

Life Is On

Schneider
Electric



Valves & Actuators Catalog

North America
EcoBuilding | 2019



www.schneider-electric.com

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 2019 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. Users of this catalog are reminded to also view product Selection Guides, Specification and Installation Sheets, as well as the separately available Wiring, Dimensions and Reference document [F-28125](#) from the Exchange Download Center.

The Exchange Extranet and iPortal

Schneider Electric's **iPortal** enables customers to quickly and easily search and order products, track order status, review order history and download product documentation.

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:

[iPortal](#)

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: [Exchange Extranet](#)

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

[Product Selection Tool](#)

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

Features

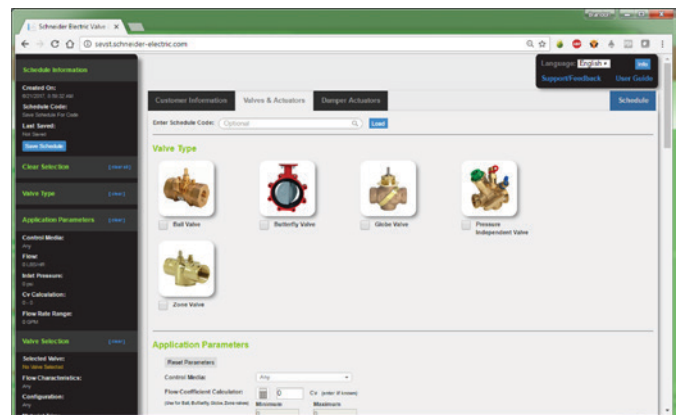
- Part selection based on calculators and drop down menus
- Save and load customer profiles, including customer name, country, contact information, job titles, project names and customer logos.
- Schedule hydronic systems using the Valve Assembly selection feature
- Schedule damper applications using 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 (recommended), Firefox, Safari, Edge, Internet Explorer 11 or greater.

Original Valve Selection Tool

- The online Valve Selection Tool launched in 2017 has all the features of the previous Valve Selection Tool plus added features; the previous Tool 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: <https://ecobuilding.schneider-electric.com/login-register>



Overview - Actuator Product Range

SR and NSR

Spring Return



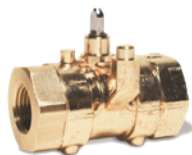
Range lb-in	Mx4D-x03x Series 30 lb-in (3.4 N-m)	Mx40-704x Series 35 lb-in (4 N-m)	Mx41-707x Series 60 lb-in (7 N-m)	Mx41-715x Series 133 lb-in (15 N-m)	Mx40-717x Series 150 lb-in (17 N-m)	Mx41-730x Series 270 lb-in (30 N-m)
Two-Position	MA4D-7030-000 MA4D-8030-000 MA4D-7033-100 MA4D-8033-100	MA40-7040 MA40-7040-501 MA40-7041 MA40-7041-501 MA40-7043 MA40-7043-501	MA41-7070 MA41-7070-502 MA41-7071 MA41-7071-502 MA41-7073 MA41-7073-502	MA41-7150 MA41-7150-502 MA41-7151 MA41-7151-502 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 MS40-7171 MS40-7173	MS41-7303 MS41-7303-502 MS41-7303-W02 MS41-7303-WH2

Non-Spring Return



Range lb-in	Mx41-6043 Series 44 lb-in (4 N-m)	Mx41-6083 Series 88 lb-in (8 N-m)	Mx41-6153 Series 133 lb-in (15 N-m)	Mx41-634x Series 300 lb-in (34 N-m)
Floating Point	MF41-6043	MF41-6083 MF41-6083-502	MF41-6153	MF41-6343
Proportional	MS41-6043	MS41-6083 MS41-6083-502	MS41-6153 MS41-6153-502	MS41-6343 MS41-6340

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 High Performance Series	Pressure Independent Balancing Control Valves (PIBCV)
Two and Three-Way Valves	7000 Valves: ½...2" 8000 Valves: 2½ ...6" (shown) 9000 Valves: 2½...6"	Two-Way: ½...3" Three-Way: ½...2"	Two-Way: ½...1-1/4" Three-Way: ½...1-1/4"	Two-Way: 2...18" Three-Way: 2...16" Two-Way High Performance 2.5...18"	Two-way: ½"...10"
Seat Leakage	Two-Way: ANSI IV (0.01% Leakage) Three-way: ANSI III (.1% 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 HP: ANSI Class 150	(To standard IEC 60534) ½...¾": Class 4, max. 0.01% of Qnom. 1...4": 0.05% of Qnom 5...10": Class 4, max. 0.01% of Qnom
Materials	Body 7000 - Bronze 8000 - Cast iron 9000 - Cast iron Stainless Steel Stems 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 (CuZn- 36Pb2As - 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, Steam	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 exchangers and terminal units such as fan coils, induction units and radiant panels.

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Mx61-720x Series Actuator and
VB-8213 Flanged Globe Valve



Mx61-720x Series Actuator and
VB-9313 Flanged Globe Valve



VB-2000 Series Ball
Valve



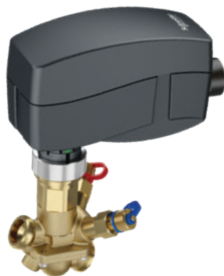
VBB/VBS Ball Valve



Zone Valves & Actuators



VB-6xxx Butterfly Valves



SmartX PIBCV MP131-24x and VP228E-1xBQx



SmartX PIBCV MP2000 Series and VP221A-150-CQx

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1. Damper 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.

1. Damper Actuators

Direct Coupled SR Actuator Matrix

Spring Return Electronic Damper Actuators

	Torque lb-in minimum	Control Type					2...10 VDC ^a Feedback		0...10 VDC Feedback		Power				Power Input			Running Time (sec)		Auxiliary Switch	Spring Return Position		
		Two-Position	Floating	Proportional							24 VAC, 24 VDC	230, 240 VAC	120 VAC	100...240 VAC 100...125 VDC	VA @60 Hz	Watts @ 60 Hz		Powered	Spring Return				
				0...10 VDC	2...10 VDC	4...20 mA										Running	Holding						
MA4D-7030-000	30												7.8	5.0	2.5	<56	<23		CCW				
MA4D-7033-100												5.1											
MA4D-8030-000												7.8	5.0	2.5									
MA4D-8033-100												5.1											
MF4D-7033-100													6.8	4.2	1.9	85	21		CCW CW				
MF4D-8033-100																							
MS4D-7033-100																							
MS4D-7033-150																							
MS4D-7033-160													6.1	3.4	1.4		CCW						
MS4D-8033-100																							
MS4D-8033-150																							
MS4D-8033-160																							
MA40-7040	35												4.3	3.4	1.2	<80	<40		CW/ CCW				
MA40-7040-501																		1					
MA40-7041													4.6	3.9	1.2			1					
MA40-7041-501																							
MA40-7043													4.4	2.9	0.8	1							
MA40-7043-501																							
MF40-7043													5.9	4.4	2.9	<130	<25						
MF40-7043-501																		1					
MS40-7043													5.6	4.2	2.4			1					
MS40-7043-501																							
MA41-7070	60												5.6	3.6	1.2	<80	<40			CW/ CCW			
MA41-7070-502																		2					
MA41-7071													8.0	4.0	1.4			2					
MA41-7071-502																							
MA41-7073													4.8	3.2	0.8	2							
MA41-7073-502																							
MF41-7073													6.2	4.8	2.8	<195	<30						
MF41-7073-502																		2					
MS41-7073													5.8	4.6	2.3			2					
MS41-7073-502																							
MA41-7150	133												10.0	8.4	3.3	<190		<30			CW/ CCW		
MA41-7150-502																			2				
MA41-7151													10.6	8.5	5.0				2				
MA41-7151-502																							
MA41-7153																							
MA41-7153-502																							
MF41-7153													9.7	7.5	2.8		2						
MF41-7153-502														7.7	3.2				2				
MS41-7153																							
MS41-7153-502														7.4	2.9				2				
MA40-7170	150												8.4			<162	<82		CW/ CCW				
MS40-7170													8.5										
MS40-7171													10.8										
MA40-7173													7.4										
MF40-7173													8.1										
MS40-7173													7.8										
MA41-7303	270												16 ¹	9.5	4.5	75	<20			CW/ CCW			
MA41-7303-502																							2
MA41-7300													21										2
MA41-7300-502																							
MS41-7303 ³													16 ¹					2					
MS41-7303-502 ³																		2					
MS41-7303-W02 ³																		2					
MS41-7303-WH2 ³													16 21 w/ heater ¹	9.5 21 w/ heater							2		

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.

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.

1. Damper Actuators

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.

Specifications	
Control Signal	Refer to the tables for actuator models and control types.
Power Inputs	See table.
Connections	3 ft (91 cm) appliance (see * in table below) or 10 ft. (3 m) 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 Installation Instructions

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	—		56	23
MA4D-7030-000*				120 Vac	7.8				
MA4D-8033-100				24 Vac/dc	5.1				
MA4D-8030-000*				120 Vac	7.8				
MF4D-7033-100		CCW	Floating	24 Vac/dc	6.8	2...10 vdc	No	85	21
MF4D-8033-100		CW							
MS4D-7033-100		CCW	2...10 vdc		6.1	2...10 vdc			
MS4D-7033-150			0...10 vdc						
MS4D-7033-160			4...20 ma						
MS4D-8033-100			2...10 vdc						
MS4D-8033-150		CW	0...10 vdc		0...10 vdc				
MS4D-8033-160			4...20 ma		2...10 vdc				

1. Damper Actuators

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



Product Description

For spring return applications requiring floating, two-position, or proportional modulation control of dampers and valves in HVAC systems. Directly mounts to 1/2"...3" Schneider Electric ball valves.

Specifications	
Control Signal	On-off, SPST control contacts or Triacs (500 mA rated). Floating point control, 24 Vac. Proportional, 2...10 Vdc or 4 to 20 mA dc with a 500 W resistor.
Power Inputs	See table.
Connections	MA40-704x and MA40-704x-501 — 3 ft. (91 cm) long, appliance cables, 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. (91 cm) long, plenum-rated cables, 1/2 in. conduit connector. For M20 Metric conduit, use AM-756 adaptor.
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 $95^{\circ} \pm 5^{\circ}$ 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°C ... 71°C). Operating: -22°F ... 140°F (-30°C ... 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				230 Vac	4.6		1-SPDT (250 Vac)				
MA40-7041							—				
MA40-7041-501							1-SPDT (250 Vac)				
MA40-7043							—				
MA40-7043-501			Floating	24 Vac/dc	4.4	1-SPDT (24 Vac)					
MF40-7043						—	<130	<25			
MF40-7043-501						1-SPDT (24 Vac)					
MS40-7043						2...10 vdc			5.9	2...10 vdc	—
MS40-7043-501											1-SPDT (24 Vac)

1. Damper Actuators

Mx41-7000 Series 60/133 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.

Specifications	
Control Signal	On-off, SPST control contacts or Triacs (500 mA rated). Floating point control, 24 Vac. Proportional, 2...10 Vdc or 4 to 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				230 Vac	8.0		2-SPDT (250 Vac)		
MA41-7071							—		
MA41-7071-502				24 Vac/dc	4.8		2-SPDT (250 Vac)		
MA41-7073							—		
MA41-7073-502	2-SPDT (24 Vac)								
MA41-7150	133 (15)		120 Vac	10.0	—	—	<190	<30	
MA41-7150-502			230 Vac	10.6		2-SPDT (250 Vac)			
MA41-7151						—			
MA41-7151-502			—	9.7		2-SPDT (250 Vac)			
MA41-7153						—			
MA41-7153-502	2-SPDT (24 Vac)								
MF41-7073	60 (7)		Floating	24 Vac/dc	6.2	—	—	<195	
MF41-7073-502							2-SPDT (24 Vac)		
MF41-7153	133 (15)		9.7		—		<190		
MF41-7153-502					2-SPDT (24 Vac)				
MS41-7073	60 (7)		2...10vdc		5.8		2...10 vdc	—	<195
MS41-7073-502								2-SPDT (24 Vac)	
MS41-7153	133 (15)		9.7	—	<190				
MS41-7153-502				2-SPDT (24 Vac)					

1. Damper Actuators

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.

Specifications	
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 to 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	2-Position	120 Vac	8.4	—	No	162	82
MA40-7173				24 Vac/dc	7.4				
MF40-7173			Floating		8.1				
MS40-7170			2...10 vdc	120 Vac	8.5	2...10 vdc		147	65
MS40-7171				240 Vac	10.8				
MS40-7173				24 Vac/dc	7.8				

1. Damper Actuators

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).

Specifications	
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 cable 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	Shipping & Storage: -40 ... 176 °F (-40...80 °C) Operating: -22 ... 122 °F (-30...50 °C) Operating Humidity: 0 ... 95% non-condensing
Location	NEMA 2 and NEMA 4 (select models; see table)
Agency Listings	c-UL-us LISTED per UL 60730-1A & -2-14, and CAN/CSA E60730- 1:02, CE compliant to directives 2014/35/EU [LVD], 2014/30/EU [EMC], and 2011/65/EU [RoHS2].
Applicable Literature	F-27870 Installation Instructions

¹Also compatible with other two position, floating, PWM, and proportional input signals, refer to the SmartX Actuators Spring Return Damper Mx-730x Series Installation Instructions, 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				100...240 Vac	21 VA at 100 Vac, 29 VA at 240 Vac		2					
MA41-7300					—							
MA41-7300-502				2								
MS41-7303			2...10 Vdc	24 Vac	16 VA	2...10 Vdc	—	150		Yes	Yes	
MS41-7303-502							2					
MS41-7303-W02					16 VA and 21 W heater		2					
MS41-7303-WH2												

Direct coupled easy to install, and available with torque ranges from 44 to 300 lb-in for floating or proportional control.



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).
- c-UL-us LISTED and CE marked.



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 1/2" conduit connection
- c-UL-us LISTED and CE marked.



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
- 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
- c-UL-us LISTED and CE marked.

1. Damper Actuators

NSR Direct Coupled Actuators Matrix

1. Damper Actuators

Non-Spring Return Electronic Damper Actuators

	Output Torque lb-in	Type of Control				Feed-back	Power			Power Input (@60Hz)			Running Time (sec)	Auxiliary Switch			
		Min	Max Stall	Floating	Proportional						VA @60Hz	Watts @60Hz Running		Watts @60Hz Holding	Powered	SPDT, 6A, Resistive, 24 VAC	24 VAC 4A Resistive
MF41-6043	44										2.3			90			
MS41-6043											3.3			90			
MF41-6083	88										2.3			125			
MF41-6083-502																2	
MS41-6083											3.3						2
MS41-6083-502																	
MF41-6153	133										3						
MS41-6153											5	4	4				
MS41-6153-502												1				2	
MF41-6343	300	650									5.7	3.9	2.8	<162			
MS41-6343											5.6	3.6	2.4	<145			
MS41-6340											7.5	4.7	3.0				

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. Damper Actuators

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

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.

Specifications	
Control Signal	MF41-6043 — Floating three-position control, 24 Vac. MS41-6043 — Proportional, 0 to 10 Vdc; input resistance 100 kW.
Power Inputs	See Table.
Connections	3 ft. (0.9 m) appliance cable, 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) 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	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2.
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	
MF41-6043	44 (5)	Floating	24 Vac	2.3	—	—	90
MF41-6083	88 (10)					2-SPDT	125
MF41-6083-502							
MS41-6043	44 (5)	0...10 vdc		3.3	0...10 vdc	—	90
MS41-6083	88 (10)					2-SPDT	125
MS41-6083-502							

1. Damper Actuators

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

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 1/2" 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.

Specifications	
Control Signal	MF41-6153 — Floating three-position control, 24 Vac. MS41-6153, MS41-6153-502 — Proportional, 0 to 10 Vdc; input resistance 100 kW.
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
Mechanical Outputs	Nominal angle of rotation 90° Maximum angular rotation 95°

Ambient Temperature Limits	Operating: -25°F...130°F (-32°C...55°C) Storage: -40°F...158°F (-40°C...70°C) Ambient humidity: 95% rh (non-condensing)
Location	NEMA 1/IP54 accableing to EN 60 529
Agency Listings	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2.
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		0...10 vdc		5	0...10 vdc	2-SPDT			
MS41-6153-502									

1. Damper Actuators

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

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 dc¹
- 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



1. Damper Actuators

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 dc¹ control signals.

Specifications	
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	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2.
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	
MF41-6343	300 (34)	Floating	24 Vac/dc	5.7	—	No	162
MS41-6343		2...10 vdc		5.6	2...10 vdc		148
MS41-6340			120 Vac	7.5			

1. Damper Actuators

0453X Series Two-Position Damper Actuators

Product Description

The 0453L, light duty damper actuators are designed for a variety of two-position, spring return, damper applications. The 0453L uses a two-wire thermostat control.

The 0453H, medium duty damper actuators are designed for a variety of two-position, Spring Return damper applications. The 0453H uses a two-wire thermostat control.

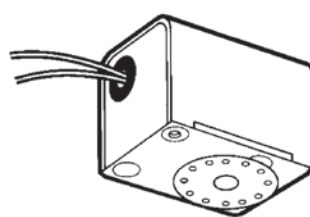
The 0453R, heavy duty damper actuators are designed for a variety of two-position, motor open and motor closed damper applications. The 0453R uses a three-wire thermostat control.

Features

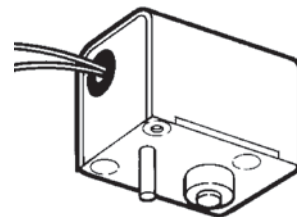
- Available with end switch
- Linkage or direct drive available
- Hysteresis synchronous motor with a "lost motion" drive to protect the gear train from closing shock

Specifications

Inputs	
Voltage	24 Vac @ 50/60 Hz, 110/120 Vac @ 50/60 Hz, 220/230 Vac @ 50/60 Hz.
Power	See Model Table
Connections	Internal junction box, 18 in. leads, cord sets.
Outputs	
Mechanical	Optional End Switch 10 A @ 120 Vac.
Direction of Rotation	CW or CCW rotation is available.
Linkage	See Figure-4.
Direct Drive	For 5/16" maximum damper output shaft with maximum engagement of 7/8".
Environment	
Temperature limits:	
Shipping & Storage	-40 to 169°F (-40 to 71°C)
Operating	0...120°F (-17... 49°C)
Humidity	Non-condensing.
Shipping Weight	0453L & 0453H: 1.2 lbs (544 g); 0453R: 1.7 lbs (771 g).
Location	NEMA 1.



Linkage Drive



Direct Drive

Regulatory Compliance

(All are rated for use in Plenum spaces).

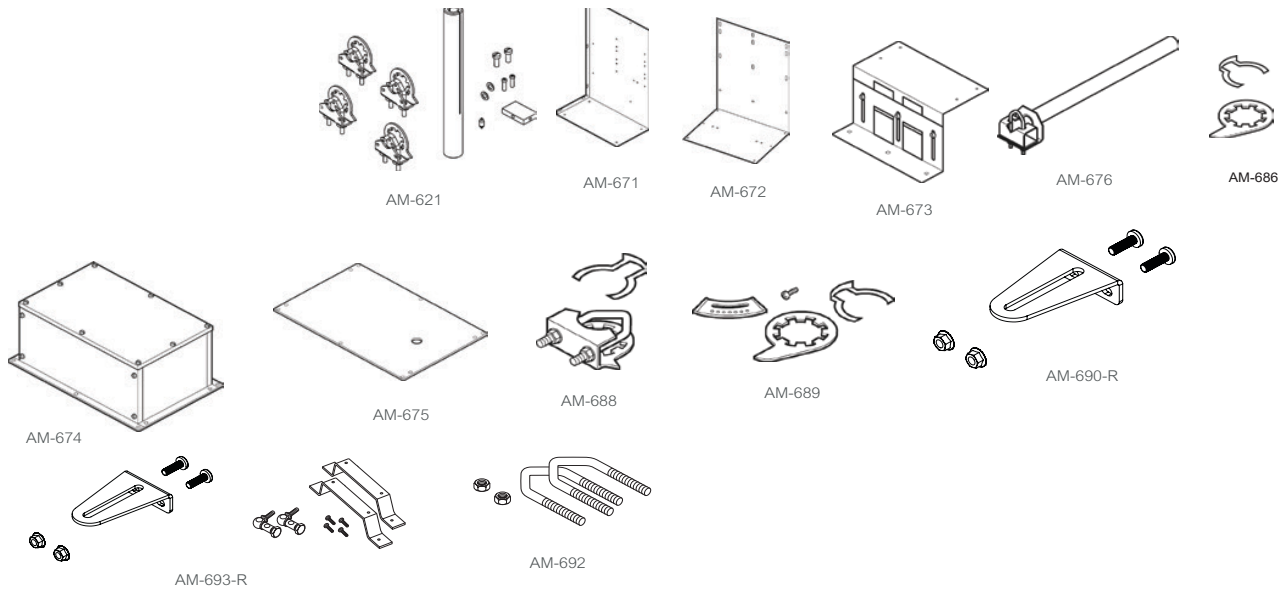
- Models 0453L, 0453H: c-UR-us RECOGNIZED Components, safety evaluated per UL 60730-1 & -2-14, (including US FCC Part-15 Class-B emissions) and safety evaluated per CSA/CAN E60730-1 & -2-14, (including ICES-003 Class-B emissions).
- Models 453L, 453H, 453R: CE Mark compliant, safety evaluated per EN 60730-1 & -2-14, (including EN 61000-6-2 EU immunity & EN 61000-6-3 EU emissions).

Accessories

453-52	6-12 in. damper shaft kit.
453-69	12-20 in. damper shaft kit.
453-239	Damper shaft adapter converts direct coupled shafts from 5/16 to 1/2 in.

Model Table

Model Table								
Model Number	Torque Rating in.-oz.				Power		Stroke Speed in Seconds	
	Motor Driven		Spring Return				Motor Driven	Spring Return
	0°	84°	0°	84°	W	VA		
0453L	45	25	17	25	6.5	7	18 @ 60 Hz 22 @ 50 Hz	6 @ 50/60 Hz
0453H	55	35	35	55	6.5	10	27 @ 60 Hz 32 @ 50 Hz	8 @ 50/60 Hz
0453R	150	150	-	-	6.5	7	37 @ 60 Hz 45 @ 50 Hz	-



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				
AM-621	Round Shaft Extension																				
AM-671 ^{abcd} AM-672 ^{abcd} AM-673 ^c	Mounting Bracket																				
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.

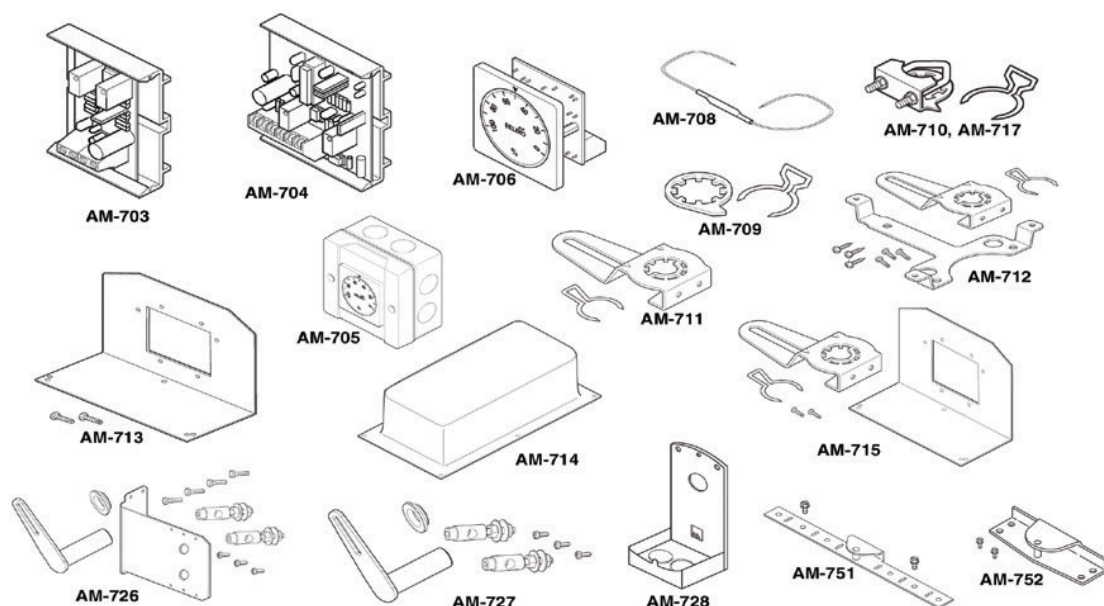
e - For shafts to 1.05" diameter or 5/8" square.

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.



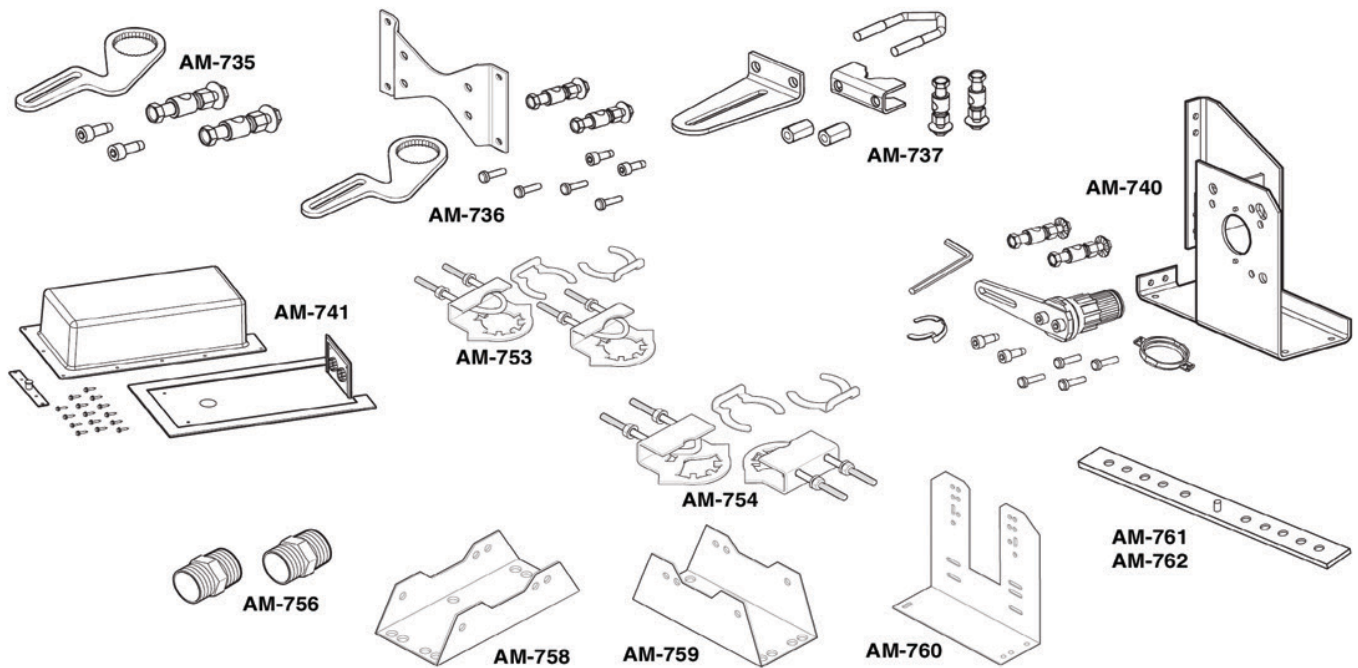
Part Number	Description	Spring Return Actuators									Non Spring Return Actuators								
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717x MF40-7173	MS40-7173	MS4D-x033	MF41-6043	MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	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 3/4" (19 mm) diameter round up to 1/2" (13 mm).

b - Cannot be used when creating a linked valve/actuator assembly.

1. Damper Actuators

Damper Accessories



1. Damper Actuators

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
AM-735	Crank Arm Kit																
AM-736	Crank Arm Kit with Bracket																
AM-737	Universal Crank Arm ^a																
AM-740	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 ¼" (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-7000 Series ½"...2" Globe Valves

2. VB-7000 Series
½" ...2" Globe Valves

2. VB-7000 Series ½"...2" Globe Valves

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	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	●	●	●	●					
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					●		●		
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-7000 (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"	●		
2½"		●	●
3"		●	●
4"		●	●
5"		●	●
6"		●	●

2. VB-7000 Series ½"...2" 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

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>

2. VB-7000 Series
½"...2" Globe Valves

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. Refer to the separately available Wiring, Dimensions and Reference Document F-28125 from the Exchange download center.
- 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. 61, 4. VB-7000 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 separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.

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.

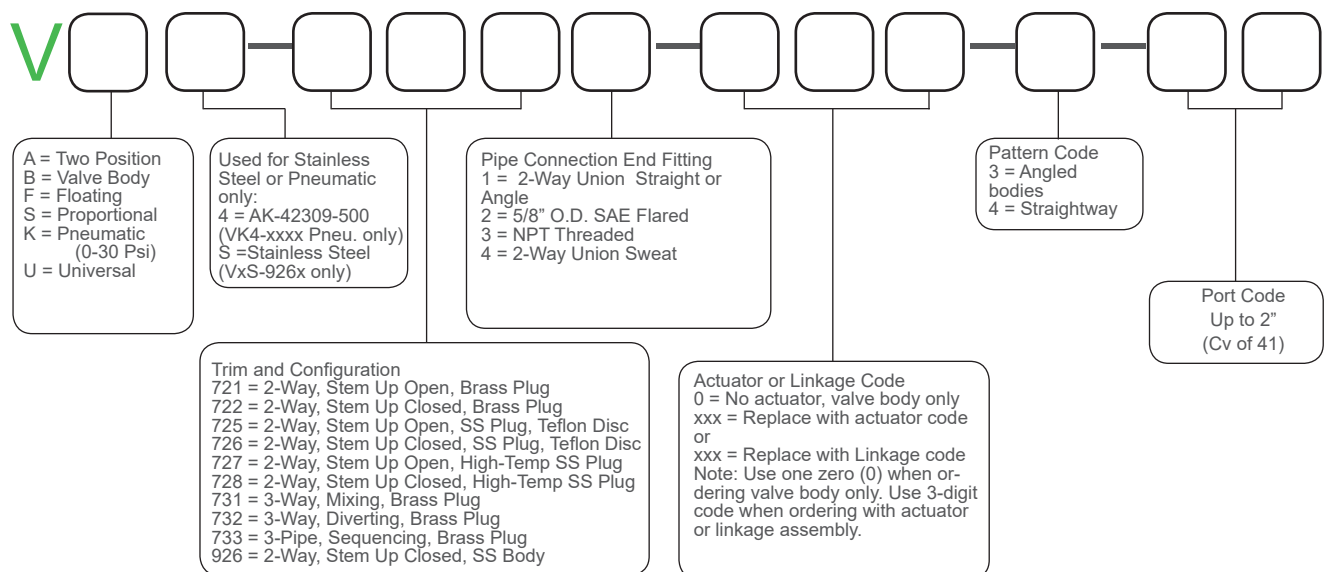
Refer to the following pages for Spring & Non-Spring Return Electric and Pneumatic Spring Return Actuator Codes, part numbers and Linkage part numbers based on required close-off pressure.

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.

2. VB-7000 Series
½" ...2" Globe Valves

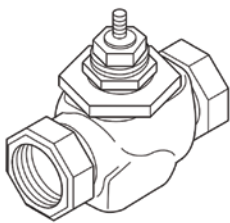
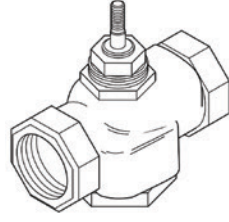
Assembly Ordering VB-7000 Series



2. VB-7000 Series ½"...2" Globe Valves

2-Way Brass Trim Valves with Soft Seats

Brass Trim Threaded with Soft Seats

2-Way Brass Trim				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 ^c				Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off. Long term seat leakage dependent on proper water conditioning maintenance of the system.	
Control Media and Temperature				20...281°F (-7...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		VB-7213-0-4-02	VB-7223-0-4-02
	2.2	1.9		VB-7213-0-4-03	VB-7223-0-4-03
	4.4	3.8		VB-7213-0-4-04	VB-7223-0-4-04
¾"	5.5	4.8		VB-7213-0-4-05	VB-7223-0-4-05
	7.5	6.5		VB-7213-0-4-06	VB-7223-0-4-06
1"	10	8.7		VB-7213-0-4-07	VB-7223-0-4-07
	14	12.1		VB-7213-0-4-08	VB-7223-0-4-08
1¼"	20	17.3		VB-7213-0-4-09	VB-7223-0-4-09
1½"	28	24.2		VB-7213-0-4-10	VB-7223-0-4-10
2"	40	34.6		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.

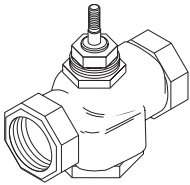
Seat Leakage Classes

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

2. VB-7000 Series ½"...2" Globe Valves

2-Way Stainless Trim Valves with Soft Seats

Stainless Steel Trim Threaded with Soft Seats

2-Way Stainless Trim (soft seats)				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)	
ANSI Seat Leakage ^c				Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off. Long term seat leakage dependent on proper water conditioning maintenance of the system.	
Control Media and Temperature				20...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		-	VB-7263-0-4-34
	1.0	0.9		-	VB-7263-0-4-36
	1.3	1.1		VB-7253-0-4-02	VB-7263-0-4-02
	1.8	1.6		-	VB-7263-0-4-28
	2.2	1.9		VB-7253-0-4-03	VB-7263-0-4-03
	2.9	2.5		-	VB-7263-0-4-30
	3.25	2.8		-	VB-7263-0-4-39
	4.4	3.8		VB-7253-0-4-04	VB-7263-0-4-04
¾"	5.5	4.8		VB-7253-0-4-05	VB-7263-0-4-05
	6.3	5.4		-	VB-7263-0-4-41
	7.5	6.5		VB-7253-0-4-06	VB-7263-0-4-06
1"	8.2	7.1		-	VB-7263-0-4-51
	9.0	7.8		-	VB-7263-0-4-52
	10	8.7		VB-7253-0-4-07	VB-7263-0-4-07
	12	10.4		VB-7253-0-4-08	VB-7263-0-4-08
1¼"	14	12.1		-	VB-7263-0-4-61
	16	13.8		-	VB-7263-0-4-62
	18	15.6		-	VB-7263-0-4-63
	20	17.3		VB-7253-0-4-09	VB-7263-0-4-09
1½"	22	19.0		-	VB-7263-0-4-71
	24	20.8		-	VB-7263-0-4-72
	28	24.2		VB-7253-0-4-10	VB-7263-0-4-10
2"	31	26.8		-	VB-7263-0-4-81
	34	29.4		-	VB-7263-0-4-82
	40	34.6		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.

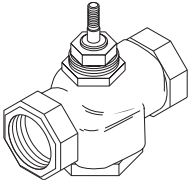
Seat Leakage Classes

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

2. VB-7000 Series ½"...2" Globe Valves

2-Way Stainless Trim Valves with Metal Seats

Stainless Steel Trim Threaded with Metal to Metal Seats

2-Way Stainless Trim (Metal to Metal)				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)	
ANSI 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		VB-7273-0-4-09	VB-7283-0-4-09
1½"	28	24.2		VB-7273-0-4-10	VB-7283-0-4-10
2"	40	34.6		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.

Seat Leakage Classes

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

MORE INFO

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

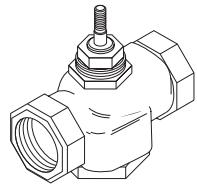


Visit:
<http://goo.gl/pdruzA>

2. VB-7000 Series ½"...2" Globe Valves

VBS-9263 ½" & ¾" 2-Way Stainless Valve 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)	
ANSI Seat Leakage ^b				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	
¾"	3.6	3.0	35:1	VBS-9263-0-4-4	
	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	

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

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

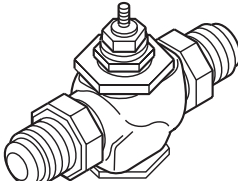
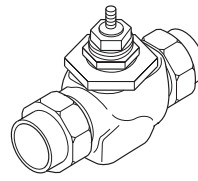
b - Refer to Seat Leakage Classes table.

2. VB-7000 Series
½" ...2" Globe Valves

2. VB-7000 Series ½"...2" Globe Valves

VB-7200 ½"...2" 2-Way Brass Trim Valves 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 ^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 (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-7214-0-4-01 ^c		VB-7224-0-4-01 ^c	
		1.3	1.1	15:1		VB-7212-0-4-02		VB-7222-0-4-02		VB-7214-0-4-02 ^c		VB-7224-0-4-02 ^c	
		2.2	1.9	25:1		VB-7212-0-4-03		VB-7222-0-4-03		VB-7214-0-4-03 ^c		VB-7224-0-4-03 ^c	
		4.4	3.8	40:1		VB-7212-0-4-04		VB-7222-0-4-04		VB-7214-0-4-04 ^c		VB-7224-0-4-04 ^c	
¾"		5.5	4.8	50:1		—		—		VB-7214-0-4-05 ^c		VB-7224-0-4-05 ^c	
		7.5	6.5	60:1						VB-7214-0-4-06 ^c		VB-7224-0-4-06 ^c	
1"		10	8.7	60:1						VB-7214-0-4-07 ^{cd}		VB-7224-0-4-07 ^{cd}	
		14	12.1	60:1						VB-7214-0-4-08 ^{cd}		VB-7224-0-4-08 ^{cd}	
1¼"		20	17.3	75:1						VB-7214-0-4-09 ^{cd}		VB-7224-0-4-09 ^{cd}	
1½"		28	24.2	75:1						VB-7214-0-4-10 ^{cd}		VB-7224-0-4-10 ^{cd}	
2"		40	34.6	75:1						VB-7214-0-4-11 ^{cd}		VB-7224-0-4-11 ^{cd}	

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

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

e - Refer to Seat Leakage Classes table.

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.

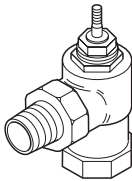
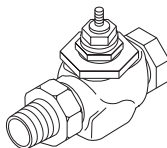
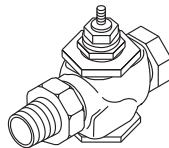


Visit:
<http://goo.gl/oYPchT>

2. VB-7000 Series ½"...2" Globe Valves

VB-7200 ½"...2" 2-Way Brass Valves Soft Seat Union

Brass 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 ^a	
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 - 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-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.

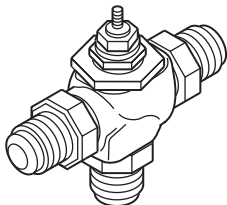
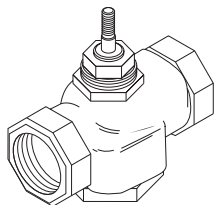
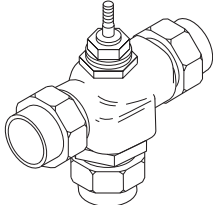
Seat Leakage Classes

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

2. VB-7000 Series ½"...2" Globe Valves

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 ^d			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.	
ANSI B Port Seat Leakage ^d			ANSI Class III		
Control Media and Temperature			20...281°F (-7...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-7314-0-4-08 ^c
1¼"	20	17.3		VB-7313-0-4-09	VB-7314-0-4-09 ^c
1½"	28	24.2		VB-7313-0-4-10	VB-7314-0-4-10 ^c
2"	36	31.3		–	–
	41	35.5		VB-7313-0-4-11	VB-7314-0-4-11 ^c

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.

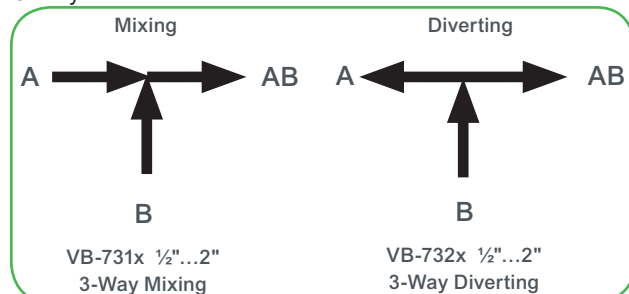
c - These part numbers do not have RoHS compliant nuts and tail pieces.

d - Refer to Seat Leakage Classes table.

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

3-Way Flow Patterns



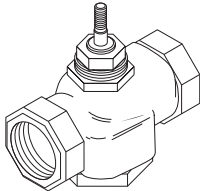
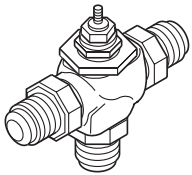
MORE INFO - VB-7313

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



Visit:
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Diverting and Sequencing Valves

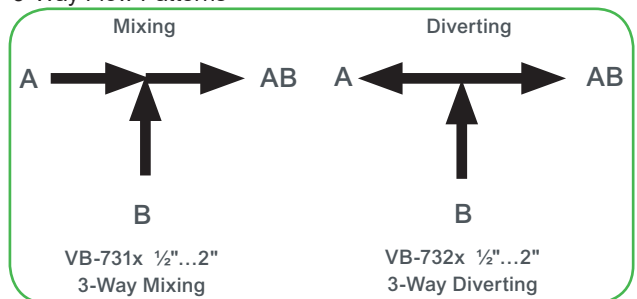
3-Way Brass Trim Diverting and Sequencing Valves Body Types	Diverting Threaded NPT	5/8" OD 45° SAE Flared Sequencing
		
Series Part Numbers	VB-7323-0-4-	VB-7332-0-4-
Pipe Size	½"...2"	½" I.D.
Stem Flow Action	Stem Up Closes A Port and Opens AB Port to the Common B Port	Stem Up Opens B to AB and Stem Down Opens A to AB, Stem Mid Position A and B are Both Closed
Stem Force Allowed	300 Lbs.	
ANSI Pressure Class	250 psi (up to 400 psi below 150°F)	250 psi (up to 400 psi below 150°F)
ANSI A Port Seat Leakage ^a	ANSI Class III	
Control Media and Temperature	20...281°F (-7...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
½"	2.2	1.9
	4.4	3.8
¾"	7.5	6.5
1"	14	12.1
1¼"	20	17.3
1½"	28	24.2
2"	40	34.6
Valve Body Part Numbers		
-		
VB-7332-0-4-03		
VB-7332-0-4-04		
VB-7323-0-4-04		
VB-7323-0-4-06		
VB-7323-0-4-08		
VB-7323-0-4-09		
VB-7323-0-4-10		
VB-7323-0-4-11		

a - Refer to Seat Leakage Classes.

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

3-Way Flow Patterns



2. VB-7000 Series 1/2"...2"
Globe Valves

Notes

2. VB-7000 Series
1/2"...2" Globe Valves

3. VB-7000 Series Valve/ Actuator Assemblies

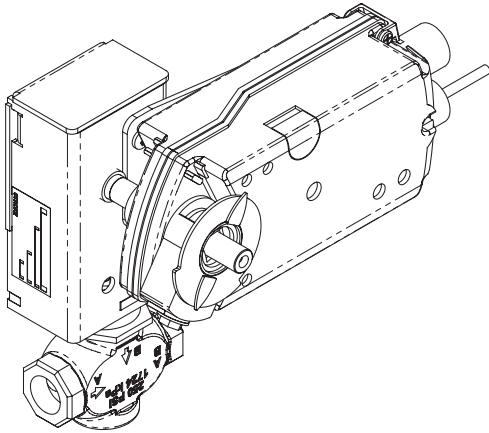


3. VB-7000 Valve/Actuator
Assemblies

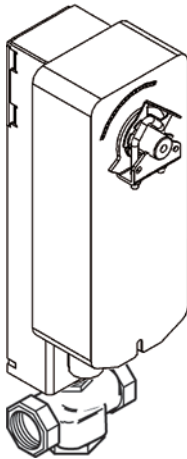
3. VB-7000 Valve/Actuator Assemblies

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

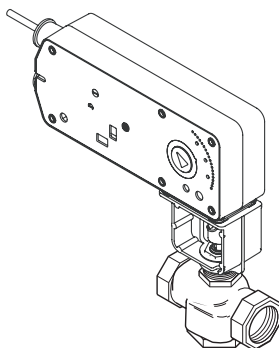
Mx4x-6xxx and Mx4x-7000 Series Spring and Non-Spring Return Actuator/Linkage Assemblies with SmartX actuators.



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



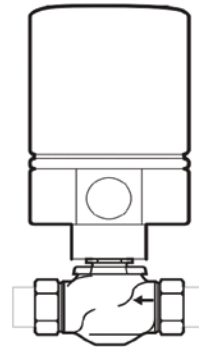
3-Way Linked Globe Valve Assembly
(Spring Return Model shown)



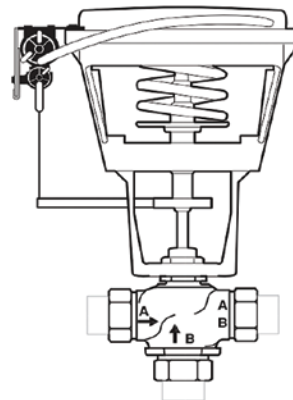
VB-73xx Series ½"...2" 3-Way Assembly
with SmartX Linear SR Actuators

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"...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

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 according to Assembly Ordering on the next pages. 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. Refer to the separately available Wiring, Dimensions and Reference Document F-28125 from the Exchange download center.
- 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 on the next pages based on the control signal type, required valve normal position, and voltage requirements. For detailed actuator information, refer to *Pg. 61, 4. VB-7000 Series Globe Valves Actuators & Linkages* for applicable actuator specifications.

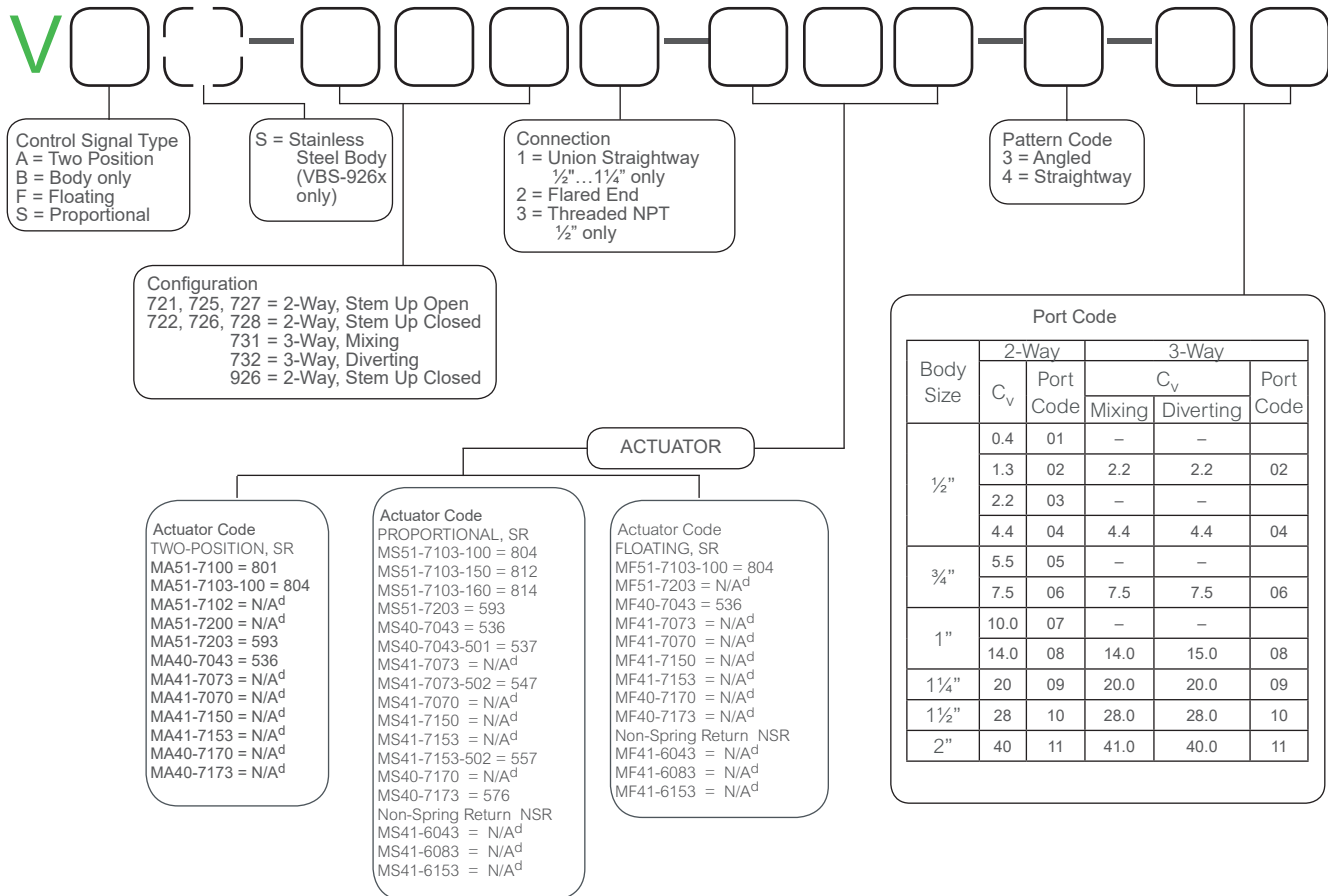
4. Close-off Pressure

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 separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.

Assembly Ordering Linked VB-7000 SmartX Globe Valves

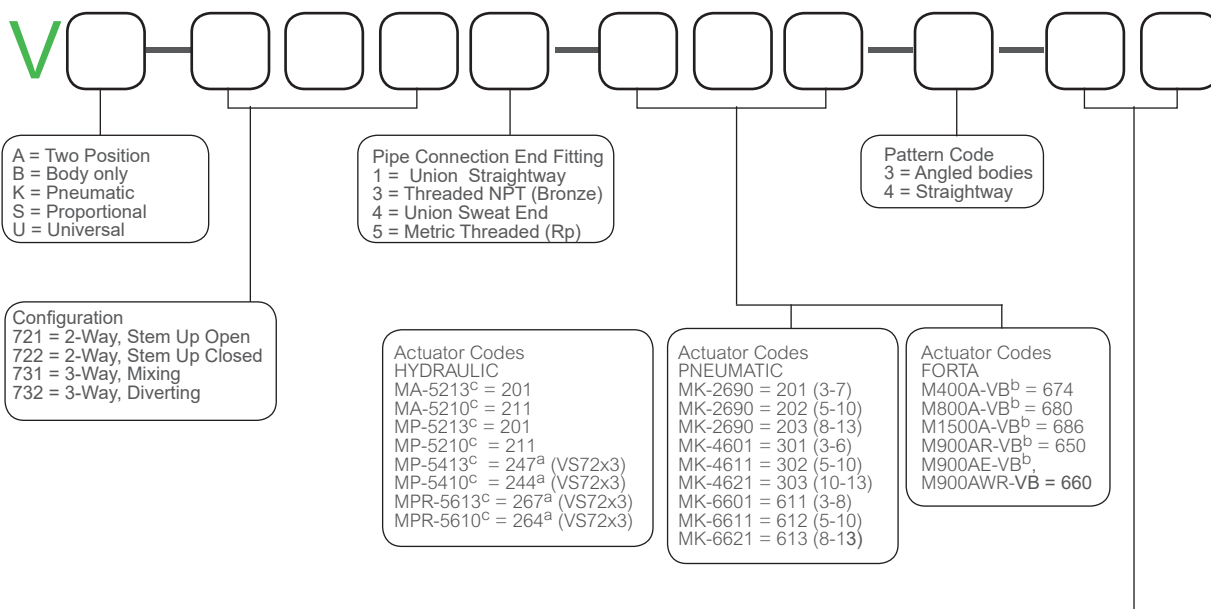


^d - Factory assemblies not available. Purchase actuator and valve body separately and field assemble.

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		Closed	A to AB Flow increases as actuator extends
Vx-731x-xxx-4-P	3-Way Mixing		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			B to A Flow increases as actuator extends B to AB Flow decreases as actuator extends

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		Closed	A to AB Flow increases as actuator rotates CW
Vx-731x-xxx-4-P	3-Way Mixing		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			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		Port Code
	C _v *	Port Code	C _v Mixing	C _v Diverting	
1/2"	0.4	01	—	—	
	1.3	02	2.2	2.2	02
	2.2	03	—	—	
3/4"	4.4	04	4.4	4.4	04
	5.5	05	—	—	
1"	7.5	06	7.5	7.5	06
	10.0	07	—	—	
1 1/4"	14.0	08	14.0	15.0	08
1 1/2"	20	09	20.0	20.0	09
1 3/4"	28	10	28.0	28.0	10
2"	40	11	41.0	40.0	11

*Brass trim models listed.

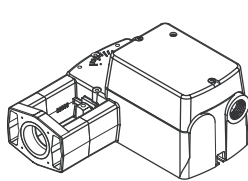
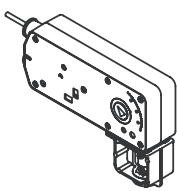
- a - AV-601 is not available as an assembly and has to be ordered separately.
 b - Add -S2 for auxiliary switch. Only available as a field assembly.
 c - Add -500 for auxiliary switch. Only available as a field assembly.

3. VB-7000 Valve/Actuator Assemblies

1/2"...2" 2-Way Globe Valves with Linear SR Actuators

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

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

2-Way Linked Globe Valve Assemblies								
					Actuator Force Rating			
					105 lbf (467 N)		220 lbf (979 N)	
					Actuator Model (Actuator Code) ^a			
					Two-Position MA51-7100 (801) MA51-7101 (801) MA51-7103-100 (804) Floating MF51-7103-100 (804) Proportional MS51-7103-100 (804) MS51-7103-120 MS51-7103-130 MS51-7103-140 MS51-7103-150 (812) MS51-7103-160 (814)		Two-Position MA51-7200 MA51-7201 MA51-7202 (593) Floating MF51-7203 (593) Proportional MS51-7203 (593)	
					Actuator Close-off Pressure psi ^{de}			
Valve Assembly Part Number ^{bj}	P Code	Valve Size in. (mm)	Cv ^c	kvs ^c	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. 46, Assembly Ordering Linked VB-7000 SmartX Globe Valves** for the relevant part series.

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

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

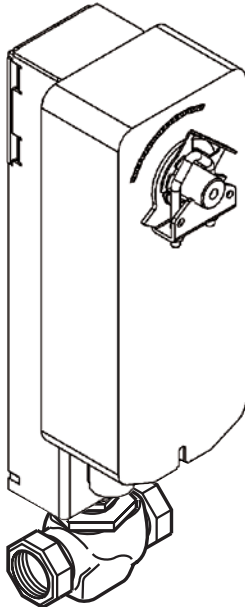
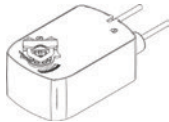
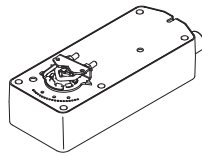
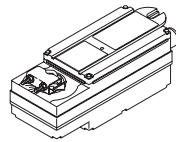
e - Close-off pressure ratings describe only the differential pressure which the actuator can close-off with adequate seating force. Consult valve body specifications for other limitations. The rating value is the pressure difference between the inlet and outlet ports.

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

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

j - Valve body and actuator size determine the close-off capabilities. Example: All 1/2", 2-Way globe valves will make the same close-off regardless of the Cv rating for a given actuator.

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 										
					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 MA40-7040 MA40-7041 MA40-7043 (536) Floating MF40-7043 (536) Proportional MS40-7043 (536) MS40-7043-501 (537)	Two-Position MA41-707x Floating MF41-7073 Proportional MS41-7073 (546) MS41-7073-502 (547)	Two-Position MA41-715x Floating MF41-7153 Proportional MS41-7153 (556) MS41-7153-502 (557)	Two-Position MA40-717x Floating MF40-7173 Proportional MS40-717x (576)		
					Note: Not all factory actuator codes are available.					
					Linkage Kit Part Number					
AV-611 (½"...2")		AV-602 (1"...2")		AV-602 (1¼"...2")						
Valve Assembly Part Number ^a	P Code	Valve Size in. (mm)	Cv ^b	kvs ^b	Actuator Close-off Pressure psi ^d					
						Single Actuator	Single Actuator	Single Actuator		
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 02 03 04 05 06 07 08 09	½ (15)	0.4 1.3 2.2 4.4	0.3 1.1 1.9 3.8	250	-	-	-		
			5.5 7.5	4.8 6.5						
			10.0 14.0	8.7 12					125 125	180 180
			20.0	17					75	120
Vx-7213-xxx-4-P Vx-7223-xxx-4-P	10 11	1½ (40) 2 (50)	28.0 40.0	24 35	50 25	80 40	140 80	160 120		

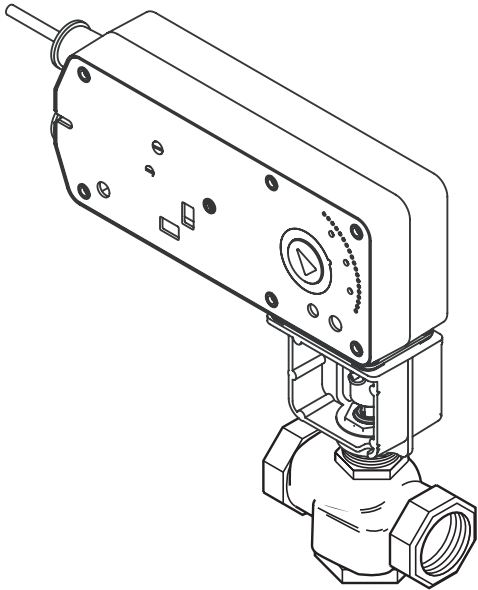
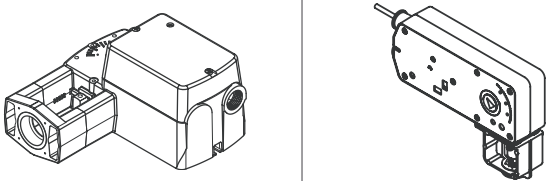
a - To determine a specific part number, see **Pg. 46, Assembly Ordering Linked VB-7000 SmartX Globe Valves** for the relevant part series.

b - kvs = m³/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.

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 						
					Actuator Force Rating	
					105 lbf (467 N)	220 lbf (979 N)
					Actuator Model (Actuator Code) ^a	
					Two-Position MA51-7100 MA51-7101 MA51-7103-100 (804) Floating MF51-7103-100 (804) Proportional MS51-7103-100 (804) MS51-7103-120 MS51-7103-130 MS51-7103-140 MS51-7103-150 (812) MS51-7103-160 (814)	Two-Position MA51-7200 MA51-7201 MA51-7203 (593) Floating MF51-7203 Proportional MS51-7203 (593)
Valve Assembly Part Number ^c	P Code	Valve Size in. (mm)	Cv ^d	kvs ^d	Actuator Close-off Pressure psi ^{ae}	
Mixing Vx-7313-xxx-4-P	2	1/2 (15)	4.4	3.8	250	-
	4					
	6	3/4 (20)	7.5	6.5	200	
	8	1 (25)	14.0	12.0	90	
	9	1 1/4 (32)	20.0	17	60	150
	10	1 1/2 (40)	28	24	35	100
	11	2 (50)	41	36	20	65
Diverting Vx-7323-xxx-4-P	4	1/2 (15)	4.4	3.8	250	-
	6	3/4 (20)	7.5	6.5		
	8	1 (25)	15.0	13.0		
	9	1 1/4 (32)	20.0	17.3		250
	10	1 1/2 (40)	28	24.2		
	11	2 (50)	40	34.6		

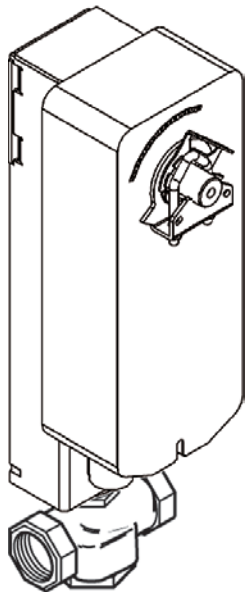
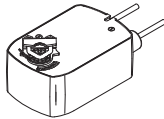
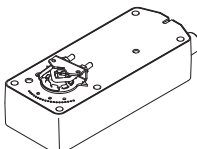
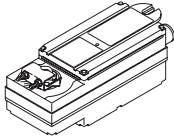
b - Models without actuator codes are not offered as factory assemblies. Purchase the actuator and the valve body separately and field assemble. For available factory assemblies, consult the price schedule.
c - To determine a specific part number, see Pg. 46, *Assembly Ordering Linked VB-7000 SmartX Globe Valves* for the relevant part series.
d - Cv = gpm / √ΔP (where ΔP is measured in psi.) kvs = Cv / 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.

3. VB-7000 Valve/Actuator Assemblies

1/2"...2" 3-Way Globe Valves with Linked 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 					  			
					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 MA40-7040 MA40-7041 MA40-7043 (536) Floating MF40-7043 (536) Proportional MS40-7043 (536) MS40-7043-502 (537)	Two-Position MA41-707x Floating MF41-7073 Proportional MS41-7073 (546) MS41-7073-502 (537)	Two-Position MA41-715x Floating MF41-7153 Proportional MS41-7153 (556) MS41-7153-502 (557)	Two-Position - Floating MF40-7173 Proportional MS40-7173 (576)
					Note: Not all factory actuator codes are available. ^e			
					Linkage Kit Part Number			
					AV-611 (1/2"...2")	AV-602 (1"...2")	AV-602 (1 1/2"...2")	AV-602
Valve Assembly Part Number ^b	P Code	Valve Size in. (mm)	Cv ^c	kvs ^c	Actuator Close-off Pressure psig			
						Single Actuator	Single Actuator	Single Actuator
Vx-7313-xxx-4-P	02	1/2 (15)	2.2	1.9	250	-	-	250
	04		4.4	3.8				
	06	3/4 (20)	7.5	6.5				
	08	1 (25)	14.0	12.0	125	180	-	250
	09	1 1/4 (32)	20.0	17	75	100		
	10	1 1/2 (40)	28	24	50	70	140	160
	11	2 (50)	41	36	25	40	80	120
Vx-7323-xxx-4-P	02	1/2 (15)	2.2	1.9	250	-	-	-
	04		4.4	3.8				
	06	3/4 (20)	7.5	6.5				
	08	1 (25)	15	13.0				
	09	1 1/4 (32)	20	17.3				
	10	1 1/2 (40)	28	24.2				
	11	2 (50)	40	34.6				

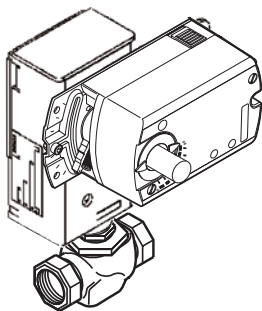
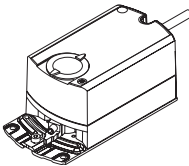
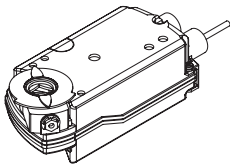
b - To determine a specific part number, see **Pg. 46, Assembly Ordering Linked VB-7000 SmartX Globe Valves** for the relevant part series.

c - $kvs = m^3/h$ ($\Delta P = 100$ kPa) $kvs = Cv / 1.156$ $Cv = kvs \times 1.156$

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.

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^f  Note: Only bronze bodies listed. VBS-9263-0-4-P stainless steel bodies to -06 are available with the same close-off performance.								
					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			
Valve Assembly Part Number ^a	P Code	Valve Size in. (mm)	Cv ^b	kvs ^b	Actuator Close-off Pressure psi ^{cd}			
							Single Actuator	
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	

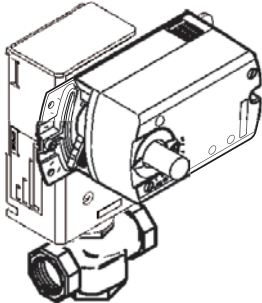
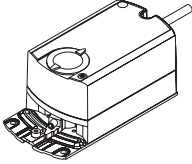
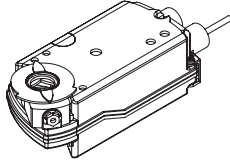
a - To determine a specific part number, see Pg. 46, *Assembly Ordering Linked VB-7000 SmartX Globe Valves* for the relevant part series.
b - $kvs = m^3/h$ ($\Delta P = 100$ kPa) $kvs = Cv / 1.156$ $Cv = kvs \times 1.156$
c - All Vx-72xx leakage ratings are ANSI V to 35 psi and ANSI IV above 35 psi; 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.

3. VB-7000 Valve/Actuator Assemblies

1/2"...2" 3-Way Globe Valves with Linked 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^f 					 		
					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.		
					Linkage Kit Part Number		
					AV-611		
Valve Assembly Part Number ^a	P Code	Valve Size in. (mm)	Cv ^b	kvs ^b	Actuator Close-off Pressure psi ^{ce}		
Vx-7313-xxx-4-P	02	1/2 (15)	2.2	1.9	225	-	-
	04		4.4	3.8			
	06	3/4 (20)	7.5	6.5			
	08	1 (25)	14.0	12.0	100	180	140
	09	1 1/4 (32)	20.0	17	60	120	
	10	1 1/2 (40)	28	24	40	75	
	11	2 (50)	41	36	20	40	80
Vx-7323-xxx-4-P	02	1/2 (15)	2.2	1.9	250	-	-
	04		4.4	3.8			
	06	3/4 (20)	7.5	6.5			
	08	1 (25)	15.0	13.0			
	09	1 1/4 (32)	20.0	17.3			
	10	1 1/2 (40)	28	24.2			
	11	2 (50)	40	34.6			

a - To determine a specific part number, see **Pg. 46, Assembly Ordering Linked VB-7000 SmartX Globe Valves** for the relevant part series.

b - $kvs = m^3/h$ ($\Delta P = 100$ kPa) $kvs = Cv / 1.156$ $Cv = kvs \times 1.156$

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.

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

f - Shown for field assembly.

MORE INFO

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

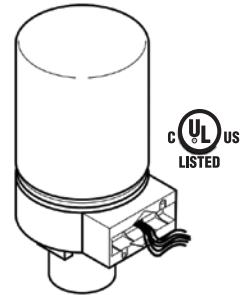


Visit:
<http://goo.gl/BnGiYc>

3. VB-7000 Valve/Actuator Assemblies

1/2" ... 2" Globe 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.



MORE INFO

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



Visit:

<http://goo.gl/EpcPNP>

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	1/2" (15 mm)	130
			-05, -06	3/4" (20 mm)	80
			-07, -08	1" (25 mm)	40
			-09	1 1/4" (32 mm)	25
			-10	1 1/2" (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	1/2" (15 mm)	200 130
			-05, -06	3/4" (20 mm)	130 80
			-07, -08	1" (25 mm)	50 40
			-09	1 1/4" (32 mm)	35 25
			-10	1 1/2" (40 mm)	35 25
			-11	2" (40 mm)	20 14

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

3-Way Hydraulic Valve/Actuator Close-Off Ratings							
Valve Linkage (½...2")				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-XXX ^b 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			
		-06	¾				
		-08	1				
		-09	1¼				
		-10	1½				
		-11	2				
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.

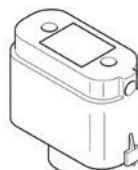
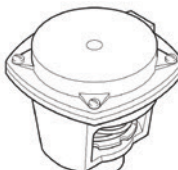
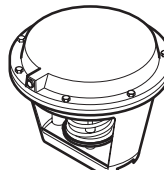
e - Diverting valves may be used in mixing applications with minor effects on flow.

f - SU- Stem Up; SD- Stem Down.

3. VB-7000 Valve/Actuator Assemblies

1/2"...2" 2-Way and 5/8" 3-Way Glove 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.

2-Way ½"...2" Globe Valves with Pneumatic Actuators																						
																						
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...7	5...10	8...13		3...6	5...10	10...13	3...8	5...10	8...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.

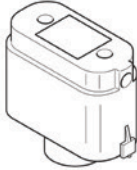
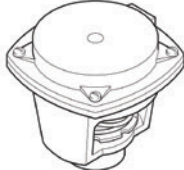
3-Way 5/8” Globe Valves with Pneumatic Actuators																												
Positive Positioner					AK-42309-500										AK-42309-500													
Actuator					MK-2690										MK-4601			MK-4611			MK-4621			MK-4621-422				
Factory Actuator Code (xxx)					201		202		203		301			302			303			313								
Spring Range (psig)					3...7		5...10		8...13		3...6			5...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 Positionc					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.

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	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Actuator Code (XXX)				201	202	203	203	301	302	303	301	302	303	303	303	303	303	303	303
Actuator				MK-2690								MK-4601	MK-4611	MK-4621	MK-4621	MK-4621	MK-4621	MK-4621	MK-4621
Spring Range (psig)				3...7	5...10	8...13	8...13	3...6	5...10	10...13	3...6	5...10	10...13	10...13	10...13	10...13	10...13	10...13	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
Stem Position ^d				SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU
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																
		-6	¾	150	150	50	60	170	100			90	30	250	250	100	150	250	250
		-8	1	60	120	30	40	100	60			60	20	180	230	70	80	180	160
		-9	1¼	30	60	9	15	50	30			25	5	90	150	30	40	100	60
		-10	1½					8	30	15		15		50	90	15	25	60	40
		-11	2						20	10		9	-	30	60	10	15	40	35
VK-7323-XXX-4-P VK4-7323-XXX-4-P	VB-7323-0-4-P	-4	½																
		-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 can be used in a diverting application but diverting valves can not be used in mixing applications.

d - SU- Stem Up; SD- Stem Down. Refer to **Pg. 29, 2. VB-7000 Series ½"...2" Globe Valves** for flow pattern, port designations and normal position.

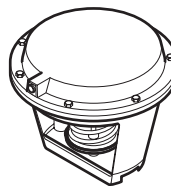
MORE INFO

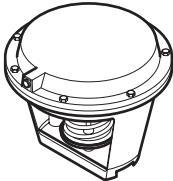
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3-Way Mixing & Diverting/Sequencing 1½" & 2" Globe Valves with Pneumatic Actuators



												
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...8		5...10			8...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	VB-7313-0-4-P	-10	1½	40	170	250	80	110	230	170	30	160
VK4-7313-XXX-4-P	VB-7314-0-4-P	-11	2	20	90	160	50	60	120	90	15	90
VK-7323-XXX-4-P	VB-7323-0-4-P	-10	1½	250								
VK4-7323-XXX-4-P		-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 valves can be used in a diverting application but diverting valves can not be used in mixing applications.

d - SU- Stem Up; SD- Stem Down. Refer to *Pg. 29, 2. VB-7000 Series ½"...2" Globe Valves* for flow pattern, port designations and normal position.

Applications

Schneider Electric Spring Return and Non-Spring Return Forta M900AxxVB series linear actuators mount directly onto ½"...2" VB-7000 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 (M900AxxW-VB) models. Field selectable input signals include reverse and direct acting, floating or proportional 0...1 Vdc, 2...10 Vdc or 4...20 mA 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:

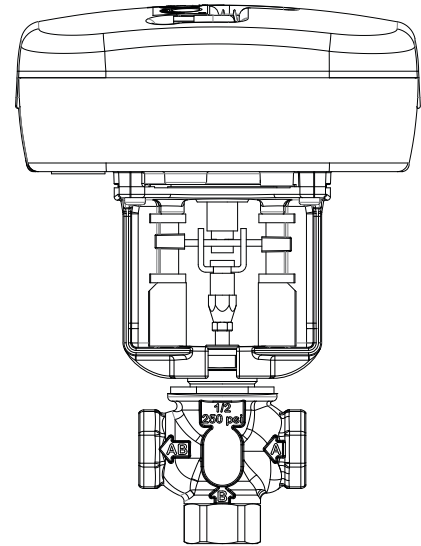
- Change the valve body part number prefix from VB to VU.
- Insert the actuator code in the third field of the part number.
- Confirm the factory assembly is available.

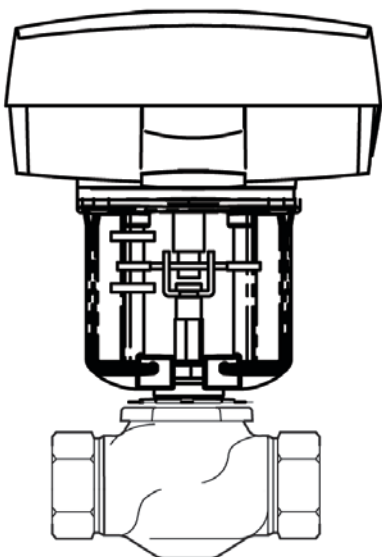
Example

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

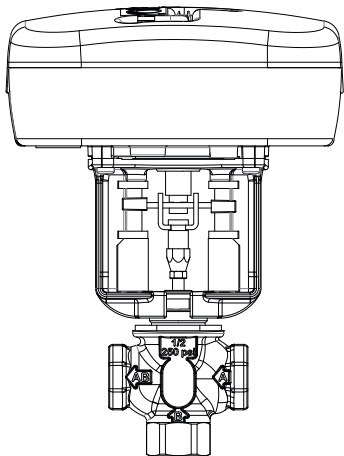
Select a valve/actuator combination having sufficient close off for the application.

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			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 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-7000 Valve / M900Axx(-VB) ^a Spring Return Actuator				
Valve Body ^{a,c}	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.

4. VB-7000 Series Globe Valves Actuators & Linkages

4. VB-7000 Series Globe Valves
Actuators & Linkages

4. VB-7000 Globe Valves Actuators & Linkages

MG350V Globe Valve NSR Actuators

MG350V

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

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

Benefits

- Tri-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.



MG350V

- 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.

MG350V 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		67 (300)
MG350V-24M	2 ... 10 Vdc, 0 ... 10 Vdc, 4... 20 mA ⁴	-	102		78 (350)
MGF350V-24MP		2 ... 10 Vdc, 0 ... 5 Vdc ³	51		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		112	67 (300)	51	7.2 VA			Yes		
MG350V-24M	VS	110	79 (350)	102		Yes	-			
MGF350V-24MP		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.

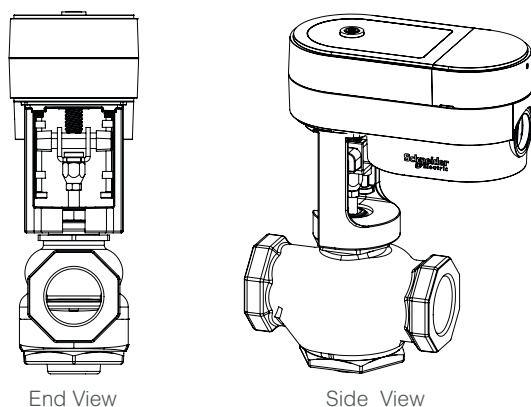
d - DIP switch configurable 0.1...25.5 sec, 0.59...2.93 sec.

e - DIP switch configurable 2...10 Vdc or 0...5 Vdc.

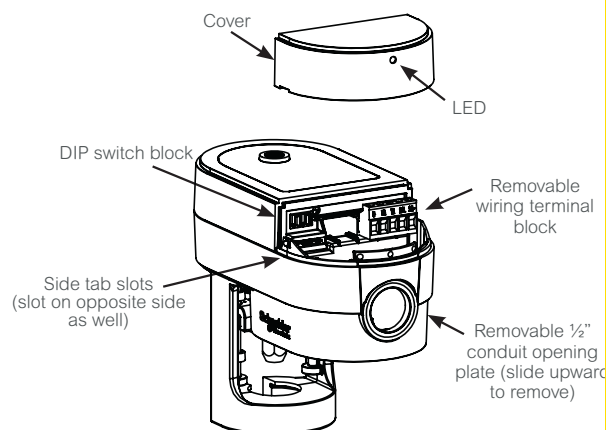
4. VB-7000 Series Globe Valves Actuators & Linkages

MG350V Globe Valve NSR Actuators

MG350V Installed on a VB-7000 Globe Valve



Actuator Diagram



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 Valve/Actuator Combination Having Sufficient Close-Off for Application

Compatible Two-Way Valve Series				
Body		Close-off Ratings, psi (kPa) ^a		Valve Bodies 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 ^a , VB-7273-0-4-P, VB-7283-0-4-P
P Code	Size	MGF350V-24FP, MGF350V-24MP	MG350V-24F, MG350V-24M	
-01, -02, -03, -04	½" (15 mm)	219 (1510)	250 (1724)	
-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)	
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.

4. VB-7000 Globe Valves Actuators & Linkages

Forta M4xx, M8xx and M15xx A-VB NSR Actuators

Forta M400A (VB) / M800A (VB) /M1500A (VB)

Forta M400A (VB) / M800A (VB) /M1500A (VB) series Non-Spring Return linear actuators are available in U-Bolt (Mx00A) and Screw Mount (Mx00A-VB) style for Schneider Electric globe valves with AV-821 linkage kits for mounting to VB-7000 valves. The Screw Mount style screws directly to the bonnet nut on VB-7000 valves (no adapter required). Applications include chilled or hot water and steam.

Benefits

- Field-selectable input signals include reverse and direct-acting, Floating or Proportional plus proportional sequencing input signal ranges.
- 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
- Linear force: 90 lbf (400N), 180 lbf (800N), 337 lbf (1500N)
- 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



U-Bolt Style Forta



Screw Mount Style Forta

Applicable Literature

- Forta Series Installation Instructions, F-27599
- Forta/VB-7000 Selection Guide, F-27490
- Forta/VB-8xxx/9xxx Selection Guide, F-27491
- AV-800 Series Linkage Adapters for Competitors Valves, F-27470
- AV-821 Linkage VB-7000, F-27701 (U-Bolt Style Only). AV-821 is required for the Mx00A but is not for the Mx00A-VB.
- AV-822 Linkage VB-8xxx, VB-9xxx, F-27702 (U-Bolt Style Only)
- CA-28 Control Valve Sizing, F-13755

Specifications

U-bolt Style	M400A	M400A-S2	M800A	M800A-S2	M1500A	M1500A-S2
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)	
2-SPDT Aux Switch	No	24 Vac 4A res	No	24 Vac 4A res	No	24 Vac 4A res

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).

5. VB-7000 Series Globe Valves Actuators & Linkages

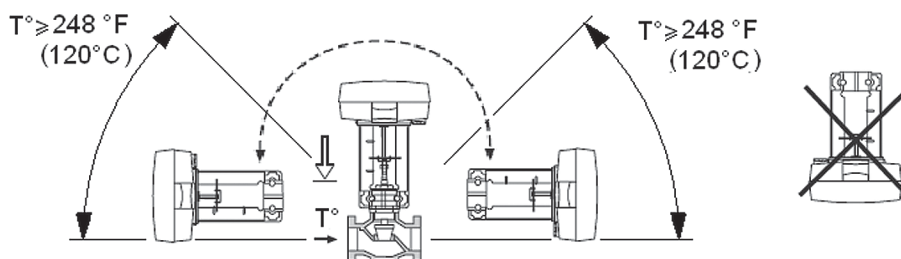
Forta M4xx, M8xx and M15xx A-VB NSR Actuators

Specifications (continued)		
Stroke	M800A, M1500A	U-Bolt style: >3/8"...2" (9-52mm)
	M800A-VB, M1500A-VB	Screw Mount Style >3/8"...1 7/8" (9-48mm)
	M400A, M400A-VB	U-Bolt and Screw Mount Style >3/8"...1 1/4" (9-48mm)
Stroke Timing	Floating: 60 or 300 sec selectable, Proportional: 15 sec @1/2" 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 (-10...50 °C)	
Ambient Humidity	15...95 % RH non-condensing	
Housing Material	Die-Cast Aluminum	
Cover Material	UL94 plenum rated plastic	
Agency Listings	UL873, cULus, RCM, CE	

4. VB-7000 Series Globe Valves Actuators & Linkages

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.



4. VB-7000 Globe Valves Actuators & Linkages

Forta M900 Factory & Field Assembly SR Models

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 .

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)
366°F (186°C)	90°F (32°C)

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

Spring Return Actuators

Mx51-7103 Series SmartX Actuator (Code 804) 24 Vac 105 lbf (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 lbf (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 lbf (979 N)



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



Specifications

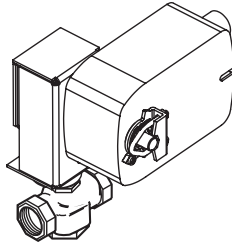
Connection	3 ft. (0.9 m) Plenum cable
Housing	Aluminum die-cast, NEMA 2
Dimensions	7 x 10-5/8 x 2-9/16 (178 x 270 x 65 mm)
Position Indicator	Visual indicator
Override	Manual
Control Signal	MA51-7203: 2-position SPST MF51-7203: Floating MS51-7203: 2...10 Vdc MS51-7203-40: 6-9 Vdc MS51-7203-50: 0...10 Vdc The control signal is factory set for direct action. It can be field-adjusted for reverse action.
Voltage	24 Vac $\pm$ 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

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 $\pm$ 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

4. VB-7000 Globe Valves Actuators & Linkages

½"...2" Linked Globe Valve Assemblies

Specifications ½"...2" Vx-7000-5xx-4-P Series Linked Globe Valve Assemblies			
Linked Globe Valve Assemblies		2-Way	3-Way
		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	NPT
		Union Straightway (up to 1¼")	
Size		Vx-7000-5xx-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...400 psig below 150 °F (66 °C) ^c	
Pressure Class (VB-7xx5)		PN16	
Rangeability		Refer to Pg. 29, 2. VB-7000 Series ½"...2" Globe Valves	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-7000 Series ½"...2" Globe Valves	
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. 107, Cavitation Limitations on Valve Pressure Drop)	

a - To determine a specific part number, see **Pg. 46, 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 separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.

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.

Mx4x-7000 Series Spring Return Actuators														
Part Numbers	Power Input								SPDT Auxiliary Switches	Approximate Tim- ing in Seconds @ 70°F (21 °C) with No Load		Actuator Output Torque Rating lb-in (N-m)	Manual Override	Linkage Part Numbers
	Voltage 50/60 Hz	Running					Holding			Powered	Spring Return			
		50 Hz		60 Hz		DC Amps	50 Hz	60 Hz						
		VA	W	VA	W			W	W					
MA40-7043	24 Vac ± 20% 22...30 Vdc	4.4	2.9	4.4	2.9	0.11	0.8	0.8	No	<50	<26	35 (4)	No	AV-611
MA40-7043-501		One ^a												
MA40-7040	120 Vac ± 10%	6.4	3.8	4.3	3.4	-	1.6	1.2	No	<50	<26			
MA40-7040-501		One ^a												
MA40-7041	230 Vac ± 10%	5.8	4.1	4.6	3.9	-	1.5	1.2	No	<50	<26			
MA40-7041-501		One ^a												
MF40-7043 ^b	24 Vac ± 20% 22...30 Vdc	5.9	4.4	5.9	4.4	0.17	2.9	2.9	No	<130	<25			
MF40-7043-501 ^b									One ^a					
MS40-7043 ^b		5.6	4.2	5.6	4.2	0.15	2.4	2.4	No					
MS40-7043-501 ^b									One ^a					
MS40-7043 ^b		6.6	5.0	6.6	5.0	0.17	3.2	3.2	No					
MS40-7043-MP5									One ^a					
MA41-7073		4.8	3.2	4.8	3.2	0.13	0.8	0.8	No	<80	<40			
MA41-7073-502									Two ^c					
MA41-7070		10.7	4.2	5.6	3.6	-	2.0	1.2	No			<60 (7)	<40	
MA41-7070-502									Two ^c					
MA41-7071	17.0	5.1	8.0	4.0	-	2.7	1.4	No						
MA41-7071-502								Two ^c						
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	60 (7)	Yes	AV-602
MF41-7073-502									Two ^c					
MS41-7073		5.8	4.6	5.8	4.6	0.17	2.3	2.3	No	<195	<30			
MS41-7073-502									Two ^c					
MA41-7153		9.8	7.5	9.7	7.5	0.29	2.8	2.8	No	<190	<30	133 (15)		
MA41-7153-502									Two ^c					
MA41-7150		11.7	8.8	10.0	8.4	-	3.6	5.0	No					
MA41-7150-502									Two ^c					

a - One switch adjustable from 15°...95° rotation.

b - With plenum rated cable.

c - One switch fixed at 5° and one switch adjustable 25°...85°.

4. VB-7000 Globe Valves Actuators & Linkages

Mx4x-71xx Series SR Actuators

Mx4x-7000 Series Spring Return Actuators (cont.)

Part Numbers	Power Input								SPDT Auxiliary Switches	Approximate Timing in Seconds @ 70°F (21 °C) with No Load		Actuator Output Torque Rating lb-in (N-m)	Manual Override	Linkage Part Numbers
	Voltage 50/60 Hz	Running					Holding			Powered	Spring Return			
		50 Hz		60 Hz		DC Amps	50 Hz	60 Hz						
		VA	W	VA	W		W	W						
MA41-7151	230 Vac ± 10%	15.5	9.5	10.6	8.5	-	4.6	3.3	No	<190	<30	133 (15)	Yes	AV-602
MA41-7151-502									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		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°...95° rotation (0 to 1 scale).

b - With plenum-rated cable.

c - One switch, adjustable from 25°...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...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						
MA40-7170	120 Vac ± 10%	8.4	6.6	6.2						
MF40-7173	24 Vac ± 20% 22...30 Vdc	8.1	5.3	5.8						
		5.7	3.6	5.7						
		MS40-7173	7.8	4.7		5.5				
			5.6	2.5		5.0				
MS40-7170	120 Vac ± 10%	8.5	5.2	6.4		147	65			
MS40-7171	240 Vac ± 10%	10.8	9.0	7.2						

4. VB-7000 Series Globe Valves
Actuators & Linkages

Mx40-7043 Series SmartX Actuator

24 Vac
35 lb-in (4 N-m)



Spring Return Actuator

Specifications

Connection	3 ft. (0.9 m) cable, 1/2" 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, 1/2" (13 mm) square
Housing	NEMA 2 (IEC IP54) with conduit connector in the down position
Dimensions	6-51/64 x 4 x 3 1/2" (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
Regulatory Compliance	c-UL-us LISTED for safety per UL 873 and CAN C22.2 No.24-93. CE mark compliant per EU directives LVD, EMC, and RoHS2. AUS/NZ marked RCM.

Electrical Specifications

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

Application

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

Specifications

- Actuators: MS40-7043, MS41-7073, MS41-7153, MS40-717x, MS41-6083, MS41-6153 and MS41-6343.
- Wire leads.

AM-708
500 Ohm
Resistor



Mx40-704x 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		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
	MA40-7041	230 Vac ± 10%	5.8	4.1	4.6	3.9	1.5	1.2
a - See Auxiliary Switches under Electrical below.								
Connections	MA40-704x and MA40-704x-501 – 3 ft. (0.9 m) long appliance cables, ½" conduit connector. For M20 Metric conduit, use AM-756 adapter. MF40-7043 and MF40-7043-501, MS40-7043 and MS40-7043-501 – 3 ft. (0.9 m) long, plenum rated cables, ½" conduit connector. For M20 Metric conduit, use AM-756 adapter.							
Motor Type	MA40-704x – Brush. MF40-7043, MS40-7043 – Brushless DC.							
Outputs	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.)							
Electrical								
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	Shipping and storage: -40...160 °F (-40...71 °C) ambient. Operating: -22...140 °F (-30...60 °C). 5...95% RH, non-condensing							
Temperature Limits								
Humidity								
Location	NEMA Type 2 (IEC IP54)							

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
Regulatory Compliance	c-UL-us LISTED for safety per UL 873 and CAN C22.2 No.24-93. CE mark compliant per EU directives LVD, EMC, and RoHS2. AUS/NZ marked RCM.

Electrical Specifications

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

Application

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

Specifications

- Actuators: MS40-7043, MS41-7073, MS41-7153, MS40-717x, MS41-6083, MS41-6153 and MS41-6343.
- Wire leads.

AM-708
500 Ohm
Resistor



4. VB-7000 Globe Valves Actuators & Linkages

Mx41-707x & Mx41-715x 60/133 lb-in SR Actuators



Mx41-7000 Series
Smart X Electric Actuator
60/133 lb-in

4. VB-7000 Series Globe Valves
Actuators & Linkages

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.																																																																																																
	<table><tr><th rowspan="3">Part Number</th><th rowspan="3">Voltage 50/60 Hz</th><th colspan="4">Running</th><th colspan="2">Holding</th></tr><tr><th colspan="2">50 Hz</th><th colspan="2">60 Hz</th><th>50 Hz</th><th>60 Hz</th></tr><tr><th>VA</th><th>W</th><th>VA</th><th>W</th><th>W</th><th>W</th></tr><tr><td>MA41-7153-xxx</td><td rowspan="3">24 Vac ± 20%</td><td>9.8</td><td>7.5</td><td>9.7</td><td>7.5</td><td>2.8</td><td>2.8</td></tr><tr><td>MS41-7153-xxx</td><td>9.8</td><td>7.4</td><td>9.7</td><td>7.4</td><td>2.9</td><td>2.9</td></tr><tr><td>MF41-7153-xxx</td><td>9.8</td><td>7.7</td><td>9.7</td><td>7.7</td><td>3.3</td><td>3.3</td></tr><tr><td>MA41-7150-xxx</td><td>120 Vac ± 10%</td><td>11.7</td><td>8.8</td><td>10.0</td><td>8.4</td><td>3.6</td><td>5.0</td></tr><tr><td>MA41-7151-xxx</td><td>230 Vac ± 10%</td><td>15.5</td><td>9.5</td><td>10.6</td><td>8.5</td><td>4.6</td><td>3.3</td></tr><tr><td>MA41-7073-xxx</td><td rowspan="3">24 Vac ± 20%</td><td>4.8</td><td>3.2</td><td>4.8</td><td>3.2</td><td>0.8</td><td>0.8</td></tr><tr><td>MS41-7073-xxx</td><td>5.8</td><td>4.6</td><td>5.8</td><td>4.6</td><td>2.3</td><td>2.3</td></tr><tr><td>MF41-7073-xxx</td><td>6.2</td><td>4.8</td><td>6.2</td><td>4.8</td><td>2.8</td><td>2.8</td></tr><tr><td>MA41-7070-xxx</td><td>120 Vac ± 10%</td><td>10.7</td><td>4.2</td><td>5.6</td><td>3.6</td><td>2.0</td><td>1.2</td></tr><tr><td>MA41-7071-xxx</td><td>230 Vac ± 10%</td><td>17.0</td><td>5.1</td><td>8.0</td><td>4.0</td><td>2.7</td><td>1.4</td></tr></table>	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	9.8	7.4	9.7	7.4	2.9	2.9	MF41-7153-xxx	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	5.8	4.6	5.8	4.6	2.3	2.3	MF41-7073-xxx	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
	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		9.8	7.4	9.7	7.4	2.9	2.9																																																																																									
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	MA41-7073-xxx	24 Vac ± 20%	4.8	3.2	4.8	3.2	0.8	0.8																																																																																									
	MS41-7073-xxx		5.8	4.6	5.8	4.6	2.3	2.3																																																																																									
MF41-7073-xxx	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.																																																																																																
Regulatory Compliance	RoHS and REACH																																																																																																

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



Spring Return Actuator

Specifications

Connection	2 ft. (61 cm) Appliance cable, ½" conduit connectors
Rotation	CW or CCW spring return using reverse mounting
Shaft Size	Standard: 3/8...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
Regulatory Compliance	c-UL-us LISTED for safety per UL 873 and CAN C22.2 No.24-93. CE mark compliant per EU directives LVD, EMC, and RoHS2. AUS/NZ marked RCM.

Electrical Specifications

Part Number	Actuator Inputs			Outputs		Approx. Timing in Seconds		Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	Spring Return	
MA40-7170	2-Position	120 Vac ± 10%	11.4	None	No	<162		10.5 (4.8)
MA40-7173		24 Vac ± 20%	9.6					
MF40-7173	Floating		10.0					
MS40-7170 ^a	2...10 Vdc 4...20 mA ^b	120 Vac ± 10%	11.1					
MS40-7173	2...10 Vdc	24 Vac ± 20%	9.4					
MS40-7171		240 Vac ± 10%						

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

4. VB-7000 Globe Valves Actuators & Linkages

Mx41-6xx3 NSR SmartX Actuators

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

a - With plenum-rated cable.

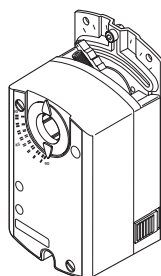
b - Minimum voltage at high temperatures: 24 Vac, +20%, -10% at 90...130 °F ambient.

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.

4. VB-7000 Series Globe Valves
Actuators & Linkages

Mx41-6043 Series SmartX Actuators 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...1/2" (6.4...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 2 3/4 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...130°F (-32...55°C)
Override	Manual
Linkages	AV-611
Installation Instructions	MF41-6043: F-27213, MS41-6043: F-27214
Regulatory Compliance	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2.

Electrical Specifications

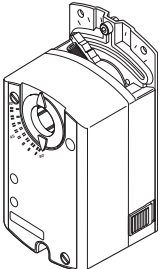
Part Number	Actuator Inputs			Outputs	Approximate Timing in Seconds	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback		
					Powered	
MF41-6043	Floating	24 Vac +20% -15%	2.3	None	<90	1.06 (0.5)
MS41-6043	0...10 Vdc			0...10 Vdc		

4. VB-7000 Series Globe Valves
Actuators & Linkages

Mx41-6083 Series SmartX Actuator

24 Vac

88 lb-in (10 N-m)



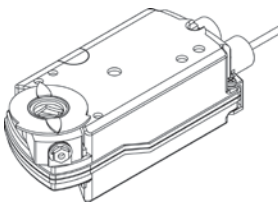




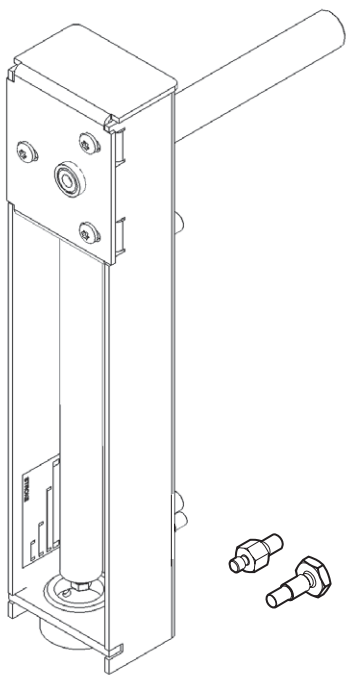
Non-Spring Return Actuator

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...1/2" (6.4...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 2 3/4 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...130°F (-32...55°C)
Override	Manual
Linkages	AV-611
Installation Instructions	MF41-6083: F-27213, MS41-6083: F-27214
Regulatory Compliance	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2.

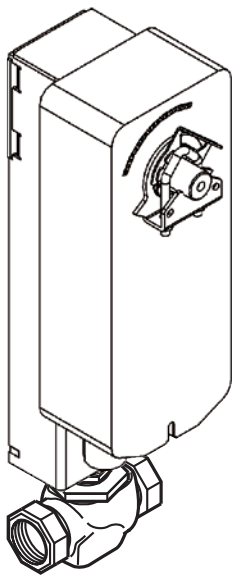
Electrical Specifications							
Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds Powered	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch		
MF41-6083	Floating	24 Vac +20% -15%	2.3	None	No	<125	1.06 (0.5)
MF41-6083-502				None	Two		
MS41-6083	0...10 Vdc		3.3	0...10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

Mx41-6153 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...3/4" (6.4...19 mm) diameter, 1/4...1/2" (6.4...13 mm) square
Housing	NEMA 1, (IP54 to EN60529)
Dimensions	8-3/8 x 3 1/4 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...130°F (-32...55°C)
Override	Manual
Linkages	AV-611
Installation Instructions	F-27215
Regulatory Compliance	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2.

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-602 Globe Valve Linkage



Typical Actuator/Linkage Mounting

Application

The AV-602 links Schneider Electric rotary actuators to 1"…2" VB-7000 globe valves.

AV-602 Actuator/Valve Combinations		
Actuator	Factory - Assemble 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"	

4. VB-7000 Globe Valves Actuators & Linkages

AV-611 Linkage

Application

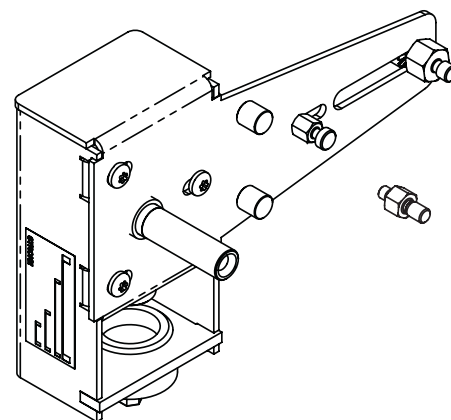
The AV-611 linkage connects SmartX Actuator Mx4x-60x3 or 6153 non-spring return and Mx40-704x spring return actuators (listed below) to ½"...2" VB-7000 and ½"...1¼" discontinued VB-9xxx 2-Way and 3-Way globe valves.

Actuators		
Actuator	Descriptions	Size
MF41-6043	Floating 44 lb-in non-spring return	½"...2"
MS41-6043	Proportional 44 lb-in non-spring return	
MF41-6083	Floating 88 lb-in non-spring return	1"...2"
MS41-6083	Proportional 88 lb-in non-spring return	
MF41-6153	Floating 133 lb-in non-spring return	1½"...2"
MS41-6153	Proportional 133 lb-in non-spring return	
MA40-704x	Two-position 35 lb-in spring return	½"...2"
MF40-7043	Floating 35 lb-in spring return	
MS40-7043	Proportional 35 lb-in spring return	

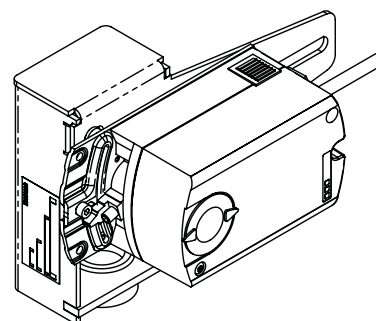
Note: The AV-611 linkage is also compatible with the actuators above with the auxiliary switch option (-5xx in the third part number field).

Applicable Literature

- Mx41-6043, Mx41-6083 Series non-spring return actuator 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-7000 Series Linked Globe Valve Assemblies Selection Guide, F-26752.



AV-611 SmartX Actuator
Globe Valve Linkage



Typical Actuator Mounting

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	½"...2"	½"...2"
	Mx41-6083	1"...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>

4. VB-7000 Globe Valves Actuators & Linkages

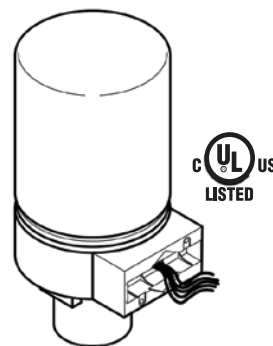
MA-52xx Electronic Hydraulic Two-Position SR Actuators

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...60° C) Operating, Damper -20...140° F (-29...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)
Regulatory Compliance	RoHS and REACH

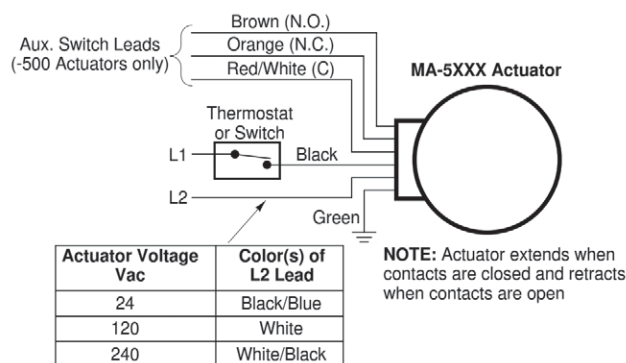
Restrictions on Maximum Allowable Ambient Air Temperature for Valve Actuators

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-7000.



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-7000 series valve bodies.

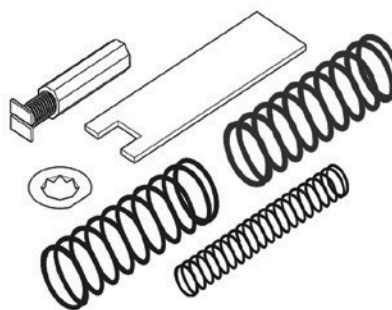
Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies.
- Kit fits all VB-7000 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



4. VB-7000 Series Globe Valves Actuators & Linkages

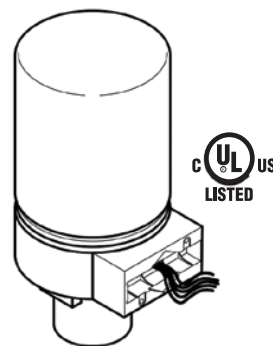
MP-52xx Electronic Hydraulic Proportional SR Actuators

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...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...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-7000 Series ½"...2" Globe Valves
Humidity	5...95% RH, non-condensing
Location	NEMA Type 1
Dimensions	6¾ x 3¼ Dia." (171 x 83 mm)
Regulatory Compliance	RoHS and REACH

4. VB-7000 Globe Valves Actuators & Linkages

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)		93°F (34°C)	100°F (38°C)	100°F (38°C)
281°F (138°C)		103°F (39°C)	115°F (46°C)	140°F (60°C) ^c
181°F (83°C)		120°F (48°C)	140°F (60°C) ^c	
80°F (26°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-7000.

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-7000 series valve bodies.

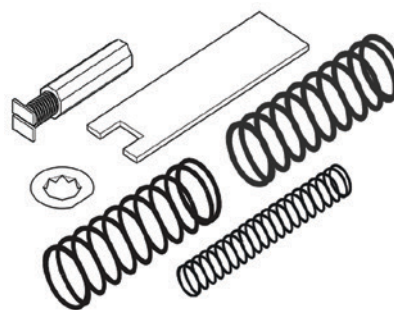
Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies.
- Kit fits all VB-7000 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



4. VB-7000 Globe Valves Actuators & Linkages

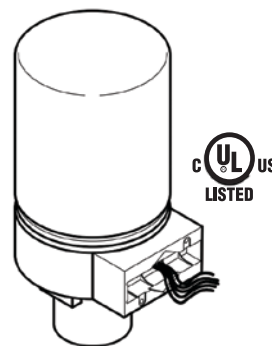
MP-541x Electronic Hydraulic Proportional SR Actuators

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...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 1/2" 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-601 ^b AV-7600-1
MP-5413	24	12.0	0.80	13.2	0.97					

a - Internal feedback circuitry provides positive positioning of valve stem in relation to control signal.

b - May be required for steam or hot water.

Specifications

Inputs	Compatible with 2...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...60° C) For valve actuators: Refer to Pg. 29, 2. VB-7000 Series 1/2"...2" Globe Valves
Humidity	5...95% RH, non-condensing
Location	NEMA Type 1
Dimensions	6 3/4 x 3 1/4 Dia." (171 x 83 mm)
Regulatory Compliance	RoHS and REACH

4. VB-7000 Globe Valves Actuators & Linkages

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-7000.

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-7000 series valve bodies.

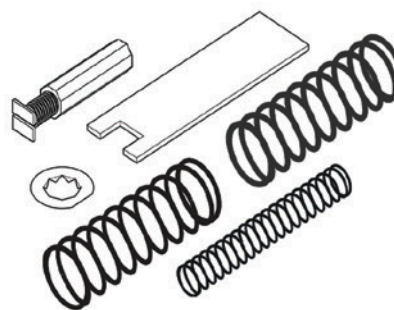
Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies.
- Kit fits all VB-7000 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



4. VB-7000 Globe Valves Actuators & Linkages

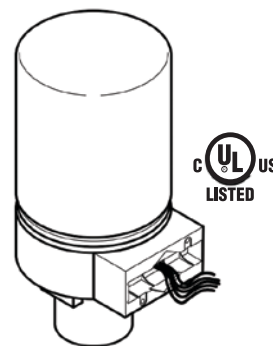
MPR-561x SR Hydraulic Proportional SR Actuators

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-601 ^a
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-7000 Series ½"...2" Globe Valves
Humidity	5...95% RH, non-condensing
Location	NEMA Type 1
Dimensions	MP-5x1x: 6¾ x 3¼" (171 x 83 mm)
Regulatory Compliance	RoHS and REACH

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-7000.



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-7000 series valve bodies.

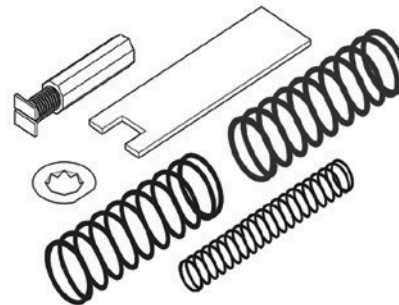
Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies.
- Kit fits all VB-7000 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



4. VB-7000 Globe Valves
Actuators & Linkages

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

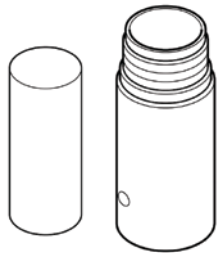
Application

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.

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 the separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.

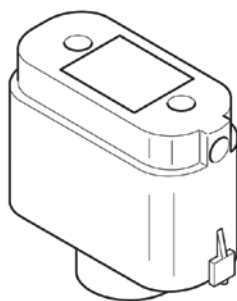
- 2-Way Valves, Union End
- 2-Way Valves, Threaded
- 3-Way Mixing and Sequencing Valves, Flared
- 3-Way Mixing and Diverting Valves, Threaded



AV-601 Linkage Extension
for Electric/Electronic Hydraulic Valve 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)		93°F (34°C)	100°F (38°C)	100°F (38°C)
281°F (138°C)		103°F (39°C)	115°F (46°C)	140°F (60°C) ^c
181°F (83°C)		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 Proportional
Pneumatic Valve Actuator

Application

The MK-2690 provides proportional pneumatic control of ½"...2" VB-7000 Series valves (subject to close-off ratings) and discontinued ½"...1¼" VB-9xxx valves.

Features

- Compact size with 6 in² (39 cm²) 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...7 (Yellow)	21...48
	5...10 (Black)	34...69
	8...13 (Blue)	55...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...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-7000 and VB-9xxx valves and 3...7, 5...10, & 8...13 springs)
AV-7400	Valve linkage for VB-7000 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...7 psig spring
PNV-145-45	5...10 psig spring
PNV-145-48	8...13 psig spring
PNV-102-1	Diaphragm

4. VB-7000 Globe Valves Actuators & Linkages

Application

The AV-7400 valve linkage kit is used to field install MK-2690 pneumatic actuators to a variety of 1/2"...2" VB-7000 series valve bodies.

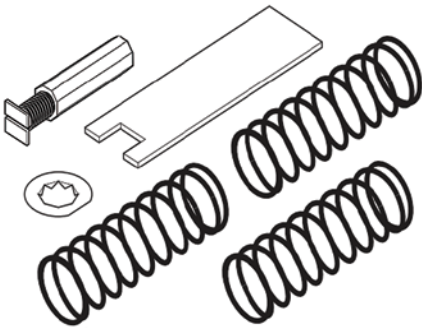
Features

- Springs are provided for control-signal applications, including 3...7, 5...10 and 8...12 psig.
- Kit fits all VB-7000 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

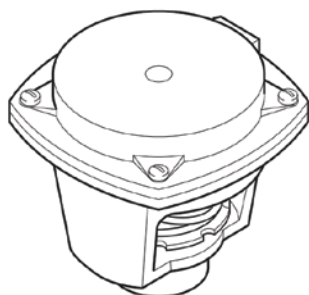


AV-7400
Pneumatic Actuator Valve
Linkage Kit

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

4. VB-7000 Globe Valves Actuators & Linkages

MK-46xx Pneumatic Actuator - Proportional



MK-46xx
Proportional Pneumatic Valve Actuator

Application

The MK-46xx Series and MK-4621-422 proportional pneumatic actuators, with 11 sq. in. (71 cm²) effective diaphragm area, are used to control ½"...2" VB-7000 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 Spring Range	Refer to Model Table.
Starting Point	Field adjustable.
MK-4601, MK-4621	+½ psig (7...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...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

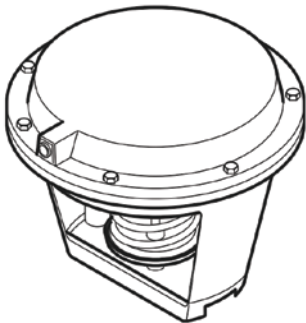
Positioner	
AK-42309-500	Positive positioner & linkage; use with MK-46x1-0-2.
TOOLS (factory-available) TOOL-095-1	Pneumatic calibration tool kit.

Application

MK-66xx proportional pneumatic actuators, with 50 sq. in. (323 cm²) effective diaphragm area, are used to control 1½"...2" VB-7000 series valves.

Features

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



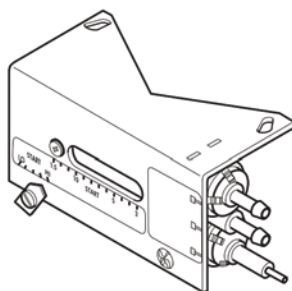
MK-66xx
Proportional Pneumatic Valve Actuator

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	
MK-6621	8...13	55...90	

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	7¼ H x 10½ W x 10½ D" (199 x 267 x 267 mm)
Maintenance Parts	See F-26033

4. VB-7000 Globe Valves Actuators & Linkages

AK-42309-500 Positive Positioning Relay



AK-42309-500
Positive Positioning Relay

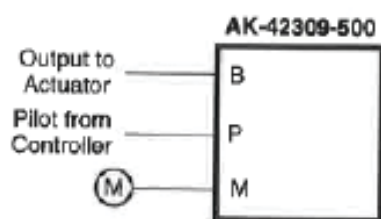


Figure 1 Piping Connections.

MORE INFO

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



Visit:
<http://goo.gl/LJCLEb>

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.

Specifications	
Action	Direct (increase in output pressure to actuator with an increase in pilot pressure from controller).
Pilot input	0...main air pressure, psig.
Output	0...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 feed-back 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).
Regulatory Compliance	RoHS and REACH

4. VB-7000 Globe Valves
Actuators & Linkages

Notes

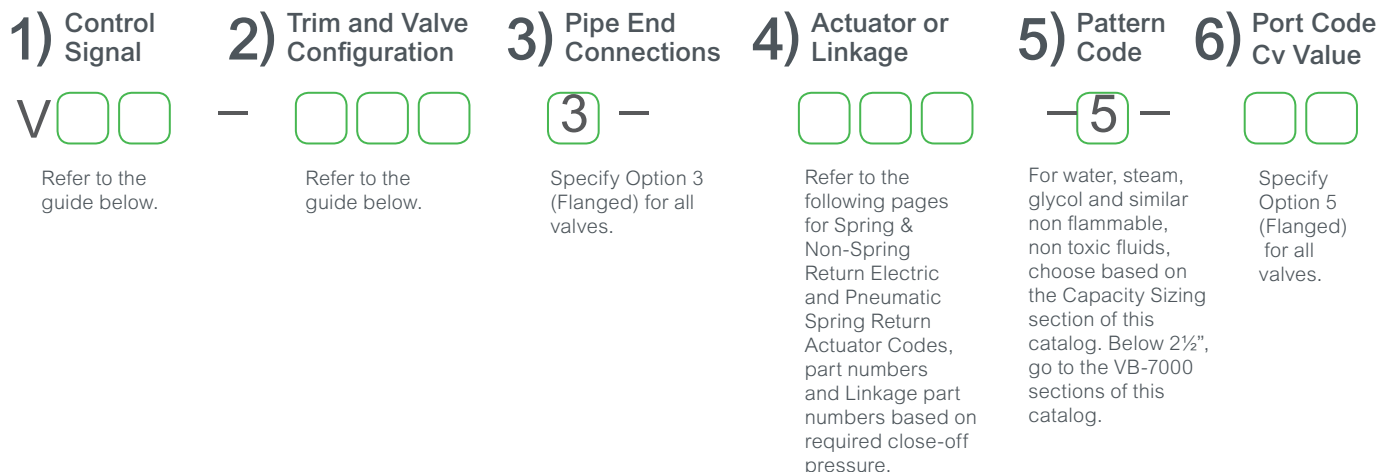
4. VB-7000 Series Globe Valves
Actuators & Linkages

5. VB-8/9000 Globe Valves Sizing and Selection

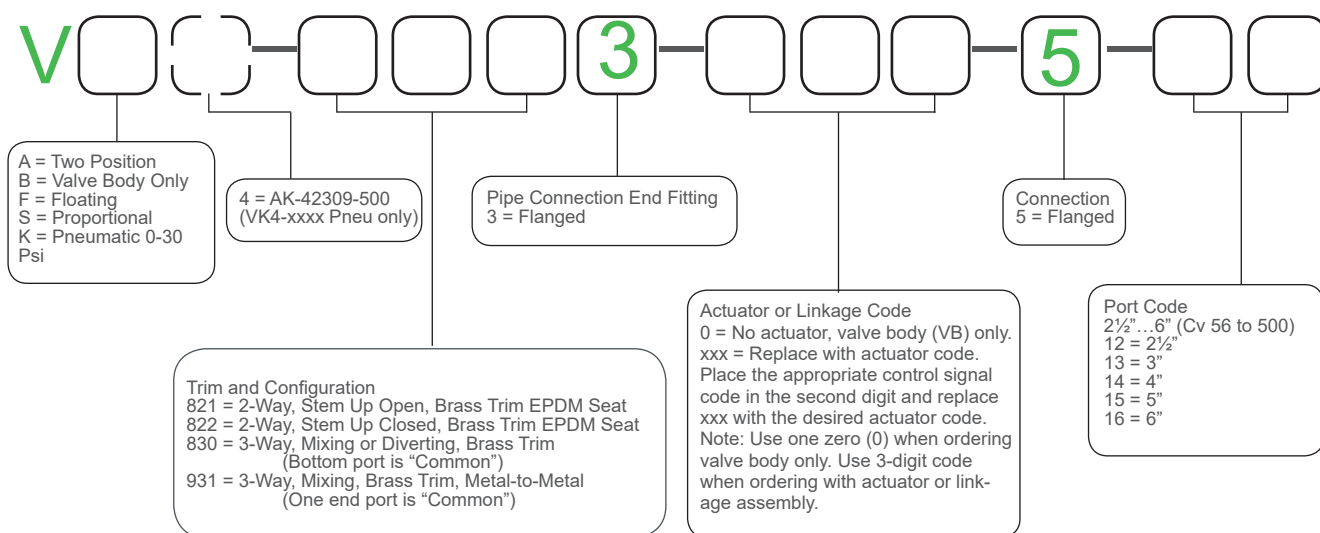


5. VB-8/9000 Globe Valves
Sizing and Selection

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



Assembly Ordering VB-8000/VB-9000



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

5. VB-8/9000 Globe Valves Sizing and Selection

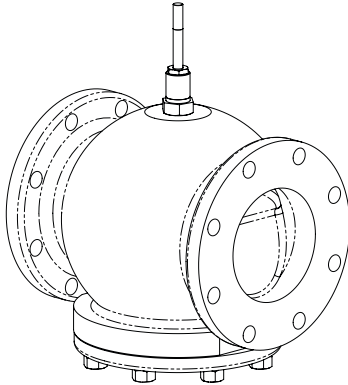
2 and 3-Way VB-8xx3 Flanged Valve Bodies

2-Way and 3-Way Valves

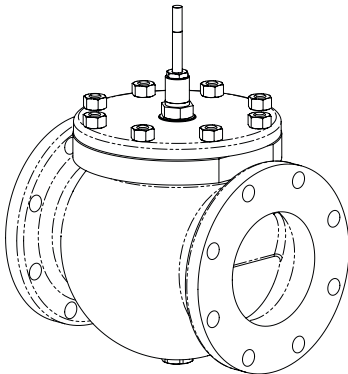
2-Way Stem Up Open or Stem Up Closed

3-Way Mixing/Diverting

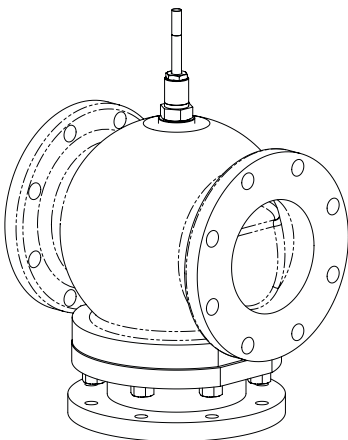
ASA 125 Flanged Cast Iron Body



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, psig		125 (up to 200 psig below 150°F)			
Maximum Inlet Pressure Steam psig (kPa)		35 psig (241 kPa)		-	
Allowable Control Media Temperature °F (°C) ^b		20°F...281°F (-7°C...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 sufficiently as 2-Way angle valves if either end (side) port is closed off.

b - 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.

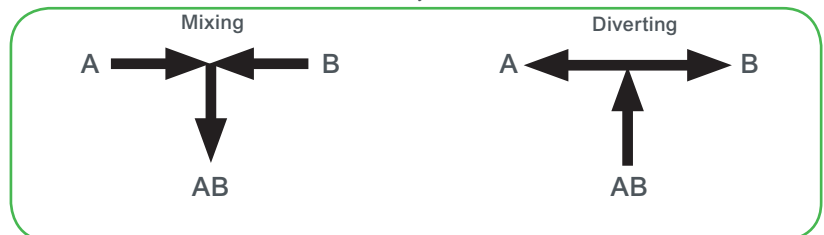
f - Diverting configuration, flow AB to A ports.

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



5. VB-8/9000 Globe Valves Sizing and Selection

VB-9313 3-Way Mixing Valve Bodies

Application

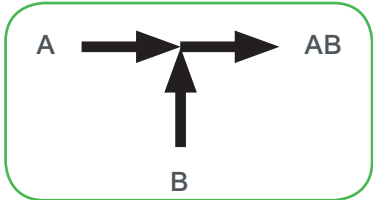
VB-9313 series 3-Way mixing valves control hot or chilled water in heating or air conditioning systems. These valves must be piped with two inlets (“A” and “B” ports) and one outlet (“AB” port). They are used for two-position or proportional control applications. Valve assemblies require an actuator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

Features

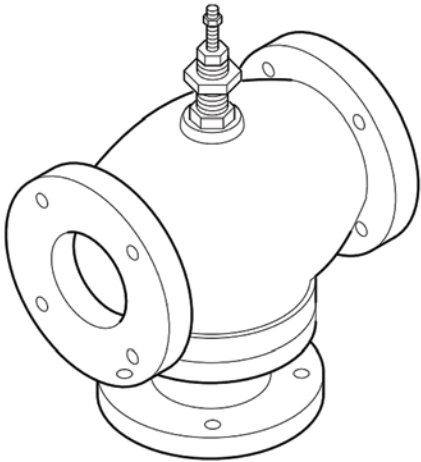
- Valve sizes 2½”...6”.
- 125 psig pressure rating per ANSI Standards (B16.1–1993) for flanged cast iron bodies.
- Spring-loaded TFE & EPDM packing.

Specifications				Valve Body Series VB-9313-0-5-P
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	kvs ^b 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	1¼ in. (45 mm)	VB-9313-0-5-15
6	390	337	1¼ 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 - $k_{vs} = m^3/h$ ($\Delta P = 100\text{ kPa}$) $k_{vs} = C_v / 1.156$ $C_v = gpm / \sqrt{\Delta P}$ (in psi).
c - Glycol up to 50%



VB-93xx 3-Way Mixing Flow Pattern



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

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:

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

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.

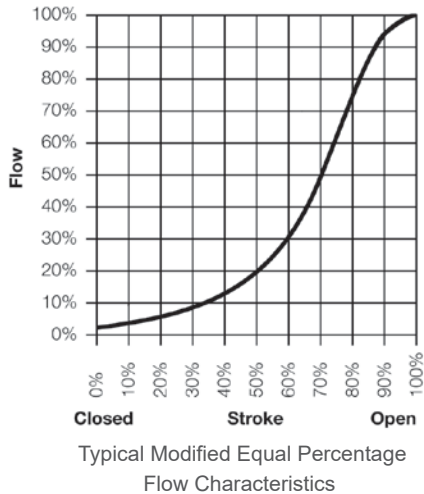
- CA-27 3-Way Valves Application Information
- Valve Selection Table Water, F-11080

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.

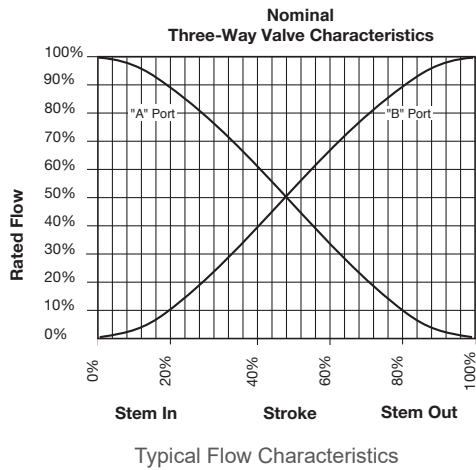
Control Precision

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.



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.

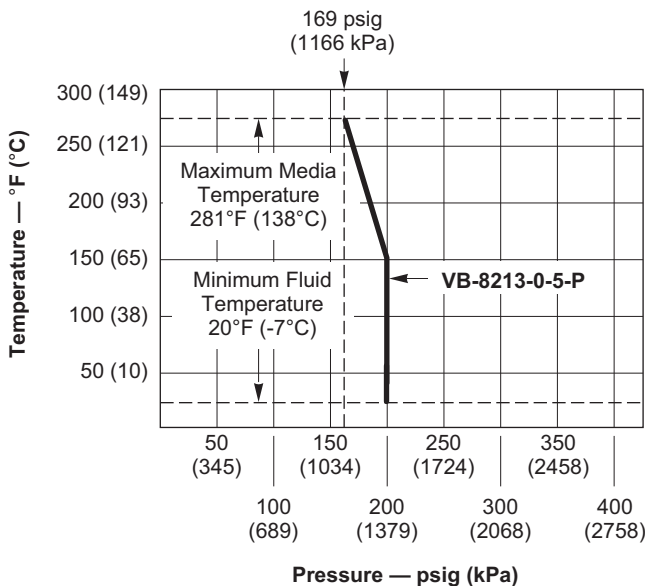


Rangeability

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)

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

Cv Equation for Water

Where:

Cv = 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).

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

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 C_v 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

$$C_v = \frac{Q \times K}{3\sqrt{\Delta P \times P_2}} \quad Q = \frac{3C_v \sqrt{\Delta P \times P_2}}{K}$$

Where:

C_v = 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.

P_2 = Outlet pressure, measured in psia (absolute pressure). P_2 = Inlet pressure + 14.7 - ΔP .

$K = 1 + (0.0007 \times ^\circ\text{F superheat})$. $K = 1$ 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:

$$P_m = 0.5 (P_1 - P_v)$$

Where:

P_m = Maximum allowable pressure drop

P_1 = Absolute inlet pressure (psia)

P_v = 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:

$$P_m = 0.5 [(18 + 14.7) - 11.53] = 10.6 \text{ psi (Vapor pressure of 200°F water is 11.53 psi.)}$$

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

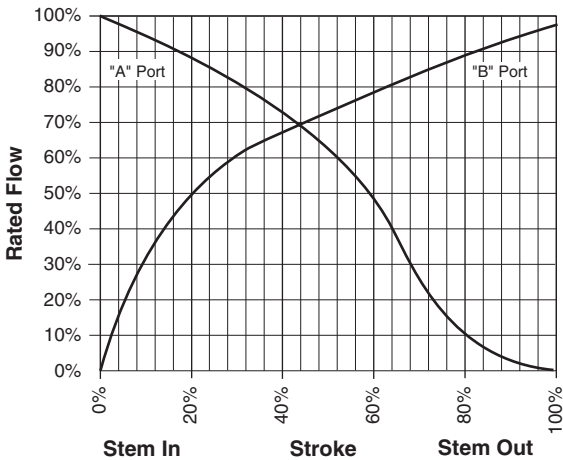
Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)	Water Temp. (°F)	Vapor Pressure (psia)
40	0.12	90	0.70	140	2.89	190	9.34
50	0.18	100	0.95	150	3.72	200	11.53
60	0.26	110	1.28	160	4.74	210	14.12
70	0.36	120	1.69	170	5.99	220	17.19
80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

5. VB-8/9000 Globe Valves Sizing and Selection

VB-9313 Valve Body Characteristics

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

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).

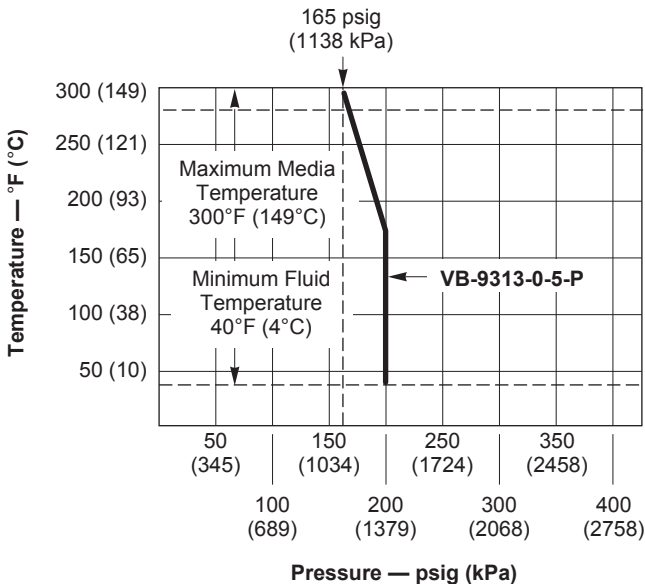
Secondary Circuits with Small Booster Pumps: 13 50% of available pressure difference (equal to the drop through load, or 50% of booster pump head).

Temperature/Pressure Ratings

VB-9313-0-5-P (Flanged Cast Iron Body)

Standards: ANSI B16.1-1993

Materials: ASTM A126 Class B



Temperature and Pressure Ratings for VB-9313 Series Valve Bodies

5. VB-8/9000 Globe Valves Sizing and Selection

VB-9313 Water Flow Coefficient and Capacity

Proportional to Blend Water Flows

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

Water Table

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

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

C_v Equation

Where:

C_v = Coefficient of flow

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

ΔP = Differential pressure in psi (pressure drop)

$$C_v = \frac{\text{GPM}}{\sqrt{\Delta P}}$$

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

$$\text{GPM} = C_v \sqrt{\Delta P}$$

VB-8xx3/9313 Close-Off Pressure Capability

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:

$$P_m = 0.5 (P_1 - P_v)$$

Where:

P_m = Maximum allowable pressure drop

P₁ = Absolute inlet pressure (psia)

P_v = 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:

$$P_m = 0.5 [(18 + 14.7) - 11.53] = 10.6 \text{ psi (Vapor pressure of 200°F water is 11.53 psi.)}$$

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

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.

5. VB-8/9000 Globe Valves Sizing and Selection

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"										
4"										
5"										
6"			125/22	125/35			125/25	125/35		
Pipe Size	VB-8303 ^a									
2 ½"	35/35				35/35				35/35	
3"										
4"										
5"	32/28				35/31			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...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 1/2" - 5" VB-8000 valves or 2 1/2" - 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 1/2" - 5" VB-8000 valves or 2- 1/2" - 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>

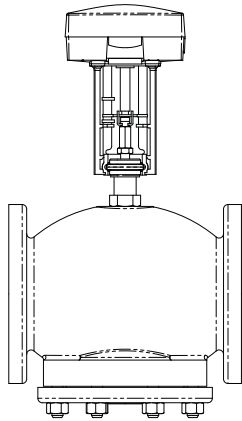
6. VB-8/9000 Valve and Actuator Assemblies



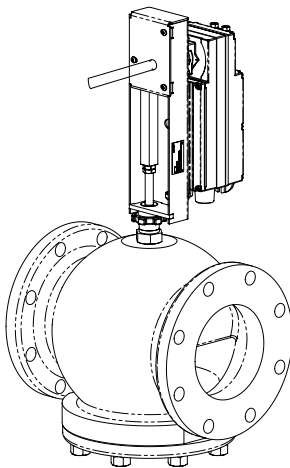
6. VB-8/9000 Valve and
Actuator Assemblies

2-Way and 3-Way Valves

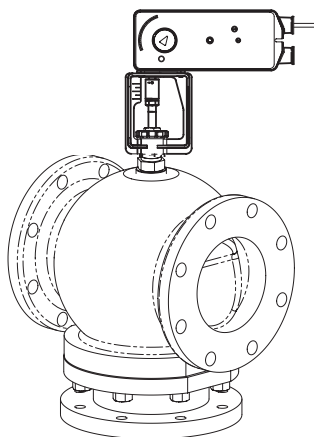
2½"...6" Flanged
2-Way Stem Up Open
2-Way Stem Up Closed
3-Way Mixing/Diverting
Electric/Electronic/Pneumatic
Globe Valve Assemblies



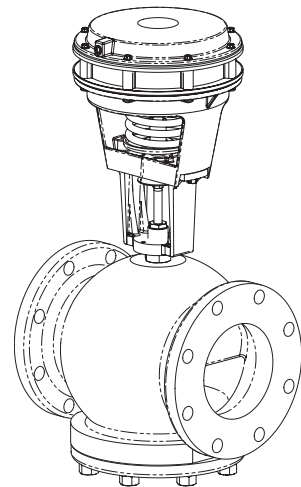
VB-8213 with M1500A Actuator



Vx-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

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 valves and a conventional mixing valve flow pattern.

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.

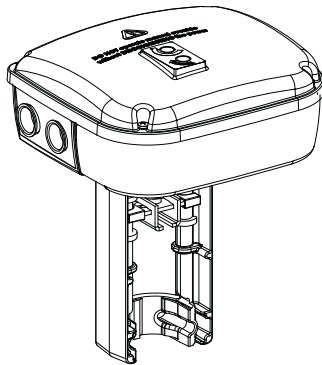
4. Close-off Pressure

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.

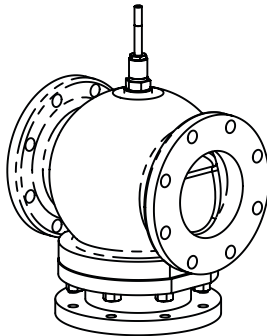
5. Available Space

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.

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.

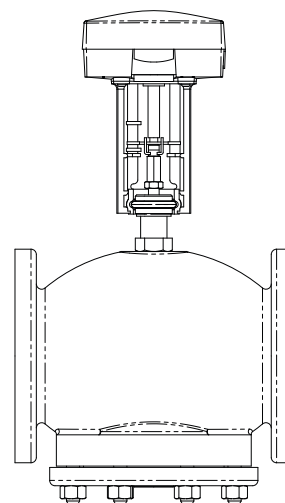
2-Way Globe Valve Assemblies with Electric Non-Spring Return Actuators								
Non-Spring Return (NSR) 2-Way Globe Valve Assemblies					M1500A		Mx41-634x	
					Actuator Output Rating (Minimum)			
					337 lbf (1500 N-m)		300 lb-in (34 N-m)	
					Actuator Model (Actuator Code)			
					Floating/Proportional 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 Actuators
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. 98, *Assembly Ordering VB-8/9000* for the relevant part series to determine a specific part no.

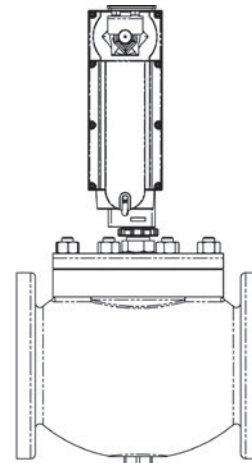
b - $C_v = \frac{gpm}{\Delta P}$ (where ΔP is measured in psi) $k_{vs} = C_v / 1.156$ $K_{vs} = \frac{m^3/h}{\Delta P}$ (where ΔP is measured in bar; 1 bar = 100 kPa).

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.



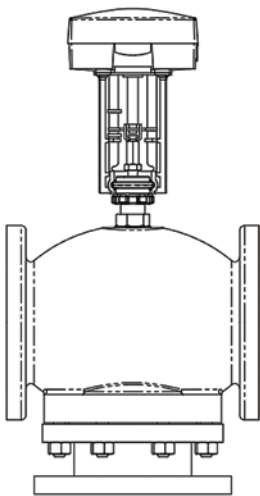
VB-8213 with M1500A Actuator



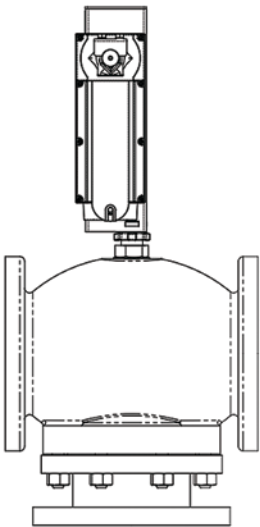
VB-8223 with Mx41-634x Actuator

3-Way Globe Valve Assemblies

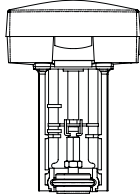
Note: Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.



Vx-8303 with M1500A Actuator



Vx-8303 with Mx41-634x Actuator

3-Way Globe Valve Assemblies with Electric Non-Spring Return (NSR) Actuators							
Non-Spring Return (NSR) 3-Way Globe Valve Assemblies					M1500A	Mx41-634x	
							
					Actuator Output Rating (Minimum)		
					337 lbf (1500 N-m)	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)	-	
			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. 98, Assembly Ordering VB-8/9000 for the relevant part series to determine a specific part number.

b - $C_v = \frac{gpm}{\Delta P}$ (where ΔP is measured in psi) $kvs = C_v / 1.156$ $K_{vs} = \frac{m^3/h}{\Delta P}$ (where ΔP is measured in bar; 1 bar = 100 kPa).

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.

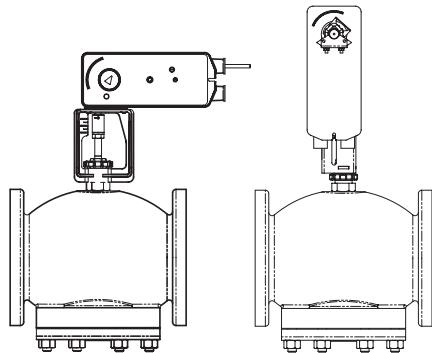
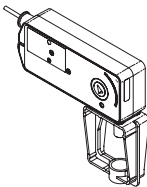
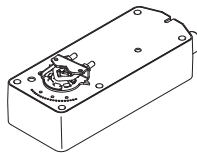
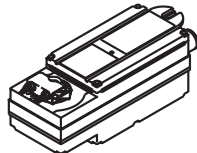
f - Diverging configuration, flow AB to A port.

g - Diverging configuration, flow AB to B port.

h - All flow configurations, mixing or Diverging.

2-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.

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-m)		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"…5") AV-609-1 (6")		AV-607-1 (2½"…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 Pressur ^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. 98, *Assembly Ordering VB-8/9000* for the relevant part series to determine a specific part number.

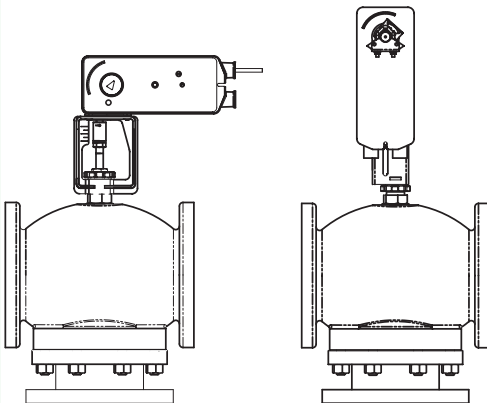
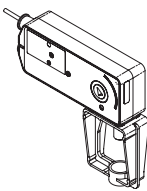
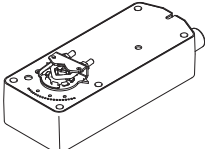
b - $C_v = \frac{gpm}{\Delta P}$ (where ΔP is measured in psi) $k_{vs} = C_v / 1.156$ $K_{vs} = \frac{m^3/h}{\Delta P}$ (where ΔP is measured in bar; 1 bar = 100 kPa).

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.

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.

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-m)		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"…5") AV-609-1 (6")		AV-607-1 (2½"…5") AV-609-1 (6")										
Close-off Pressure (psi)					35									
Valve Assembly Part Number ^a					Maximum Allowable Operating Differential Pressure, psi (kPa) (Mixing/Diverting)									
					Mx61-720x		Single Actuator	Dual Actuator ^d	Single Actuator	Dual Actuator ^d				
Vx-8303-5xx-5-P					35 (240) / 35 (240)		35 (240) / 35 (240)	-	35 (240) / 35 (240)	-				
											12	2½	80 ^e	69 ^e
													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	32 (219) / 28 (192)	35 (240) / 35 (240)	35 (240) / 31 (212)	35 (240) / 35 (240)		
					16	6	500 ^h	433 ^h	-	15 (103) / 11 (75)	-	16 (110) / 12 (82)	35 (240) / 31 (214)	

a - See Pg. 98, *Assembly Ordering VB-8/9000* for the relevant part series to determine a specific part number.

b - $C_v = \frac{gpm}{\Delta P}$ (where ΔP is measured in psi) $kvs = C_v / 1.156$ $K_{vs} = \frac{m^3/h}{\Delta P}$ (where ΔP is measured in bar; 1 bar = 100 kPa).

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.

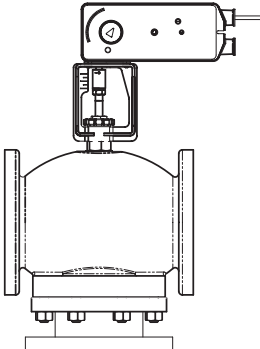
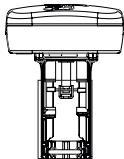
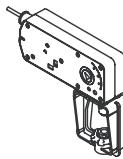
f - Diverting configuration, flow AB to A port.

g - Diverting configuration, flow AB to B port.

h - All flow configurations, mixing or Diverting.

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.

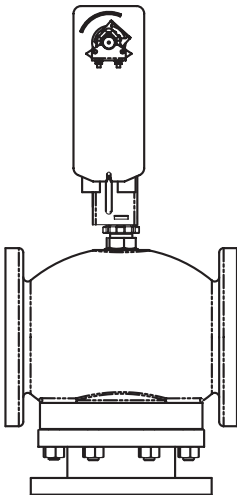
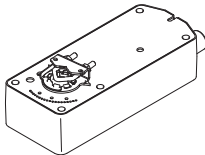
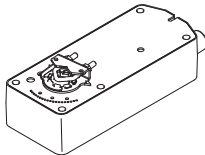
3-Way Linked Globe Valve Assemblies with Linear Series Spring Return Actuators								
3-Way Linked Globe Valve Assemblies^a 								
					Actuator Force Rating			
					157 lbf (700 N)		220 lbf (979 N)	
					Actuator Model (Actuator Code)			
					Floating/Proportional (Universal) M900AR (650) Linkage 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 - For piping information refer to the separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.

b - To determine a specific part number, see **Pg. 98, Assembly Ordering VB-8/9000** for the relevant part series.

c - $C_v = \frac{gpm}{\Delta P}$ (where ΔP is measured in psi) $kvs = C_v / 1.156$ $K_{vs} = \frac{m^3/h}{\Delta P}$ (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.

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)			Two-Position MA41-715x		Two-Position MA40-717x	
					Floating MF41-7073			Floating MF41-7153		Floating MF40-7173	
Proportional MS41-7073			Proportional MS41-7153		Proportional MS40-717x (576)						
Linkage Kit Part Number											
AV-607-1 (2½" ...4")			AV-607-1 (2½" ...4") AV-609-1 (5" and 6")		AV-607-1 (2½" ...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	

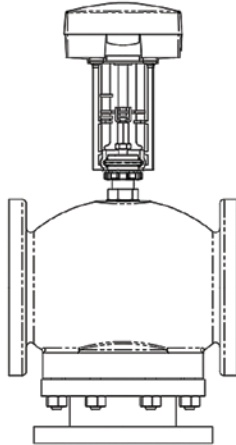
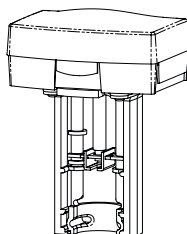
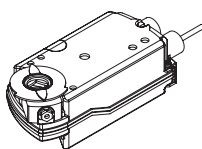
a - For piping information refer to the separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.

b - To determine a specific part number, see **Pg. 98, Assembly Ordering VB-8/9000** 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.

3-Way Linked Globe Valve Assemblies with Non-Spring Return Actuators												
Non-Spring Return 3-Way Linked Globe Valve Assemblies^a 												
					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" ... 4")		AV-609-1 f (2½" ... 6")						
Valve Assembly Part Number ^b	P Code	Valve Size in.	C _v ^c	k _{vs} ^c	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 - For piping information refer to the separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.

b - To determine a specific part number, see **Pg. 98, Assembly Ordering VB-8/9000** for the relevant part series.

c - $kvs = m^3/h$ ($\Delta P = 100$ kPa) $kvs = Cv / 1.156$ $Cv = kvs \times 1.156$

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.

Floating and Proportional NSR 300, 337 lb-in and Two-Position 220 lbf SR Linear 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-m)	Yes
		Proportional (Vdc or mA _{dc})					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 mA _{dc})	120 Vac ±10%	7.5	6.2	4.7	148	148	300 lb-in (34 N-m)	
MS41-6343	516	Proportional (Vdc or mA _{dc})	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.
d - For the floating control signal only.
e - Proportional control.

Two-Position, Floating, and Proportional Spring Return Electric 220 lbf Schneider Electric SmartX Linear Actuators														
Actuator Part Number	Actuator Code	Control Signal Type	Power Input								Timing, Sec. ^a		Output Force, lbf (N)	Manual Override
			Voltage 50/60 Hz	Running				DC Amp	Holding					
				50 Hz		60 Hz			50 Hz	60 Hz				
				VA	W	VA	W		W	W	Powered	Spring Return		
MA61-7200		2-Position (SPST or Triac)	120 Vac ±10%	11.7	8.8	10.0	8.4	-	3.6	5.0			<190	<40
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 mA _{dc})	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.

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

Actuator Part Number	Actuator Code	Control Signal Type	Power Input								Timing, Seconds ^a		Torque, lb-in (N-m) ^b	Manual Override
			Voltage 50/60 Hz	Running				DC Amp	Holding		Powered	Spring Return		
				50 Hz		60 Hz			50 Hz	60 Hz				
				VA	W	VA	W		W	W				
MA41-7150		2-Position (SPST)	120 Vac ±10%	11.7	8.8	10.0	8.4	-	3.6	5.0	<190	<30	133 (15)	Yes
MA41-7151			230 Vac ±10%	15.5	9.5	10.6	8.5	-	4.6	3.3				
MA41-7153	556		24 Vac ±20% 22-30 Vdc	9.8	7.5	9.7	7.5	0.29	2.8	2.8				
MF41-7153		Floating (SPDT)	24 Vac ±20% 22-30 Vdc	9.8	7.7	9.7	7.7	0.3	3.3	3.3				
MS41-7153	556	Proportional (Vdc or mAdc)	24 Vac ±20% 22-30 Vdc	9.8	7.4	9.7	7.4	0.3	2.9	2.9				

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

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

Linkage Kits and Actuator/Linkage Assemblies

Application	Actuator	Linkage Kit ^a
2½"...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"...4" 3-Way	MK-8811	AV-496 (VB-9313 only)
5"...6" 3-Way	MK-8911	AV-496 (VB-9313 only)
2½"...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-607-1 ^c
6" 2-Way & 3-Way (1¼" nominal stroke)		AV-609-1 ^d
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"...5" VB-8000 valves or 2½"...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"...5" valve, required for 6" valve. VK4 valve assemblies include positive positioner.

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

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

Two Position, Floating and Proportional SR 150 lb-in SmartX 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	147	65		
			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				
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.

6. VB-8/9000 Valve and Actuator Assemblies

VB-8xx3/9313 with Forta SR & NSR Actuators

Easily Assembled with VB-8000/9000 Series Globe Valves

The VB-8000/9313 2½"...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					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	Yes
	M900ARW*						None	
	M900ARW-S2*						2 SPDT	
	M900AE*						None	
	M900AEW-S2*			2 SPDT			Yes	

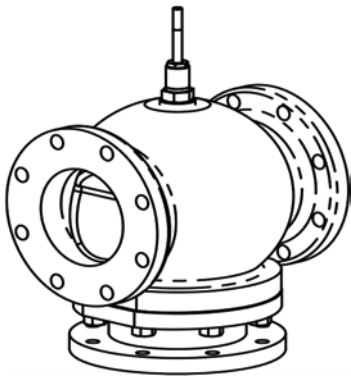
*VB-9313 valves only.

6. VB-8/9000 Valve and Actuator Assemblies

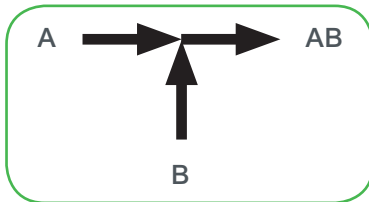
VB-9313 3-Way Valves with M900Axx SR Actuators

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

Schneider Electric Forta Actuator Model Table

Model	Actuator Code	Force	Power	Running Watts	Transformer 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								24 Vac 4a		Return	
M900ARW-S2 ^d	-										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.

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)
366°F (186°C)	90°F (32°C)

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

Select Valve/Actuator Combination Having Sufficient close-off for Application

Valve Body	Valve Action	P Code	Cv	Size	Close-off Ratings PSI	Maximum Operating Pressure Differential
					M900Axx ^a	
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

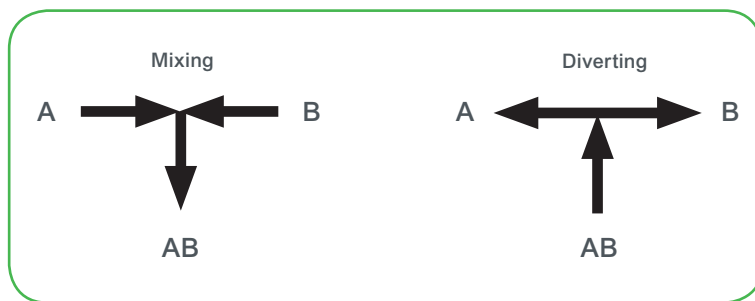
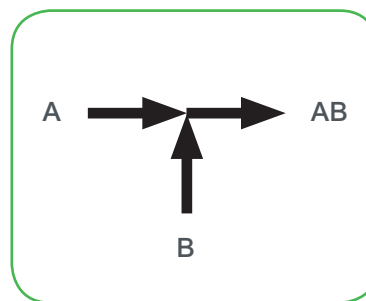
VB-9313 Series Valve Assembly Part Numbers ^a	P Code	Size	Valve Action Stem UP	M900AR (650) or M900ARW (660) Action on Power Loss
VU-9313-6x0-5-P (Mixing):	12	2 ½"	Flow B to AB	Flow B to AB
	13	3"		
	14	4"		

a - 650 = M900AR, 660 = M900ARW.

VB-9313 Valve Body and M900Axx Spring Return Actuator Actions

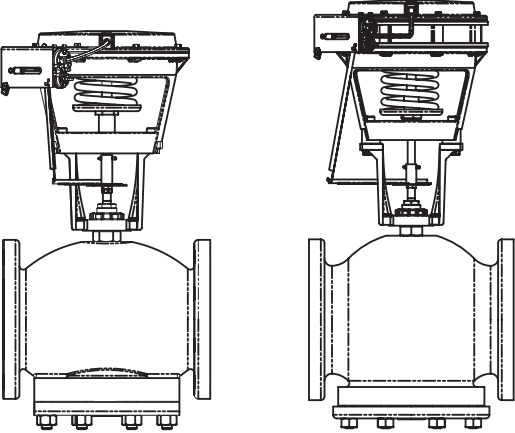
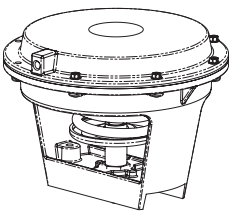
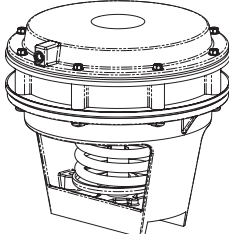
Valve Body Part Number	Valve Body Description	Valve Body Stem Up Water Flow	M900ARx			M900AEx		
			Unpowered Valve Assembly Water Flow	Switch 7 off, Loss of Control Signal Only	Switch 7 on, Loss of Control Signal Only	Unpowered Valve Assembly Water Flow	Switch 7 off, Loss of Control Signal Only	Switch 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

3-Way Flanged Valve Body Flow Patterns


VB-8303 3-Way Flow Patterns
Flow is out AB for Mixing application and in AB for Diverting applications.

VB-9313 3-Way
Mixing Flow Patterns

2-Way Valves

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

2-Way Globe Valve Assemblies with Pneumatic Spring Return Actuators								
Pneumatic Spring Return 2-Way Globe Valve Assemblies (shown with Positive Positioner) 					MK-6811 ^b		MK-6911 ^b	
								
					Actuator Models (Actuator Codes)			
					MK-6811 (602)		MK-6911 (652)	
					Linkage Kit Part Number			
					AV-497		AV-497	
Spring Range, psig (kPa)				5...10 (34 to 69) ^a		5...10 (34 to 69) ^a		
Close-off Pressure (psi)					125			
Valve Assembly Part Number ^b	P Code	Valve Size in.	C _v ^b	kvs ^b	Maximum Allowable Operating Differential Pressure ^d , psi (kPa)			
VK-8213-602-5-12 VK-8223-602-5-12 VK4-8213-602-5-12 VK4-8223-602-5-12	12	2½	56	48	35 (240)			
VK-8213-602-5-13 VK-8223-602-5-13 VK4-8213-602-5-13 VK4-8223-602-5-13	13	3	85	74				
VK-8213-602-5-14 VK-8223-602-5-14 VK4-8213-602-5-14 VK4-8223-602-5-14	14	4	145	125				
VK-8213-602-5-15 VK-8223-602-5-15 VK4-8213-602-5-15 VK4-8223-602-5-15	15	5	240	208				
VK4-8213-652-5-16 VK4-8223-652-5-16	16	6	370	320	-			
					35 (240)			

a - Spring range field adjustable with positive positioner.

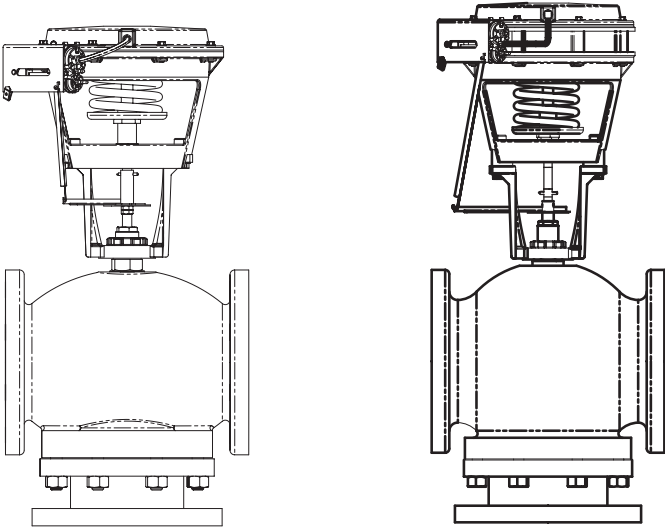
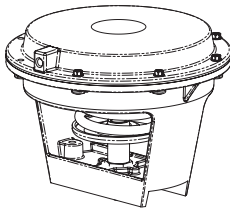
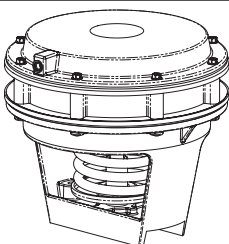
b - AK-42309-500 positive positioner optional for 2½" ... 5" valve. Supplied as standard on VK4 factory valve assemblies. See **Pg. 98, Assembly Ordering VB-8/9000** for the relevant part series to determine a specific part number.

c - $C_v = \frac{q_{pm}}{\Delta P}$ (where ΔP is measured in psi) $kvs = C_v / 1.156$ $K_{vs} = \frac{m^3/h}{\Delta P}$ (where ΔP is measured in bar; 1 bar = 100 kPa).

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

3-Way Valves

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...10 (34 to 69) ^a	5...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	80 ^e	69 ^e	35 (240) / 35 (240)	-
			95 ^f	82 ^f		
			115 ^g	99 ^g		
VK-8303-602-5-13	13	3	110 ^e	95 ^e		
			120 ^f	104 ^f		
			120 ^g	104 ^g		
VK-8303-602-5-14	14	4	190 ^h	164 ^h		
VK-8303-602-5-15 VK4-8303-602-5-15	15	5	290 ^h	251 ^h		
VK4-8303-652-5-16	16	6	500 ^h	433 ^h	-	35 (240) / 35 (240)

a - Spring range field adjustable with positive positioner.

b - AK-42309-500 positive positioner optional for 2½"...5" valve, required for 6" valve. Supplied as standard on VK4 factory valve assemblies. See "Pg. 98, Assembly Ordering VB-8/9000" for the relevant part series to determine a specific part number.

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

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.

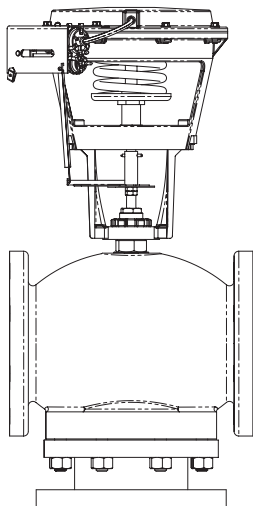
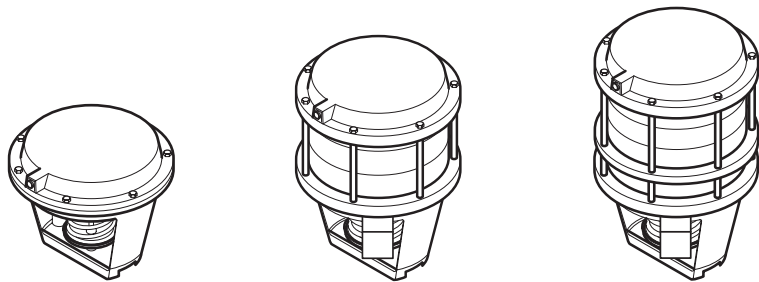
f - Diverting configuration, flow AB to A port.

g - Diverting configuration, flow AB to B port.

h - All flow configurations, mixing or Diverting.

6. VB-8/9000 Valve and Actuator Assemblies

VB-9313 3-Way Valves with Pneumatic SR 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...10			5...10			5...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 in.									
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. For piping information refer to the separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center 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

7. VB-8/9000 Series Actuators and Linkages

7. VB-8/9000 Series
Actuators and Linkages

133 lb-in Spring Return Actuators

**Mx41-7153 Series
SmartX Actuator**
(Code 556)
24 Vac
(Linkage not shown.)



Mx41-7153



**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 down
Dimensions	10½ x 4 x 3½ (267 x 110 x 89 mm)
Linkage	AV-607-1 (2½" - 5" VB-8000 valves or 2½" - 4" VB-9313 valves) or AV-609-1 (6" VB-8000 valves or 5" - 6" VB-9313 valves)
Position Indicator	Visual indicator
Override	Manual
Motor Type	Brushless
Rotation	0...90°
Control Signal	MA41-7153: 2-position SPST MF41-7153: Floating MS41-7153: 2...10 Vdc The 2...10 Vdc control signal is factory set for direct action. It can be changed in the field to reverse action.
Voltage	24 Vac ± 20%, 22-30 Vdc
VA@60 HZ	9.7
Feedback	MA41 and MF41: None MS41: 2...10 Vdc
Auxiliary Switch	None
Timing (seconds)	Powered <190 Spring return <30
General Instructions	F-26642

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

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.

150 lb-in Spring Return Actuators

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



Mx40-7173



**Mx40-7170 Series
SmartX Actuator**
120 Vac



Mx40-7170



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

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.

220 lb-in Spring Return Actuators

**Mx61-7203 Series
SmartX Actuator**
(Code 596)
24 Vac



Mx61-7203



**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	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 $\pm$ 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

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 $\pm$ 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>

300 lb-in Single Non-Spring Return Actuators

**Mx41-6343 Series
SmartX Actuator**
(Code 516)
24 Vac



Mx41-6343



**MS41-6340 Series
SmartX Actuator**
(Code 512)
120 Vac



MS41-6340



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

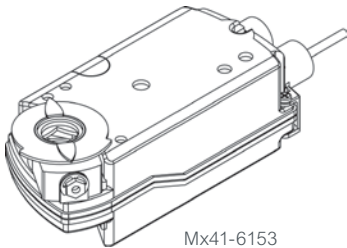
Note: Single mount actuators may be factory assembled, dual mount are field assembled.

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

133 lb-in 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 3/4-in. (6.4 to 19 mm) dia., 1/4 to 1/2-in. (6.4 to 13 mm) sq.
Housing	NEMA Type 1, IP54 according to EN 60 529.
Dimensions	8-3/8 H x 3 1/4 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 (2 1/2" to 4" VB-9313 valves)
Installation Instructions	Refer to F-27215.
Wiring Diagrams	MF41-6153 MS41-6153
Regulatory Compliance	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2.

Specifications - Electrical & Timing

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							

157 lbf Spring Return Actuators



M900A
NEMA 1 & 2

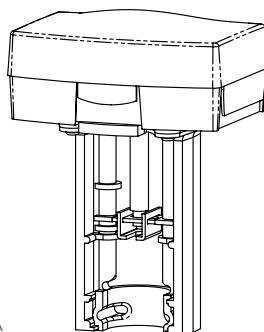
Forta
M900A Actuators
24 Vac - 20-29 Vdc

7. VB-8/9000 Series
Actuators and Linkages

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)
Regulatory Compliance	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2. RCM marked for AUS/NZ.
Environmental	RoHS, REACH

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 @ 1/2" 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
Regulatory Compliance	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93, CE compliant to LVD, EMC, and RoHS2 directives, and RCM marked for AUS/NZ.

Specifications - Electrical & Control

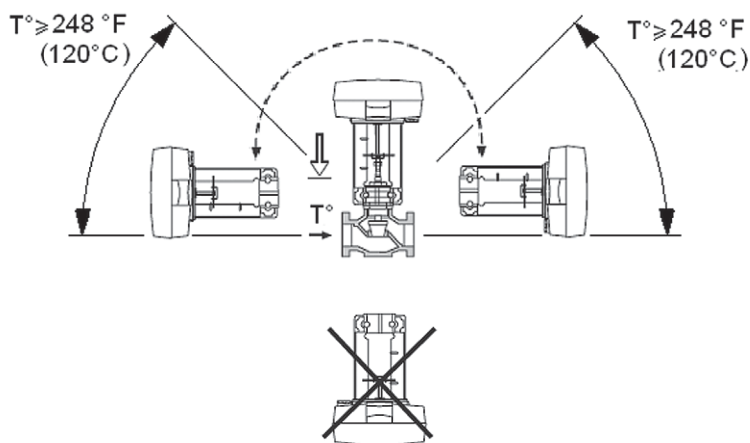
Model	M800A	M800A-S2	M1500A	M1500A-S2
AC Power	24 Vac +/- 10% 50-60 Hz			
DC Power	20 - 29 Vdc 20 W		20 - 29 Vdc 30 W	
Running VA	15		24	
Transformer Size VA	50		50	
Floating Control	Yes			
Proportional Control	0...10 Vdc, 2...10 Vdc or 4...20mA with 500 ohm resistor			
Feedback	2...10 Vdc			
Force	180 lbf (800 N)		337 lbf (1500 N)	
2-SPDT Aux Switch	No	24 Vac 4a res	No	24 Vac 4a res

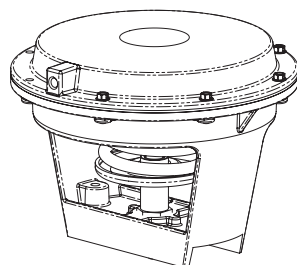
Dimensions

Refer to the separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.

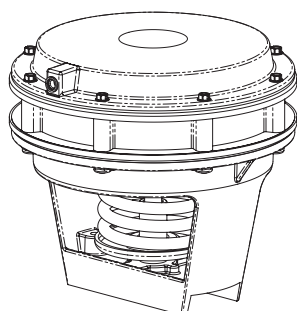
Mounting

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

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	1 3/4" (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>

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.

Accessories

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

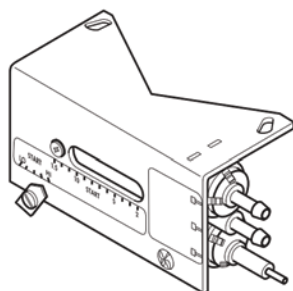


MK-8xxx
Series Actuator
with 3-Way Valve Assembly

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	11¼ high x 10½ wide x 10½ deep	298 high x 267 wide x 267 deep	VB-9313 2½ – 4"
MK-8911			2	50.8	12¼ 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.



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.

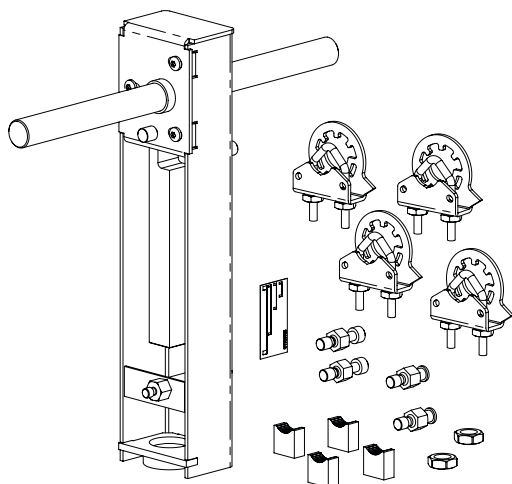
Specifications	
Action	Direct (increase in output pressure to actuator with an increase in pilot pressure from controller).
Pilot input	0 to main air pressure, psig.
Output	0 to main air pressure, psig.
Construction	
Housing	Polysulfone
Diaphragm	Neoprene
Start point	Adjustable 1...12 psig (7...83 kPa).
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

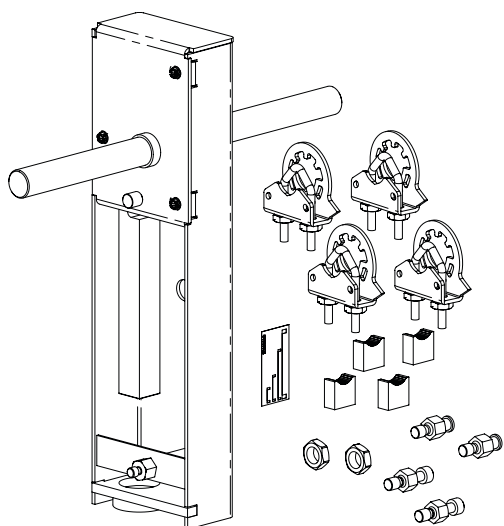
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for more information.



Visit:
<http://goo.gl/LJCLEb>



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, INVEN-SYS) 2½"…5" VB-8xx3, 2½"…4" VB-9313 and discontinued 2"…4" VB-9xxx valves and Schneider Electric SmartX actuators²
- AV-609-1 is compatible with Schneider Electric (Siebe, Barber-Colman, INVEN-SYS) 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

2 - Check the appropriate valve selection guide for close-offs for your application. AV-607-1 and AV-609-1 replace AV-607 and AV-609 respectively

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 2½" 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-7000 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.

MORE INFO

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



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

Notes

7. VB-8/9000 Series
Actuators and Linkages

8. VBB/VBS and VB-2000 Series Ball Valve Assemblies



8. VBB/VBS and VB-2000 Series
Ball Valve Assemblies

VBB/VBS Ball

V B x x N x x

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

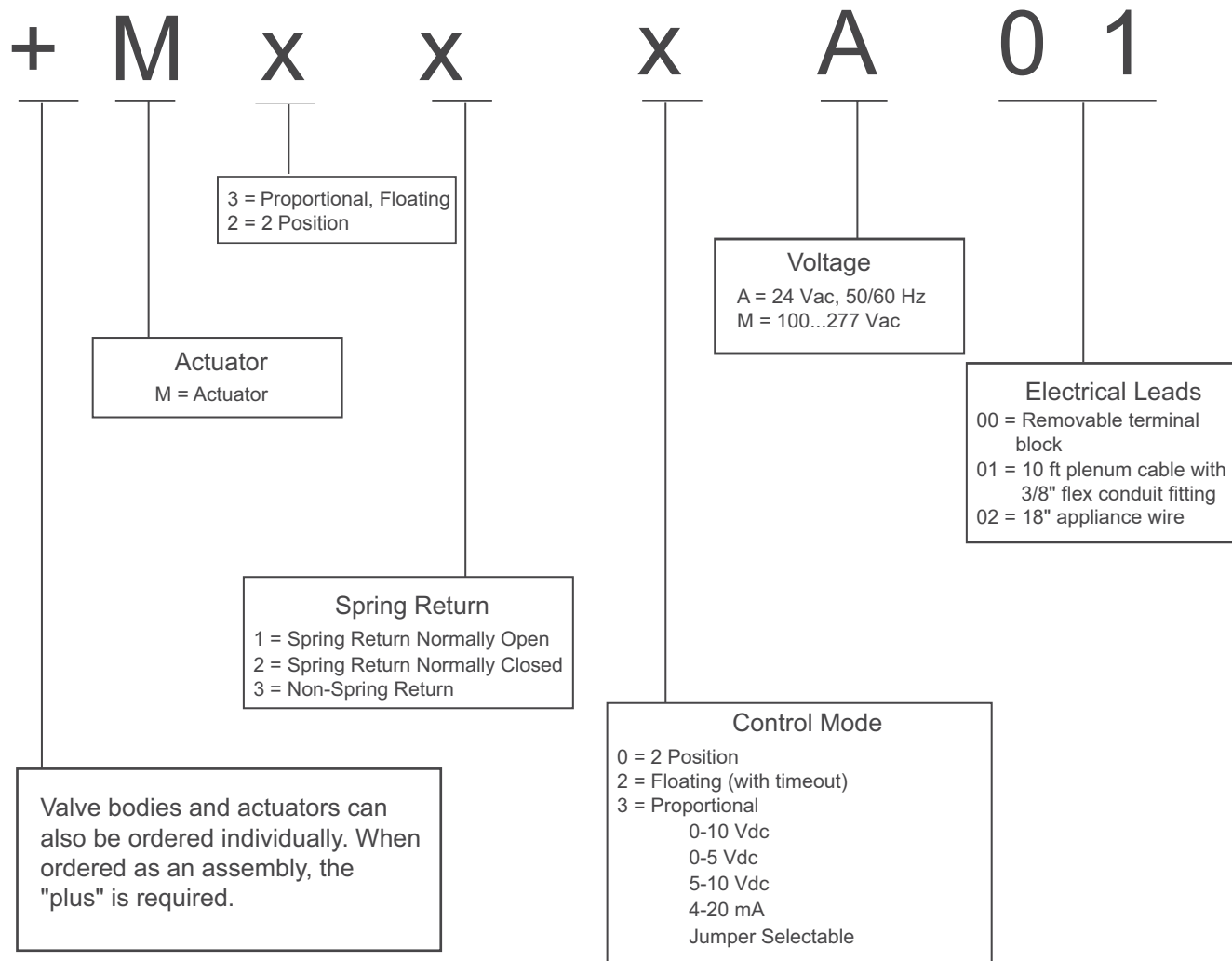
Valve Body Data
2 = Two-Way
3 = Three-Way

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
3/4"	07*	10.0
	10	.3
	11	.7
	12	1.2
	13	2.1
	14	3.5
	15	4.7
	16	7.7
	17*	10.0
3-Way		
Size	Port Code	Cv
1/2"	00	0.3
	01	0.6
	02	1.0
	03	2.0
	04	3.0
	05	4.5
	06	7.3
3/4"	07*	10
	10	0.3
	11	0.6
	12	1.0
	13	2.0
	14	3.0
	15	4.5
	16	7.3
	17*	10

* full port

Valve Assemblies





Application

The VBB and VBS Series valves with SmartX Actuators are 2-Way or 3-Way, 1/2" or 3/4", characterized ball valves. The M3 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 2-Way and 3-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.

Application Note for 2-Way and 3-Way Valves

The VBB/VBS Series Ball Valves are Characterized Control Ball Valves. They are designed so that flow thru the A-port exhibits equal percentage flow. Thus, the A-port is the control port.

In a three-way valve, the B-port is the bypass port. Flow thru the B-port is designed to be less than that of the A-port. In most applications, this reduced flow compensates for the pressure drop that is seen by the coil supplied by the A-port.

Specifications

Actuator

Voltage	24 Vac for floating and proportional 100...277 Vac for two position multi-voltage types
Power Requirements	See Table-1, Table-2, and Table-3.
Control Signal	2-Position, Floating, or Proportional; half wave rectified power supply
Timing, Full Open to Full Close	See Table-1, Table-2 and Table-3.
Manual Operating Lever / Position Indicator	Standard on all models.
Auxiliary End Switch (optional)	SPST 24 Vac/Vdc, 101 mA...5 A max.
Materials	Thermoplastic base and cover. Approved for use in air plenums.
Shipping & Storage Temperature Limit	-40...169 °F (-40...76°C).
Operating Temperature Limit at max fluid temp.	Floating 32...140 °F (0...60 °C)
	Proportional 32...140 °F (0...60 °C)
	Two-Position 32...169 °F (0...76 °C)
	Humidity 5...95% relative humidity, non-condensing.
Locations	NEMA 2, IEC IP31. Indoor Use Only.

Valve

Service ^a	Hot and chilled water, up...60% glycol.
System Static Pressure Limit	600 psi (4137 kPa).
Fluid Temperature Limit	20...250°F (-7...121°C).
Cv (Kv)	See Tables 4 through 7.
Close-off Pressure ^b	130 psi 2-Way; 70 psi 3-Way
Differential Pressure	30 psi normal operation 20 psi quiet operation.
Seat Material	PTFE
Characterized Insert	Glass-filled PEEK
Seat Leakage	ANSI class IV (0.01%) at both A and B ports with pressure at inlet.
End Connections	NPT threaded (VBxxNxx)
Rangeability	Greater than 300:1.
Body Material	Forged brass.
Stem Material	Stainless steel anti-blow out stem with dual Viton™ o-rings.
Ball Material	Chrome plated brass (VBB series) or stainless steel (VBS series).

a. Not rated for steam service.

b. Close-off is defined as the maximum allowable pressure drop to which a valve may be subjected while fully closed.

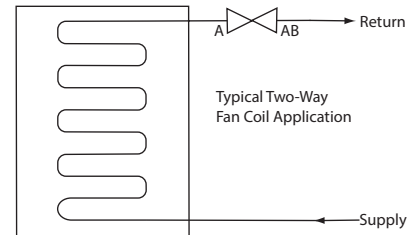
Agency Listings

M2 SmartX actuators	North America: c-UL-us LISTED per UL 873 and C22.2 No.24. European Union: LVD 2006/95/EC and EMC 2004/108/EC directives compliant.
M3 SmartX actuators:	North America: c-UL-us LISTED per UL 60730-1 & -2-14 and CSA E60730-1 & -2-14. FCC part15 classB & ICES-003 classB emissions compliant. European Union: LVD 2014/35/EU and EMC 2014/30/EU directives, per EN 60730-1 & -2-14. EN 61000-6-2 immunity & EN 61000-6-3 emissions compliant.
Australia	This product meets requirements to bear the RCM Mark.
Plenum Rating	Actuators with terminal block or plenum cable leads are plenum rated.
CRN Number	CRN OC0970.9012345678NTY.
RoHS Compliant	VBS valves and M3/M2 actuators comply with European Directive RoHS 2 Directive 2011/65/EU. Please consult factory for part number specific compliance.
REACH Compliant	Compliant as defined in Article 33 of the REACH Regulation (EC)1907/2006.

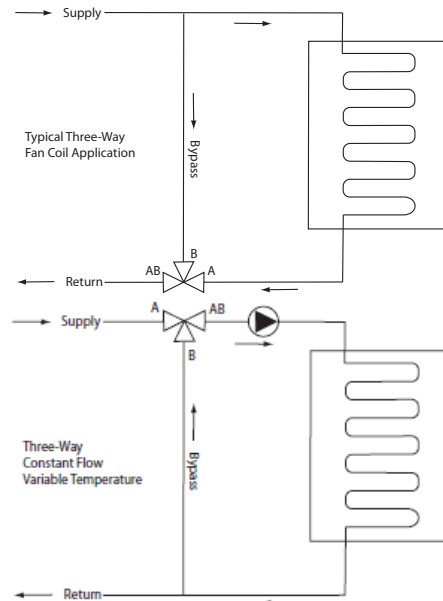
Application Schematics

Typical applications

For simplicity, balancing valves and control devices are not shown.



Mixing applications



Ball Valve Assembly Selection Procedure

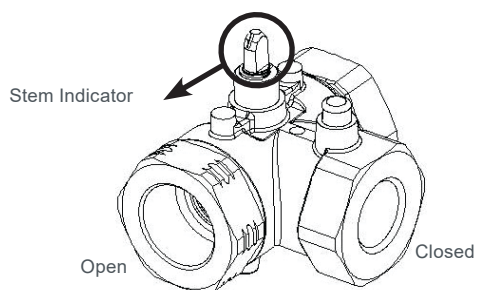
1. Select the actuator. When selecting a ball valve assembly, you must know the control signal type and voltage to first select an actuator. Consult the following tables: Table-1 covers two-position actuator specifications and model numbers, Table-2 covers floating actuator specifications and model numbers and Table-3 covers proportional actuator specifications and model numbers.
2. Select the valve body. The valve body model number is selected based on the line size (1/2" or 3/4"), ball material trim, and flow coefficient (Cv/Kv) required. Consult Table-4 and Table-5 for brass trim valve body specifications and model numbers and Table-6 and Table-7 for stainless steel trim valve body specifications and model numbers. See "Flow Coefficient Selection" for information in determining the flow coefficient.

Other considerations

1. General service conditions: Make sure the actuator is suitable for the anticipated ambient conditions and that the valve body is compatible with the system fluid temperature and pressure requirements.
2. Close-off pressure: Confirm that the VBB/VBS ball valve's close off rating is suitable for the valve control application.
3. Space requirements: If mounting space limitations are a consideration, check the actuator/valve assembly dimensions.
4. Pipe reducers: Refer to Tables for estimating effective Cvs when using pipe reducers.
5. Ordering information. You may order the actuator and valve body separately or as a factory assembly. To order a complete valve and actuator assembly, specify the valve body part number and the actuator part number separated by a "+." Example: To order actuator valve body VBB2N15 and M312A00 as a factory valve/actuator assembly, specify VBB2N15+M312A00.

Flow Direction

A notch cut into the stem indicator at the tip of the valve stem is an external indicator of where the closed portion of the ball sits internally. Check the notch position prior to assembling the actuator to verify the ball is orientated in the correct plane.



In the drawings below, the black mark on the stem indicator represents this stem notch.

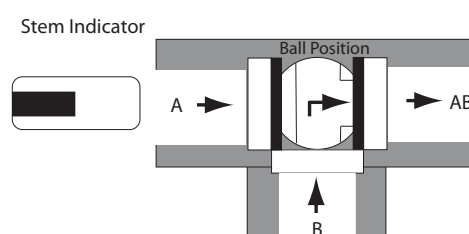
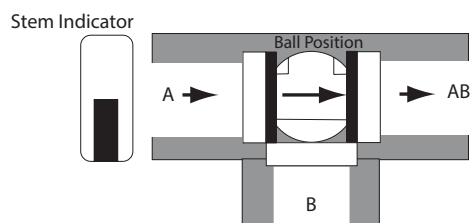
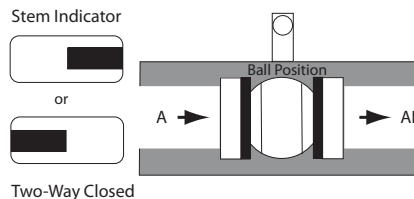
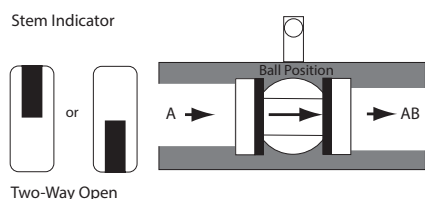


Table-1: Two-Position Actuators

Part Number	Control Signal	Spring Return Action (Valve Normal Position)	VA / Voltage	Leads	Stroke Timing ^a	Spring Return Timing ^a	End Switch
M210A00	Two-Position	Normally Open	3.5/1.8 at 24 Vac/24 Vdc	Removeable Terminal Block ^b	50 sec	35 sec.	
M210A01				10 ft. (3.05 m) Plenum Cable ^c			
M210A11							SPST
M210A02			6.0/6.0 at 100...277 Vac, 50/60 Hz	18 in. (45 cm) Appliance Wire			
M210A12							SPST
M210M02				18 in. (45 cm) Appliance Wire			SPST
M220A00		Normally Closed	3.5/1.8 at 24 Vac/24 Vdc	Removeable Terminal Block ^b	50 sec	35 sec.	
M220A01				10 ft. (3.05 m) Plenum Cable ^c			
M220A11							SPST
M220A02			6.0/6.0 at 100...277 Vac, 50/60 Hz	18 in. (45 cm) Appliance Wire			
M220A12							SPST
M220M02				18 in. (45 cm) Appliance Wire			SPST

Table-2 Floating Actuators

Part Number	Control Signal	Spring Return Action (Valve Normal Position)	VA @ 24 Vac 50/60 Hz	Leads	Stroke Time, sec. 50/60 Hz	Time-out Delay, sec. 50/60 Hz	
M332A00	Floating	None	2.3/2.4	Terminal Block ^b	159/135	181 Sec	
M332A01				10 ft. (3.05 m) Plenum Cable ^c			
M312A00		Normally Open	3.2/3.3 ^d	Terminal Block ^b			
M312A01				10 ft. (3.05 m) Plenum Cable ^c			
M322A00		Normally Closed		Terminal Block ^b			
M322A01				10 ft. (3.05 m) Plenum Cable ^c			

Table-3 Proportional Actuators

Part Number	Control Signal	Spring Return Action (Valve Normal Position)	VA @ 24 Vac 50/60 Hz	Leads	Stroke Time, sec. 50/60 Hz	Time-out Delay sec. 50/60 Hz
M333A00	Proportional ^a (Vdc : 0...5, 0...10, 2...10, 5...10, 4...20 mA dc ^e)	None	2.7/2.8	Terminal Block ^b	159/135	200/166
M333A01				10 ft. (3.05 m) Plenum Cable ^c		145 Sec
M313A00		Normally Open	2.7/2.8 ^d	Terminal Block ^b		
M313A01				10 ft. (3.05 m) Plenum Cable ^c		
M323A00		Normally Closed		Terminal Block ^b		
M323A01				10 ft. (3.05 m) Plenum Cable ^c		

a. Default configured for 0...10 Vdc input signal, direct acting control.

b. All terminal block and appliance wire units accept a 1/2" conduit connector fitting (.875" diameter).

c. All plenum cable units include an integral 3/8" conduit connector fitting.

d. Size transformer for 10 VA per actuator.

e. For 4...20 mA control, a separate isolated transformer must be used with each valve.

g. Nominal.

Table-4 2-Way Brass Trim Valve Bodies

Size	Part Number	End Connection	Cv (Kv)
1/2"	VBB2N00	NPT	0.3 (0.3)
	VBB2N01		0.7 (0.6)
	VBB2N02		1.2 (1.0)
	VBB2N03		2.1 (1.8)
	VBB2N04		3.5 (3.0)
	VBB2N05		4.7 (4.1)
	VBB2N06		7.7 (6.7)
	VBB2N07 ^b		10 (8.7)
3/4"	VBB2N10		0.3 (0.3)
	VBB2N11		0.7 (0.6)
	VBB2N12		1.2 (1.0)
	VBB2N13		2.1 (1.8)
	VBB2N14		3.5 (3.0)
	VBB2N15		4.7 (4.1)
	VBB2N16		7.7 (6.7)
	VBB2N17 ^b		10 (8.7)

b. Full Port Model without characterized disc.

Table-5 3-Way Brass Trim Valve Bodies

Size	Part Number	End Connection	Cv (Kv) A Port	Cv (Kv) B Port
1/2"	VBB3N00	NPT	0.3 (0.3)	0.3 (0.3)
	VBB3N01		0.6 (0.5)	0.8 (0.7)
	VBB3N02		1.0 (.85)	0.8 (0.7)
	VBB3N03		2.0 (1.7)	1.5 (1.3)
	VBB3N04		3.0 (2.6)	1.5 (1.3)
	VBB3N05		4.5 (3.9)	2.7 (2.3)
	VBB3N06		7.3 (6.3)	4.1 (3.5)
	VBB3N07 ^b		10.0 (8.7)	4.8 (4.1)
3/4"	VBB3N10		0.3 (0.3)	0.3 (0.3)
	VBB3N11		0.6 (0.5)	0.8 (0.7)
	VBB3N12		1.0 (.85)	0.8 (0.7)
	VBB3N13		2.0 (1.7)	1.5 (1.3)
	VBB3N14		3.0 (2.6)	1.5 (1.3)
	VBB3N15		4.5 (3.9)	2.7 (2.3)
	VBB3N16		7.3 (6.3)	4.1 (3.5)
	VBB3N17 ^b		10.0 (8.7)	4.8 (4.1)

b. Full Port Model without characterized disc.

Table-6 2-Way Stainless Steel Trim Valve Bodies

Size	Part Number	End Connection	Cv (Kv)
1/2"	VBS2N00	NPT	0.3 (0.3)
	VBS2N01		0.7 (0.6)
	VBS2N02		1.2 (1.0)
	VBS2N03		2.1 (1.8)
	VBS2N04		3.5 (3.0)
	VBS2N05		4.7 (4.1)
	VBS2N06		7.7 (6.7)
	VBS2N07 ^b		10 (8.7)
3/4"	VBS2N10		0.3 (0.3)
	VBS2N11		0.7 (0.6)
	VBS2N12		1.2 (1.0)
	VBS2N13		2.1 (1.8)
	VBS2N14		3.5 (3.0)
	VBS2N15		4.7 (4.1)
	VBS2N16		7.7 (6.7)
	VBS2N17 ^b		10 (8.7)

b. Full Port Model without characterized disc.

Table-7 3-Way Stainless Steel Trim Valve Bodies

Size	Part Number	End Connection	Cv (Kv) A Port	Cv (Kv) B Port
1/2"	VBS3N00	NPT	0.3 (0.3)	0.3 (0.3)
	VBS3N01		0.6 (0.5)	0.8 (0.7)
	VBS3N02		1.0 (.85)	0.8 (0.7)
	VBS3N03		2.0 (1.7)	1.5 (1.3)
	VBS3N04		3.0 (2.6)	1.5 (1.3)
	VBS3N05		4.5 (3.9)	2.7 (2.3)
	VBS3N06		7.3 (6.3)	4.1 (3.5)
	VBS3N07 ^b		10.0 (8.7)	4.8 (4.1)
3/4"	VBS3N10		0.3 (0.3)	0.3 (0.3)
	VBS3N11		0.6 (0.5)	0.8 (0.7)
	VBS3N12		1.0 (.85)	0.8 (0.7)
	VBS3N13		2.0 (1.7)	1.5 (1.3)
	VBS3N14		3.0 (2.6)	1.5 (1.3)
	VBS3N15		4.5 (3.9)	2.7 (2.3)
	VBS3N16		7.3 (6.3)	4.1 (3.5)
	VBS3N17 ^b		10.0 (8.7)	4.8 (4.1)

b. Full Port Model without characterized disc.

Application Notes

The VBB/VBS Series Ball Valves are valve actuator assemblies designed to make incremental adjustments to flow based on the control signal input. The actuators are not intended for continuous use in zero dead band control systems.

Two-Position Spring Return SmartX Actuators

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.

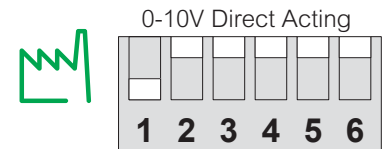
Floating/Proportional Spring Return SmartX Actuators

When power is applied to the actuator, there is a 3-second delay before the solenoid latches and the gear train is engaged. Upon power loss, the solenoid releases after 2 seconds, allowing the actuator to spring return to normal position. This prevents the loss of valve position during brief outages. The spring return feature should not be used for routine, normal operation.

Proportional Spring Return and Non-Spring Return SmartX Actuators

The control signal input and action is selected by means of the input signal dip switch on the actuator circuit board.

All actuators are shipped with the input signal dip switch (SW1) set to ON for a 0...10 Vdc control signal and the remaining dip switches and the control action dip switch set to OFF for direct action (DA; valves opens with increasing control signal, as shown). When using a 4...20 mA dc control signal, a separate isolation transformer must be used with each actuator.



When using switches 1-4, the lowest numbered dip switch set to ON takes priority, e.g. if both SW2 and SW4 are on, SW2 takes precedent. SW1 through SW4 must be OFF (and SW5 ON) for 4-20 mA mode. For more information see Guidelines for Powering Multiple Actuators EN-206 (F-26363).

Multiple actuators may be connected to a single controller. Do not exceed the maximum current draw of the controller or transformer.

Proportional Actuators perform a self-calibration cycle on power-up. The actuator will run to the open direction for approximately 20 seconds and then to the closed direction for approximately 2 ½ min (60 Hz) or 3 ½ min (50Hz). See Table-2 for exact timing. Once this cycle is complete, the actuator will then accept and respond to the control signal.

Do not use manual positioning while power is applied to the actuator. Manual positioning of the actuator while power is applied is NOT recommended. If the actuator is manually positioned while power is applied, the calibration cycle will need to be completed again for the actuator to function properly. To recalibrate the actuator, cycle power off for more than 6 seconds.

Floating Spring Return and Non-Spring Return SmartX Actuators

Spring Return and Non-Spring Return actuators with time-out will automatically limit the running time of the actuator. The time-out feature automatically cuts off the control signal to the valve after three minutes (see Table-1) of continuous operation. Upon change in control signal direction, the actuator will resume operation. The controller or thermostat used to operate the Non-Spring Return Floating actuator without timeout must be configured to turn off the control signal after being continuously on for three minutes. Multiple actuators may be connected to a single controller. Do not exceed the maximum current draw of the controller or transformer.

Power/Failure Action

	Control Signal	Position upon loss of power		
		Non-Spring Return Actuator	Spring Return Open Actuator - Fail Open	Spring Return Closed Actuator - Fail Closed
Floating	Power to "Open" terminal will open A to AB	Maintain last position	Will spring A to AB open	Will spring A to AB closed
Proportional	DA Dip Switch selected (SW6 OFF)- Increase in control signal will open A to AB	Maintain last position	Will spring A to AB open	Will spring A to AB closed
	RA Dip Switch selected (SW6 ON)- increase in control signal will close A to AB	Maintain last position	Will spring A to AB open	Will spring A to AB closed
2-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	

Note: 2-Way valve operation described. For a 3-Way valve, A to AB operation is the same. B to AB operation is opposite that of A to AB operation.

Using Pipe Reducers with Ball Valves

This table provides estimated effective Cvs when using pipe reducers with ball valve assemblies. Use these estimated effective Cvs in place of the rated Cvs when reducers or increasers are located within 6 pipe diameters upstream and 3 pipe diameters downstream of the valve.

⚠ WARNING

RISK OF PIPE FAILURE

- Do not use a valve sized less than one-half the pipe run size. Erosion or wire draw may cause pipe failure in the reduction area.

Failure to follow this instruction may result in death or serious injury.

2-Way Valves

Valve Size inch	Valve Body NPT Threaded	Cv (Kv)	Estimated Effective Cv (Kv)				
			Pipe Size in Inches				
			1/2	3/4	1	1-1/4	1-1/2
1/2	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)		
3/4	VBx2N07	10 (8.7)	10 (8.7)	8.5 (7.4)	7.0 (6.0)	—	—
	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)

3-Way Valves

Valve Size in	Valve Body NPT Threaded	Cv (Kv)	Estimated Effective Cv (Kv)				
			Pipe Size in Inches				
			1/2	3/4	1	1-1/4	1-1/2
1/2	VBx3N00	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	—	—
	VBx3N01	0.6 (0.5)	0.6 (0.5)	0.6 (0.5)	0.6 (0.5)		
	VBx3N02	1.0 (.9)	1.0 (.9)	1.0 (.9)	1.0 (.9)		
	VBx3N03	2.0 (1.7)	2.0 (1.7)	2.0 (1.7)	2.0 (1.7)		
	VBx3N04	3.0 (2.6)	3.0 (2.6)	2.9 (2.5)	2.8 (2.4)		
	VBx3N05	4.5 (3.8)	4.5 (3.8)	4.2 (3.6)	3.9 (3.3)		
	VBx3N06	7.3 (6.2)	7.3 (6.2)	6.2 (5.3)	5.1 (4.4)		
3/4	VBx3N07	10.0 (8.5)	10.0 (8.5)	8.5 (7.4)	7.0 (6.0)	—	—
	VBx3N10	0.3 (0.3)	—	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)
	VBx3N11	0.6 (0.5)		0.6 (0.5)	0.6 (0.5)	0.6 (0.5)	0.6 (0.5)
	VBx3N12	1.0 (.9)		1.0 (.85)	1.0 (.85)	1.0 (.9)	1.0 (.9)
	VBx3N13	2.0 (1.7)		2.0 (1.7)	2.0 (1.7)	2.0 (1.7)	2.0 (1.7)
	VBx3N14	3.0 (2.6)		3.0 (2.6)	3.0 (2.6)	2.9 (2.5)	2.9 (2.5)
	VBx3N15	4.5 (3.8)		4.5 (3.8)	4.4 (3.8)	4.3 (3.7)	4.2 (3.6)
	VBx3N16	7.3 (6.2)		7.3 (6.2)	7.1 (6.1)	6.9 (5.9)	6.8 (4.1)
	VBx3N17	10.0 (8.5)		10.0 (8.5)	9.5 (8.2)	9.0 (7.8)	7.2 (6.2)

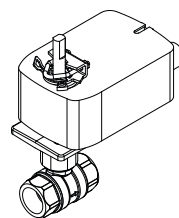
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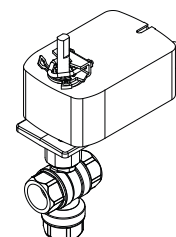
The Schneider Electric VA, VF, and VS-2xx3-xxx-9-xx series Ball Valve Assemblies are complete actuator/valve assemblies that accept two-position, floating, or proportional control signals from a DDC system or a thermostat, for control of hot or chilled water, or solutions of up to 50% glycol. They consist 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.

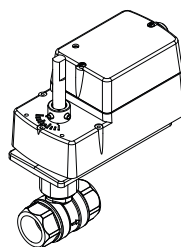


Vx-22x3-5xx-9-xx
2-Way Assembly with
Spring Return Actuator

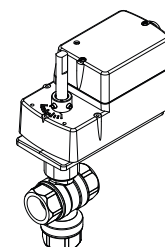


Vx-2313-5xx-9-xx
3-Way Assembly with
Spring Return Actuator

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 157 or “Ball Valve Assemblies Using SmartX 8xx Actuators” on page 158, 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 171 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 159 or “3-Way Ball Valve Assemblies with SmartX Actuators” on page 160.
3. Actuator
Select the appropriate actuator and code, according to “Ball Valve Assemblies Using SmartX 5xx Actuators” on page 157 or “Ball Valve Assemblies Using SmartX 8xx Actuators” on page 158, based on the control signal type, required valve normal position, and voltage requirements. For detailed actuator information, refer to the applicable actuator specifications.

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 “Assemblies with Mx40-704x SR SmartX Actuators” on page 167 and “Assemblies with Mx4D-703x/803x SR SmartX Actuators” on page 168, “Assemblies with MF/Ms41-6043/83 NSR SmartX Actuators” on page 166.
4. Close-off Pressure
Confirm in Table-4, Table-5, Table-6, and Table-7 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 (Figure 1 through Figure 8) and its accompanying table for any potential fit problems.

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

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

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

Port Code
Refer to separate Port Code table

Actuator Code ¹ ²				Valves Used On ³					
Model	Code	Normal Position	Voltage	1/2 to 1"		1-1/4"		1-1/2" to 3"	1-1/2" to 2"
				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

^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.

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

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

Ball Valve Assemblies Using SmartX 8xx Actuators

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

Port Code
Refer to separate
Port Code table

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 Steel³

Connection

3 = Threaded NPT

Actuator Code ¹					Valves Used On ³			
Model ^a	Code	Normal Position	Voltage	Type	1/2" to 1"		1-1/4" to 3"	1-1/4" to 2"
					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	—	—

Valve Body/Linkage Assembly^c VB-22x3-500-9-xx, VB-2313-500-9-xx

SR = Spring Return NSR = Non-Spring Return

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.

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

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

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
1	18	28.6 ^b	24.7
	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
1 1/4	27	54.2 ^b	46.9
	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

Size in.	2-Way		
	Port Code	Cv ^a	Kvs ^a
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 DP is measured in psi)

$kvs = \frac{Cv}{1.156}$

$kvs = \frac{m^3/h}{\sqrt{\Delta P}}$ (where DP 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 DP is measured in psi)

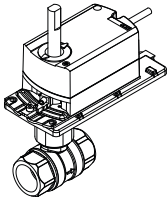
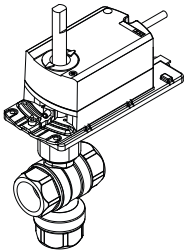
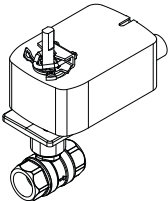
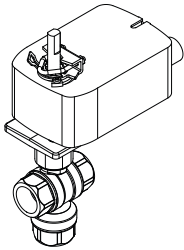
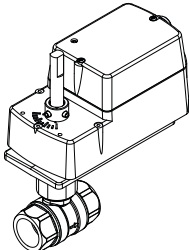
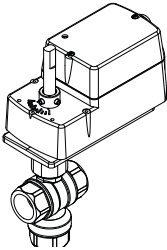
$kvs = \frac{Cv}{1.156}$

$kvs = \frac{m^3/h}{\sqrt{\Delta P}}$ (where DP 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.

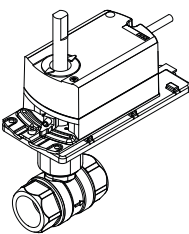
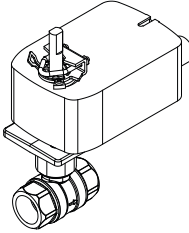
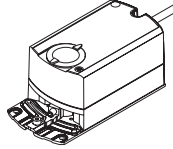
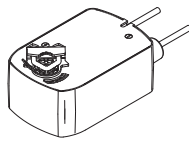
Table-3. Specifications for Ball Valve Assemblies

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	 Non-Spring Return Vx-2313-505-9-P Vx-2313-506-9-P
		 Spring Return Vx-22x3-5xx-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	 Spring Return Vx-2313-81x-9-P Vx-2313-82x-9-P Vx-2313-83x-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 173.	Same as close-off pressures shown in Table-5 or Table-7. Refer to "Cavitation Limitations on Valve Pressure Drop" on page 173.
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. 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	1/2	1, 2, 3, 4, 5, 6, 7	130 (896) (field assemble)	-
	3/4	11, 12, 13, 14, 15, 16, 17, 18		
	1	21, 22, 23, 24, 25, 26, 27	100 (689)	130 (896) (field assemble)
	1 1/4	41, 42, 43, 44, 45, 46	70 (482)	
Valve/Linkage Assembly VB-22x3-500-9-P	1 1/2	51, 52, 53, 54	-	70 (482)
	2	61, 63, 65, 66, 67		
	2 1/2	71, 72, 73, 74, 75, 76		
	3	82, 85		

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 159.

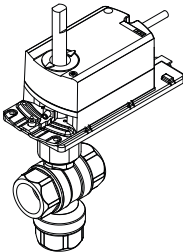
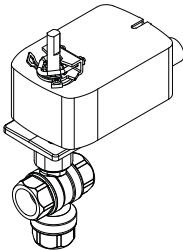
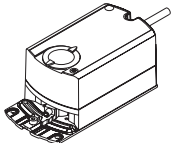
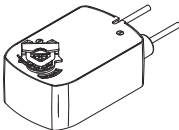
c - To determine a specific part number, identify the actuator's control signal type ("A," "F," or "S"), actuator code, and P code. Refer to "Part Numbering System" on page 157.

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.

3-Way Mixing Assemblies Using SmartX Actuators

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

Table-5. 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	1/2	1, 2, 3, 4, 5, 6	50 (344) (field assemble)		-	50 (344) (field assemble)		
	¾	11, 12, 13, 14, 15, 16						
	1	21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	50 (344)					
Valve/Linkage Assembly VB-2313-500-9-P	1¼	41, 43, 44, 45, 46	40 (275)		40 (275)			
	1½	51, 52, 53, 54, 55, 56	-					
	2	61, 62, 63, 64	-					

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 160.

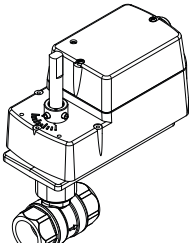
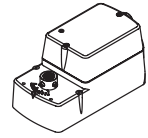
d - To determine a specific part number, identify the actuator's control signal type ("A," "F," or "S"), actuator code, and P code. Refer to "Ball Valve Assemblies Using SmartX 8xx Actuators" on page 158.

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.

2-Way Ball Valve Assemblies Using SmartX Actuators

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

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

2-Way Ball Valve Assemblies with SmartX			Spring Return
 Spring Return Vx-22x3-81x-9-P Vx-22x3-82x-9-P Vx-22x3-83x-9-P			
			Actuator Models (Actuator Codes)
			24 Vac
			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	1/2	1, 2, 3, 4, 5, 6, 7	130 (896)
	3/4	11, 12, 13, 14, 15, 16, 17, 18	130 (896)
	1	21, 22, 23, 24, 25, 26, 27	100 (689)
	1 1/4	41, 42, 43, 44, 45, 46	
Valve/Linkage Assembly VB-22x3-500-9-P	1 1/2	51, 52, 53, 54	
	2	61, 63, 65, 66, 67	-
	2 1/2	71, 72, 73, 74, 75, 76	
	3	82, 85	

b - To find the corresponding flow coefficients for these port codes, refer to "3-Way Ball Valve Assemblies with SmartX Actuators" on page 160.

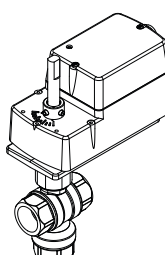
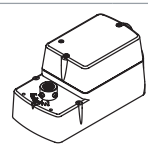
c - To determine a specific part number, identify the actuator's control signal type ("A," "F," or "S"), actuator code, and P code. Refer to "Part Numbering System" on page 158.

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.

3-Way Mixing Assemblies Using SmartX Actuators

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

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

3-Way Mixing Ball Valve Assemblies with SmartX ^b			Spring Return
 Spring Return Vx-2313-81x-9-P Vx-2313-82x-9-P Vx-2313-83x-9-P			
			Actuator Models (Actuator Codes)
			24 Vac
			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	1/2	1, 2, 3, 4, 5, 6	50 (344)
Valve Assembly	3/4	11, 12, 13, 14, 15, 16	
with SmartX	1	21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	
Vx-2313-8xx-9-P ^d	1 1/4	41, 43, 44, 45, 46	
Valve/Linkage	1 1/2	51, 52, 53, 54, 55, 56	-
Assembly	2	61, 62, 63, 64	
VB-2313-500-9-P			

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 160.

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 158.

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.

Assemblies with MF/MS41-6043/83 NSR SmartX Actuators

Table-8. Actuator Specifications

Inputs						
Control Signal	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					
Power Requirements	All 24 Vac circuits are Class 2.					
	Part Number	Power Input @ 50/60 Hz				
		Voltage	Running VA	Holding VA	Watts	
	MF41-6043 and MF41-6083	24 Vac +20/-15%	2.3	-	2.0	
	MS41-6043 and MS41-6083		3.3	1.2	3.0	
Connections	3 ft. (0.9 m) long, 18 AWG plenum-rated leads.					
Motor Type	Synchronous					
Outputs						
Electrical	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		Switch hysteresis: 3° rotation			
	DC Rating: 12 to 30 Vdc, DC 2 A		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°			
	Timing:	Part Number			90° Timing in Sec.	
					At 60 Hz	At 50 Hz
	MF41-6043 MS41-6043	90	108			
	MF41-6083 MS41-6083	125	150			
Mechanical	Output torque rating: 44 lb-in. (5 N-m) for Mx41-6043; 88 lb-in. (10 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).					
Environment						
Temperature Limits	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)					
Humidity	5 to 95% RH, non-condensing.					
Locations	NEMA Type 2 (IEC IP54).					
Agency Listings (Actuator)						
UL	UL-873, Underwriters Laboratories.					
cUL	Canadian Standards C22.2 No. 24-93.					
European Community	EMC Directive (89/336/EEC). Emissions (EN50081-1). Immunity (EN50081-2).					

Assemblies with Mx40-704x SR SmartX Actuators

Table-11. 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 - 44 lb-in (5 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.								

* Not available as an assembly.

Mx4D-703xx/803xx Actuator Specifications

Table-14. Actuator Specifications

Inputs							
Control Signal and Power Requirements	Part Number for Mx4D-703x-xxx Mx4D-803x-xxx	Control Signal	Voltage	Actuator Power Input			
				Running			Holding
				50/60 Hz		DC Amps	50/60 Hz
				VA	W		W
	MA4D-x033-100	2-position	24 Vac ±20% or 20 to 30 Vdc	5.1	3.6	0.14	1.3
	MF4D-x033-100	Floating		6.8	4.2	0.15	1.9
	MS4D-x033-100	2 to 10 Vdc ^a Proportional		6.1	3.4	0.12	1.4
	MS4D-x033-120	0 to 3 Vdc Proportional					
	MS4D-x033-130	6 to 9 Vdc Proportional					
	MS4D-x033-150	0 to 10 Vdc Proportional					
MS4D-x033-160	4 to 20 mAdc Proportional						
a. 4 to 20 mAdc with field-installed 500 W resistor.							
Connections	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.						
Motor Type	Brush DC						
Outputs							
Electrical	Timing:						
	Part Number		Approximate Timing in Sec. @ 70 °F (21 °C) ^a				
			Powered		Spring Return		
					CCW ^b	CW ^b	
	MA4D-7033-100		56		26	-	
	MF4D-7033-100		85		21	-	
	MS4D-7033-100						
	MA4D-8033-100		56		-	26	
	MF4D-8033-100		85		-	21	
	MS4D-8033-1x0						
a. Timing was measured with no load applied to actuator. b. CCW or CW as viewed from cover side of actuator.							
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.							
Mechanical	Stroke: 93° nominal.						
	Manual override: Allows positioning of valve shaft, using a manual crank..						
	Output torque rating: 30 lb-in (3.4 N-m).						
	RA/DA Jumper (Proportional Models): Permits selection of reverse acting or direct acting control.						
	Position indicator: Visual indicator.						

MS4D-x033-120 and MS4D-x033-130 are no longer available and included here for reference purposes.

Continued

Inputs	
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.

Installation Considerations

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-xxxx Series SmartX Rotary Overshaft Actuators General Instructions, F-27170.

Piping

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

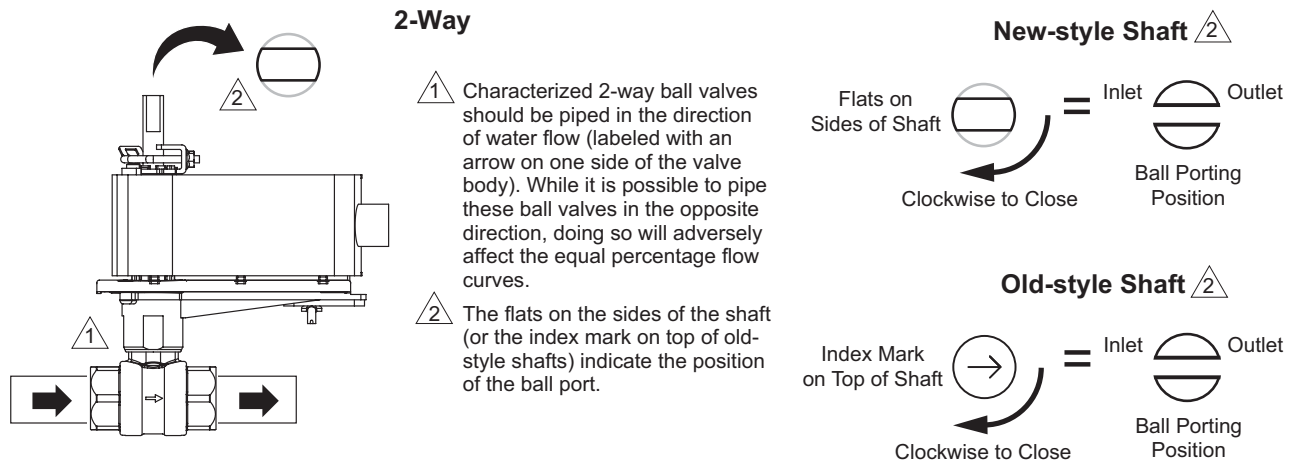
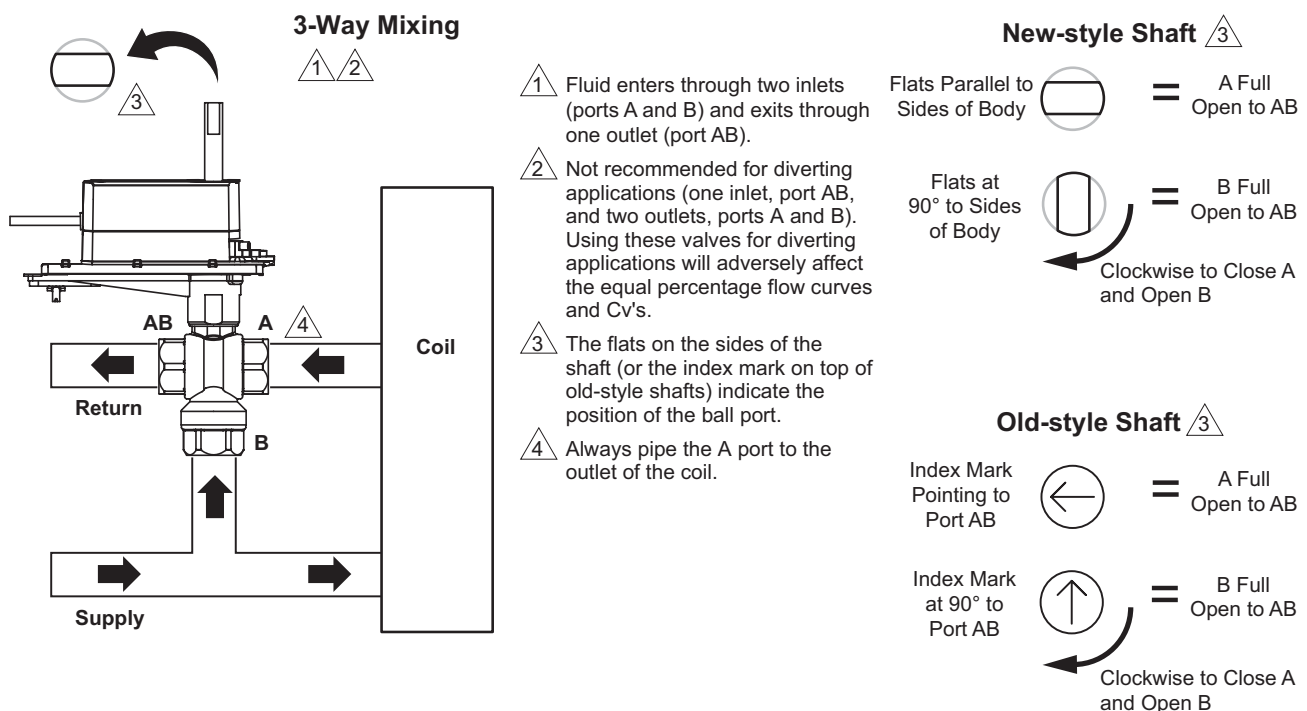


Figure 7. 2-Way Valve Assemblies Piping Diagram.



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..

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:

$C_v = \frac{\text{gpm}}{\sqrt{\Delta P}}$ 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).

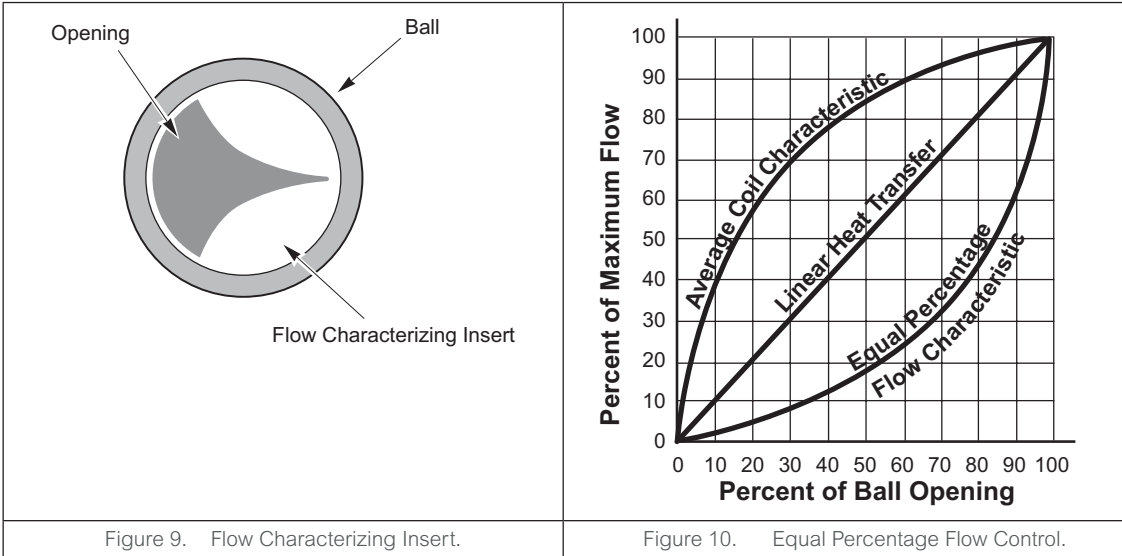
If the Cv is already known, it may be converted directly to its kvs equivalent: $kvs = \frac{C_v}{1.156}$

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.



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-17. 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.

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:

$$P_m = 0.5 (P_1 - P_v)$$

Where:

P_m = Maximum allowable pressure drop (psi)

P_1 = Absolute inlet pressure (psia)

P_v = Absolute vapor pressure (psia)

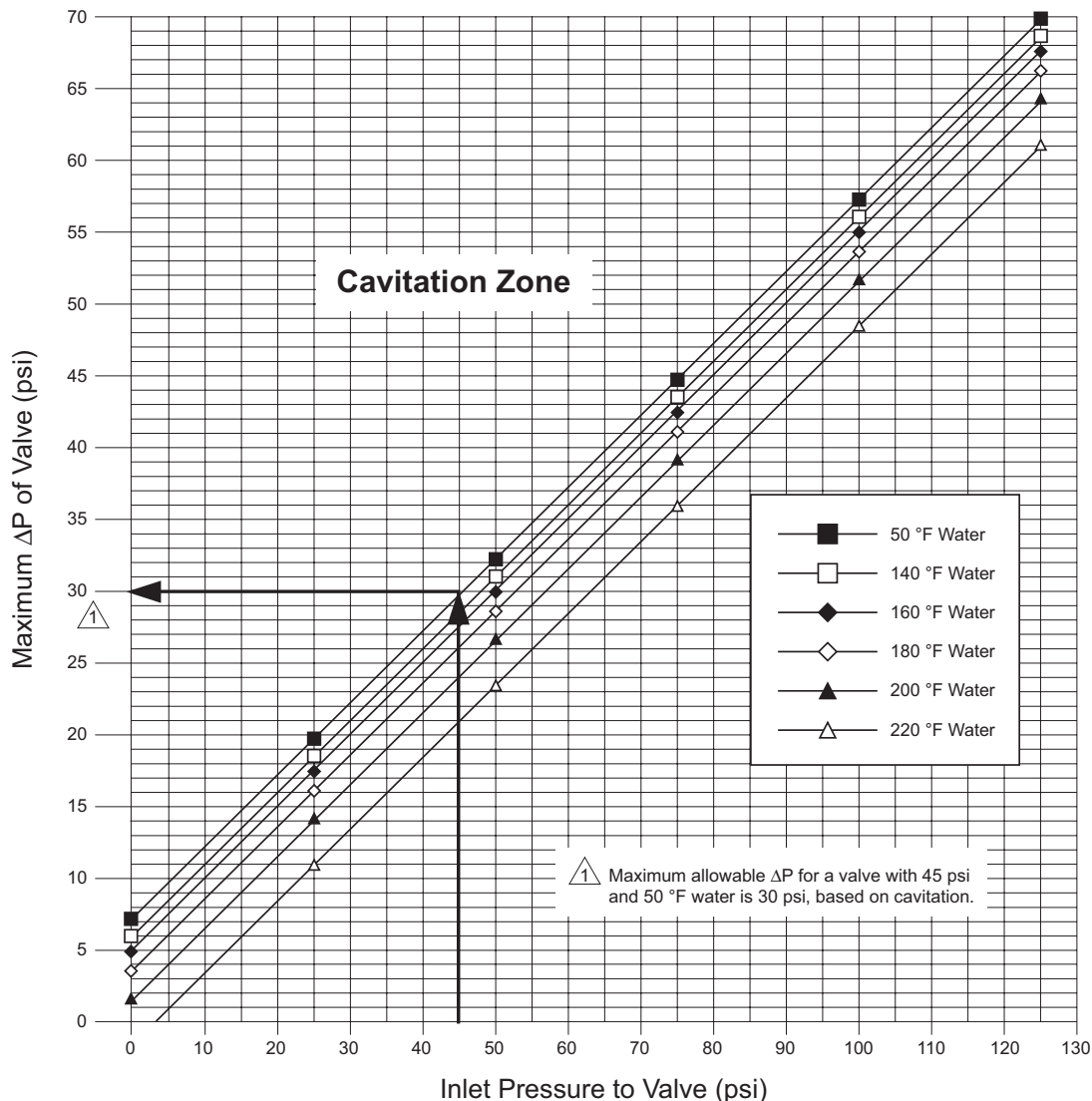
Note: Add 14.7 psi to gauge supply pressure to obtain absolute pressure value.

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

$$P_m = 0.5 [(18 + 14.7) - 11.53] = 10.6 \text{ psi}$$

(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.



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 larger 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-18. 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)					

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

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	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)				
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)	

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

Valve Size in.	P Code	C _v	Estimated Effective Cv (Kvs)									
			Pipe Size - inches (NPT)									
			1/2	3/4	1	1¼	1½	2	2½	3	4	5
2½	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.

Estimated Effective Cv con't

Using Pipe Reducers with 3-Way Ball Valve Assemblies

The following table provides estimated effective Cvs when using a 3-way valve assembly on the same or larger 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-19. 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	¾	1	1¼	1½	2	2½
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)				
¾	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)	

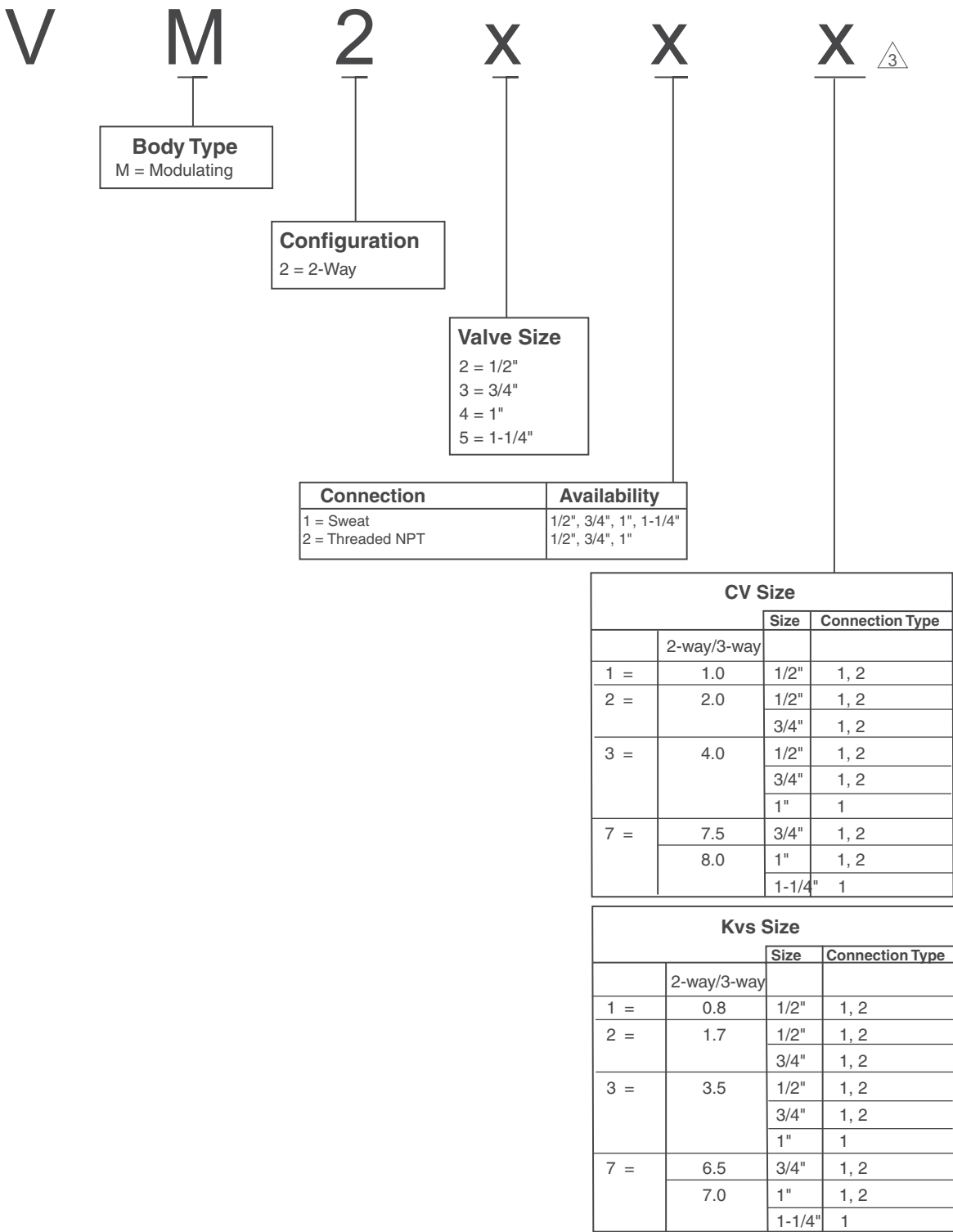
a - Denotes a full port valve, without the characterized insert.

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
1 1/4	41	4.1				4.1 (3.5)	4.0 (3.5)	4.0 (3.5)
	43	8.7				8.7 (7.5)	8.6 (7.4)	8.5 (7.4)
	44	12.7				12.7 (11.0)	12.6 (10.9)	12.3 (10.6)
	45	19.4 a				19.4 (16.8)	19.2 (16.6)	18.5 (16.0)
	46	34.1 a				34.1 (29.4)	32.9 (28.4)	29.9 (25.9)
1 1/2	51	4.0					4.0 (3.5)	4.0 (3.5)
	52	8.3					8.3 (7.2)	8.2 (7.1)
	53	13.4					13.4 (11.6)	13.3 (11.5)
	54	23.5					23.5 (20.3)	23.1 (19.9)
	55	32.0 ^a					32.0 (27.7)	31.0 (26.8)
	56	61.1 ^a					61.1 (52.8)	54.9 (47.5)
2	61	23.9						23.9 (20.7)
	62	38.2						38.2 (33.0)
	63	56.7 ^a						56.7 (49.0)
	64	108.5 ^a						108.5 (93.9)

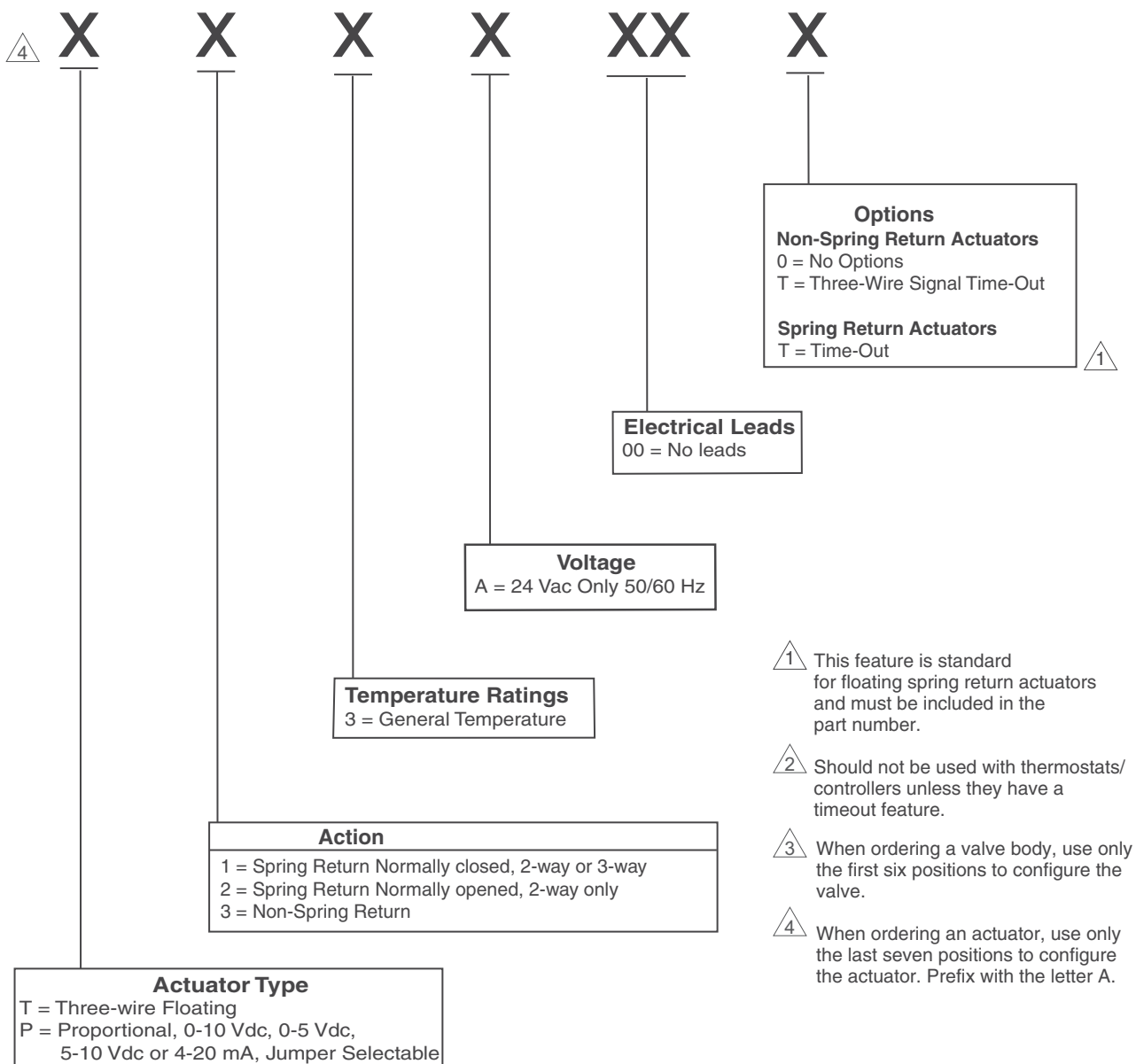
a - Denotes a full port valve, without the characterized insert.



Modulating Zone

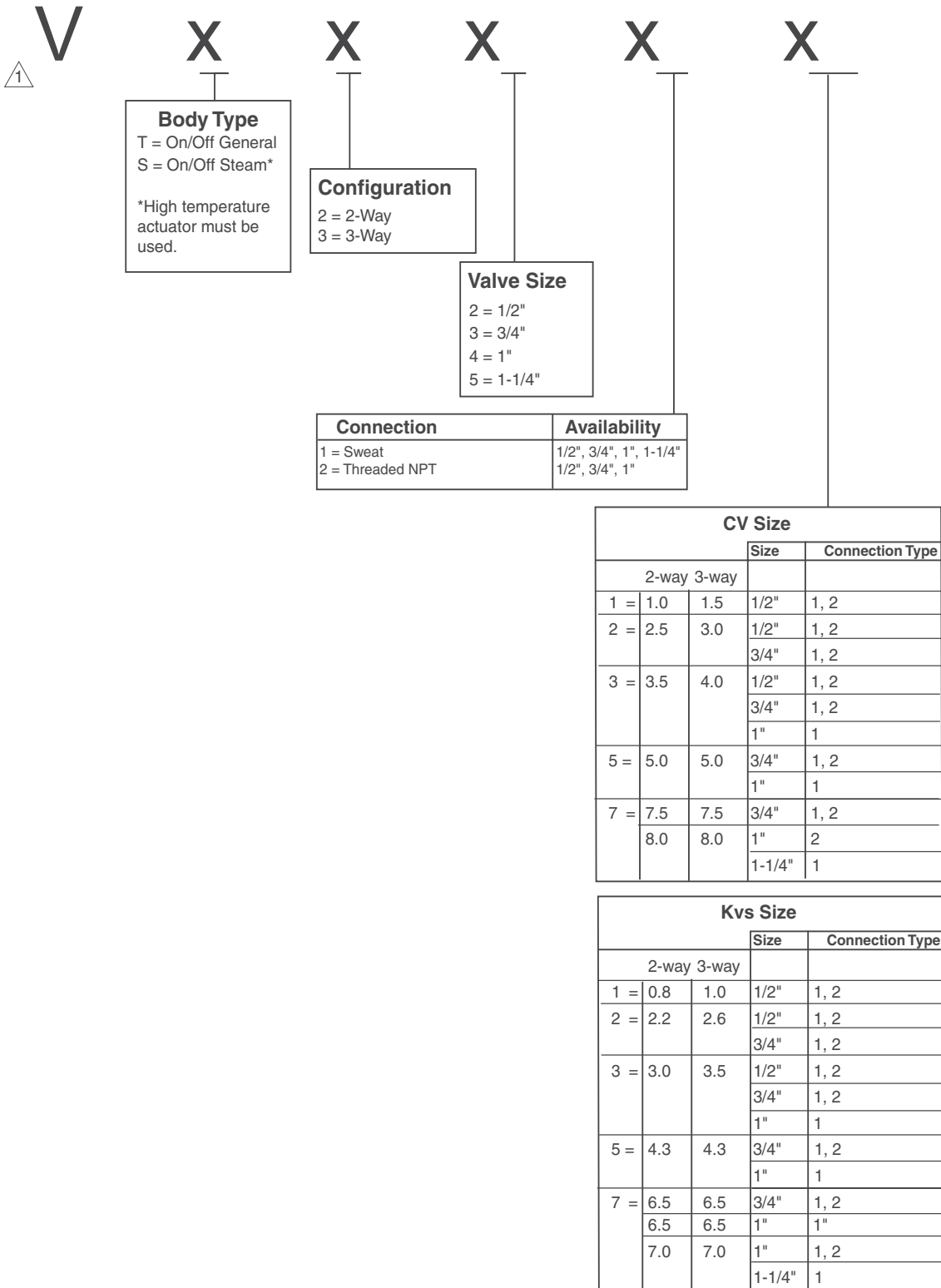


Valve Assemblies

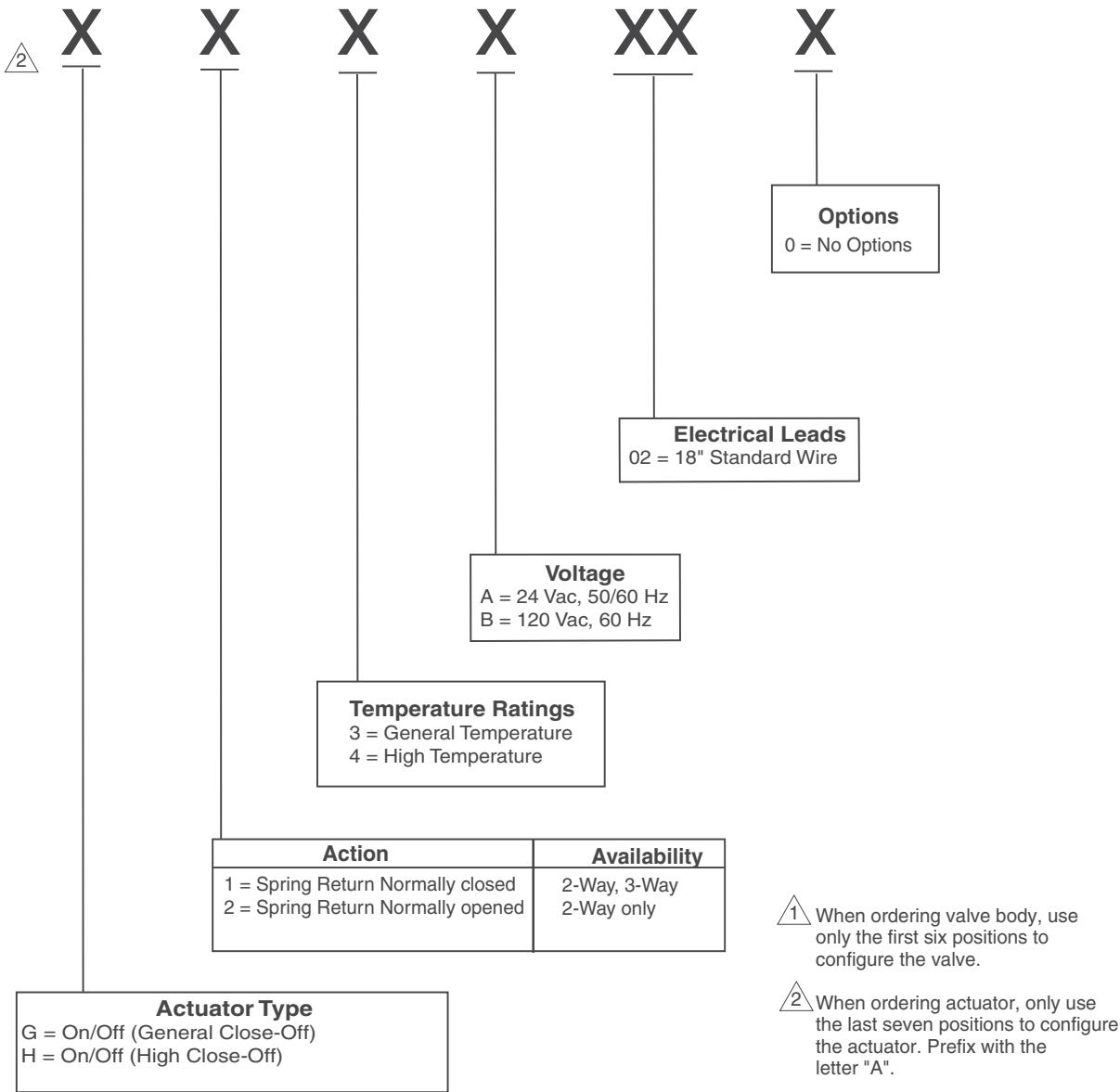


Available Actuators				
Part Number	Action	Position	Actuator Type	Option
AT13A00T	Spring Return	N.C.	Three Wire Floating	With Time-Out
AT23A00T	Spring Return	N.O.	Three Wire Floating	With Time-Out
AT33A000	Non-Spring Return		Three Wire Floating	None
AT33A00T	Non-Spring Return		Three Wire Floating	With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

Two-Position Zone



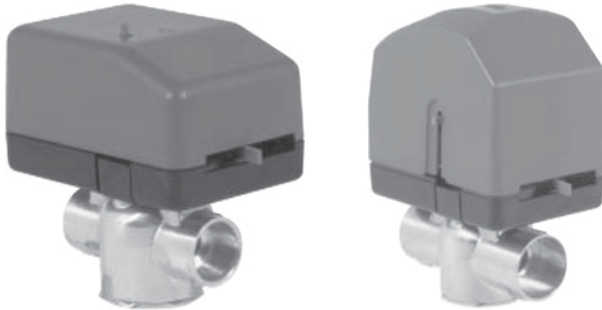
Valve Assemblies



Body & Actuator Combination Requirements	
Temperature Configurations	
Body Configuration VTXXXX	Actuator Spring Return Mode AXX3XXX
T = General	3 = General Temperature
S = Steam	4 = High Temperature
If body configuration is T, actuator temp rating can be 3 or 4.	If actuator temp rating is 3, body style must be T.
If body configuration is S, actuator temp rating must be 4.	If actuator temp rating is 4, body style can be S or T.

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.
- Actuator 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

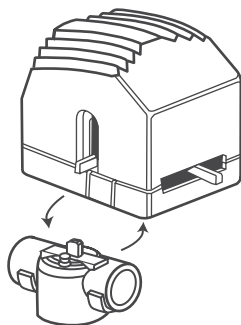
AG, AH Series



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"...1" NPT 2-Way SR Modulating N.O./N.C. and 3-Way N.C.



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

2-Way SR Modulating N.O.

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		
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

2-Way SR Modulating N.C.

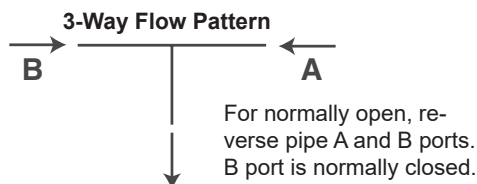
Size in.	Cv (K _{vs})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional ^a 0-10 V, 4-20 mA
		Spring Close	Motor Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM2221T13A00T	VM2221P13A000
	2 (1.7)	20 (138)	50 (344)	VM2222T13A00T	VM2222P13A000
	4 (3.5)	20 (138)	35 (241)	VM2223T13A00T	VM2223P13A000
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.

3-Way Mixing SR Modulating N.C.

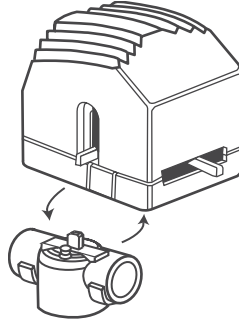
Size in.	Cv (K _{vs})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional ^a 0-10 V, 4-20 mA
		Spring Close	Motor Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM3221T13A00T	VM3221P13A000
	2 (1.7)	20 (138)	50 (344)	VM3222T13A00T	VM3222P13A000
	4 (3.5)	20 (138)	35 (241)	VM3223T13A00T	VM3223P13A000
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.



Actuator Code Table		
Operation	Model	Description
2-Way N.O.	AT23A00T	3-wire Floating with Timeout
2-Way N.C.	AT13A00T	
3-Way N.C.	AT13A00T	

Erie™ ½"...1¼" Sweat Ends 2-Way Modulating N.O./N.C and 3-Way Mixing SR N.C.



Flow Type	1 to 4 Cv equal %; 7.5/8 Cv linear
Body	Forged brass
Material	Brass
Seat	Nickel plated brass
Stem	Highly saturated nitrile
Paddle/Plug	
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

2-Way SR Modulating N.O.

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		
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

2-Way SR Modulating N.C.

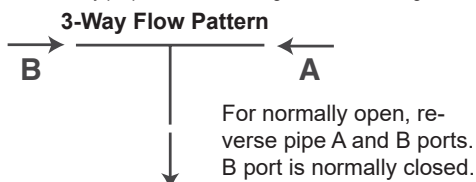
Size in.	Cv (K _{vs})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional ^a 0-10 V, 4-20 mA
		Motor Close	Spring Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM2211T13A00T	VM2211P13A000
	2 (1.7)	50 (344)	20 (138)	VM2212T13A00T	VM2212P13A000
	4 (3.5)	35 (241)		VM2213T13A00T	VM2213P13A000
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.

3-Way SR Mixing N.C.

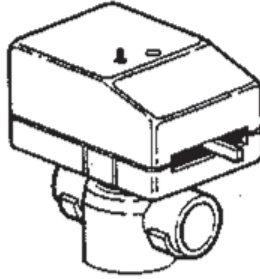
Size in.	Cv (K _{vs})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional ^a 0-10 V, 4-20 mA
		Spring Close	Motor Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM3211T13A00T	VM3211P13A000
	2 (1.7)	20 (138)	50 (344)	VM3212T13A00T	VM3212P13A000
	4 (3.5)	20 (138)	35 (241)	VM3213T13A00T	VM3213P13A000
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.



Actuator Code Table		
Operation	Model	Description
2-Way N.O.	AT23A00T	3-wire Floating with Timeout
2-Way N.C.	AT13A00T	
3-Way N.C.	AT13A00T	

Erie™ ½"...1" NPT 2-Way Modulating & 3-Way Mixing NSR



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

2-Way NSR Modulating	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.

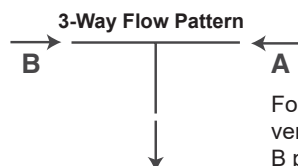
3-Way NSR Mixing	Size in.	Cv (K _{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Floating Requires Thermostat/Controller with Timeout. 24 Vac	Proportional ^a 0-10 V, 4-20 mA
	1/2	1 (0.8)	50 (344)	VM3221T33A00T	VM3221T33A000	VM3221P33A000
		2 (1.7)	50 (344)	VM3222T33A00T	VM3222T33A000	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.

Erie™ ½"...1¼" Sweat Ends 2-Way NSR Modulating

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

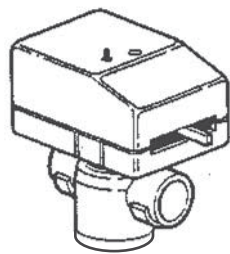
a-Factory proportional control signal is direct-acting. An increase in control signal will open this model.



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

Actuator Code Table		
Operation	Model	Description
2-Way NPT	AP33A000	0...10 Vdc 4...20 mA field selectable
3-Way NPT		
2-Way Sweat		

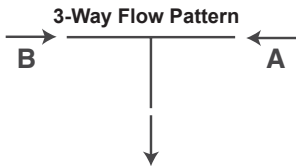
Erie™ 1/2"...1 1/4" NPT 3-Way Mixing SR Modulating



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

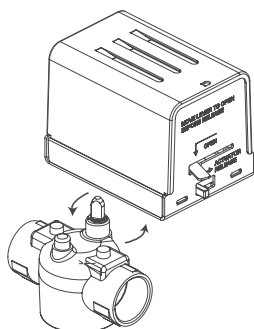
Size in.	Cv (K _{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Floating Requires Thermostat/Controller with Timeout. 24 Vac	Proportional ^a 0-10 V, 4-20 mA, 0-5 Vdc or 5-10 Vdc
1/2	1 (0.8)	50 (344)	VM3211T33A00T	VM3211T33A000	VM3211P33A000
	2 (1.7)	50 (344)	VM3212T33A00T	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.



Actuator Code Table		
Operation	Model	Description
3-Way NPT	AP33A000	0...10 Vdc 4...20 mA field selectable

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

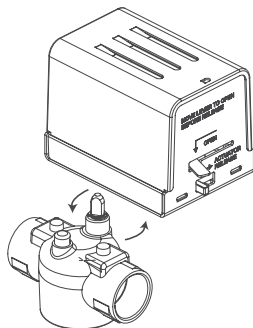


Flow Type	On, off, normally open or closed
Material	Body Forged brass Seat Brass Stem Nickel plated brass Paddle Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature	VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76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

Actuator Code Table	
Model	Description
AG13A020, AG23A020, AG14A020, AG24A020 AG13B020, AG23B020 AG14B020, AG24B020	2-Position

Erie™ 1/2"...1" Two Position 2-Way SR General Close Off - Female NPT

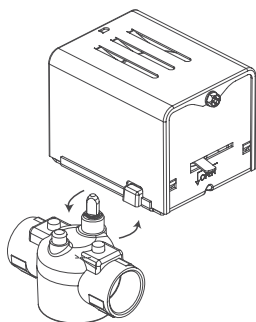


Flow Type	On, off, normally open or closed
Body	Forged brass
Seat	Brass
Stem	Nickel plated brass
Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature	VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water 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

Actuator Code Table	
Model	Description
AG13A020, AG23A020, AG14A020, AG24A020 AG13B020, AG23B020 AG14B020, AG24B020	2-Position

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

**Flow Type**

Material

Body
Seat
Stem
Paddle

Forged brass
Brass
Nickel plated brass
Highly saturated nitrile (VS), Buna N (VT)
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

Fluid Temperature**Maximum Static Pressure**

400 psi (20.6 bar)

Seat Leakage

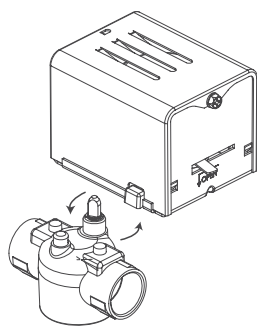
ANSI IV

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

Actuator Code Table

Model	Description
AH13A020, AH23A020 AH14A020, AH24A020, AH13B020, AH23B020 AH14B020, AH24B020	2-Position

Erie™ 1/2"...1" 2-Way SR High Close Off
Two Position - Female NPT

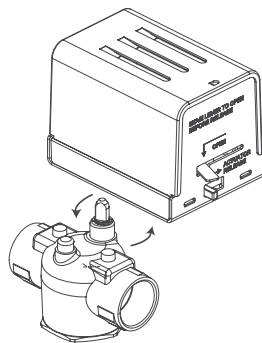


Flow Type	On, off, normally open or closed
Material	Body Forged brass Seat Brass Stem Nickel plated brass Paddle Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature	VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76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

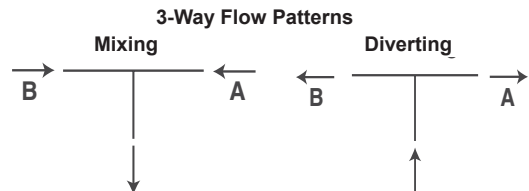
Actuator Code Table	
Model	Description
AH13A020, AH23A020 AH14A020, AH24A020, AH13B020, AH23B020 AH14B020, AH24B020	2-Position

Erie™ 1/2"...1 1/4" 3-Way Mixing or
Diverting SR N.C. - Sweat Ends



Flow Type	Body	1 to 4 Cv equal % 8 Cv linear
		Forged brass
Material	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

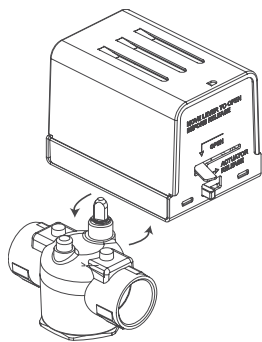
Size in.	Cv (K _{vs})	Close Off Pressure psi (kPa)	VT Series 32 to 200 °F	VS Series - High Temp 32 to 250 °F	Voltage Vac
1/2	1 (0.8)	60 (413)	VT3211G13A020	VS3211G14A020	24
			VT3211G13B020	VS3211G14B020	120
	3 (2.6)	40 (275)	VT3212G13A020	VS3212G14A020	24
			VT3212G13B020	VS3212G14B020	120
	4 (3.4)	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



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

Actuator Code Table	
Model	Description
AG13A020, AG14A020, AG13B020, AG14B020	2-Position

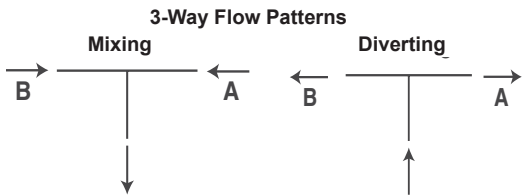
Erie™ 1/2"...1 1/4" 3-Way Mixing or Diverting SR N.C. - Female NPT



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	

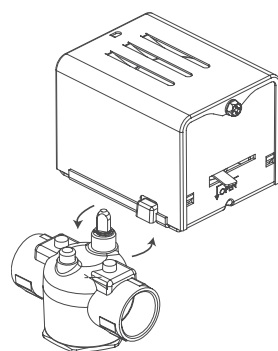
Size in.	Cv (Kvs)	Close Off psig (kPa)	VT Series 32 to 200 °F	VS Series - High Temp 32 to 250 °F	Voltage Vac
1/2	1.5 (1.3)	60 (413)	VT3221G13A020	VS3221G14A020	24
			VT3221G13B020	VS3221G14B020	120
	3 (2.6)	40 (275)	VT3222G13A020	VS3222G14A020	24
			VT3222G13B020	VS3222G14B020	120
	4 (3.4)	25 (172)	VT3223G13A020	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

9. Zone Valves



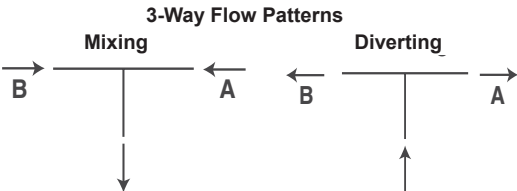
Actuator Code Table	
Model	Description
AG13A020, AG14A020, AG13B020, AG14B020	2-Position

Erie™ 1/2"...1 1/4" 3-Way Mixing or
Diverting SR N.C. - Sweat Ends



Flow Type	Body	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Fluid Temperature		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

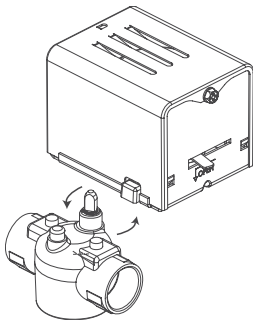
Size in.	Cv (K _{vs})	Close Off psig (kPa)	VT Series 32 to 200 °F		VS Series - High Temp 32 to 250 °F	
			24 Vac	120 Vac	24 Vac	120 Vac
1/2	1.5 (1.3)	75 (517)	VT3211H13A020	VT3211H13B020	VS3211H14A020	VS3211H14B020
	3 (2.6)	50 (344)	VT3212H13A020	VT3212H13B020	VS3212H14A020	VS3212H14B020
	4 (3.4)	30 (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



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

Actuator Code Table	
Model	Description
AH13A020, AH14A020, AH13B020, AH14B020	2-Position

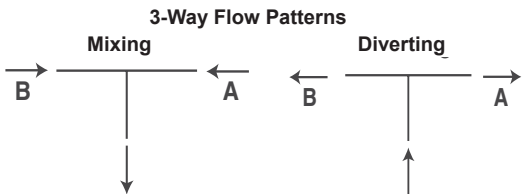
Erie™ 1/2"...1" 3-Way Mixing or Diverting SR N.C. - Female NPT



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	

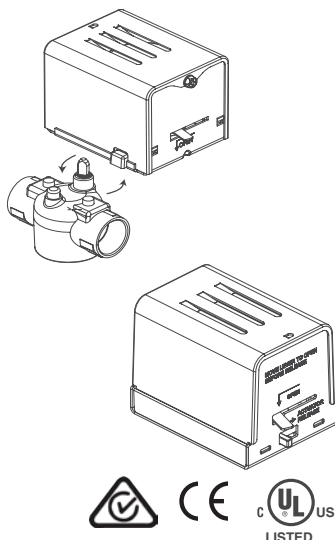
Size in.	Cv (K _{vs})	Close Off psig (kPa)	VT Series 32 to 200 °F		VS Series 32 to 250 °F	
			24 Vac	120 Vac	24 Vac	120 Vac
1/2	1.5 (1.3)	75 (517)	VT3221H13A020	VT3221H13B020	VS3221H14A020	VS3221H14B020
	3 (2.6)	50 (344)	VT3222H13A020	VT3222H13B020	VS3222H14A020	VS3222H14B020
	4 (3.4)	30 (208)	VT3223H13A020	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

9. Zone Valves



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

Actuator Code Table	
Model	Description
AH13A020, AH14A020, AH13B020, AH14B020	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).

MotorType:

Hysteresis synchronous.

Install Instructions

Refer to F-26496.

Regulatory Compliance

c-UL-us LISTED mark for US safety compliance per UL 60730-1 & -2-14, and Canadian compliance per CAN/CSA E60730-1 & -2-14.

CE mark EU safety compliance per EN 60730-1 & -2-14 and per directives 2014-35/EU [LVD], 2014-30/EU [EMC], and 2011/65/EU [RoHS2].

RCM mark compliance for Australian/New Zealand.

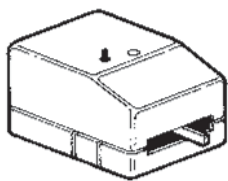
General Close-Off, 2-Position, Power (Open or Close): 9 to 11 Seconds; Spring Return (Open or Close): 4 to 5 Seconds

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			32 to 250°F (Fluid) @ 169°F (Ambient) (0 to 121°C @ 76°C)		
AG14A020	24			32 to 200°F (Fluid) @ 104°F (Ambient) (0 to 93°C @ 40°C)		
AG14B020	120			32 to 250°F (Fluid) @ 169°F (Ambient) (0 to 121°C @ 76°C)		
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			32 to 250°F (Fluid) @ 169°F (Ambient) (0 to 121°C @ 76°C)		
AH14A020	24			32 to 200°F (Fluid) @ 104°F (Ambient) (0 to 93°C @ 40°C)		
AH14B020	120			32 to 250°F (Fluid) @ 169°F (Ambient) (0 to 121°C @ 76°C)		
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			32 to 250°F (Fluid) @ 169°F (Ambient) (0 to 121°C @ 76°C)		
AH24A020	24			32 to 200°F (Fluid) @ 104°F (Ambient) (0 to 93°C @ 40°C)		
AH24B020	120			32 to 250°F (Fluid) @ 169°F (Ambient) (0 to 121°C @ 76°C)		

Erie™ APx3, ATx3 Series NSR Modulating Actuator

**Connections:****Housing:****Dimensions:****Switches:****Override:****Motor Type:** Install**Instructions****Regulatory****Compliance**

Terminal block.

NEMA 1.

2-1/4 H x 2-3/4 W x 4-1/4 D in. (57 x 70 x 108 mm)

None.

Manual.

Stepper motor.

Refer to F-27013.

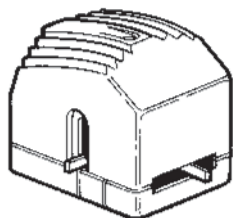
c-UL-us LISTED mark for US safety compliance per UL 60730-1 & -2-14, and Canadian compliance per CAN/CSA E60730-1 & -2-14.

CE mark EU safety compliance per EN 60730-1 & -2-14 and per directives 2014-35/EU [LVD], 2014-30/EU [EMC], and 2011/65/EU [RoHS2].

RCM mark compliance for Australian/New Zealand.

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 Modulating Actuators

**Connections:****Housing:****Dimensions:****Override:****MotorType:****Install Instructions**

Terminal block.

NEMA 1.

3-11/16 H x 2-3/4 W x 4-1/4 D in. (93 x 70 x 108 mm)

Manual.

Stepper motor.

Refer to F-27013.

Regulatory**Compliance**

c-UL-us LISTED mark for US safety compliance per UL 60730-1 & -2-14, and Canadian compliance per CAN/CSA E60730-1 & -2-14.

CE mark EU safety compliance per EN 60730-1 & -2-14 and per directives 2014-35/EU [LVD], 2014-30/EU [EMC], and 2011/65/EU [RoHS2].

RCM mark compliance for Australian/New Zealand.

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 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.

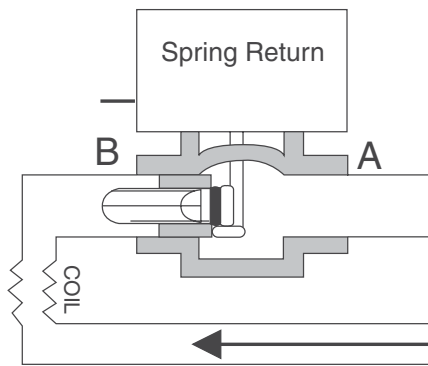


Figure 1 Two-Way Valve Normally Closed.

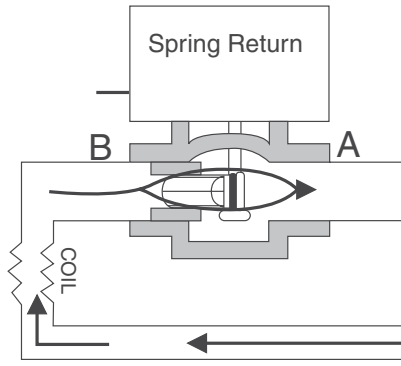
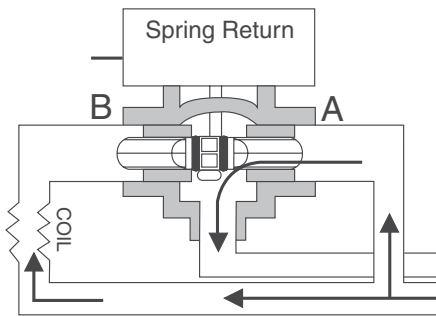
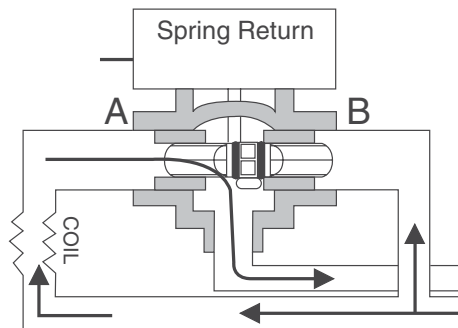


Figure 2 Two-Way Valve Normally Open.



**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 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 actuator 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.

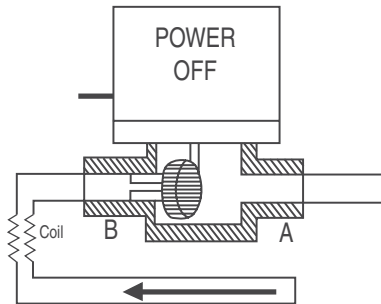


Figure 5 Two-Way Valve with Normally Closed Actuator.

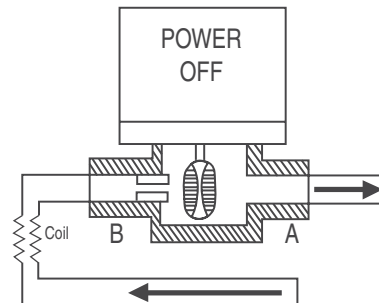


Figure 6 Two-Way Valve with Normally Open Actuator.

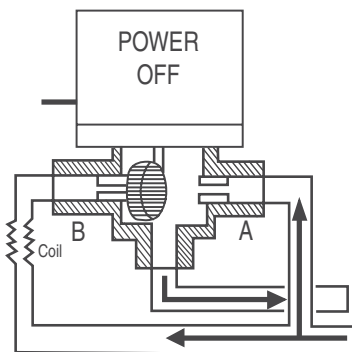


Figure 7 Three-Way Valve in Mixing Configuration Normally Closed to the Coil.

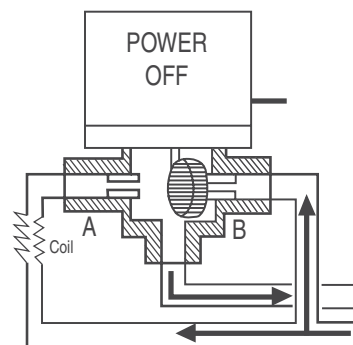


Figure 8 Three-Way Valve in Mixing Configuration Normally Open to the Coil.

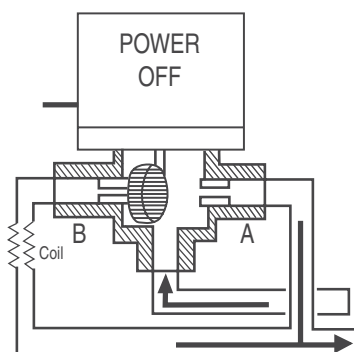


Figure 9 Three-Way Valve in Diverting Configuration Normally Closed to the Coil.

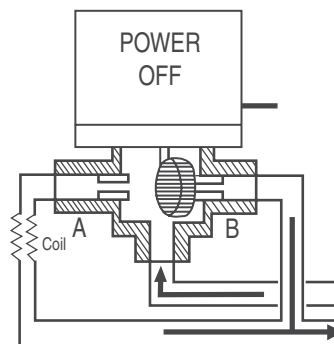


Figure 10 Three-Way Valve in Diverting Configuration Normally Open to the Coil.

10. Butterfly Valve Assemblies

10. Butterfly Valve Assemblies



10. 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. High Performance Butterfly Valves are ideally suited to both high pressure, high temperature, high cycle HVAC applications and mission critical HVAC applications. This includes chiller isolation, cooling tower isolation, change-over systems, large air handler's coil control, bypass and process control applications. With ANSI Class 150 rating, all valves are tested for bubble tight close-off to API 598 standards at maximum rated differential pressure.

Standard 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

High Performance Features

- Double Offset Stem/Disc Design
 - Reduced seat wear, zero leakage, and low torque
- Blow-out Proof Stem
 - Safety and ease of use
- Energized RTFE Seat
 - Zero leakage, self-adjusting for wear and easy field replacement
- Pressure Assisted, but not Pressure Dependent Seat Design
 - Optimal performance and sealing at high or low differential pressures
- Adjustable PTFE Packing
 - Packing can be adjusted while the valve is in service
- Dead End Rating Equal to Nominal Pressure Rating
 - Allows the control valve to function as an isolation valve.



Part Numbering System

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.

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 = Proportional (Vdc, mAdc)

Disc

F = Full 175 psi close to 12"
U = Undercut 50 psi close

Accessory

S = Auxiliary 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)

Table 1: Actuator Codes and Part Numbers^a

Refer to the part numbering system illustration on the previous page.

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)
E70 (120 Vac only)	S70-120-1300-H (VAxS)	E72 (120 Vac only)	S70-120-1300-SV (VSxS)
E80 (120 Vac only)	S70-120-1800-H (VAxS)	E82 (120 Vac only)	S70-120-1800-SV (VSxS)

a. See Table 2 to verify the correct actuator application for the valve selected.

b. D = Dual actuators

c. E10 through E50 available as 24 Vac powered: change actuator code E to "F" and 120 to 24, e.g. F10 = "S70-24-0061-H"

Table 2: 2-Way and 3-Way Valve Assemblies

Size	Close Off	2-Way Butterfly Valve Assemblies ^a				3-Way Butterfly Valve Assemblies ^a			
		Schneider Electric SmartX™ 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 Pos	Mod			2 Pos	Mod
2"	175	556	E24	E10	E12	556	E24	E10	E12
2.5"	175	556	E24	E10	E12	556 D	E25	E10	E12
	285	–		E10	E12	–		–	
3"	175	556 D	E25	E10	E12	556 D	E25	E10	E12
	285	–		E10	E12	–			
4"	50	556 D	E25	–		556 D	E25	E10	E12
	175		E25 D	E10	E12		E25 D	E10	E12
	285		–	E10	E12		–		
5"	50		E25	E10	E12		E25 D	E10	E12
	175		–	E10	E12		–	E10	E12
	285		–	E20	E22		–		
6"	50		E25 D	–			E25 D	E20	E22
	175			E10	E12			E20	E22
	285			E20	E22			–	
8"	50			E20	E22			E20	E22
	175			E30	E32			E30	E32
	285			E30	E32			–	
10"	50			E30	E32			E30	E32
	175	–		E40	E42	–		E50	E50
	285			E40	E42			–	
12"	50			E40	E42			E50	E52
	175			E50	E52			E60	E62 ^e
	285			E50	E52			–	
14"	50			E50	E52			E50	E52
	150			E60	E62			–	
	285			E60	E62			–	
16"	50			E60	E62			E60	E62 ^e
	285			E70	E72				
18"	50			E60	E62				
	285			E80	E82				

- a. 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.
d. For 24 Vac use "F"
e. 120 Vac only: E6x, E7x, E8x.

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)

10. Butterfly Valve Assemblies

2"...4" 2 and 3-Way SR SmartX 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 $\pm$ 20%, 22...30 Vdc, 9.7VA.
Environment	NEMA 2
Ambient Temperatures	-22...140 °F (-12...60 °C).
Regulatory Compliance	c-UL-us LISTED mark and CE mark.
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		Two SPDT Auxiliary Switches ^a
MA41-7153-502			On/off	—		
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 NSR 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 $\pm$ 10% NR-2216 6.5VA, NR-2224 7.5VA
Environment	NEMA 2.

Ambient Temperatures	-4 to 122 °F (-2 to 50 °C).
Regulatory Compliance	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.

Non-Spring Return S70-xxxx
Actuator

Table 6: S70 NSR Actuators for 2"...18" 2-Way and 2"...16" 3-Way Valves

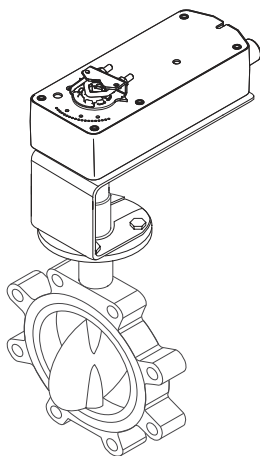
Model Number	Actuator Code	Power ^a	Input Signal	Feedback	Power Loss Mode	Accessories		
S70-120-0061-H (VAxS)	E10	E=120 Vac F=24 Vac	On/off, floating	–	NSR	Two SPDT Auxiliary Switches and heater (standard)		
S70-120-0121-H (VAxS)	E20							
S70-120-0201-H (VAxS)	E30							
S70-120-0301-H (VAxS)	E40							
S70-120-0501-H (VAxS)	E50							
S70-120-0651-H (VAxS)	E60 (120 Vac Only)							
S70-120-1300-H (VAxS)	E70 (120 Vac Only)							
S70-120-1800-H (VAxS)	E80 (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)							
S70-120-1300-SVH (VSxS)	E72 (120 Vac Only)							
S70-120-1800-SVH (VSxS)	E82 (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.	Ambient Temperatures	–40 to 150 °F (–40 to 60 °C).
Control Signal		Regulatory Compliance	c-UL-us LISTED mark and CE mark
Actuator Code	Ex0 (120 Vac) or Fx0 (24 Vac) On/off, floating	Standard Auxiliary Switch	(Included) 10 A resistive at 125/250 Vac, 1/2 A at 125 Vdc.
Actuator Code	Ex2 (120 Vac) or Fx2 (24 Vac) Factory configured for 4...20 mA with a 250 W input impedance, field configurable for 0...10 Vdc or 2...10 Vdc.	Heater	15 W.
Power Requirements	120 Vac or 24 Vac, 50/60 Hz.	Manual Operator with Disconnect	Hand wheel with power disconnect provided on all S70 actuator models.
E1x/F1x	1.5 ^a		
E2x/F2x,E3x/F3x	2.1 ^a		
E4x/F4x,E5x/F5x,E6x	3.0 ^a		
Environment	NEMA 4.		



Flow Type	Equal % bidirectional.
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.
Material	
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

Actuator Code Table.

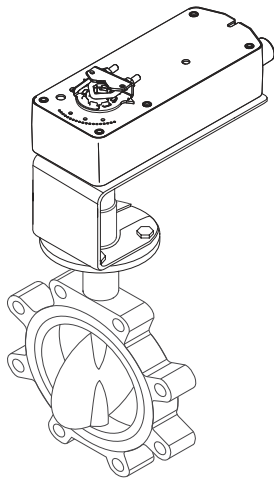
Vxxx-6220-556x-L-xx

Actuator Codes	Model Prefix ^a	Actuator Model	Description
556 ^b	VAx	MA41-7153	24 Vac, on/off, SR
556 ^{bc}	VAXS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches
556 ^b	VFx	MF41-7153	24 Vac, Floating, SR
556 ^{bc}	VFXS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches
556 ^b	VSx	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.

10. Butterfly Valve Assemblies

2"...4" Lug Bodies 2-Way
SR N.O. Assemblies



Material	Flow Type	Equal % bidirectional.
	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.
Fluid Temperatures	Disc	Ductile iron nylon 11 coated disc.
	Close-Off Rating	-40 to 250°F (-40 to 121°C).
	Application	ANSI VI Bubble tight.
		Chilled or hot water up to 60% glycol.

Two-Way Normally Open Assemblies

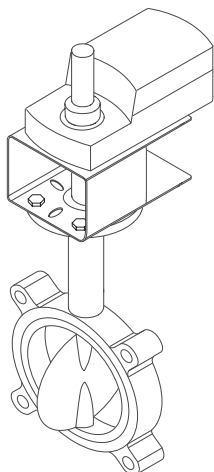
Size in.	Cv (Kvs) @ 90°	Close-Off Pressure psi (kPa)	Two Position	Floating	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VAF-6210-556-L-11	VFF-6210-556-L-11	VSF-6210-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-6210-556-L-12	VFF-6210-556-L-12	VSF-6210-556-L-12	24
3	461 (399)	175 (1207)	VAF-6210-556D-L-13	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

Actuator Code Table.

Vxxx-6210-556x-L-xx

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.

**Flow Type**

Equal % bidirectional.

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.

Material**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.

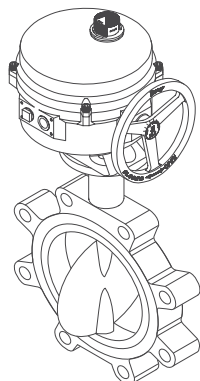
Size in.	Cv (K _{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position or Floating	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VFF-6200-E24-L-11	VSF-6200-E24-L-11	24
2.5	282 (244)	175 (1207)	VFF-6200-E24-L-12	VSF-6200-E24-L-12	24
3	461 (399)	175 (1207)	VFF-6200-E25-L-13	VSF-6200-E25-L-13	24
4	841 (727)	175 (1207)	VFF-6200-E25D-L-14	VSF-6200-E25D-L-14	24
5	1376 (1190)	50 (345)	VFU-6200-E25-L-14	VSU-6200-E25-L-14	24
6	1850 (1600)		VFU-6200-E25-L-15	VSU-6200-E25-L-15	24
			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.

10. Butterfly Valve Assemblies 2"...18" Lug Bodies 2-Way NSR w/ Hand Wheel Assemblies



Flow Type	Equal % bidirectional.
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.
Material	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"

Actuator Code Table
VxxS-6200-Exx-L-xx

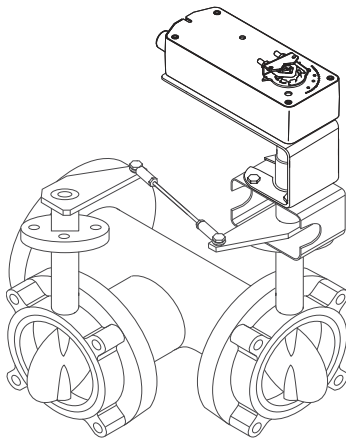
Actuator Codes	Model Prefix	Actuator Model	Description
E10	VAxS	S70-0051-H	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override
E20		S70-0121-H	
E30		S70-0201-H	
E40		S70-0301-H	
E50		S70-0501-H	
E60		S70-0651-H	
E12	VSxS	S70-0051-SVH	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override
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	24 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	24 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	

10. Butterfly Valve Assemblies

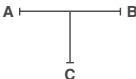
2"...4" Lug Bodies 3-Way
SR N.C. Assemblies



Flow Type	Equal % linear bidirectional. Mixing or diverting configurations.
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.
Material	Stainless steel double D stem.
Stem	Self adjusting double U cup.
Stem Seals	Ductile iron nylon 11 coated disc.
Disc	-40 to 250°F (-40 to 121°C).
Fluid Temperatures	ANSI VI Bubble tight.
Close-Off Rating	Chilled or hot water up to 60% glycol.
Application	

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.

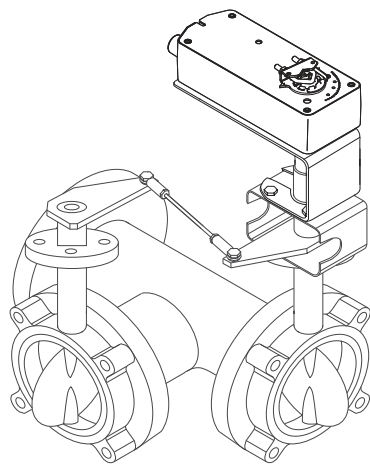


Actuator Code Table.

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 pretix field. Ex: VxxsS
b-D = Dual mounting.
c-Dual mounted application. One Mx41-7153 and one Mx41-7153-502 are supplied.

**Flow Type**

Equal % linear bidirectional.
Mixing or diverting configurations.

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.

Material**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

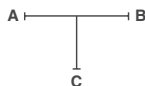
^a Select 7 or 8 for the "x".

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.

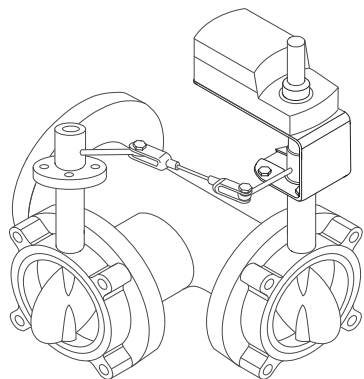
**Actuator Code Table.****Vxxx-631x-556x-L-xx**

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.

**Flow Type**

Equal % linear bidirectional.

Body

Mixing or diverging configuration.

SeatPolyester coated cast iron, ASTM A126 Class B lug.
Mates with ANSI 125/150 flanges.**Material**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
			VFU-630x-E25-L-14	VSU-630x-E25-L-14	24
5	1376 (1190)	50 (345)	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

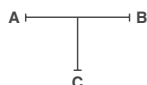
a-Select 1 or 2 for the "x".

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.**

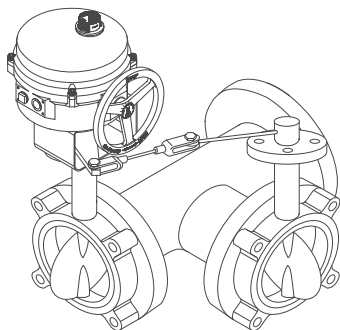
Vxxx-E2xx-L-xx

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

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.

**Flow Type**

Equal % linear bidirectional.
Mixing or diverting configurations.

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.

Material**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

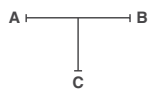
a-Select 1 or 2 for the "x".

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.



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	
F60		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	

10. Butterfly Valve Assemblies

2.5" ... 18" 2-Way High Performance Assemblies

Product Description

Schneider Electric's High Performance Butterfly Valves are ideally suited to both high pressure, high temperature, high cycle HVAC applications and mission critical HVAC applications. This includes chiller isolation, cooling tower isolation, change-over systems, large air handler's coil control, bypass and process control applications.

With ANSI Class 150 rating, all valves are tested for bubble tight close-off to API 598 standards at maximum rated differential pressure.

Features

- Double Offset Stem/Disc Design
 - Reduced seat wear, zero leakage, and low torque
- Blow-out Proof Stem
 - Safety and ease of use
- Energized RTFE Seat
 - Zero leakage, self-adjusting for wear and easy field replacement
- Pressure Assisted, but not Pressure Dependent Seat Design
 - Optimal performance and sealing at high or low differential pressures
- Adjustable PTFE Packing
 - Packing can be adjusted while the valve is in service
- Dead End Rating Equal to Nominal Pressure Rating
 - Allows the control valve to function as an isolation valve.

Specifications

Service	Hot Water, Chilled Water, Condenser Water, Steam	Leakage	Bubble Tight
Fluid Temperature Limits	-40...500 °F	Materials	
Max Steam Pressure	On/Off 150 PSI Proportional 50 PSI	Body	Carbon Steel
Sizes	2.5" ... 18"	Stem	17-4 Stainless Steel
Flow Characteristic	Modified Equal Percentage	Disc	316 Stainless Steel
		Seat	RTFE

2-Way High Performance Butterfly Valve Assemblies With S70 Series NSR Actuator and NEMA 4, Hand Wheel with Two SPDT Auxiliary Switches and Heater

Model Number		Power ^a	Valve Size	Close Off PSI	Cv at 90°
On/Off	Modulating				
VAFS-6200-E10-H1-12	VSFS-6200-E12-H1-12	E=120 Vac F=24 Vac	2.5"	285 psi	160
VAFS-6200-E10-H1-13	VSFS-6200-E12-H1-13		3"		185
VAFS-6200-E10-H1-14	VSFS-6200-E12-H1-14		4"		375
VAFS-6200-E20-H1-15	VSFS-6200-E22-H1-15		5"		790
VAFS-6200-E20-H1-16	VSFS-6200-E22-H1-16		6"		1350
VAFS-6200-E30-H1-17	VSFS-6200-E32-H1-17		8"		2800
VAFS-6200-E40-H1-18	VSFS-6200-E42-H1-18		10"		4300
VAFS-6200-E50-H1-19	VSFS-6200-E52-H1-19		12"		6650
VAFS-6200-E60-H1-20b	VSFS-6200-E62-H1-20b		14"		7650
VAFS-6200-E70-H1-21b	VSFS-6200-E72-H1-21b		16"		9800
VAFS-6200-E80-H1-22b	VSFS-6200-E82-H1-22b		18"		10500

- a. 120 Vac powered models shown, for 24 Vac models change the letter E to F. Example VAFS-6200-F10-L-11 would be 24 Vac powered
 b. E60/62 E70/72 E80/82 only available in 120 Vac.



Notes

11. Pressure Independent Balancing and Control Valves and Actuators

11. Pressure Independent Balancing and Control Valves and Actuators



actuators are  

Product Description

The SmartX PIBC 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 PIBC 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 PIBC 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 PIBC 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 PIBC covers the pressure balancing, flow limitation and control modulation.
- Easy and Quick Commissioning
 - SmartX PIBC 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.

11. Pressure Independent Balancing and Control Valves and Actuators

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.

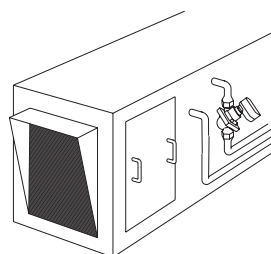
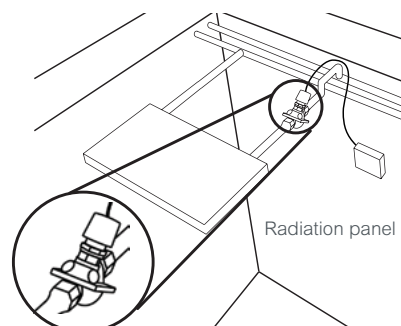
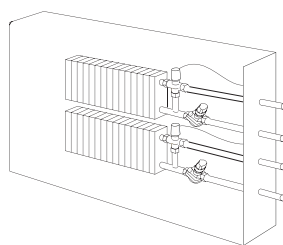
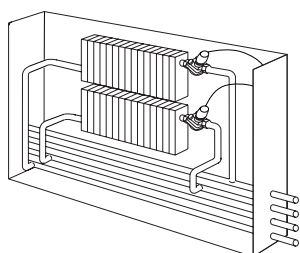
PIBCVs immediately react to all changes in system pressures, providing stable valve control independent from the fluctuating pressures in the piping system. No valve authority, pressure calculations or complicated valve flow setting calculations are required. At partial system load there is no resulting 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.

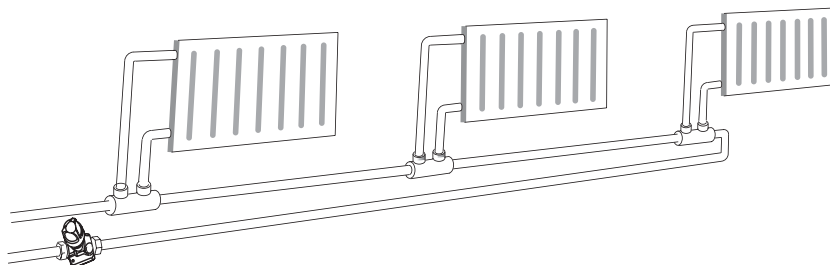
Applications

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/cooling, concrete core activation or radiation panels.



Air handling unit (AHU)



11. Pressure Independent Balancing and Control Valves and Actuators

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)

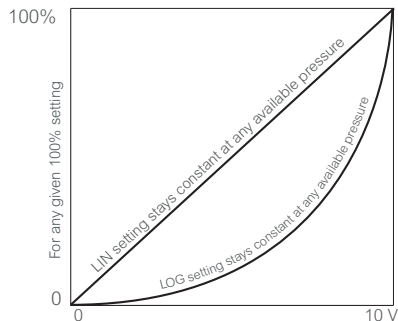
The differential pressure controller maintains a constant differential pressure across the control valve. The pressure difference is balanced so that when the differential pressure across the control valve changes (due to a change in available pressure, or movement of the control valve) the pressure 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.

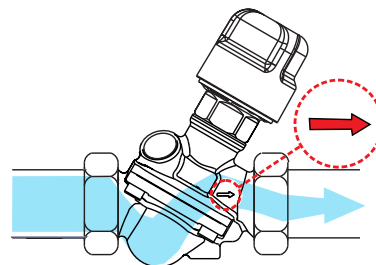
Flow Direction

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.

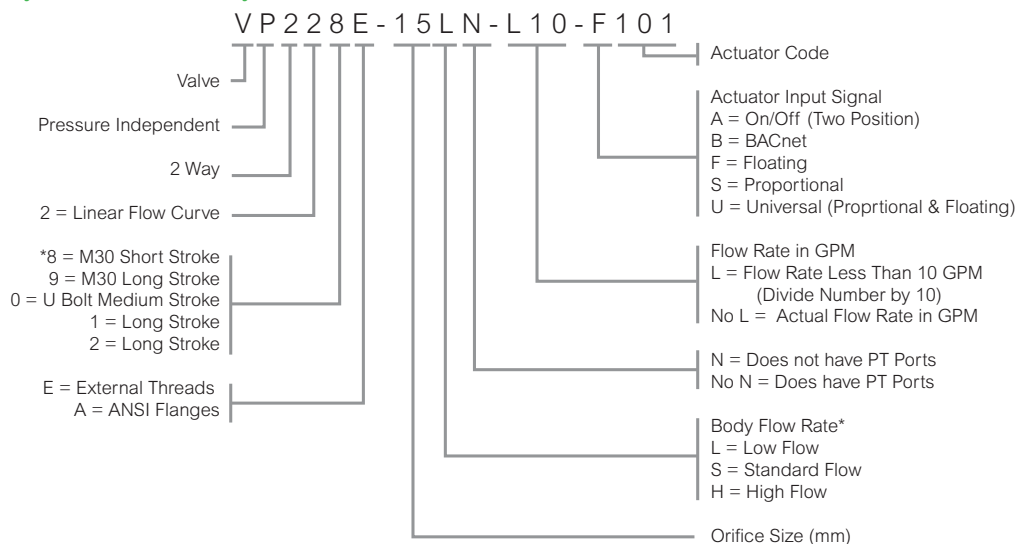
In the case when a system condition allows backflows, it is strongly recommended to use a backflow preventer in order to avoid possible water/glycol hammer that can damage the valve as well as other elements in the system.

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 225.

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 226 and for the valve body in Table 12. Specification Threaded Version, ½"...2" on page 230.

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 230 shows the valve body specifications and Table 23. ½"...2" Valve Flow Ranges (Q_{min} to Q_{nom}) on page 237, and Table 24. 2½"...10" Flanged Valve Flow Ranges (Q_{min} to Q_{nom}) on page 238, 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 (Q_{min} to Q_{nom}) on page 237, 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 233, 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 226 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 224.

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 230 shows the valve body specifications and Table 23. ½"...2" Valve Flow Ranges (Q_{min} to Q_{nom}) on page 237 and Table 24. 2½"...10" Flanged Valve Flow Ranges (Q_{min} to Q_{nom}) on page 238 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 233, 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 1½" 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 229 (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.

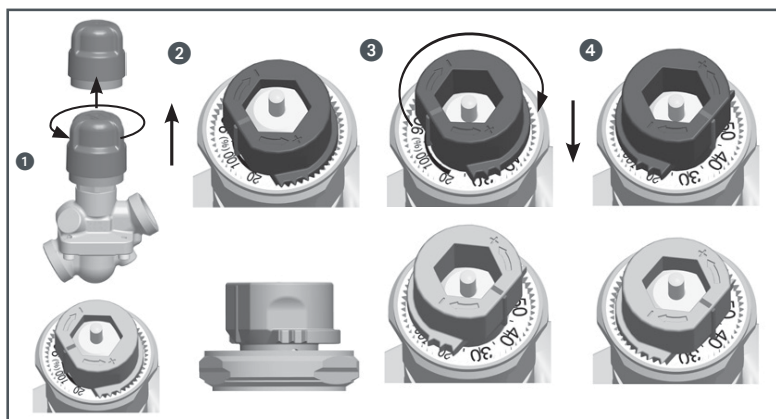
Example: VP229E-15HN

With this ½" valve the nom flow = 5 gal/min = 100% presetting.

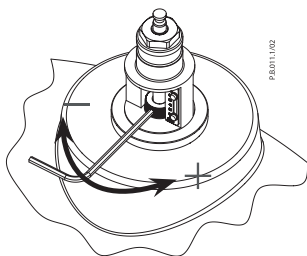
To set a flow of 4 gal/min you have to set: $4/5 = 80\%$.

Schneider Electric recommends a presetting/flow from 20% to 100%.

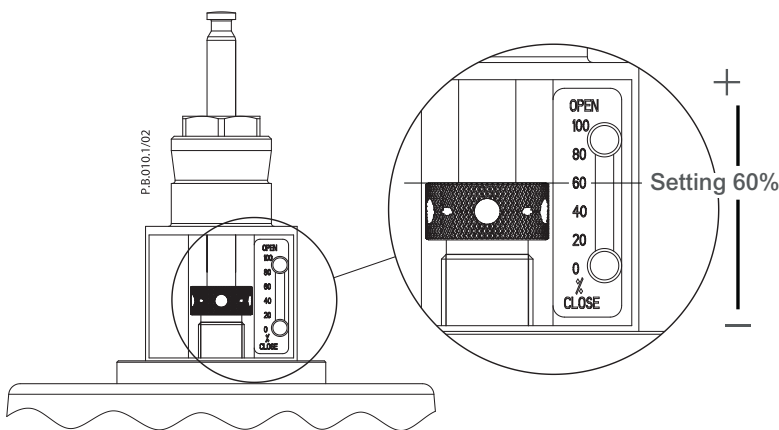
To set a PIBCV valve to a Q_{high} setting above 100%, turn the green pointer counter clock wise from 100%. The Q_{high} setting is the scale setting plus 90%. For example, to set the VP229E-15HN to a flow rate of 5.5 gal/min, set $5.5/5.0 = 110\%$ setting. Obtain the 110% setting by turning the green pointer counter clock wise from 100% to 20% (20% and 90% = 110%). As shown on page 230, Q_{high} settings above 100% slightly increase the valve's required minimum differential pressure.



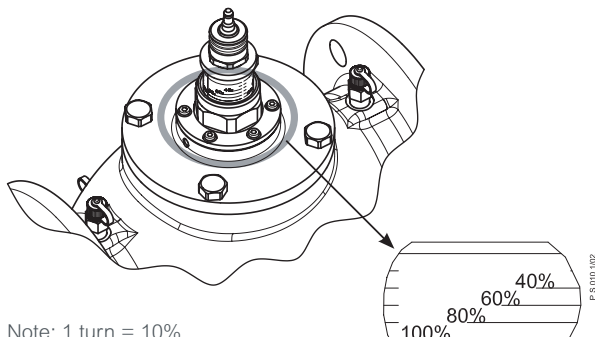
PIBCV Flow Setting 5"...10"



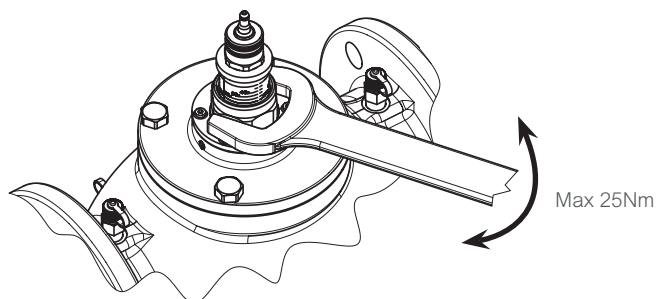
Note:
1 turn = 5%



PIBCV Flow Setting 1½"...4"



Note: 1 turn = 10%



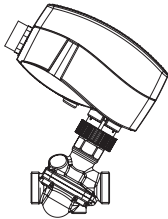
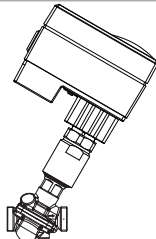
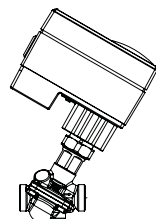
Max 25Nm

11. Pressure Independent Balancing and Control Valves and Actuators

PIBCV Assemblies: ½...1¼" Female NPT, without PT Ports

Valve Assembly and Suitable Actuators

Table 1. Valve Assemblies ½...1¼" With Female NPT End Connectors, Without PT Ports

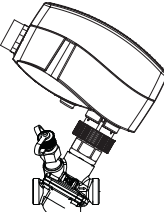
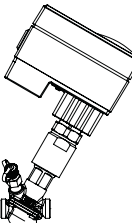
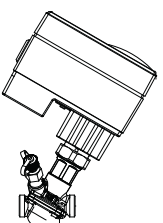
Flow Rate (GPM) ^a	Valve Size (inch)	24 Vac Two Position with Auxiliary Switch (MP131-24T)	24 Vac Three Wire Floating with Auxiliary Switch (MP131-24F)	24 Vac Proportional with Position Output Signal (MP131-24MP)	24 Vac Proportional/Floating with Position Output Signal Spring Return Open (MP300-SRU)	24 Vac Proportional/Floating with Position Output Signal 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	VP228E-15SN-L15-A101	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	VP229E-15HN-L25-A101	VP229E-15HN-L25-F101	VP229E-15HN-L25-S101	VP229E-15HN-L25-U201	VP229E-15HN-L25-U301
3.0	1/2	VP229E-15HN-L30-A101	VP229E-15HN-L30-F101	VP229E-15HN-L30-S101	VP229E-15HN-L30-U201	VP229E-15HN-L30-U301
3.5	1/2	VP229E-15HN-L35-A101	VP229E-15HN-L35-F101	VP229E-15HN-L35-S101	VP229E-15HN-L35-U201	VP229E-15HN-L35-U301
4.0	1/2	VP229E-15HN-L40-A101	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	VP229E-15HN-L45-A101	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	VP229E-20HN-L55-A101	VP229E-20HN-L55-F101	VP229E-20HN-L55-S101	VP229E-20HN-L55-U201	VP229E-20HN-L55-U301
6.0	3/4	VP229E-20HN-L60-A101	VP229E-20HN-L60-F101	VP229E-20HN-L60-S101	VP229E-20HN-L60-U201	VP229E-20HN-L60-U301
6.5	3/4	VP229E-20HN-L65-A101	VP229E-20HN-L65-F101	VP229E-20HN-L65-S101	VP229E-20HN-L65-U201	VP229E-20HN-L65-U301
7.0	3/4	VP229E-20HN-L70-A101	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	VP229E-25HN-L80-A101	VP229E-25HN-L80-F101	VP229E-25HN-L80-S101	VP229E-25HN-L80-U201	VP229E-25HN-L80-U301
8.5	1	VP229E-25HN-L85-A101	VP229E-25HN-L85-F101	VP229E-25HN-L85-S101	VP229E-25HN-L85-U201	VP229E-25HN-L85-U301
9.0	1	VP229E-25HN-L90-A101	VP229E-25HN-L90-F101	VP229E-25HN-L90-S101	VP229E-25HN-L90-U201	VP229E-25HN-L90-U301
9.5	1	VP229E-25HN-L95-A101	VP229E-25HN-L95-F101	VP229E-25HN-L95-S101	VP229E-25HN-L95-U201	VP229E-25HN-L95-U301
10	1	VP229E-25HN-010-A101	VP229E-25HN-010-F101	VP229E-25HN-010-S101	VP229E-25HN-010-U201	VP229E-25HN-010-U301
11	1	VP229E-25HN-011-A101	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	VP229E-32SN-013-A101	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	VP229E-32HN-015-A101	VP229E-32HN-015-F101	VP229E-32HN-015-S101	VP229E-32HN-015-U201	VP229E-32HN-015-U301
16	1¼	VP229E-32HN-016-A101	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 230 and page 237.

11. Pressure Independent Balancing and Control Valves and Actuators

PIBCV Assemblies: ½...1¼" Female NPT, with PT Ports

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	VP228E-15S-L15-A101	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 230 and page 237.

Table 3. Specification ½...1¼" Valve Body Actuators

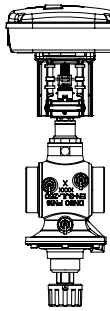
1/2" to 1¼" Valve Body Actuator Part Number (actuator code)	MP131-24T (A101)	MP131-24F (F101)	MP131-24MP (S101)	MP300-SRU (U201)	MP300-SRD (U301)
Input Signal	Two Position, 3 Wire with selectable input jumper signal action selection	Three Wire Floating	Proportional, 0...10 Vdc, 2...10 Vdc, 4...20 mA, 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
Auxiliary 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

11. Pressure Independent Balancing and Control Valves and Actuators

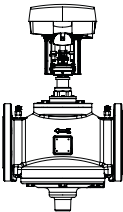
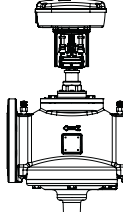
PIBCV Assemblies: 1½, 2" Female NPT, with PT Ports

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 Signal 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 230 and page 237.

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

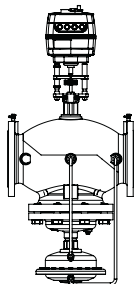
a. Factory set. Complete flow ranges shown in tables for 2½"...4" on page 231 and page 238.

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
Auxiliary 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" and 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 231 and page 238.

Table 8. Specification 5" and 6" Valve Body Actuators

5" and 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 switch 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
Auxiliary Switch	Yes		
Other Features	Auto calibration, 3-color LED indication, powered manual override, configurable position output 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

11. Pressure Independent Balancing and Control Valves and Actuators

PIBCV Assemblies: 8 and 10" with PT Ports & Flanges

Table 9. Valve Assembly 8" and 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 are shown in tables for 8" and 10" on page 231 and page 238.

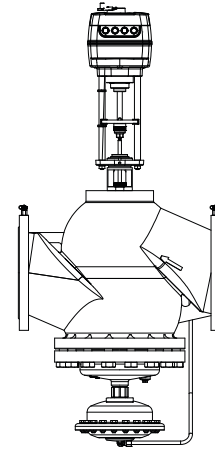


Table 10. Specification 8" and 10" Valve Body Actuators

8" and 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 switch selectable
Electrical Connection	Screw terminal with conduit connector
Position Feedback Output Signal	0...10 Vdc, 2...10 Vdc, 0...20 mA, 4...20 mA *
Spring Return	—
Auxiliary 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-xxxxxx, VP229E-xxxxxx	Use black cap provided with VP228E-xxxxxx or VP229E-xxxxxx 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 232 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			232 psi (16 bar)													
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 232 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

11. Pressure Independent Balancing and Control Valves and Actuators

PIBCV Specifications: 2½...10" Flange Version

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)}	ΔpQ _{nom}	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}		
Max. close off differential pressure across the valve			232 psi (16 bar)		
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⁾	ΔpQ _{nom}	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			232 psi (16 bar)							
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 Q_{nom} (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 - P₂) 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

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		F-27934
1-1/2	VP220E-40S-	VP220E-40CQS	Threaded	911 2108 040	Yes	
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	F-27939
5	VP220A-125S-	VP221A-125CQS	Flanged		Yes	
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	

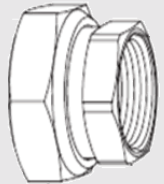
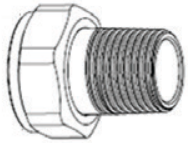
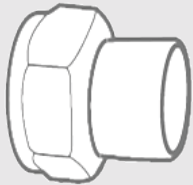
11. Pressure Independent Balancing and Control Valves and Actuators

PIBCV Valve Actuator Codes and ½...2" Tail Pieces

Table 16. Selection: Valve Actuator Codes

Actuator Part Number	Actuator Code	Valve Sizes	Non Spring Return	Spring Return Open	Spring Return Close
MP131-24T	A101	½"...1¼"	√		
MP131-24F	F101				
MP131-24MP	S101				
MP300-SRU	U201			√	
MP300-SRD	U301				√
MP500C	U131	1½"...4"	√		
MP500C-SRU	U231			√	
MP500C-SRD	U331				√
MP2000-NSR	U161	5" and 6"	√		
MP2000-SRU	U261			√	
MP2000-SRD	U361				√
MP4000	U181	8" and 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	
	Two Male NPT Connectors, Two Nuts, Two Gaskets	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)

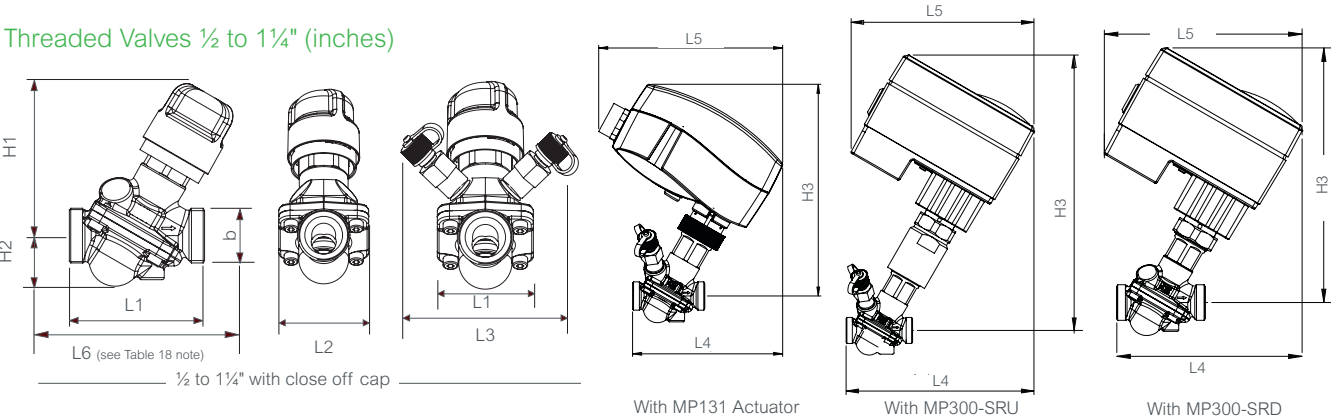


Table 18. Threaded Valves ½ to 1¼" (inches)

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. Selection: ½"...2" Valve Body Tail Pieces on page 233.
For assemblies with Female NPT: L6= (2x Column A - 2x Column B) + L1

Threaded Valves 1½" and 2" (inches)

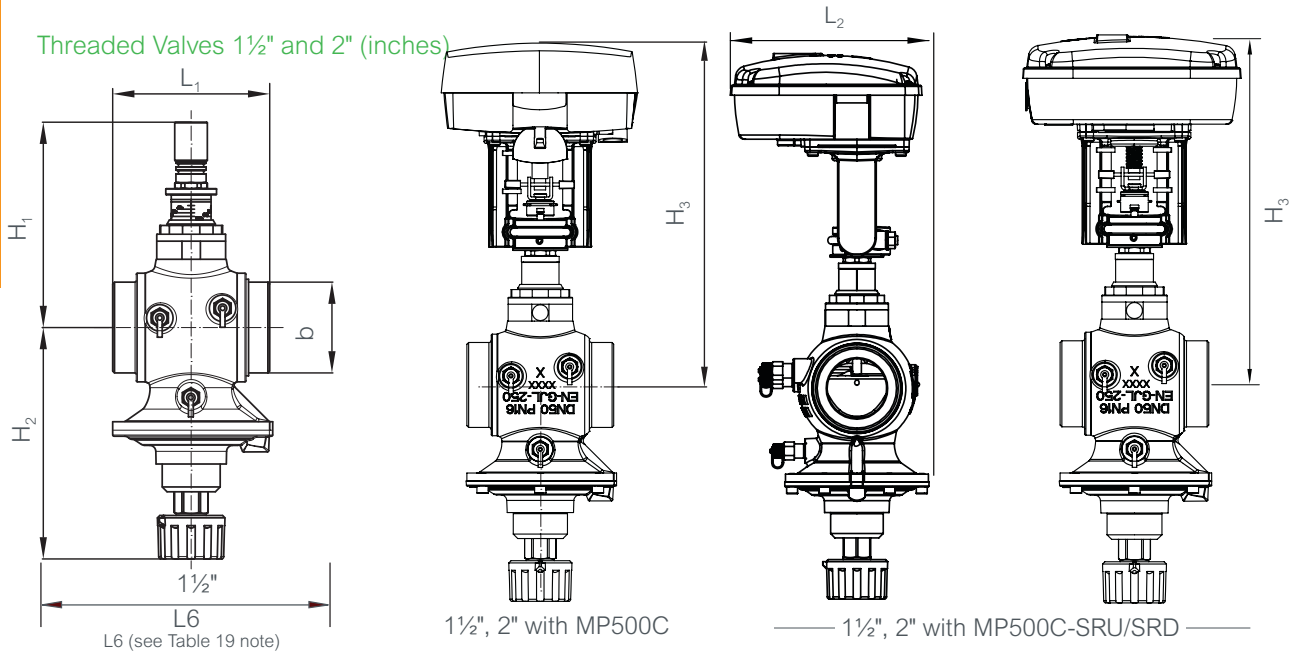


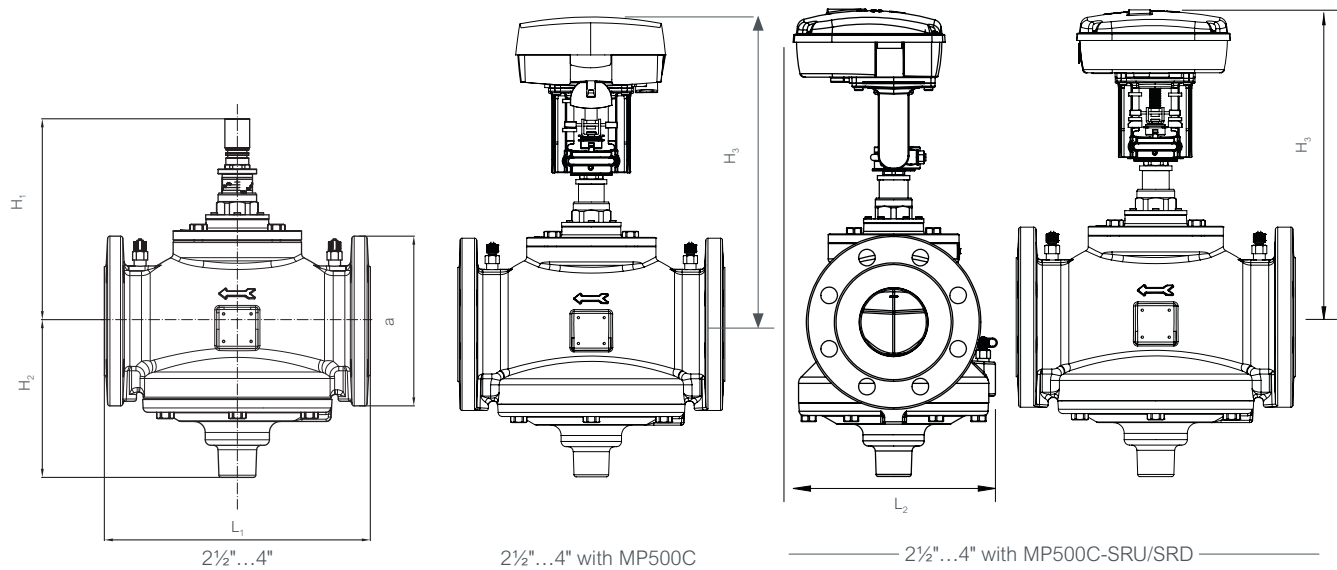
Table 19. Threaded Valves 1½" and 2" (inches)

Type	L1	L2	H1	H2	H3	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. Selection: ½"...2" Valve Body Tail Pieces on page 233.
For assemblies with Female NPT: L6= (2x Column A - 2x Column B) + L1

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



Flanged Valves 5" and 6"

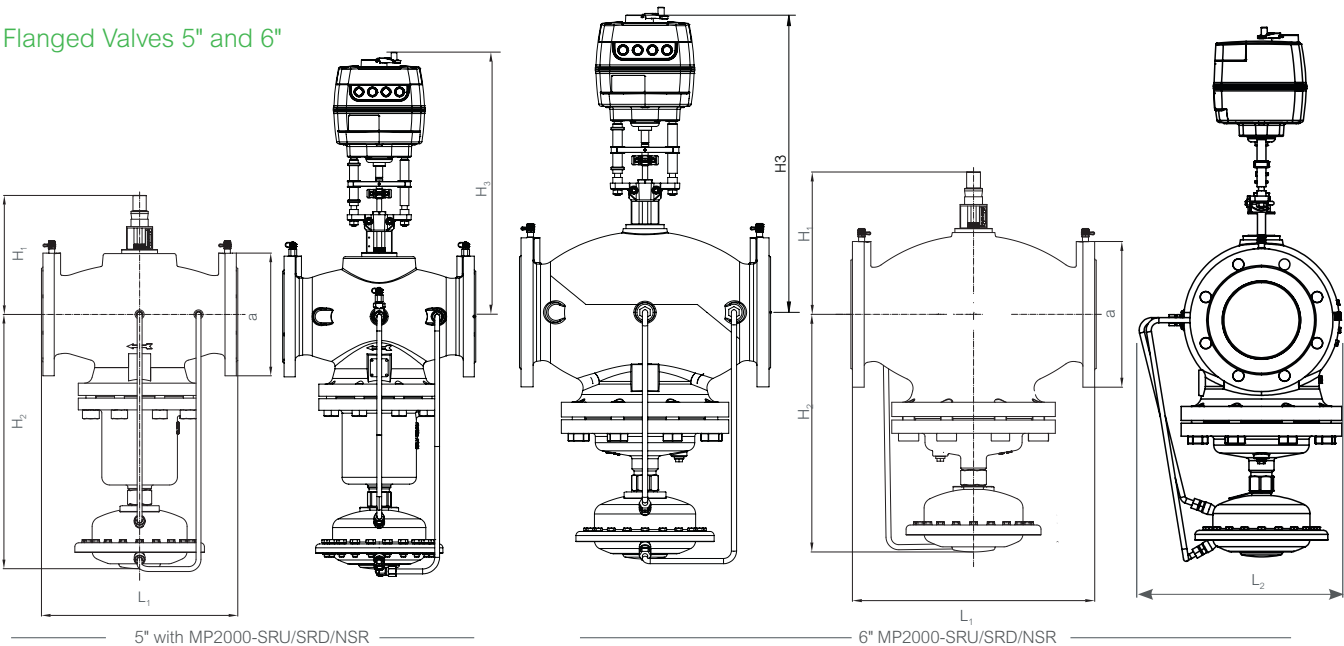


Table 21. Flanged Valves 5" and 6" (inches)

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" and 10"

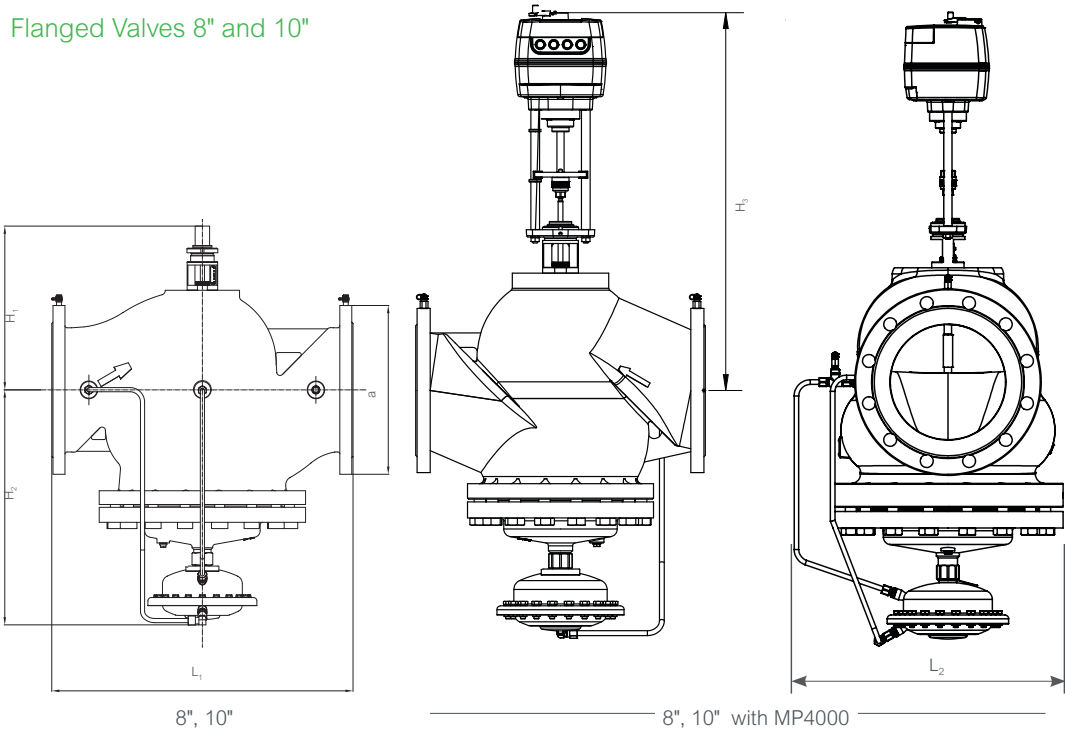
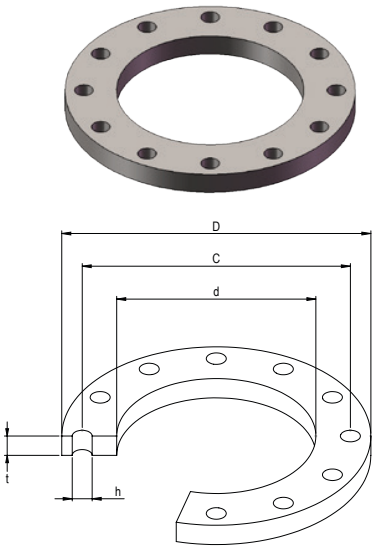


Table 22a. Flanged Valves 8" and 10" (inches)

See Table 22b for Valve Flange Adapters.

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 Flange Adapters 8" and 10"



Specifications and Part Numbers		
Size	8" (200 mm)	10" (250mm)
Part Number	D2576-16-200	D2576-16-250
Bolt Hole Diameter	.87" (22 mm)	1.02" (25.9 mm)
Bolt Circle	11.61" (294.89 mm)	13.98" (355.09 mm)
Pressure	PN16	
d	8.63" (219.1 mm)	10.75" (273mm)
D	13.39" (340 mm)	15.94" (405mm)
C	11.61" (295 mm)	13.98" (355mm)
Number of Bolts	12	
h	0.87" (22 mm)	1.02" (26mm)
t	1.024" (26 mm)	1.14" (29mm)
Weight	24.03 lbs (10.9 kg)	39.68 lbs (18.0 kg)
Material	Carbon Steel	Carbon Steel
IMPA/ISSA Code	734554 735564	734555 735565

11. Pressure Independent Balancing and Control Valves and Actuators

PIBCV Valve Flow Ranges: ½...2"

Table 23. ½...2" Valve Flow Ranges (Q_{min} to Q_{nom})

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
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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
55												1

Table 24. 2½"...10" Flanged Valve Flow Ranges (Q_{min} to Q_{nom})

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

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 1-1/4". Typical applications are temperature control and permanent automatic balancing on terminal units (fan-coils, chilled ceilings, air-handling units).

Specifications

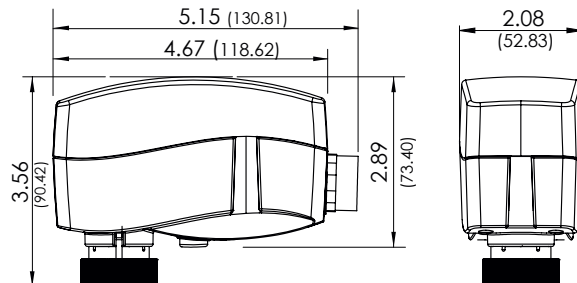
Part Numbers	MP131-24F, MP131-24MP, MP131-24T
Power supply	24 Vac +10... -15 %
Power consumption	1.0 VA
MP131-24F/T	1.5 VA, standby 0.4 W
MP131-24MP	
Frequency	50/60 Hz
Control Input	
MP131-24MP	0...10 (2-10) V Ri = 200 kΩ
Feedback Control input Y	0...20 (4-20) mA Ri = 500 Ω
Control output X	0...10 V 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)
Standards	
Heat	IEC 60068-2-2
Humidity	IEC 60068-2-3
Cold	IEC 60068-2-1
Vibration	IEC 60068-2-6
Regulatory Compliance: c-UL-us LISTED mark compliance per UL 60730-1 & -2-14 and CAN/CSA E60730-1 & -2-14. CE mark compliance per directives [2014/35/EU] LVD, [2014/30/EU] EMC, and [2011/65/EU] RoHS2. RCM mark compliance for Australia/New Zealand community.	



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

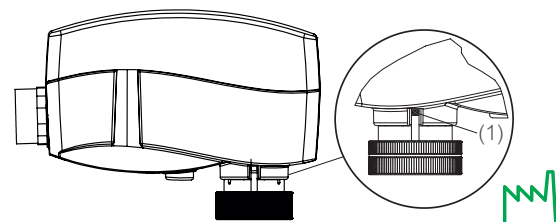
Dimensions (mm)



Mounting and Installation

The actuator should be mounted with the valve stem in either horizontal position or pointing upwards. The actuator is fixed to the valve body by means of a ribbed nut which requires no tools for mounting. The ribbed nut should be tightened by hand.

1. Check the valve neck. The actuator should be in stem up position (factory setting) and mounted securely on the valve body.
2. Wire the actuator according to the wiring diagram.
3. Stem movement is indicated by the Position Indicator (a small pin riding in a channel as shown in (1) below).



Spring Return Multi-signal Actuators for VP228E/VP229E SmartX PIBCV, DN10-32 (1/2"-1 1/4")



Product Description

MP300-SRU/SRD actuators with Floating and Proportional control are low voltage motoric actuators for the SmartX PIBCV DN10-32 (1/2"...1 1/4") 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.

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
Standards	
Heat	IEC 60068-2-2
Humidity	IEC 60068-2-3
Cold	IEC 60068-2-1
Vibration	IEC 60068-2-6

Regulatory Compliance: c-UL-us LISTED mark compliance per UL 60730-1 & -2-14 and CAN/CSA E60730-1 & -2-14. CE mark compliance per directives [2014/35/EU] LVD, [2014/30/EU] EMC, and [2011/65/EU] RoHS2. RCM mark compliance for Australia/ New Zealand community.

Part Numbers

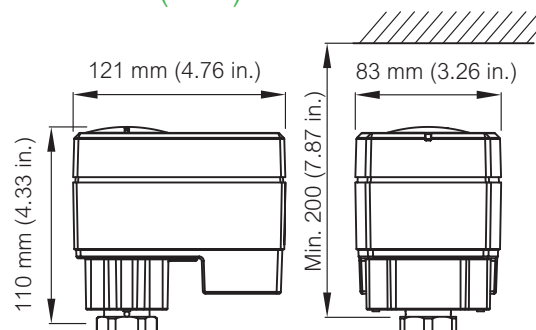
Part Number	Spring Return Direction	Linkage (included with actuator)
MP300-SRU	Up - Normally Open	Adapter *
MP300-SRD	Down - Normally Closed	Spacer

* Total height of the valve/actuator assembly increases with the use of the Adapter model.

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.

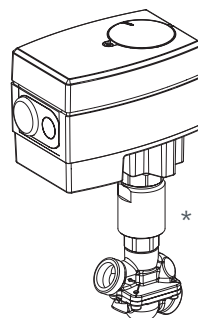
Dimensions (mm)



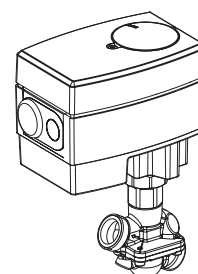
Actuator Valve Combinations

MP300-SRU for a normally open valve.

MP300-SRD for a normally closed valve.



MP300-SRU +
VP228E, VP229E



MP300-SRD +
VP228E, VP229E

11. Pressure Independent Balancing and Control Valves and Actuators

MP500C NSR, MP500C-SRU/ SRD Multi-Signal Actuators

Multi-Signal Non-Spring/Spring Return Actuators for VP220x SmartX PIBCV, DN40...100 (1½...4")

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.

Specifications

MP500C	Non-Spring Return
MP500C-SRU	Stem up (retract)
MP500C-SRD	Stem down (extend)
Voltage supply	24 Vac ±20% 50-60Hz 24 Vdc ±20%
Power consumption	
MP500C-SRU/SRD: Running	30 VA (21 W)
Rest	7 W
MP500C	average 15 VA
Running Time	
Modulating	15 sec.
Increase/decrease	60/300 sec. (selectable)
MP500C-SRU/SRD Spring Return:	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	24 Vac
Current through closed input	5 mA
Pulse time	min. 20 ms
Position Feedback	
MP500C	2...10 Vdc
MP500C SRU/SRD	2-10 Vdc or 0-5 Vdc (0-100%) - Load 2 mA
Environmental	
Operation Temperature	14...122°F (-10...50 °C)
Storage Temperature	-13...149°F (-25...65 °C)
Ambient Humidity	max 90% RH (non-condensing)
Enclosure rating	IP54 (NEMA 2)



MP500C-SRU/SRD



MP500C

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.

Sound power level	
MP500-SRU/SRD	43 dba
MP500C	32 dba
Standards	
Heat	IEC-68-2-2
Humidity	IEC-68-2-3
Cold	IEC-68-2-1
Vibration	IEC-68-2-6
Regulatory Compliance: c-UL-us LISTED mark compliance per UL 60730-1 & -2-14 and CAN/CSA E60730-1 & -2-14. CE mark compliance per directives [2014/35/EU] LVD, [2014/30/EU] EMC, and [2011/65/EU] RoHS2. RCM mark compliance for Australia/New Zealand community.	
Material	
Housing	Aluminum
Max cable core diameter	2.5 mm²
Cover	
MP500C SRU/SRD	Aluminum
MP500C	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:	2.8 Kg (6.17 lbs)
MP500C	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	-

Spring Return Multi-Signal Actuators for VP221 SmartX PIBCV, DN125-150 (5" ... 6")

Product Description

MP2000 SRU/SRD/NSR Actuators with spring return safety function and non-spring return are for fine regulation of large control valves under the demand of the HVAC controller. MP2000 SR can be controlled by either a modulating or a 3-point control signal and is 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) 6.26 kg NSR (13.8 lbs)
Safety function	Yes
Safety fuction runtime 50mm stroke	120 s
Manual operation	Electrical and Mechanical
Power failure response	
MP2000-SRD Safety function:	stem extends down
MP2000-SRU Safety function:	stem retracts up



Features

- Manual operation mechanical and/or electrical
- Position indication, LED signalization
- Selectable speed 4 or 6 s/mm (3 or 6 s/mm NSR)
- Automatic Stroke Calibration
- Linear to EQ% Curve Adaptation
- Anti-oscillation function
- Voltage or current output signal U
- 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)

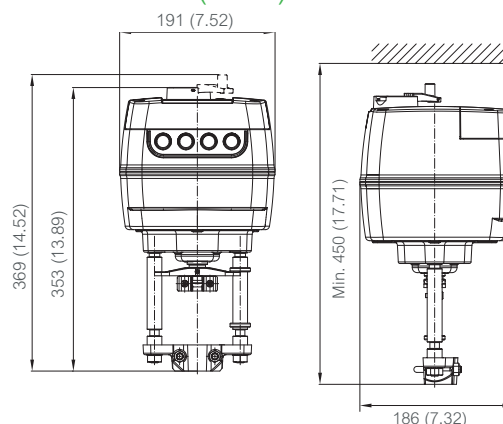
Standards/Directives	
Heat	IEC 60068-2-2
Humidity	IEC 60068-2-3
Cold	IEC 60068-2-1
Vibration	IEC 60068-2-6

Regulatory Compliance: c-UL-us LISTED mark compliance per UL 60730-1 & -2-14 and CAN/CSA E60730-1 & -2-14. CE mark compliance per directives [2014/35/EU] LVD, [2014/30/EU] EMC, and [2011/65/EU] RoHS2. RCM mark compliance for Australia/New Zealand community.

Part Numbers

Part No.	Spring Return Direction
MP2000-SRD	Stem down, extends (valve closed)
MP2000-SRU	Stem up, retracts (valve open)
MP2000-NSR	Non-Spring Return

Dimensions mm (inch)



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)

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)

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
Standards	
Heat	IEC 60068-2-2
Humidity	IEC 60068-2-3
Cold	IEC 60068-2-1
Vibration	IEC 60068-2-6
Regulatory Standards	c-UL-us LISTED mark compliance per UL 60730-1 & -2-14 and CAN/CSA E60730-1 & -2-14. CE mark compliance per directives [2014/35/EU] LVD, [2014/30/EU] EMC, and [2011/65/EU] RoHS2. RCM mark compliance for Australia/New Zealand community.

11. Pressure Independent Balancing and Control Valves and Actuators

Notes

Note this section has sectional 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", 1/2" 1.05" round or 3/8"...1/2" and 3/4" 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°F...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 commanded 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. 1/2"...3/4" 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 assemblies 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" 2-way and 2" ... 16" 3-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" 2-way and 3-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" 2-way and 3-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 2-way or 3-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 $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", and $1\frac{1}{4}$ " depending on model.
8. Valve CVs are to from 1 to 8 depending on model.
9. Actuators are to be UL listed

B. Bronze $\frac{1}{2}$ "...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. 2-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 281°F 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 2-way and 3-way configurations.
4. Connection: Female NPT end fittings, Teflon® PTFE seat, characterizing disc glass-filled PEEK providing equal percentage flow curve on 2-way valve.
5. Operating Temperature 20...250°F chilled or hot water with up to 60% glycol solution.
6. 2-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 2-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.

13. Close off ratings shall be 232 psi for all valve sizes.

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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