CVs are to from 1 to 8 depending on model.
9. Actuators are to be UL listed

B. Bronze ½”…2” Globe Control Valves

[Schneider Electric Venta VB-7000 valves]

1. 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.
2. 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.
3. 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:
   a. 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 …281°F to assure reliability with dual temperature applications.
   b. 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 …340°F to assure to assure reliability with dual temperature applications.
   c. 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 …400°F.

4. Two-way fluid system globe valves shall have the following characteristics:
   a. Rangeability: Greater than 100:1 for all valves with flow coefficients of 0.4 and higher to provide stable control under light load conditions.
   b. Maximum Allowable Seat Leakage: Standard and heavy duty valves must be designed to meet ANSI Class V (0.0005 ml per minute per “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).
   c. The valve must be able to operate with a full-open operating differential of no less than 87 psi.
   d. 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.
   e. Sizing:
      1 Two Position Water: Water: Line size or size using a differential pressure of 1 psi.
      2 Modulating Water: 5 PSI or twice the load pressure drop.
      3 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.
      4 100 psi saturated steam maximum inlet pressure for heavy duty bronze body globe valves ½”…2”.
      5 150 psi saturated steam maximum inlet pressure for high temperature bronze body globe valves ½”…2”.
      6 35 psi saturated steam maximum inlet pressure for standard duty bronze body globe valves ½”…2”.

5. Valves 3-Way mixing (two inlets and one outlet) NPS 2” and Smaller:
   a. 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…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 …340°F to assure reliability with dual temperature applications.

6. 3-Way mixing hydronic system globe valves shall have the following characteristics:
   a. Rangeability: Greater than 100:1 for all valves to provide stable
   b. Maximum Allowable Seat Leakage: A port must be designed to meet ANSI Class V (0.0005 ml per minute per “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).
   c. The valve must be able to operate with a full-open operating differential of 87 psi.

d. Flow Characteristics: Modified linear characteristics with gradual opening for light loads.
e. Sizing: Modulating Water: Minimum 5 psi or at least equal to the load pressure drop.

7. Valves 3-Way diverting (one inlet and two outlets) NPS 2” and Smaller:
   a. 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 be 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 …281°F to assure reliability with dual temperature applications.
8. 3-Way diverting hydronic system globe valves shall have the following characteristics:
   a. Rangeability: Greater than 100:1 for all valves to provide stable control under light load conditions.
   b. Maximum Allowable Seat Leakage: ANSI Class III seat leakage (maximum 0.1% of full open valve capacity).
   c. Maximum Allowable Pressure Differential: 35 psi in.an open position.
   d. Flow Characteristics: Modified linear characteristics with gradual opening for light loads.
   e. Sizing:
      1 a. Modulating Water: Minimum 5 psi or at least equal to the load pressure drop.
9. Required Certifications:
   a. Pressure Equipment Directive (PED 97/23/EC), RoHS (Restriction of Hazardous Substances) and REACH (Regulation, Evaluation, Authorization, and Restriction of Chemicals), Canadian Registration Number.
10. Valve and Operator:
    a. 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.

C. 2”…6” Cast Iron Flanged Valves

[Schneider Electric VB-8000 and VB-9000 valves]

1. Bodies
   a. 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)
2. Manufacturer
   a. 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.
3. Serviceability

a. 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.

4. Construction
   a. Material grades must meet the fluid temperature and pressure requirement temperatures of 20°F …281°F to assure reliability throughout all application temperature ranges.
5. Packings
   a. 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.
6. Characteristics
   a. Rangeability: Two way,100:1 and greater for stable control under light load.
   b. Shutoff, 2-Way: Leakage allowed: ANSI Class IV (0.01% of max flow)
   c. 3-Way: Leakage allowed: ANSI Class III (0.1% of max flow)
   d. Flow curves: 2-Way modified equal percentage characteristic.
   e. Mixing and Diverting: Linear, modified with gradual opening for light loads.
7. Piping
   a. Diverting valves, with the common port at the bottom can be used for mixing.
   b. Mixing valves with the common port at the end must not be used for diverting applications.
8. 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. 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.
9. Certifications for All Models
   a. Pressure Equipment Directive (PED 97/23/EC), RoHS (Restriction of Hazardous Substances) and REACH (Regulation, Evaluation, Authorization, and Restriction of Chemicals

D. ½"…¾" Ball Valve

[Schneider Electric VBB/VBS Ball Valves]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. ½" and ¾" Ball Valves: Forged brass body rated at no less than 600 psi, chrome plated brass ball with blowout proof stem or optional stainless steel ball with blowout proof stem,
3. Valves are to be in two-way and tree-way configurations.
4. Connection: Female NPT end fittings,Teflon® PTFE seat, characterizing disc glass-filled PEEK providing equal percentage flow curve on two-way valve.
5. Operating Temperature 20…250°F chilled or hot water with up to 60% glycol solution.
6. Two-way and Bypass port should be ANSI Class IV (0.01% of Cv) seat leakage.
7. Rangeability must be at least 300:1.
8. Tool-less actuator connection.
9. System Static Pressure Limit should be 600 psig (4137 Pa)
10. The manufacturer shall warrant all components for a period of 2 years from the date of production.

E. 2-way (½"…3") and 3-way (½"…2") Ball Valves

[Schneider Electric VB-2000 series]

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Valves must be for control of hot or chilled water, or solutions of up to 50% glycol.
3. Ball valves must have close-offs of 40…130 psi depending on size.
4. Valves will provide Cvs from 0.33…266 depending on size.
5. Valve characterizing insert, is to made of glass-filled Noryl™ and provide equal percentage flow.
6. Valve body is to made of forged brass ASTM B283-06 and rated for static pressure of 360 psi at fluid temperatures of 20…250°F (-7…121°C).
7. All valves are to have balls made of nickel/chromium plated brass with two-way valves having stainless steel balls as an option. All valve stems are to be stainless steel with reinforce Teflon® EPDM O-ring seals.
8. 2-way valves are to be ANSI Class IV (0.01% of Cv) shutoff. 3-way valves are to be ANSI Class IV (0.01% of Cv piped coil-side outlet to the port A only.
9. Fluid (water) temperature are a minimum 20°F (-7°C) and a maximum of 250°F (121°C).
10. Valves will have a two warranty.

F. Pressure Independent Balancing Control Valves ½"…10"

[Schneider Electric SmartX PIBCV]

When selecting pressure independent valves the specifier should also revise section 232113 to NOT include balancing valves and also modify section 230593 to NOT require the individual balancing of each coil/valve combination.

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. NPS 2 and Smaller: PN 16, stainless steel components.
3. NPS 2½ through 10: Class 125 cast iron body per ASME B16.1-2010, Material class B per ASTM A 126-04 (2014), stainless steel components.
4. Accuracy NPS ¾" and Smaller: The control valves shall accurately control the flow from 0…100% rated flow with a differential pressure range of 2.32…58 psi for low and standard flow units, 5…58 psi for high flow units within 5% of set flow value.
5. Accuracy NPS 1 through 1¼: The control valves shall accurately control the flow from 0…100% rated flow with a differential pressure range of 2.9…58 psi for standard flow units, 5…58 psi for high flow units within 5% of set flow value.
6. Accuracy NPS 1½ through 4: The control valves shall accurately control the flow from 0…100% rated flow with a differential pressure range of 4.35…58 psi within 5% of set flow value.
7. Accuracy NPS 5 through 10: The control valves shall accurately control the flow from 0…100% rated flow with a differential pressure range of 5.8…58 psi for standard flow units, 8.7…58 psi for high flow units within 5% of set flow value.
8. Flow Characteristics: Linear Control, selectable to equal percentage at the proportional valve actuator.
9. Field adjustable flow by means of a percentage of rated valve flow.
10. Position feedback output signal integrated into all proportional actuators.
11. 100% authority with modulating below 1% regardless of flow settings.
12. No cartridges requiring replacement or maintenance.

G. Butterfly Valves

1. Manufactured, brand labeled or distributed by Schneider Electric.
2. Valve body are to be polyester coated iron ASTM A126 lug mating with ANSI class 125/150 flanges.
3. Disc Type: Ductile iron nylon 11 coated.
4. Valve Stem:
   a. 2…8” 416 stainless steel double D stem.
   b. 10…12” 316 stainless steel double D stem.
   c. 14” and larger: stainless steel round shaft woodruff key slot.
5. Valve seat:
   a. EPDM tongue and groove seat and molded O-ring flange seat
6. Flow Characteristics: Modified equal percentage.
7. Close-Off Pressure Rating: Bubble-tight shutoff (no leakage).
8. Valve fluid temperature rating: -40…250°F (-40…121°C)
9. Valve will have two (2) inch extended neck (because of heat).
10. Valve must accept pneumatic or electric/electronic actuators
11. Valves must have a minimum of a two (2) year warranty.

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