



# Valves and Actuators

## Catalog 2022



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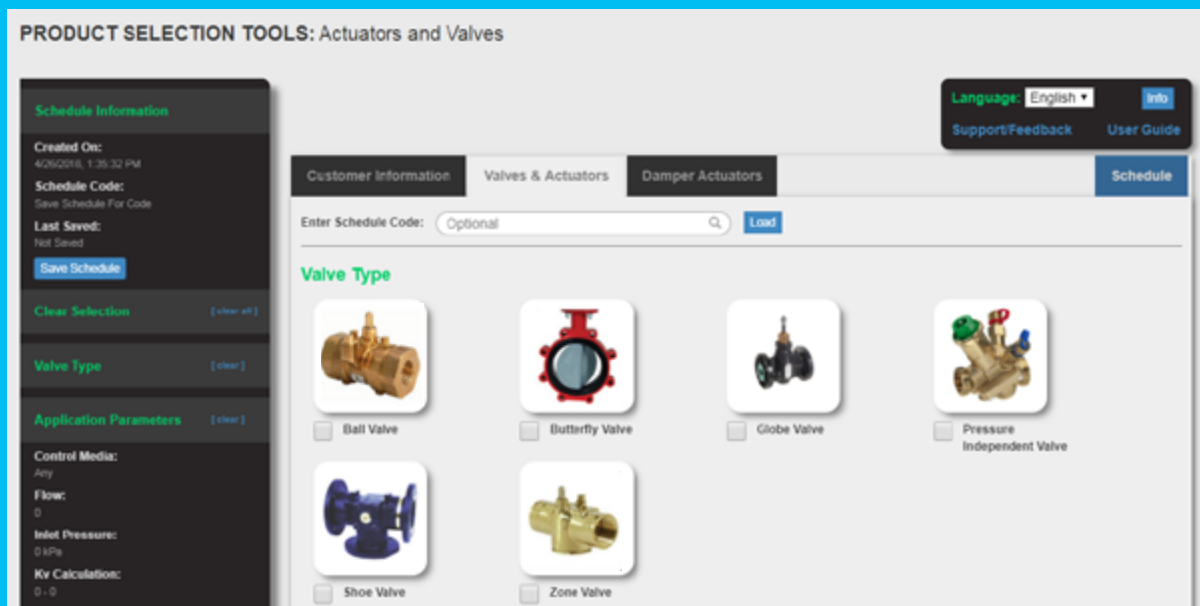
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## On-line Valve and Actuator Selection Tool

The Valve and Actuator Selection Tool is a dynamic sizing tool designed to provide a very quick and simple way of choosing the most appropriate product for your application. A wealth of information is at your fingertips with full technical details and quick access to key product documentation.

### Sizing and selection for all HVAC valve and actuators

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

### Features

- Intuitive selection based on calculators and/or drop down menus
- Customer and partner profiles possible in any schedule creation
- Valve and Actuator selection feature to create schedule of hydronic systems
- Ability to create own or add to hydronics a schedule of damper actuators
- Ability to view, edit, change, communicate and adjust schedules. Download completed schedules to Excel, pdf, and BOM
- Ability to save schedules in progress to be worked on later or for use as a template for future projects

### Browser compatibility

- Chrome (preferred). Use of other browsers may exhibit unintended behaviors



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# EMEA/APAC Product Listing

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## Disclaimers

- Not all products in the guide may be available in every country, please check availability with the local Schneider Electric office.
- Some product images are not images of the exact model, but are represented by a “series” image.
- Information within this guide is subject to change without notice.
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# Ball valves and actuators

## VB210R, VB200R and VB310R, VB300R

These VB range of ball valves utilise a low friction packing design around the ball which enables a low torque and compact motor to be used in the actuator.

The VB210R and VB310R ball valves variants incorporate a flow characterizing insert to providing an equal percentage flow characteristic with high rangeability.

These valves are suitable for control of hot or chilled water applications.

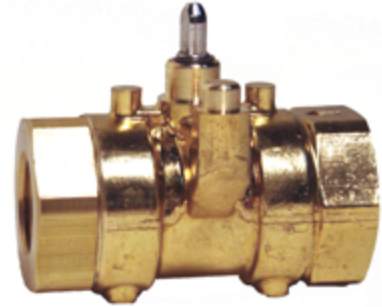
### Specifications

<b>Service<sup>a</sup></b>	Hot and chilled water, up to 60% glycol
<b>System static pressure limit</b>	PN40
<b>Media temperature limits</b>	-7 to 120 °C
<b>Close-off pressure<sup>b</sup></b>	895 kPa 2-way; 480 kPa, 3-way
<b>ΔPm</b>	205 kPa normal operation, 135 kPa psi quiet operation
<b>Seat leakage<sup>c</sup></b>	ANSI class IV (0.01%)
<b>End connections</b>	Rp threaded
<b>Material</b>	
<b>Body material</b>	Forged UNC 37700 brass
<b>Stem Material</b>	Stainless steel anti-blow out stem with dual Viton™ o-rings
<b>Ball material</b>	304 Stainless steel
<b>Seat material</b>	PTFE
<b>Characterized insert</b>	Glass-filled PEEK

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.

c. Seat Leakage in normal direction of flow only



### VB210R 2-Way Control Valves

Size	Part number	Type designation	Thread	kvs
DN15	VB210R-15BS01	VB210R-15BS 0.25T 00	Rp 1/2	0.25
	VB210R-15BS03	VB210R-15BS 0.6T 00		0.6
	VB210R-15BS04	VB210R-15BS 1.0T 00		1.0
	VB210R-15BS05	VB210R-15BS 1.8T 00		1.8
	VB210R-15BS07	VB210R-15BS 3.0T 00		3.0
	VB210R-15BS08	VB210R-15BS 4.0T 00		4.0
	VB210R-15BS09	VB210R-15BS 6.3T 00		6.3
20mm	VB210R-20BS08	VB210R-20BS 4.0T 00	Rp 3/4	4.0
	VB210R-20BS09	VB210R-20BS 6.3T 00		6.3

### VB200R 2-Way Full Port Valves

Size	Part number	Type designation	Thread	kvs
DN15	VB200R-15BS	VB200R-15BS 8.7T 00	Rp 1/2	8.7
DN20	VB200R-20BS	VB200R-20BS 8.7T 00	Rp 3/4	

### VB310R 3-Way Control Valves

Size	Part number	Type designation	Thread	kvs
DN15	VB310R-15BS03	VB310R-15BS 0.52T 00	Rp 1/2	0.52
	VB310R-15BS04	VB310R-15BS 0.86T 00		0.86
	VB310R-15BS05	VB310R-15BS05 1.6T 00		1.6
	VB310R-15BS07	VB310R-15BS07 2.5T 00		2.5
	VB310R-15BS08	VB310R-15BS 4.0T 00		4.0
	VB310R-15BS09	VB310R-15BS 6.3T 00		6.3
DN20	VB310R-20BS08	VB310R-20BS 4.0T 00	Rp 3/4	4.0
	VB310R-20BS09	VB310R-20BS 6.3T 00		6.3

### VB300R 3-Way Full Port Valves

Size	Part number	Type designation	Thread	kvs
DN15	VB300R-15BS	VB300R-15BS 8.7T 00	Rp 1/2	8.7
DN20	VB300R-20BS	VB300R-20BS 8.7T 00	Rp 3/4	



## Ball Valves and Actuators

### MB3, MB6

The MB3 and MB6 are compact actuators for the VB210R, VB310R, VB200R and VB300R.

A 'pop top' connection between the valve and actuator provides a fast and easy installation.

Actuators are available in both spring return and non-spring return versions for floating, proportional and 2-position control.

<b>Supply voltage</b>		24 Vac +25%, -15% @ 50/60 Hz.
<b>Floating and Modulating</b>		
<b>Two-position</b>		24 Vac 50/60, (+25%, -15%). 24 Vdc (+/-20%)
<b>Manual operation</b>		
<b>Floating/modulation</b>		Hand lever
<b>Two-position</b>		Hex Key 3.96 mm (5/32")
<b>Proportional control (Field Selectable)</b>		0–10V, 2–10V, 0–5 V, 5–10V, 4–20 mA Direct or reverse acting
<b>Main construction materials</b>		Thermoplastic base and cover. Approved for use in air plenums.
<b>Electrical connection</b>		Terminal Block
<b>Cable gland (M20)</b>		5 to 9 mm O/D
<b>Shipping and storage temp. limits</b>		-40 to 76 °C
<b>Environment (at media temp. limits)</b>		
<b>Operating temperature</b>		
<b>Floating</b>		0 to 60 °C
<b>Proportional</b>		0 to 60 °C
<b>Two-Position</b>		0 to 76 °C
<b>Humidity</b>		5 to 95% relative humidity, non-condensing
<b>Enclosure rating (horizontal and vertical mounting)</b>		IP31



#### Two-Position Actuators

Part number	Type designation	Spring return action (valve normal position)	Stroke time, sec. 50/60 Hz	Spring return Time, sec. 50/60 Hz	VA @ 24 V ac/dc	Power consumption ac/dc
MB6-SO-24T	MB6-SRO-24T T31 00	Normally open	50	35	3.5/1.8	2.3/1.6 W
MB6-SC-24T	MB6-SRC-24T T31 00	Normally closed				

#### Three Point Floating Actuators (Increase/decrease)

Part number	Type designation	Spring return action (valve normal position)	Stroke time, sec. 50/60 Hz	Time-out Delay, sec. 50/60 Hz	VA	Power consumption
MB3-24F	MB3-24F T31 00	None	135	180	4.5*	2.0 W
MB3-SO-24F	MB3-SRO-24F T31 00	Normally open				
MB3-SC-24F	MB3-SRC-24F T31 00	Normally closed				

\* Size transformer for each spring actuators at 7VA

#### Proportional Actuators (0 to 10V, 2–10V, 0 to 5V, 5 to 10V, 4 to 20 mA)

Part number	Type designation	Spring return action (valve normal position)	Stroke time, sec. 50/60 Hz	VA	Power consumption
MB3-24M	MB3-24M T31 00	None	135	4.5*	2.0 W
MB3-SO-24M	MB3-SRO-24M T31 00	Normally open			
MB3-SC-24M	MB3-SRC-24M T31 00	Normally closed			

\* Size transformer for each spring actuators at 7VA

## VB601R Valves and MB10 Series Actuators

The VB601R is a 6-port motorized ball valve that performs a diverting function between two water circuits in 4-pipe changeover system. The VB601R Valve will switch between heating and cooling with the addition of the **SpaceLogic** MB10 Two-Position Rotary Actuator.

Flow regulation is provided from an additional **SpaceLogic** PIBCV Valve and Actuator. This provides the additional benefit of having a balanced energy efficient solution with superb proportional control.

The control signal to the 6-port diverting valve actuator determines the direction of flow through the valve. Changing the control signal will rotate the actuator and switch the supply ports between heating and cooling or vice versa. During the 6-port valve motorization, the valve rotates through a mid point with all ports isolated and with no possibility to cross connect and mix the heating and cooling circuits.

Models also exist for use with PIBCV SP90 Actuators: MB10-24T-PLUG, MB10-24T-ENGY and MB10-24T-FLEX.

Other features include:

- No cross-flow between supply circuits
- Single on/off control signal to change over supply circuits
- Visual indication of actual valve position
- Silent and reliable operation
- Maintenance free
- Teflon seal and polished chrome valve ball to prevent valve sticking
- Manual override

Specifications		
<b>Valve</b>		
<b>DN</b>	15	20
<b>Diff Pressure</b>	3.6 kPa at $Q_{nom}$ of 450 l/h DN15-STD Flow PIBCV	14 kPa $Q_{nom}$ of 900 l/h DN20-STD Flow PIBCV
<b>Kvs</b>	2.4 m <sup>3</sup> /h	4.0 m <sup>3</sup> /h
<b>Pressure class, PN</b>	16	16
<b>Medium Temp.</b>		0 – 90 °C
<b>Shut off</b>		800 kPa
<b>Valve neck</b>		Quick fix connection
<b>Connection</b>		Internal thread Rp 1/2 ISO 7/1
<b>Weight</b>		1140 g
<b>Main construction materials:</b>		
<b>Body and connection</b>		CW 602 N (DZR Brass)
<b>Ball</b>		CW 614 N Chrome plated
<b>Stem</b>		CW 614 N Nickel plated
<b>Seals</b>		P.T.F.E. (TEFLON)
<b>O-ring</b>		70 EPDM 281
<b>Actuator</b>		
<b>Power supply</b>		24 AC ± 20% V
<b>Operating power consumption</b>		5 VA (only when running)
<b>Frequency</b>		50/60 Hz
<b>Running speed</b>		80 sec/90°
<b>Control input</b>		2-point
<b>Operating torque</b>		10 Nm
<b>Rotation angle</b>		90 °
<b>Environment</b>		
<b>Operating temperature</b>		0 to 55 °C
<b>Storage/transp. temp</b>		-10 to 80 °C
<b>Protection class (EN 60730-1)</b>		II according
<b>Enclosure rating</b>		IP42
<b>Weight</b>		405 g
<b>Connection cable</b>		1.5 m
<b>(halogen free)</b>		3×0.5 mm <sup>2</sup>



MB10 Actuators		
Cable length (m)	Part number	Associated Control Valve Actuators (fitted to PIBCV)
1.5	MB10-24T	MP130
10	MB10-24T-10M	
1.5	MB10-24T-PLUG	SP90
	MB10-24T-ENGY	
	MB10-24T-FLEX	

VB601R Valve bodies			
DN	Kvs (m <sup>3</sup> /h)	Connection	Part number
15	2.4	Rp 1/2	VB601R-15B
20	4.0	Rp 3/4	VB601R-20B



# Butterfly Valves and Actuators

## VF208W 25-200NS and 100-200NZ

The VF208W is a new generation butterfly valve for the isolation and control of water for HVAC systems such as boiler isolation or heat pump change over from cooling to heating. The butterfly valves have elongated wafer type eyelets for fitment between flanges

- Energy saving: EPDM soft seats provide tight shut off and zero leakage (complete insulation possible according to German energy saving order, EnEV)
- Approved for use with drinking water DN25-80 (DVGW)
- Maintenance free, double sealing of stem, central disc bearing
- Good flow control characteristics
- Integrated dew point barrier
- No linkage kits required

### Specifications

<b>Pressure class</b>	PN16
<b>Leakage (EN 12266-1)</b>	Tight, (Leakage Rate A)
<b>Temperature range</b>	-10 °C to +100 °C
<b>Max glycol</b>	50%
<b>Main construction materials</b>	
<b>Body</b>	Nodular Iron (EN-JS1030)
<b>Lining</b>	EPDM
<b>Disc</b>	DN25-80: 1.4581 (AISI316)
<b>With zinc-lamella coating</b>	DN100-200: (EN-JS1030)
<b>Stem</b>	1.4021-QT



Size	Kv	Stainless Steel Disc		Max ΔP (kPa)	Actuator
		Part number	Full type designation		
DN25	26	VF208W-25NS	VF208W-25NS 26E B00	600	MF20
DN32	26.5	VF208W-32NS	VF208W-32NS 26E B00	600	MF20
DN40	50	VF208W-40NS	VF208W-40NS 50E B00	600	MF20
DN50	115	VF208W-50NS	VF208W-50NS 115E B00	600	MF20
DN65	260	VF208W-65NS	VF208W-65NS 260E B00	600	MF20
DN80	375	VF208W-80NS	VF208W-80NS 375E B00	600	MF20
DN100	760	VF208W-100NS	VF208W-100NS 760E B00	600	MF20
DN125	1,025	VF208W-125NS	VF208W-125NS 1025E B00	600	MF40
DN150	1,790	VF208W-150NS	VF208W-150NS 1790E B00	300	MF40
DN200	3450	VF208W-200NS	VF208W 200NS 3450E B00	300	MF40

Size	Kv	Nodular Iron Disc		Max ΔP (kPa)	Actuator
		Part number	Full type designation		
DN100	760	VF208W-100NZ	VF208W 100NZ 760E B00	600	MF20
DN125	1,025	VF208W-125NZ	VF208W 125NZ 1025E B00	600	MF40
DN150	1,790	VF208W-150NZ	VF208W 150NZ 1790E B00	300	MF40
DN200	3450	VF208W-200NZ	VF208W 200NZ 3450E B00	300	MF40

Contact Product Management for larger sizes.

## VF299W-250 to 500CN

The VF299W is a general purpose, large butterfly valve with an undercut disc for low actuator torque.

- Wafer lugs for PN6, PN10 and PN16 pattern flanges
- The EPDM soft-seat provides a tight close off with low torque actuator
- Nylon 11 disc for compatibility with many media types including sea water
- Manual adjustment through hand lever, gearbox

Specifications	
<b>Pressure class</b>	PN16
<b>Leakage (EN 12266-1)</b>	Tight, (Leakage Rate A)
<b>Temperature range</b>	-29 °C to 121 °C
<b>Fluids</b>	Hot and cold water with 50% Glycol vol. max. Well water, salt water
<b>Main construction materials</b>	
<b>Body</b>	ASTM A 126 ≈ GG25
<b>Primary and secondary seal, seat</b>	EPDM
<b>Disc</b>	GGG40 Nylon11 coated
<b>Stem</b>	1.4405-QT

Size	Kvs	Part number	Max ΔP (kPa)	Actuator	Gear operator
DN250	4670	VF299W-250CN	350	MF200	917 0300000
DN300	6946	VF299W-300CN		MF550/700	
DN350	9063	VF299W-350CN		MF700	917 0400000
DN400	12004	VF299W-400CN			
DN450	14804	VF299W-450CN			
DN500	19212	VF299W-500CN			917 0500000





## VF209W-50 to 500CN

The VF209W is a premium high pressure butterfly valve for heavy duty HVAC and industrial applications.

The VF209W can be used as a manual isolation valves or be controlled from a choice of Two-position on/off, 3-point floating and modulating actuators.

Wafer type connection for fitting between flanges. PN6 (DN50 to DN400), PN10, and PN16 (DN50 to DN500)

- EPDM soft-seat provides a tight closing of the butterfly valve with the maximum close-off pressure
- Suitable for cooling with salt, brackish and drinking water media from the Nylon 11 disc coating
- Manual adjustment through a ten-position hand lever, gearbox or the handwheel on the actuators

### Specifications

<b>Pressure class</b>	PN16
<b>Leakage (EN 12266-1)</b>	Gas tight, (Leakage Rate A)
<b>Temperature range</b>	-29 °C to 121 °C
<b>Fluids</b>	Hot and cold water with 50% Glycol vol. max. Well water, salt water
<b>Main construction materials</b>	
<b>Body</b>	Grey cast iron GG25
<b>Primary and secondary seal, seat</b>	EPDM
<b>Disc</b>	GGG40 Nylon11 coated
<b>Stem</b>	1.4405-QT



DN	Kvsa	Valve type/part no.	ΔP	Actuator type	Hand Lever	Gear Operator		
50	124	VF209W-50CN	1200	MF68	916 0080000			
65	243	VF209W-65CN						
80	397	VF209W-80CN						
100	723	VF209W-100CN						
125	1.083	VF209W-125CN						
150	1.591	VF209W-150CN						
200	2.852	VF209W-200CN	1000	MF200	916 0200000			
250	4.67	VF209W-250CN		MF550/700	917 0300000			
300	6.946	VF209W-300CN		MF700			917 0400000	
350	9.063	VF209W-350CN						
400	12.044	VF209W-400CN						MF1450
450	14.804	VF209W-450CN						MF2050
500	19.212	VF209W-500CN						

a - The recommended angle of rotation range for modulating control is between 15° and 70°.  
At a disc angle of 70°, the KV is 55% of the stated Kvs value.

## MF20 (SR), MF20-R, MF40 (ER)

The MF20 and MF40 are robust reliable actuators for the control of the VF208W Butterfly Valves. These actuators mount to the VF208W Series Valves without linkage kits and connect using terminal blocks to simplify and reduce installation time. The MF20-R actuator allows connection on to installed TRV-S Butterfly Valves, no linkage kit is required with this actuator too.

- Models for floating/modulating/on-off control
- 2 to 10V Positional feedback on modulating models
- Latching manual override
- Direct handlever/position indicator
- Auxiliary switch available as an accessory
- Standard and Spring return/electronic return variants

### Actuators for VF208W Butterfly Valves

Suitable VF208W Valve	Loss of power function	Torque	Control	Part number	Supply Voltage	Power consumption			Operating time, 90°	
						Rest	Operation	Transformer/wire sizing		
DN25 to 100	Stop in place	20Nm	On-Off/3P	MF20-230F	230 Vac	0.4 W	3 W	7 VA	90 sec	
				MF20-24F	24 Vac/Vdc	0.2 W	2.5 W	5.5 VA		
	Spring return		2 to 10V	MF20-24M		0.4 W	2.5 W	5 VA	75 sec	
				On-Off	MF20SR-TS	24-230 Vac	3 W	7 W		18 VA
DN125 to 200	Stop in place	40Nm	On-Off/3P	MF40-230F	230 Vac	2.5 W	5 W	9 VA	150 sec	
				MF40-24F	24 Vac/Vdc	2 W	4 W	6 VA		
				2 to 10V		MF40-24M	2 W	4.5 W		6.5 VA
	Electronic return		2 to 10V	On-Off	MF40ER-24T	24 Vac/Vdc	3 W	11 W	21 VA	150 sec
				MF40ER-24M						



MF20/MF20-R



MF40ER



MF40



MF20SR

### Actuators for installed base of TRV-S Butterfly Valves

Suitable TRV-S Valve size	Loss of power function	Torque	Control	Part number	Supply Voltage	Power consumption			Operating time, 90°
						Rest	Operation	Transformer/wire sizing	
DN25 to 125	Stop in place	20Nm	On-Off/3P	MF20-230F-R	230 Vac	0.4 W	3 W	7 VA	90 sec
				MF20-24F-R	24 Vac/Vdc	0.2 W	2.5 W	5.5 VA	
				2 to 10V		MF20-24M-R	0.4 W	2.5 W	

The MF40 and MF40-ER will connect without linkage kit to the TRV-S valves DN150-200

NOTE: Max ΔP Pressure for the valve remains (Max Valve ΔP is a function of construction, not the actuator)

## Butterfly Valves and Actuators

### Accessories

<b>MD-S1, 1 x SPDT Auxiliary Switch</b>	9141060000
<b>MD-S2, 2 x SPDT Auxiliary Switch</b>	9141061000



Hand lever

Handlevers can be ordered to fit the VF208W butterfly valve. This enables the valve to be used as hand isolation valves: Hand Levers

<b>DN25 to 65</b>	9150065000
<b>DN80 to 100</b>	9150100000
<b>DN125 to 200</b>	9150200000

## MF68, MF200, MF550, MF700, MF1470, MF2050

The direct-coupled IP65 rotary actuators are heavy duty dedicated actuators for VF209W and VF299W butterfly valves.

- Hand wheel for manual operation as standard
- Adjustable start/end point switch
- 2 additional auxiliary switches as standard
- Terminal connection
- Direct fit without any linkage kits
- Optical position display
- Suitable for outdoor and industrial environments (IP65)
- Very low maintenance
- Self-regulating heater to prevent condensation buildup within the actuator
- Adjustable positioning speed, 60 sec to 360 sec (modulating models)
- Control signal sensitivity adjustment (modulation models)

Suitable VF209W Valve	Suitable VF299W Valve	Control	Part number	Torque	Supply voltage	Power consumption			Operating Time 90°
						Rest	Operation	Wire Sizing	
<b>DN50 to 150</b>	-	Floating and On/Off	MF68-24F	68 Nm	24 Vac	5 W	43 VA	48 VA	60 sec.
<b>DN200</b>	<b>DN250</b>		MF200-24F	226 Nm			48 VA	53 VA	
<b>DN250 to 300</b>	<b>DN350 to 450</b>		MF550-24F	565 Nm			69 VA	77 VA	
<b>DN50 to 150</b>	-	0(2)-10V Modulating	MF68-24M	68 Nm	7 W	45 VA	50 VA		
<b>DN200</b>	<b>DN250</b>		MF200-24M	226 Nm		50 VA	55 VA		
<b>DN250 to 300</b>	<b>DN350 to 450</b>		MF550-24M	565 Nm		71 VA	79 VA		
<b>DN50 to 150</b>	-	Floating and On/Off	MF68-230F	68 Nm	230 Vac	5 W	140 VA	155 VA	36 sec.
<b>DN200</b>	<b>DN250</b>		MF200-230F	226 Nm			108 VA	120 VA	
<b>DN250 to 350</b>	<b>DN350 to 500</b>		MF700-230F	735 Nm			232 VA	258 VA	
<b>DN400 to 450</b>	-		MF1450-230F	1470 Nm			275 VA	305 VA	132 sec.
<b>DN500</b>	-		MF2050-230F	2034 Nm			315 VA	350 VA	





# Damper Actuators

## MD5A, MD10A, MD20A, MD40A

The MD-A are 2 to 10V modulating damper actuators designed for operating air control dampers in ventilation and air conditioning systems for building services installations.

As an accessory, these modulating actuators have a fully adjustable auxiliary switch unit.

Damper actuators can be used with mounting kits to drive selected butterfly and shoe valves.

Specifications	
<b>Power supply</b>	24 Vac $\pm$ 20%, 50/60 Hz, 24 Vdc $\pm$ 20%
<b>Connection cable</b>	1 m, 4 $\times$ 0.75 mm <sup>2</sup> (AWG 18)
<b>Effective control signal range</b>	2 to 10Vdc
<b>Input signal range X</b>	0 to 10Vdc
<b>Input resistance</b>	100 k Ohm
<b>Operating range</b>	2 to 10Vdc (for set angle of rotation)
<b>Synchronisation tolerance</b>	$\pm$ 5%
<b>Position feedback Y</b>	2 to 10Vdc (max. 1 mA)
<b>Direction of rotation</b>	Reversible with switch 0/1 at switch position 0 resp 1
<b>Angle of rotation</b>	Max. 95° (adjustable by mechanical stops)
<b>Running time</b>	150 s
<b>Position indication</b>	Mechanical
<b>Manual override</b>	Gearing latch disengaged with push-button, self-resetting, manual locking
<b>Enclosure rating</b>	IP 54
<b>Humidity</b>	95% RH, non-condensing
<b>Environment</b>	
<b>Operating temperature</b>	-30 to +50 °C
<b>Storage temperature</b>	-40 to +80 °C
<b>Maintenance</b>	Maintenance free



Part number	Description	Torque	Power consumption		
		Nm	In operation	At rest	For transformer sizing
8751009000	MD5A-24	5	1 W	0.4 W	2 VA
8751019000	MD10A-24	10	2 W		4 VA
8751029000	MD20A-24	20			
8751039000	MD40A-24	40	4.5 W	2 W	6.5 VA

Description	For air control dampers area	Damper spindle	Spindle length, mm	Spindle diameter, mm
<b>MD5</b>	approx. 1 m <sup>2</sup>		min. 37	6 to 20
<b>MD10</b>	approx. 2 m <sup>2</sup>	Clamp on top	min. 40	8 to 26.7
		Clamp on bottom*	min. 20	8 to 20
<b>MD20</b>	approx. 4 m <sup>2</sup>	Clamp on top	min. 48	10 to 20
		Clamp on bottom	min. 20	
<b>MD40</b>	approx. 8 m <sup>2</sup>	Clamp on top	min. 52	12 to 26.7
		Clamp on bottom	min. 20	

\* Optional accessory K-MD10 Part number 9141062000. For damper actuator accessories see "Damper Actuator Accessories" on page 86.

## MD5B, MD10B, MD20B, MD40B

The MD-B are on/off damper actuators designed for operating air control dampers in ventilation and air conditioning systems for building services installations. The actuators are available in 24 Vac/Vdc or 230 Vac versions and versions with an integrated end point switch (-S types). The Auxiliary switch is also available as an accessory.

Damper actuators can be used with mounting kits to drive selected butterfly and shoe valves.

Specifications	
<b>Connection cable</b>	
<b>Actuator</b>	1 m, 3×0.75 mm <sup>2</sup> (AWG 18)
<b>Auxiliary switches (-S)</b>	1 m, 3×0.75 mm <sup>2</sup> (AWG 18)
<b>Angle of rotation</b>	max. 95° (adjustable by mechanical stops)
<b>Running time</b>	150 s
<b>Direction of rotation</b>	Reversible with switch 0/1 at switch position 0 resp 1
<b>Position indication</b>	Mechanical
<b>Auxiliary switch</b>	1 mA to 3 (0.5) A, 250 Vac
<b>Switching point</b>	(adjustable 0 to 100%)
<b>Protection class</b>	
<b>MD-B-24(-S)</b>	III Safety extra-low voltage
<b>MD-B-230(-S)</b>	II Totally insulated
<b>Enclosure rating</b>	IP 54
<b>Humidity</b>	95% RH, non-condensing
<b>Environment</b>	
<b>Operating temperature</b>	-30 to +50 °C
<b>Storage temperature</b>	-40 to +80 °C
<b>Maintenance</b>	Maintenance free



Part number	Description	Torque Nm	Power supply	Power consumption		
				In operation	At rest	For transformer sizing
8751001000	MD5B-230	5	230 Vac -60%/+15%	1.5 W	0.4 W	3.5 VA
8751003000	MD5B-230-S					
8751005000	MD5B-24		24 Vac/Vdc ± 20%	1 W	0.2 W	1.5 VA
8751007000	MD5B-24-S					
8751011000	MD10B-230	10	230 Vac -60%/+15%	2.5 W	0.6 W	5.5 VA
8751015000	MD10B-24					
8751021000	MD20B-230	20	230 Vac -60%/+15%	2.5 W	0.6 W	6 VA
8751025000	MD20B-24					
8751035000	MD40B-24		40	24 Vac/Vdc ± 20%	4 W	2 W

Description	For air control dampers area	Damper spindle	Spindle length mm	Spindle diameter mm
<b>MD5</b>	approx. 1 m <sup>2</sup>		min. 37	6 to 20
<b>MD10</b>	approx. 2 m <sup>2</sup>	Clamp on top	min. 40	8 to 26.7
		Clamp on bottom*	min. 20	8 to 20
<b>MD20</b>	approx. 4 m <sup>2</sup>	Clamp on top	min. 42	10 to 20
		Clamp on bottom	min. 20	
<b>MD40</b>	approx. 8 m <sup>2</sup>	Clamp on top	min. 42	14 to 26
		Clamp on bottom	min. 20	

\* Optional accessory K-MD10 part number 9141062000.  
For damper actuator accessories see "Damper Actuator Accessories" on page 86.

## Damper Actuators

### LF24, LF230, LF24-SR

The LF series are compact, low-torque, spring return damper actuators suitable for controlling air dampers up to 0.8m<sup>2</sup> cross sectional area.

The LF24 and LF230 versions are on/off controlled. The LF24-SR version is for 0 to 10V modulating control with 2 to 10V position feedback

Specifications	
Connection cable	2×0.75 mm <sup>2</sup> (AWG 18)
Angle of rotation	Max. 95° (adjustable 37 to 100% with additional limit stop ZDB-LF)
Torque	Min. 4 Nm (3 ft-lbf)
Spring return	
Running time	40 to 75 s (0 to 4 Nm (0 to 3 ft-lbf))
Actuator	
Spring return	Approx. 20 s (at -20 to +50 °C) max. 60 s (at -30 °C)
Direction of rotation	Selected by mounting L/R
Position indication	Mechanical
Enclosure rating	IP 54
Humidity	95% RH, non-condensing
Environment	
Operating temperature	-30 to +50 °C
Storage temperature	-40 to +80 °C
Service life	min. 60,000 operations
Maintenance	Maintenance free



Part number	Description	Torque Nm	Control signal	Power supply	Power consumption		
					In operation	At rest	For transformer sizing
8740003000	LF24	4	on/off	24 Vac±20%	5 W	2.5 W	7 VA
8750003000	LF230			230 Vac±14%		3 W	
8770003000	LF24-SR		0 to 10V	24 Vac±20%	2.5 W	1 W	5 VA

For damper actuator accessories see "Damper Actuator Accessories" on page 86.



# Damper Actuators

## MD10 SR

The MD10 SR is a compact spring return damper actuator for the operation of ventilation dampers up to 2m<sup>2</sup> in building service installations

Specifications	
<b>Motor Torque</b>	Min. 10 Nm@ Nominal Voltage
<b>Spring Return</b>	Min. 10Nm
<b>Running Time, Motor</b>	
<b>Modulating</b>	≤150 s
<b>On/off</b>	≤75 s
<b>Spring Return</b>	≤20 s
<b>Input Control signal range (X)</b>	0...10 Vdc
<b>Input Resistance</b>	100 kΩ
<b>Operational control signal range (modulating)</b>	2...10 Vdc
<b>Position Feedback (Y)</b>	2...10 Vdc, max. 0.5mA
<b>Position accuracy</b>	+/- 5%
<b>Cable Size</b>	1m
<b>-24M,</b>	4 x 0.75 mm <sup>2</sup>
<b>-T, -24T</b>	2 x 0.75 mm <sup>2</sup>
<b>S2 versions</b>	2+6 x 0.75 mm <sup>2</sup>
<b>Direction of Rotation</b>	
<b>Motor</b>	Reversible with Switch I/O
<b>Spring return</b>	via mounting orientation, L / R
<b>Manual Override</b>	5 mm Hex key, supplied plus interlocking switch
<b>Adjustable angle of rotation</b>	0...Max 95°
<b>Position indication</b>	Mechanical
<b>Protection Class</b>	
<b>24 V versions</b>	III Extra low Voltage
<b>230 V Versions</b>	II Totally insulated
<b>Enclosure rating</b>	IP54



<b>Humidity</b>	95% r.h. Non-condensing
<b>Environment</b>	
<b>Operating Temperature</b>	-30 °C...+ 50 °C
<b>Storage Temperature</b>	-40 °C...+ 80 °C
<b>Sound power level</b>	
<b>Motor</b>	≤40 dB (mod.) 45dB (on/off)
<b>Spring return</b>	≤62 dB
<b>Service Life</b>	Min.60,000 emergency positions
<b>Maintenance</b>	Maintenance free
<b>Weight</b>	2.1Kg

Part number	Type Designation	Torque Nm	Power Supply	Power Consumption			Control Signal
				In Operation	At Rest	For wire sizing	
<b>MD10SR-T</b>	MD10 SR-24/230T 1M54 00	10	24...240 Vac / 24...125 Vdc	6W	2.5W	9.5VA	On/Off
<b>MD10SR-TS</b>	MD10 SR-24/230FTS 1M54 00					8.5VA	
<b>MD10SR-24T</b>	MD10 SR-24T 1M54 00		24 Vac/Vdc	3.5W		5.5VA	2...10 V Mod.
<b>MD10SR-24TS</b>	MD10 SR-24TS 1M54 00						
<b>MD10SR-24M</b>	MD10 SR-24M 1M54 00						

### Spindle Clamp

Damper Spindle Attachment		Spindle length	Spindle diameter	Spindle diameter	Spindle diameter
			●	■	◆
<b>Clamp on Top</b>	With Insert	≥85 mm	10...22 mm	10 mm	14...25.4 mm
	Without Insert		19...25.4 mm	12...18 mm	
<b>Clamp on Bottom</b>	With Insert	≥15 mm	10...22 mm	10 mm	14...25.4 mm
	Without Insert		12...18 mm	19...25.4 mm	

# Damper Actuators

## MD20 SR

The MD20 SR is a compact spring return damper actuator for the operation of ventilation dampers up to 4m<sup>2</sup> in building service installations

Specifications	
<b>Motor Torque</b>	Min. 20 Nm@ Nominal Voltage
<b>Spring Return</b>	Min. 20Nm
<b>Running Time, Motor</b>	
<b>Modulating</b>	≤150 s
<b>On/off</b>	≤75 s
<b>Spring Return</b>	≤20 s
<b>Input signal range, modulating (X)</b>	0...10 Vdc
<b>Effective Control Signal range, modulating</b>	2...10 Vdc
<b>Input Resistance</b>	100 kΩ
<b>Position Feedback (Y)</b>	2...10 Vdc, max. 0.5mA
<b>Position accuracy</b>	+/- 5%
<b>Cable Size</b>	1m, 0.75 mm <sup>2</sup>
<b>-24M,</b>	4 x 0.75 mm <sup>2</sup>
<b>-T, -24T</b>	2 x 0.75 mm <sup>2</sup>
<b>S2 versions</b>	2+6 x 0.75 mm <sup>2</sup>
<b>Direction of Rotation</b>	
<b>Motor</b>	Reversible with Switch I/O
<b>Spring return</b>	via mounting orientation, L / R
<b>Manual Override</b>	5 mm Hex key, supplied plus interlocking switch
<b>Adjustable angle of rotation</b>	0...Max 95°
<b>Position indication</b>	Mechanical
<b>Protection Class</b>	
<b>24 V versions</b>	III Extra low Voltage
<b>230 V Versions</b>	II Totally insulated
<b>Enclosure rating</b>	IP54



<b>Environment</b>	
<b>Operating Temperature</b>	-30 °C...+ 50 °C
<b>Storage Temperature</b>	-40 °C...+ 80 °C
<b>Humidity</b>	95% r.h. Non-condensing
<b>Sound power level</b>	
<b>Motor</b>	≤40 dB (mod.) 45dB (on/off)
<b>Spring return</b>	≤62 dB
<b>Service Life</b>	Min.60,000 emergency positions
<b>Maintenance</b>	Maintenance free
<b>Weight</b>	2.1Kg

Part number	Type Designation	Torque Nm	Power Supply	Power Consumption			Control Signal
				In Operation	At Rest	For wire sizing	
<b>MD20SR-T</b>	MD20 SR-24/240T 1M54 00	20	24...240 Vac / 24...125 Vdc	6.5W	3.3W	18VA	On/Off
<b>MD20SR-TS</b>	MD20 SR-24/240TS 1M54 00						
<b>MD20SR-24T</b>	MD20 SR-24T 1M54 00		24 Vac/Vdc	5W	2.5W	7.5VA	
<b>MD20SR-24TS</b>	MD20 SR-24TS 1M54 00						
<b>MD20SR-24M</b>	MD20 SR-24M 1M54 00			3W	7VA	2...10 V Mod.	

### Spindle Clamp

Damper Spindle Attachment		Spindle length	Spindle diameter	Spindle diameter	Spindle diameter
			●	■	◆
<b>Clamp on Top</b>	With Insert	≥85 mm	10...22 mm	10 mm	14...25.4 mm
	Without Insert		19...25.4 mm	12...18 mm	
<b>Clamp on Bottom</b>	With Insert	≥15 mm	10...22 mm	10 mm	14...25.4 mm
	Without Insert		12...18 mm	19...25.4 mm	

## MD40 ER

The MD40 Electronic Return (SuperCap) Damper Actuator is a powerful rotary damper actuator with super capacitor technology for positional electronic drive return in the event of a power failure.

- Air dampers up to 8m<sup>2</sup>
- 24 Vac/Vdc
- 2 to 10V position feedback
- Long life supercaps

Specifications	
<b>Power supply</b>	AC: 19.2 to 28.8V; 50/60 Hz DC: 21.6 to 28.8V
<b>Running time</b>	
<b>Motor driven</b>	150 s/90°
<b>Capacitor driven</b>	35 s/90°
<b>Control signal</b>	
<b>Range of operation (X)</b>	2 to 10Vdc
<b>Input resistance</b>	100 kΩ
<b>Position feedback (Y)</b>	2 to 10Vdc, max. 0.5 mA
<b>Position accuracy</b>	+/- 5%
<b>Functional data</b>	
<b>Electronic return position</b>	0 to 100% of max. angle or rotation (POP dial)
<b>Direction of rotation</b>	Reversible with Switch 0/1
<b>Motor (mod.)</b>	
<b>Electronic Return (SuperCap) Position</b>	0 to 100% (any position between, as set by POP dial)
<b>Angle of Rotation</b>	Max. 95°, limited both ends, adjustable end stops
<b>Position Indication</b>	Mechanical
<b>Environment</b>	
<b>Operating temperature</b>	-30 to +50 °C
<b>Storage temperature</b>	-40 to +80 °C
<b>Humidity</b>	95% r.h. Non-condensing
<b>Weight</b>	approx. 1.8 kg
<b>Safety</b>	
<b>Protection class</b>	III Safety Extra Low Voltage/ UL Class 2 Supply
<b>Enclosure rating</b>	IP54 NEMA2, UL Enclosure Type 2



Part number	Control	Torque	Power consumption		
		Nm	In operation	At rest	For transformer sizing
MD40ER-24M	Modulating	Min. 40 Nm	11 W @ nominal torque	<3 W	≤21 VA
MD40ER-24T	Two-Position				
Description	For air control dampers area	Damper spindle		Spindle length, mm	Spindle diameter, mm
MD40	approx. 8 m <sup>2</sup>	Clamp on top		min. 52	12 to 26.7
		Clamp on bottom		min. 20	

For damper actuator accessories see "Damper Actuator Accessories" on page 86.



Damper Actuator accessories



KH8



ZDB-AF



ZDB-LF



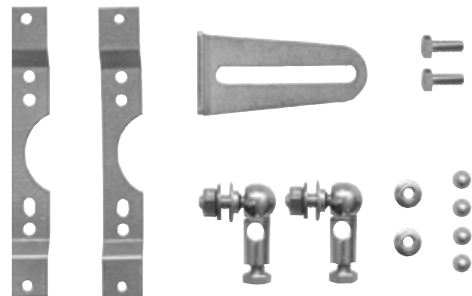
K-MD10



AV8-25



ZG-AF



ZG-MD20

## Damper Actuators

### Mechanical accessories

Name	Description	Part number	MD5	MD10	MD20	MD40	LF	MD10 SR	MD20 SR
<b>AV8-25</b>	<ul style="list-style-type: none"> <li>Shaft extension</li> <li>Length approx. 250 mm</li> <li>For damper spindles</li> <li>8 to 25 mm dia. or 10 to 25 mm square</li> </ul>	914-1023-010		•	•		•	•	•
<b>K-MD10</b>	<ul style="list-style-type: none"> <li>Reversible spindle clamp</li> </ul>	914-1062-000		•					
<b>KH8</b>	<ul style="list-style-type: none"> <li>Universal damper crank arm</li> <li>Zinc-plated steel</li> <li>For damper spindles</li> <li>10 to 18 mm dia. or 10 to 14 mm square</li> <li>Slot width 8.2 mm</li> </ul>	914-1021-000			•		•	•	•
<b>ZG-MDSR</b>	<ul style="list-style-type: none"> <li>Mounting kit for flat and side installation</li> </ul>	914-1046-000						•	•
<b>ZDB-LF</b>	<ul style="list-style-type: none"> <li>Angle of rotation limiter and pointer</li> </ul>	914-1045-000					•		
<b>ZG-MD20</b>	<ul style="list-style-type: none"> <li>Parallel lever linkage kit</li> </ul>	914-1063-000			•				
<b>Z-AF</b>	<ul style="list-style-type: none"> <li>Mounting plate adaptor for anti-rotation strap-- Retrofitting MD20 SR or MD10 SR from AF installation</li> </ul>	914-1047-000						•	•

### Electrical accessories

Name	Description	Part number	MD5	MD10	MD20	MD40	LF	MD10 SR/MD20 SR
<b>MD-S1</b>	Auxiliary switch, add-on 1×SPDT 1 mA to 3(0.5) A, 250 Vac	914-1060-000						Actuators only available with integrated switches
<b>MD-S2</b>	Auxiliary switch, add-on ×SPDT1 mA to 3(0.5) A, 250 Vac	914-1061-000						



Auxiliary Switch  
MD-S2

# Globe Valves and Actuators

## V241

The V241 is a high quality general purpose valve. Polished stainless seats provide high differential pressure capability and low leakage.

Suitable for a wide range of applications such as heating, cooling, air handling, domestic hot water, and district heating applications. The valve can handle hot and cold water with phosphate, hydrazine and antifreeze additives.

If the valve is used for media at temperatures below 0 °C (32°F), it should be equipped with a heater to prevent ice formation on the valve stem.

### Specifications

<b>Design</b>	2-way plug valve, stem up closed
<b>Pressure class</b>	PN 16
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	(refer to table)
<b>Leakage</b>	up to 0.02% of Kv
<b>ΔPm</b>	600 kPa, water
<b>Max. temperature of medium</b>	150 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Max. glycol/concentration</b>	50%
<b>Connection</b>	External pipe thread according to ISO 228/1
<b>Main construction materials</b>	
<b>Body</b>	Bronze Rg5
<b>Plug and seat</b>	Stainless steel SS 2346
<b>Stem</b>	Stainless steel SS 2346
<b>Stem packing</b>	EPDM



V241					Max close-off pressure (kPa)									
					Non-spring return actuators						Spring return			
Part number	DN	Connection	Kvs	Rangeability	M310	MG350	M400	M800	M1500	MV15B (1500N)	M700	MG900 SR		
7214106000	15	G1B	0.25	>50	800	800	1000	1600	1600	1600	1600	1600		
7214110000			0.40											
7214114000			0.63											
7214118000			1.0				800	1500						
7214122000			1.6											
7214126000			2.5											
7214130000	4.0													
7214134000	20	G1½B	6.3	>100	650	650	650	1500	1350	1350	1100	1510		
7214138000	25	G1½B	10		400	400	500	1150			850	1160		
7214142000	32	G2B	16		300	300	350	850			950	950	650	855
7214146000	40	G2¼B	25		150	150	250	600			950	950	450	605
7214150000	50	G2¾B	38		50	50	150	400			650	650	300	415

Service kit:

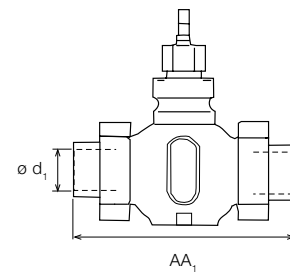
Replacement stem packing box: 100108000



Connections V241

Valve		Ød1	AA1	Part number for connection, one pkg/port	
DN	End Conn.	Int. thread (ISO 7/1)	mm	Packing, std	Packing, spec.*
15	G1B	Rp ½	146	9112100015	9112103015
20	G1¼B	Rp ¾	146	9112100020	9112103020
25	G1½B	Rp 1	159	9112100025	9112103025
32	G2B	Rp 1¼	169	9112100032	9112103032
40	G2¼B	Rp 1½	197	9112100040	9112103040
50	G2½B	Rp 2	222	9112100050	9112103050

\* The accessory intended for the primary circuit of district heating connections.

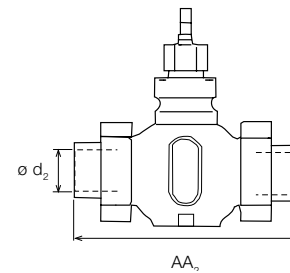


Internal thread connection

Main construction materials		
Union nut		malleable iron casting, galv.
Union end		malleable iron casting, galv.
Packing, standard		Fibre Gasket (Klingsil C4400)
or Packing, spec		PTFE Gasket (Kingersil Top Chem 1.5 mm)

Valve		Ød2	AA2	Part number for connection, one pkg/port	
DN	End Conn.	mm	mm	Packing, std	Packing, spec.*
15	G1B	15	136	9112101015	9112104015
20	G1¼B	22	146	9112101020	9112104020
25	G1½B	28	155	9112101025	9112104025
32	G2B	35	163	9112101032	9112104032
40	G2¼B	42	200	9112101040	9112104040
50	G2½B	54	232	9112101050	9112104050

\* The accessory combination intended for the primary circuit of district heating connections.



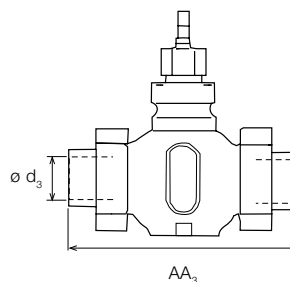
Soldering Type Connection

Main construction materials		
Union nut		malleable iron casting, galv
Union end		Bronze, SS 5204
Packing, standard		Fibre Gasket (Klingsil C4400)
or Packing, spec		PTFE Gasket (Kingersil Top Chem 1.5 mm)

Valve		Ød3	AA3	Part number for connection, one pkg/port	
DN	End Conn.	mm	mm	Packing, std	Packing, spec.*
15	G1B	21.8	182	9112102015	9112105015 (1)
20	G1¼B	26.9	182	9112102020	9112105020 (1)
25	G1½B	33.7	187	9112102025	9112105025 (1)
32	G2B	42.4	197	9112102032	9112105032 (1)
40	G2¼B	48.3	232	9112102040	9112105040
50	G2½B	60.3	262	9112102050	9112105050

(1) Material Union nut: brass SS 5252

\* The accessory Combination intended for the primary circuit of district heating connections. 2 sets of connections required for 2-way valves



Welded Type Connection

Main construction materials		Malleable iron casting, galv
Union nut Packing, standard		
or packing, spec		Brass
Union end		Stainless steel SS2172
Packing, standard		Fibre Gasket (Klingsil C4400)
or Packing, spec		PTFE Gasket (Kingersil Top Chem 1.5 mm)

## VG210R 15-50B

The VG210R 15-50B is a range of compact precision bronze globe valves, suitable for a wide range of fluid control applications, including heating, cooling, air handling and domestic hot water systems. The VG210R 15-50B series works reliably under a wide variety of conditions, including fluids with high glycol concentrations and very high temperature bands. The valve utilizes precision plugs for improved rangeability and fine fluid control on small opening degrees. Soft seating also guards against seepage of precious energy when not required.

Specifications	
<b>Design</b>	2-way plug valve, stem up closed
<b>Pressure class</b>	PN 16
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	11 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>100
<b>ΔPm</b>	400 kPa, water
<b>Max. temperature of medium</b>	138 °C
<b>Min. temperature of medium</b>	-7 °C
<b>Max. glycol concentration</b>	60%
<b>Connections</b>	Internal pipe thread Rp
<b>Main construction materials</b>	
<b>Body</b>	Bronze; ASTM B584; CDA 83450 Oshalloy®
<b>Bonnet/Packing Cartridge chevrons Stem</b>	Brass; UNS C36000 and PTFE/EPDM AISI 316 SS
<b>Plug</b>	Brass; UNS C36000
<b>Plug seal</b>	EPDM, DN25 to 50
<b>Seat seal</b>	PTFE, DN15 to 20
<b>Integral seat</b>	ASTM B584; CDA 83450 Oshalloy®
<b>Slotted stem adaptor</b>	RoHS compliant Zinc-plated steel



VG210R 15-50B					Max close-off pressure (kPaa)			
Part number	Type designation	DN	Connection	Kvs	MG350C		MG600C (-SR) Actuator	
					Class IV-S1 ≤0.005%	Class IV1 ≤0.01%	Class IV-S1 <0.005%	Class IV >0.01%
VG210R-15B02	VG210R 15B 0.4E SU 00	15	Rp 1/2	0.4	1000	1500	1600	1600
VG210R-15B03	VG210R 15B .63E SU 00			0.63				
VG210R-15B04	VG210R 15B 1E SU 00			1.0				
VG210R-15B05	VG210R 15B 1.6E SU 00			1.6				
VG210R-15B07	VG210R 15B 2.5E SU 00			2.5				
VG210R-15B08	VG210R 15B 4.0E SU 00			4.0				
VG210R-20B	VG210R 20B 6.3E SU 00	20	Rp 3/4	6.3	800	930		
VG210R-25B	VG210R 25B 10E SU 00	25	Rp 1	10	380	460	1100	1200
VG210R-32B	VG210R 32B 17E SU 00	32	Rp 1¼	17	250	290	600	700
VG210R-40B	VG210R 40B 24E SU 00	40	Rp 1½	24	100	170	350	450
VG210R-50B	VG210R 50B 35E SU 00	50	Rp 2	35	55	69	90	240

a - Valves designed for direct connection onto compact **SpaceLogic** actuators, type MG350C, MG600C. For all other **SpaceLogic** actuators, Type M310, M400, M800, M1500 stem extension, code AV-823 is required. M700 and MV15B will not connect to this valve. Leakage class as a percentage of a valves Kvs, EN60534-4. Replacement Bonnet, Packing Gland: YBA-689-C.

## V211T

The V211T is an internally threaded valve with a soft seat for tight shut off.

Suitable for a wide range of applications such as heating, cooling and air handling systems with hot or chilled water.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	2-way plug valve, stem up closed
<b>Pressure class</b>	PN 16
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage</b>	Tight sealing
<b>ΔPm</b>	400 kPa, water
<b>Max. temperature of medium</b>	120 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Max. glycol concentration</b>	50%
<b>Connections</b>	Internal pipe thread Rp
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron EN-JS 1030
<b>Stem</b>	Stainless steel SS 2346
<b>Plug</b>	Brass CW602N
<b>Seat sealing</b>	EPDM
<b>Seat</b>	Nodular iron EN-JS 1030
<b>Stem packing</b>	EPDM



V211T					Max close-off pressure kPa							
					Non-spring return actuators						Spring return	
Part number	DN	Connection	Kvs	Rangeability	M310	MG350	M400	M800	M1500	MV15B (1500N)	M700	MG900 SR
7211716000	15	Rp 1/2	1.6	>50	800	800	800	1600	1600	1600	1400	1600
7211720000			2.5									
7211724000			4.0									
7211728000	20	Rp 3/4	6.3		650	650	650	1500	1350	1350	1100	1510
7211732000	25	Rp 1	10		400	400	500	1150			850	1160
7211736000	32	Rp 1¼	16		300	300	350	850			650	855
7211740000	40	Rp 1½	25		150	150	250	600	950	950	450	605
7211744000	50	Rp 2	38	50	50	150	400	650	650	300	415	

Service Kit: Replacement stem packing box: 100108000

## V211

The V211 is a flanged valve with a soft seat for tight shut off.

Suitable for a wide range of applications such as heating, cooling and air handling systems with hot or chilled water.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	2-way plug valve, stem up closed
<b>Pressure class</b>	PN 16
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage</b>	Tight sealing
<b>ΔPm</b>	400 kPa, water
<b>Max. temperature of medium</b>	120 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Max. glycol/concentration</b>	50%
<b>Connections</b>	Flange according to ISO 7005-2
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron EN-JS 1030
<b>Stem</b>	Stainless steel SS 2346
<b>Plug</b>	Brass CW602N
<b>Plug sealing</b>	EPDM
<b>Seat</b>	Nodular iron EN-JS 1030
<b>Stem packing</b>	EPDM



V211				Max close-off pressure kPa						
				Non-spring return actuators					Spring return	
Part number	DN	Kvs	Rangeability	M310	MG350	M400	M800	M1500	MV15B (1500N)	MG900 SR
7211116000	15	1.6	>50	800	800	800	1600	1600	1600	1600
7211120000		2.5								
7211124000		4.0								
7211128000	20	6.3		650	650	650	1500	1350	1350	1510
7211132000	25	10		400	400	500	1150			1160
7211136000	32	16		300	300	350	850	1350	1350	855
7211140000	40	25		150	150	250	600	950	950	605
7211144000	50	38		50	50	150	400	650	650	415

Service kit:  
Replacement stem packing box: 100108000



## V212T

The V212T is an internally threaded balanced valve requiring only minimal actuator force. Coupled with a soft seat and good rangeability the V212T provides very energy efficient control of hydronic applications. If the valve is used for media at temperatures below 0 °C, it should be equipped with a heater to prevent ice formation on the valve stem. Suitable for a wide range of applications such as heating, cooling and air handling systems with hot or chilled water.

Specifications	
<b>Design</b>	2-way pressure balanced plug valve, stem up closed
<b>Pressure class</b>	PN 16
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage</b>	Tight sealing
<b>ΔPm</b>	400 kPa, water
<b>Max. temperature of medium</b>	120 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Max. glycol/concentration</b>	50%
<b>Connections</b>	Internal pipe thread Rp
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron EN-JS 1030
<b>Stem</b>	Stainless steel SS 2346
<b>Plug</b>	Brass CW602N
<b>Seat sealing</b>	EPDM
<b>Seat</b>	Nodular iron EN-JS 1030
<b>Stem packing</b>	EPDM



V212T					Max close-off pressure kPa					
					Non-spring return actuators				Spring return	
Part number	DN	Connection	Kvs	Rangeability	M400	M800	M1500	MV15B (1500N)	M700	MG900 SR
7211832000	25	Rp 1	10	>50	800	1600	1600	1600	1600	1600
7211836000	32	Rp 1¼	16		750					
7211840000	40	Rp 1½	25		700					
7211844000	50	Rp 2	38		600					

Service kit:  
Replacement stem packing box: 10010800

## V212

The V212 is a flanged balanced valve requiring only minimal actuator force. Coupled with a soft seat and good rangeability the V212 provides very energy efficient control of hydronic applications.

Suitable for a wide range of applications such as heating, cooling and air handling systems with hot or chilled water.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a heater to prevent ice formation on the valve stem.

### Specifications

<b>Design</b>	2-way pressure balanced plug valve, stem up closed
<b>Pressure class</b>	PN 16
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage</b>	Tight sealing
<b>ΔPm</b>	400 kPa, water
<b>Max. temperature of medium</b>	120 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Max.glycol/concentration</b>	50%
<b>Connections</b>	Flange according to ISO 7005-2
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron EN-JS 1030
<b>Stem</b>	Stainless steel SS 2346
<b>Plug</b>	Brass CW602N
<b>Sealing</b>	EPDM
<b>Seat</b>	Nodular iron EN-JS 1030
<b>Stem packing</b>	EPDM



V212				Max close-off pressure kPa				
				Non-spring return actuators				Spring return
Part number	DN	Kvs	Rangeability	M400	M800	M1500	MV15B (1500N)	MG900 SR
7211236000	32	16	>50	750	1600	1600	1600	1600
7211240000	40	25		700				
7211244000	50	38		600				

Service kit:

Replacement stem packing box: 100108000

## VGS211F 15-100CS

The VGS211F-CS is a flanged high temperature valve for media temperatures up to 200°C. Primarily designed for steam but also suitable for a wide range of applications such as heating, cooling and air handling systems with hot or chilled water and steam.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a stem heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	2-way plug valve, stem up open
<b>Pressure class</b>	PN 16
<b>Flow characteristic</b>	Equal Percentage
<b>Rangeability (Kvs/Kvmin.)</b>	
DN15 to 20	>50
DN25 to 100	>35
<b>Leakage</b>	0.02% of Kvs
<b>ΔPm</b>	600 kPa
<b>Max. temperature of medium</b>	200 °C
<b>Min. temperature of medium</b>	-10 °C
<b>Max. glycol/concentration</b>	50%
<b>Connections</b>	Flange according to ISO 7005-2
<b>Main construction materials</b>	
<b>Body</b>	Cast iron, EN-GJL 250
<b>Stem</b>	Stainless steel (AISI 303)
<b>Plug</b>	Stainless steel (AISI 303)
<b>Seat</b>	Stainless steel (AISI 303)
<b>Stem packing</b>	Spring Loaded PTFE V-Ring
<b>Stroke</b>	
DN15 to DN25	16.5 mm
DN32 to DN65	25 mm
DN80 to DN100	45 mm



VGS211F-CS					Max close-off pressure kPa						
					Non-spring return actuators				Spring return		
Part number	Type designation	DN	Kvs	Rangeability	M400	M800	M1500	MV15B (1500N)	M3000	M700	MG900 SR
VGS211F-15CS03	VGS211F-15CS 0.63M SD00	15	0.6	>50	1600	1600	1600	1600		32 40 50	1600
VGS211F-15CS04	VGS211F-15CS 1M SD00		1.0								
VGS211F-15CS05	VGS211F-15CS 1.6M SD00		1.6								
VGS211F-15CS07	VGS211F-15CS 2.5M SD00		2.5								
VGS211F-15CS08	VGS211F-15CS 4M SD00		4.0								
VGS211F-20CS	VGS211F-20CS 6.3 M SD00	20	6.3		750					1500	
VGS211F-25CS	VGS211F-25CS 10M SD00	25	10		450	1300				900	1300
VGS211F-32CS	VGS211F-32CS 16M SD00	32	16								
VGS211F-40CS	VGS211F-40CS 24M SD00	40	24		250	800	1350	1350		550	800
VGS211F-50CS	VGS211F-50CS 32M SD00	50	32	>35	150	500	900	900		350	500
VGS211F-65CS	VGS211F-65CS 63M SD00	65	63			210	350	350	720	150	210
VGS211F-80CS	VGS211F-80CS 110M SD00	80	110		-	150	250	250	550	100	-
VGS211F-100CS	VGS211F-100CS 140M SD00	100	140			90	150	150	350	60	-

Service kit:

Replacement stem packing box: 100108110.

## VG221F 65-150C

The VG221F-C is a large flanged balanced valve suitable for large hydronic flows in heating and air conditioning circuits. The balanced plug enables a low actuating force to control the valve.

Suitable for a wide range of applications using hot water or de-aerated cooling water  
With cooling media at temperatures below 0 °C, a heater must be fitted to protect against stem seizure due to freezing.

Specifications	
<b>Design</b>	2-way pressure balanced plug valve, stem up closed
<b>Pressure class</b>	PN 16
<b>Flow characteristics</b>	Equal percentage
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Stroke</b>	
DN65	25 mm
DN80 to DN150	45 mm
<b>Leakage</b>	<0.03% of Kvs
<b>ΔPm</b>	200 kPa, water
<b>Max. temperature of medium</b>	150 °C
<b>Min. temperature of medium</b>	-10 °C
<b>Connection</b>	Flange according ISO 7005-2
<b>Main construction materials</b>	
Body	Grey cast iron (EN-GJL 250)
Stem	stainless steel (AISI 303)
Plug	Brass (CW614N)
Seat, integrated	Grey cast iron (EN-GJL 250)
Stem packing	EPDM



VG221F-C						Max close-off pressure kPa					
						Non-spring return actuators			Spring return		
Part number	Type designation	Stroke	DN	Kvs	Rangeability	M800	M1500	MV15B (1500N)	M3000	M700	MG900 SR
VG221F-65C	VG221F-65C 63M SU00	25	65	63	>50	1600	1600	1600	1600	1300	1600
VG221F-80C	VG221F-80C 100M SU00	45	80	100		1450				1000	
VG221F-100C	VG221F-100C 130M SU00		100	130		1000				700	
VG221F-125C	VG221F-125C 200M SU00		125	200		750	470				
VG221F-150C	VG221F-150C 300M SU00		150	300		550	1450	1450	300		

Service kit:

Replacement stem packing box: 100108100

## V231

The V231 is a flanged PN25 valve with a very high rangeability.

The valve is suitable for primary district heating circuits as well as hot and chilled water applications where high pressure or where a very fine resolution of flow control is required.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	2-way plug valve, stem up closed
<b>Pressure class</b>	PN 25
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	(refer to table)
<b>Leakage</b>	Up to 0.02% of Kvs
<b>ΔPm</b>	Max. 800 kPa, water
<b>Max. temperature, water</b>	150 °C
<b>Max. temperature, saturated steam</b>	120 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Max. glycol concentration</b>	50%
<b>Flanges drilling</b>	According to SS 335 and ISO 2084
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron SS 0727 (GGG40.3)
<b>Plug and seat</b>	Stainless steel SS 2346
<b>Stem</b>	Stainless steel SS 2346
<b>Stem packing</b>	EPDM



V231				Max close-off pressure kPa					
				Non-spring return actuators					Spring return
Part number	DN	Kvs	Rangeability	M310	M400	M800	M1500	MV15B (1500N)	MG900 SR
7213106000	15	0.25	>50	1000	1000	1600	1600	1600	1600
7213110000		.40							
7213114000		.63							
7213118000		1.0							
7213122000		1.6							
7213126000		2.5							
7213130000		4.0							
7213134000	20	6.3	>200	650	650	1500			1500
7213138000	25	10		400	500	1150			1150
7213142000	32	16		300	350	850	1350	1350	850
7213146000	40	25		150	250	600	950	950	600
7213150000	50	38		50	150	400	650	650	400

Service kit:  
Replacement stem packing box: 100108000



## V232

The V232 is a pressure balanced flanged PN25 valve with high rangeability and a high differential pressure capability. The balanced plug enables a low actuating force to control the valve.

The valve is suitable for primary district heating circuits as well as hot and chilled water applications where high pressure or a very fine resolution of controllable flow is required.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	2-way pressure balanced plug valve, stem up closed
<b>Pressure class</b>	PN 25
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	(refer to table)
<b>Leakage</b>	Up to 0.02% of Kvs
<b>ΔPm</b>	Max. 800 kPa, water
<b>Max. temperature of medium</b>	150 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Flanges drilling</b>	According to SS 335 and ISO 2084
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron SS 0727 (GGG40.3)
<b>Plug and seat</b>	Stainless steel SS 2346
<b>Stem</b>	Stainless steel SS 2346
<b>Stem packing</b>	EPDM



V232				Max close-off pressure kPa				
				Non-spring return actuators				Spring return
Part number	DN	Kvs	Rangeability	M400	M800	M1500	MV15B (1500N)	MG900 SR
7213238000	25	10	>200	800	1600	1600	1600	1600
7213242000	32	16		750				
7213246000	40	25		700				
7213250000	50	38		600				

Service kit:

Replacement stem packing box: 100108000

## V292

The V292 is a large pressure balanced flanged valve to PN25. The balanced plug enables a low actuating force to control the valve.

The valve is suitable for primary district heating circuits as well as high pressure hot and chilled water applications

Specifications	
<b>Design</b>	2-way pressure balanced plug valve, stem up closed
<b>Pressure class</b>	PN 25
<b>Flow characteristics</b>	Equal percentage
<b>Stroke</b>	
DN65 to DN100	30 mm
DN125 to DN150	50 mm
<b>Rangeability (Kvs/Kvmin.)</b>	> 50
<b>Leakage</b>	<0.05% of Kvs
<b>Max. temperature of medium</b>	150 °C
<b>Min. temperature of medium</b>	-10 °C
<b>Max. glycol concentration</b>	50%
<b>Connection</b>	Flange according ISO 7005-2
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron GGG40.3
<b>Stem</b>	Stainless steel SS 1.4021
<b>Plug</b>	Stainless steel SS 1.4021
<b>Seat</b>	Stainless steel SS 1.4021
<b>Packing box</b>	Spring-loaded PTFE-V-ring



V292				Max close-off pressure kPa						
				Non-spring return actuators				Spring return		
Part number	DN	Kvs	Rangeability	M800	M1500	M15B	M3000	MV22 (2200N)	M50 (5000N)	M700
7219254010	65	63	>50	1500	2500	2500	2500	-	-	1200
7219258010	80	85								
7219262010	100	130		1100	1600	1600	-	-	800	
7219266000	125	250		-	-	-	-	1800	2500	-
7219270000	150	350		-	-	-	-	1400	2500	-

Service Kit: Replacement stem packing box

DN65 to DN100: 100108201

DN125 to DN150: 100108210

Stem Heater

DN65 to DN100: 8800112000

DN125 to DN150: 8800113000

Replacement stem adaptor/hex bush:

DN125 to DN150: 8800134000

## V341

The V341 is a high quality general purpose valve. Polished stainless seats provide high differential pressure capability and low leakage.

The valve is suitable for a wide range of applications such as heating, cooling, air handling and domestic hot water systems. The valve can handle hot and cold water with phosphate, hydrazine and antifreeze additives.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	3-way plug valve Stem up closed, A port (B-AB open)
<b>Pressure class</b>	PN 16
<b>Flow characteristics A-AB</b>	Equal percentage modified Complementary
<b>Flow characteristics B-AB</b>	
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	(refer to table)
<b>Leakage A-AB</b>	up to 0.02% of Kvs
<b>Leakage B-AB</b>	up to 0.05% of Kvs
<b>ΔPm (mixing)</b>	600 kPa, water
<b>ΔPm (diverting)</b>	60 kPa, water
<b>Max. temperature of medium</b>	150 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Connection</b>	External pipe thread according to ISO 228/1
<b>Glycol concentration</b>	50%
<b>Main construction materials</b>	
<b>Body</b>	Bronze Rg5
<b>Plug and seat</b>	Stainless steel SS 2346
<b>Stem</b>	Stainless steel SS 2346
<b>Stem packing</b>	EPDM



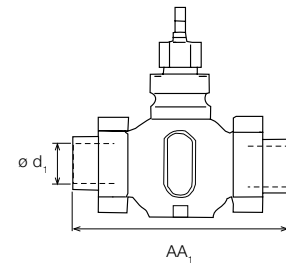
V341				Max close-off pressure kPa									
				Non-spring return actuators						Spring return			
Part number	DN	Kvs	Rangeability	M310	M350	M400	M800	M1500	MV15B (1500N)	M700	MG900 SR		
7314121000	15	G1B	>50	800	800	800	1600	1600	1600	1400	1600		
7314125000													
7314129000													
7314133000	20	G1½B	>100	650	650	650	1500	1350	1350	1100	1510		
7314137000	25	G1½B		400	400	500	1150			850	1160		
7314141000	32	G2B		300	300	350	850			1350	1350	650	855
7314145000	40	G2¼B		150	150	250	600			950	950	450	605
7314149000	50	G2¾B		50	50	150	400			650	650	300	415

Service kit:  
Replacement stem packing box: 100108000

## Connections V341

Valve		Ød1	AA1	Part number for connection, one pkg/port	
DN	End Conn.	Int. thread (ISO 7/1)	mm	Packing, std	Packing, spec.*
15	G1B	Rp ½	146	9112100015	9112103015
20	G1¼B	Rp ¾	146	9112100020	9112103020
25	G1½B	Rp 1	159	9112100025	9112103025
32	G2B	Rp 1¼	169	9112100032	9112103032
40	G2¼B	Rp 1½	197	9112100040	9112103040
50	G2½B	Rp 2	222	9112100050	9112103050

\* The accessory intended for the primary circuit of district heating connections.



### Internal thread connection

#### Main construction materials

Union nut  
Union end

malleable iron casting, galv.  
malleable iron casting, galv.

Packing, standard

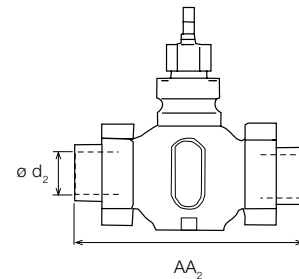
Fibre Gasket  
(Klingsil C4400)

or Packing, spec

PTFE Gasket  
(Kingersil Top Chem 1.5 mm)

Valve		Ød2	AA2	Part number for connection, one pkg/port	
DN	End Conn.	mm	mm	Packing, std	Packing, spec.*
15	G1B	15	136	9112101015	9112104015
20	G1¼B	22	146	9112101020	9112104020
25	G1½B	28	155	9112101025	9112104025
32	G2B	35	163	9112101032	9112104032
40	G2¼B	42	200	9112101040	9112104040
50	G2½B	54	232	9112101050	9112104050

\* The accessory combination intended for the primary circuit of district heating connections.



### Soldering Type Connection

#### Main construction materials

Union nut  
Union end

malleable iron casting, galv  
Bronze, SS 5204

Packing, standard

Fibre Gasket  
(Klingsil C4400)

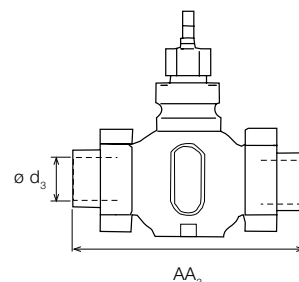
or Packing, spec

PTFE Gasket  
(Kingersil Top Chem 1.5 mm)

Valve		Ød3	AA3	Part number for connection, one pkg/port	
DN	End Conn.	mm	mm	Packing, std	Packing, spec.*
15	G1B	21.8	182	9112102015	9112105015 <sup>1</sup>
20	G1¼B	26.9	182	9112102020	9112105020 <sup>1</sup>
25	G1½B	33.7	187	9112102025	9112105025 <sup>1</sup>
32	G2B	42.4	197	9112102032	9112105032 (1)
40	G2¼B	48.3	232	9112102040	9112105040
50	G2½B	60.3	262	9112102050	9112105050

1 - Material Union nut: brass SS 5252

\* The accessory Combination intended for the primary circuit of district heating connections.  
3 sets of connections required for 3-way valves



### Welded Type Connection

#### Main construction materials

Union nut Packing, standard

Malleable iron casting, galv

or packing, spec  
Union end

Brass  
Stainless steel SS2172

Packing, standard

Fibre Gasket  
(Klingsil C4400)

or Packing, spec

PTFE Gasket  
(Kingersil Top Chem 1.5 mm)

## VG310R 15-50B

The VG310R 15-50B is a range of compact precision bronze globe valves, suitable for a wide range of fluid control applications, including heating, cooling, air handling and domestic hot water systems. The VG310R 15-50B series works reliably under a wide variety of conditions, including fluids with high glycol concentrations and very high temperature bands.

The valve utilizes precision plugs for improved rangeability and fine fluid control on small opening degrees. Soft seating provides an ultra tight close off performance against energy seepage.

Specifications	
<b>Design</b>	3-way plug valve, stem up closed
<b>Pressure class</b>	PN 16
<b>Flow characteristic</b>	Equal percentage modified
<b>Stroke</b>	11 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>100
<b>ΔPm</b>	400 kPa, water
<b>Max. temperature of medium</b>	138 °C
<b>Min. temperature of medium</b>	-7 °C
<b>Max. glycol concentration</b>	60%
<b>Connections</b>	Internal pipe thread Rp
<b>Main construction materials</b>	
<b>Body</b>	Bronze
<b>Stem</b>	Stainless steel 316
<b>Plug</b>	Brass CW602N
<b>Sealing</b>	PTFE for 15 and 20 mm units. EPDM for others.
<b>Seat</b>	Bronze
<b>Standard packing box</b>	Brass with PTFE and EPDM Chevrons
<b>Slotted stem adapter</b>	RoHS compliant Zinc-plated Steel



VG310R 15-50B						Max close-off pressure (kPa)			
						with MG350C		with MG600C (-SR) Actuator	
Part number	Type designation	DN	Connection	Kvs	Rangeability	Class IV-S1 ≤0.005%	IV1 ≤0.01%	Class IV-S1 ≤0.005%	Class IV ≤0.01%
VG310R-15B05	VG310R-15B 1.6T SU00	15	Rp 1/2	1.6	>100	1000	1500	1600	1600
VG310R-15B07	VG310R-15B 2.5T SU00			2.5					
VG310R-15B08	VG310R-15B 4T SU00			4.0					
VG310R-20B	VG310R-20B 6.3T SU00	20	Rp 3/4	6.3		800	930		1600
VG310R-25B	VG310R-25B 10E SU00	25	Rp 1	10		380	460	1100	1200
VG310R-32B	VG310R-32B 17E SU00	32	Rp 1¼	17		250	290	600	700
VG310R-40B	VG310R-40B 24E SU00	40	Rp 1½	24		100	170	350	450
VG310R-50B	VG310R-50B 35E SU00	50	Rp 2	35		55	69	90	240

a. Valves designed for direct connection onto compact SpaceLogic actuators, type MG350, MG600C, MG600C-SR. For M310, M400, M800, M1500 actuators, stem extension code AV-823 is required. It is not possible to drive this valve with the M700 or MV15B actuator. Replacement Bonnet, Packing Gland: YBA-689-C



## V311T

The V311T is an internally threaded valve with a soft seat for tight shut off. If the valve is used for media at temperatures below 0 °C, it should be equipped with a heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	3-way plug valve, stem up closed, A port (B-AB) open
<b>Pressure class</b>	PN 16
<b>Flow characteristic A-AB</b>	Equal percentage modified
<b>Flow characteristic B-AB</b>	Complementary
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage A-AB and B-AB</b>	Tight sealing
<b>ΔPm (mixing)</b>	400 kPa, water
<b>ΔPm (diverting)</b>	60 kPa, water
<b>Max. temperature of medium</b>	120 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Max. glycol concentration</b>	50%
<b>Connections</b>	Internal pipe thread Rp
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron EN-JS 1030
<b>Stem</b>	Stainless steel SS 2346
<b>Plug</b>	Brass CW602N
<b>Sealing</b>	EPDM
<b>Seat</b>	Nodular iron EN-JS 1030
<b>Stem packing</b>	EPDM



V311T					Max close-off pressure (kPa)							
					Non-spring return actuators						Spring return	
Part number	DN	Connection	Kvs	Rangeability	M310	MG350	M400	M800	M1500	MV15B (1500N)	M700	MG900SR
7311717000	15	Rp 1/2	1.6	>50	800	800	800	1600	1600	1600	1400	1600
7311721000			2.5									
7311725000			4.0									
7311729000	20	Rp 3/4	6.3		650	650	650	1500	1100	1510		
7311733000	25	Rp 1	10		400	400	500	1150	850	1160		
7311737000	32	Rp 1½	16		300	300	350	850	1350	1350	650	605
7311741000	40	Rp 1½	25		150	150	250	600	950	950	450	604
7311745000	50	Rp 2	38		50	50	150	400	650	650	300	415

Service kit:  
Replacement stem packing box: 100108000

## V311

The V311 is a flanged valve with a soft seat for tight shut off.

The valve is suitable for a wide range of mixing applications with hot or chilled water in heating cooling and air handling systems.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a stem heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	3-way plug valve, stem up closed, A port (B-AB) open)
<b>Pressure class</b>	PN 16
<b>Flow characteristic A-AB</b>	Equal percentage modified
<b>Flow characteristic B-AB</b>	Complementary
<b>Stroke</b>	20 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage A-AB and B-AB</b>	Tight sealing
<b>ΔPm (mixing)</b>	400 kPa, water
<b>ΔPm (diverting)</b>	60 kPa, water
<b>Max. temperature of medium</b>	120 °C
<b>Min. temperature of medium</b>	-20 °C
<b>Max. glycol concentration</b>	25%
<b>Connections</b>	Flange according to ISO 7005-2
<b>Main construction materials</b>	
<b>Body</b>	Nodular iron EN-JS 1030
<b>Stem</b>	Stainless steel SS 2346
<b>Plug</b>	Brass CW602N
<b>Sealing</b>	EPDM
<b>Seat</b>	Nodular iron EN-JS 1030
<b>Stem packing</b>	EPDM



V311				Max close-off pressure (kPa)							
				Non-spring return actuators						Spring return	
Part number	DN	Kvs	Rangeability	M310	MG350	M400	M800	M1500	MV15B (1500N)	M700	MG900 SR
7311117000	15	1.6	>50	800	800	800	1600	1600	1600	1400	1600
7311121000		2.5									
7311125000		4.0									
7311129000	20	6.3		650	650	650	1500	1350	1350	1100	1510
7311133000	25	10		400	400	500	1150			850	1160
7311137000	32	16		300	300	350	850	1350	1350	650	855
7311141000	40	25		150	150	250	600	950	950	450	605
7311145000	50	38		50	50	150	400	650	650	300	415

Service kit:  
Replacement stem packing box: 100108000

## VG311F 65-150C

The VG311F-C is a large flanged general purpose valve suitable for a wide range of mixing applications with hot or chilled water in heating cooling and air handling systems.

If the valve is used for media at temperatures below 0 °C, it should be equipped with a stem heater to prevent ice formation on the valve stem.



### Specifications

<b>Design</b>	3-way plug mixing valve stem up closed (A port/B-AB open)
<b>Pressure class</b>	PN 16
<b>Flow characteristic A-AB</b>	Equal percentage
<b>Flow characteristic B-AB</b>	Linear
<b>Stroke</b>	
DN65	25 mm
DN80 to 150	45 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage A-AB</b>	< 0.03% of Kvs
<b>Leakage B-AB</b>	< 2% of Kvs
<b>ΔPm (mixing)</b>	200 kPa, water
<b>ΔPm (diverting)</b>	60 kPa, water
<b>Max. temperature of medium</b>	150 °C
<b>Min. temperature of medium</b>	-10 °C
<b>Max. glycol concentration</b>	50%
<b>Connections</b>	Flange according to ISO 7005-2
<b>Main construction materials</b>	
<b>Body</b>	Grey Cast iron (GJL 250)
<b>Stem</b>	Stainless steel (AISI 303)
<b>Plug (DN65 to DN100)</b>	Brass (CW614)
<b>Plug (DN125 to DN150)</b>	Bronze (CB491K UNI EN 1982)
<b>Seat</b>	Grey Cast iron (EN JL 1040)
<b>Stem packing</b>	EPDM

### Mixing Applications

VG311F-C					Max Close-off Pressure ΔPC (kPa)				
					Non-spring return actuators			Spring return	
Part number	Type designation	DN	Kvs	Rangeability	M800	M1500/MV15B (1500N)	M3000	M700	MG900 SR
VG311F-65C	VG311F-65C 63M SU00	65	63	>50	240	400	850	220	290
VG311F-80C	VG311F-80C 100M SU00	80	100		160	240	570	140	-
VG311F-100C	VG311F-100C 130M SU00	100	130		100	150	370	80	
VG311F-125C	VG311F-125C 200M SU00	125	200		60	90	230	50	
VG311F-150C	VG311F-150C 300M SU00	150	300		40	50	160	35	

### Diverting Applications

0VG311F-C					Max Close-off Pressure ΔPC (kPa)				
					Non-spring return actuators			Spring return	
Part number	Type designation	DN	Kvs	Rangeability	M800	M1500/MV15B (1500N)	M3000	M700	MG900 SR
VG311F-65C	VG311F-65C 63M SU00	65	63	>50	80	135	285	75	85
VG311F-80C	VG311F-80C 100M SU00	80	100		53	80	190	45	-
VG311F-100C	VG311F-100C 130M SU00	100	130		33	50	125	25	
VG311F-125C	VG311F-125C 200M SU00	125	200		20	30	76	16	
VG311F-150C	VG311F-150C 300M SU00	150	300		13	16	55	12	

ΔPC = Maximum allowed pressure drop across a closed valve (that the nominal force of the actuator will open or close against).

# Globe Valve Actuators

## SpaceLogic MG350

The **SpaceLogic** MG350 is a compact electro-mechanical actuator for controlling 2-way and 3-way globe valves V241/V341, V211, V211T, V311, and V311T. The MG350 actuators are primarily designed for applications where the demands on speed and thrust are relatively small.

- Stable force control with stall protection
- Dual 3-Point floating and 2-position control.
- Sink or source floating control
- High Resolution PCBA and motor transmission for fine valve plug position and excellent flow control.
- LED status indication
- Tri-color LED for operation, calibration, and alarm notification
- Removable terminal block and cable gland for ease of installation.

### Specifications

<b>Supply voltage</b>	24 Vac/Vdc $\pm$ 20% 50/60 Hz
<b>Power consumption (50Hz)</b>	
Running: MG350-24 (F)	5.2 VA (3.5 W)
MG350-24 (M/MP/FP)	7.2 VA (3.5 W)
Holding (M/MP/FP)	1.2 VA
<b>Transformer sizing</b>	(same as power consumption)
<b>Running time</b>	4 s/mm (Full stroke time = 80 sec)
<b>Max. stroke</b>	21.5 mm
<b>Force</b>	350 N
<b>Control (Floating/Digital)</b>	
<b>Dependant upon wiring</b>	
3 wire Floating	24 Vac/Vdc or 0 V
2 Position on/off	NO or NC
Minimum input pulse	100 msec
<b>Control (modulating)</b>	
<b>Selectable input signals</b>	
MG350-24M	0 to 10Vdc, 2 to 10Vdc
MG350-24MP	0 to 10Vdc, 2 to 10Vdc, 4 to 20mA
<b>Impedance</b>	min. 100 k $\Omega$
<b>Environment</b>	
<b>Operating temperature</b>	-5 to +55 °C (for valve fluid temperatures up to 130 °C)
<b>Storage</b>	-40 to +70 °C
<b>Humidity</b>	max. 95%
<b>Position feedback</b>	
MG350-(24MP/-24FP)	0 to 5 Vdc/2 to 10Vdc
<b>Enclosure rating</b>	IP 53 (vertically mounted)
<b>Sound power level</b>	max. 30 dBA
<b>Weight (shipping)</b>	0.36 kg
<b>Material</b>	
Yoke	Aluminum
Housing	PBT/PC
<b>Manual override</b>	3 mm Hex
<b>Position indication</b>	Red and blue position markers for hot and cold pipe indication (green position indicator for closed valve)
<b>Wiring entry</b>	
Cable Gland wire size	min. 2.4 mm to max. 6.6 mm
Conduit hole	M20



### Part number

### Control

Part number	Control
MG350-24M	Modulating
MG350-24MP	Modulating with feedback and alarms
MG350-24F	Floating
MG350-24FP	Floating with feedback and alarms

## SpaceLogic MG350C

The **SpaceLogic** MG350C is a compact electro-mechanical actuator for controlling the VG210 and VG310 2-way and 3-way linear globe valves. The MG350C actuators are primarily designed for applications where the demands on speed and thrust are relatively small.

- Stable force control with stall protection
- Hysteresis Control - intelligent response to fluctuating control signals, extending actuator life and better plant regulation
- High Resolution PCBA and motor transmission for fine valve plug position and excellent flow control.
- Low power holding
- Auto adaptation to valve end stroke limits upon first power up
- LED status indication
- Tri-color LED for operation, calibration, and alarm notification
- Removable terminal block and cable gland for ease installation

Specifications	
<b>Supply voltage</b>	24 Vac/Vdc $\pm$ 20% 50/60 Hz
<b>Power consumption (50Hz)</b>	
Running: MG350C-24F	5 VA (3.5 W)
MG350C-24M	7.2 VA (3.5 W)
Holding (modulating only)	1.2 VA
<b>Transformer sizing</b>	(same as power consumption)
<b>Running time</b>	8 s/mm (Full stroke time = 88 sec)
<b>Max. stroke</b>	16.5 mm
<b>Nominal Force</b>	350 N
<b>Control (Floating/Digital)</b>	
Dependant upon wiring	
3 wire Floating	24 Vac/Vdc or 0 V
2 Position on/off	NO or NC
Minimum input pulse	100 msec
<b>Control (modulating)</b>	
Selectable input signals	0 to 10Vdc, 2 to 10Vdc
Impedance	min. 100 k $\Omega$
<b>Environment</b>	
Operating temperature	-5 to +55 °C (for valve fluid temperatures up to 130 °C)
Storage	-40 to +70 °C
<b>Humidity</b>	max . 95% RH (NC)
<b>Enclosure rating</b>	IP 53 (vertically mounted)
<b>Sound power level</b>	max. 30 dBA
<b>Weight (shipping)</b>	0.36 kg
<b>Material</b>	
Yoke	Aluminum
Housing	PBT/PC
<b>Mechanical</b>	
Manual override	3 mm Hex
<b>Position indication</b>	Red and blue position markers for hot and cold pipe indication (green position indicator for closed valve)
<b>Wiring entry</b>	
Cable Gland wire size	min. 2.4 mm to max. 6.6 mm
Conduit hole	M20



Part number	Control
MG350C-24M	Modulating
MG350C-24F	Floating



## SpaceLogic M310, M400, M800, M1500 and M3000

The SpaceLogic M310, M400, M800, M1500 and M3000 are a family of actuators for the control of 2-way and 3-way globe valves.

A very fine resolution PCBA board provides good rangeability of the valve. The Software in the actuator calibrates the running time and S2 switch points to the valve stroke limits. It may also be configured for different Flow characteristics, inverse signal or sequence control.

The U-bolt mounting makes for a very easy and quick installation. The manual override allows the actuator to be overridden and valve position adjusted without disconnecting the power supply.

Specifications	
<b>Supply voltage</b>	
AC	24 Vac +25%/-35%, 50/60 Hz
DC	24 Vdc ±10%
<b>Duty cycle</b>	Max. 20%/60 minutes
<b>Full Stroke Runtime</b>	
Modulating	(refer to table)
Increase/decrease	300s/60s
<b>Analog control input</b>	
Selectable voltages	0 to 10V/ 2 to 10V/ 0 to 5 V/ 5 to 10/2 to 6/6 to 10
<b>Impedance</b>	Min. 100 kΩ
<b>Digital inputs VH-HC</b>	
Voltage across open input	24 Vac
<b>Current through closed input</b>	5 mA
<b>S2 output – auxiliary end point switch (optional)</b>	
Type	2 x SPDT
Voltage	24 Vac
Load	4A (resistive)/1A (inductive)
<b>Regulated voltage output, G1</b>	
Voltage	16 Vdc ±0.3 V
Load	25 mA, short-circuit proof
<b>Position feedback, Y</b>	
Voltage	2 to 10V (0 to 100%)
Load	2 mA
<b>Environment</b>	
Operating temperature	-10 to +50 °C
Storage temperature	-10 to +50 °C
Humidity	Max. 90% RH
<b>Enclosure rating</b>	
M310, M400, M800, M1500	IP54
M3000	IP55
<b>Wiring entry</b>	
Conduit connection	3 x M20 screwed
Cable gland	1 x 6–12 mm O/D, IP68
<b>Main construction materials</b>	
Housing	Aluminium
Cover	ABS/PC plastic
Color (M310, M400, M800, M1500)	Aluminium/Grey
Color (M3000)	Black/Grey



M310, M400, M800, M1500



M3000

SpaceLogic Actuators		Force N	Modulating control Running time/stroke			Avg. power consumption VA	Transformer sizing
Part number	Description		9-25 mm	25-32 mm	32-51 mm		
8800210030	M310	300	15s	20s	-	6	30
8800211030	M310 S2						
8800230030	M400	400	60s	60s	7	50	
8800231030	M400 S2						
8800310030	M800	800	15s	20s	30s		10
8800311030	M800 S2						
8800450000	M1500	1500	14-40s	40-50s	50-80s	15	
8800451000	M1500 S2						
8800500000	M3000	3000	14-40s	40-50s	50-80s	25	
8800510000	M3000 S2						

## SpaceLogic MG900 SR

The SpaceLogic MG900 SR is a spring return actuator for the control of linear globe valves.

The Manual override is operated by a hex key and can be locked into position for commissioning.

Regenerative Braking is used to control the actuator closing speed when the actuator is driven under the spring return force.

Specifications	
Supply voltage	24 Vac +25%/-30%, 50/60 Hz
Power consumption	Average 30 VA
Transformer sizing	50 VA
Spring return close off time at power failure	
20 mm stroke	Less than 50 seconds
32 mm stroke	Less than 95 seconds
Stroke range	9 to 30 mm
Thrust	900 N
Duty cycle	Max. 20%/60 minutes (and 80%/ 60 min.) for half load/amb. temp
Running time	
Modulating 10 to 25 mm (0.39 to 1 in.)	15s
Modulating 25 to 32 mm (1 to 1.26 in.)	20s
Increase/decrease	300s/60s
Analog input	
Voltage	0 to 10V/2 to 10V/0 to 5V/5 to 10/2 to 6/6 to 10
Digital inputs VH-VC	
Voltage across open input	24 Vac
Current through closed input	5 mA
Pulse time	Min. 20 ms
Output, G1	
Voltage	16 Vdc/20 Vdc ±0.3 V
Load	25 mA, short-circuit proof
Output, Y	
Voltage	2 to 10V (0 to 100%)
Load	2 mA
Wiring entry	
Conduit connection	4 x M20 capped holes
Cable gland	1 x 6-12 mm O/D, IP68
Environment	
Operating temperature	-10 to 50 °C
Storage temperature	-10 to 50 °C
Humidity	Max. 90% RH
Main construction materials	
Housing	Aluminium
Cover	Aluminium



Part number	Spring return Function	Type designation	IP Rating
MG900-SU	Stem up	MG900 SRU-24FM T54 00	54
MG900-SD	Stem down	MG900 SRD-24FM T54 00	

Part number	Description
8800104000	S2 auxiliary end point switches
AV-821	Linkage kit to VB-7000 valves
AV-822	Linkage kit to VB-8000 valves
8800109000	Yoke heater
MG900-SU-PCB	Circuit board for MG900 SRU
MG900-SD-PCB	Circuit board for MG900 SRD
8800124000	L2SV linkage kit to VZ and MZ Satchwell Valves.
8800129000	Linkage - M30 x 1.5, Spirax Sarco KE, KL, KF, DN15 to 100

## SpaceLogic MG600C, MG600C-SR

The MG600C and MG600C-SRU/SRD are short yoke actuators designed for use with the VG210R and VG310R valves. Spring return and Non-spring return versions with Flexible control configuration (floating or modulating, sequencing), position feedback and flow curve adaptation (EQ to Lin).

- Brushless DC motors and a high resolution control board allow a very fine fluid control.
- Working range and end point switches adjust automatically to valve stroke.
- Firmware calibrates consistent running time regardless of valve stroke.
- On power loss the spring return mechanism drives the motor, generating power to control braking speed, avoiding mechanical stress and system water hammer.
- Available in spring return stem up or spring return stem down and either IP54 or rooftop IP65 enclosures.
- Configurable for either a 3-point Increase/decrease signal or various modulating control signals including sequencing.
- U-Bolt connection allows direct mounting without any mounting kit or special tools.

Specifications	
<b>Supply voltage</b>	24 Vac +25%/-35%, 50/60 Hz
<b>Duty cycle</b>	Max. 20%/60 minutes
<b>Analog control input</b> Selectable voltages	0 to 10V/2 to 10V/0 to 5V/5 to 10/2 to 6/6 to 10
<b>Impedance</b>	Min. 100 kΩ
<b>Digital inputs (3-point floating)</b> Voltage across open input	24 Vac
<b>Current through closed input</b>	5 mA
<b>Minimum pulse time</b>	20 ms
<b>S2 output – auxiliary end point switch (optional)</b> Type	2 x SPDT
<b>Voltage</b>	24 Vac
<b>Load</b>	4A (resistive)/1A (inductive)
<b>Position feedback, Y</b> Voltage	2 to 10V (0 to 100%)
<b>Load</b>	2 mA
<b>Environment</b> Operating temperature	-10 to +50 °C
<b>Storage temperature</b>	-10 to +50 °C
<b>Humidity</b>	Max. 90% RH
<b>Enclosure rating</b>	IP54
<b>Wiring entry</b> Conduit connection 600C	3 x M20 screwed
<b>600C-SR</b>	4 x M20 screwed
<b>Cable gland</b>	1 x 6–12 mm O/D, IP68
<b>Main construction materials</b> Housing	Aluminium
<b>Cover</b>	ABS/PC plastic
<b>Color</b>	Aluminium/Grey



MG600C



MG600C-SR

Part number	Designation	SR function	VG210R/ VG310R function on SR operation	Running time		Transf. sizing	Power consumption	
				Modulating	Increase/ decrease		(running)	(rest)
<b>MG600C</b>	MG600C-24FM T54 00	-	-	60s	300s/60s	30 VA	4W	3W
<b>MG600C-S</b>	MG600C-24FMS T54 00	-	-	15s		50 VA	21W	7W
<b>MG600C-SRU</b>	MG600C SRU-24FM T54 00	Stem up	A-AB Closed	15s				
<b>MG600C-SRD</b>	MG600C SRD-24FM T54 00	Stem down	A-AB Open	15s				

The MG600C(-SR) will not connect on to Satchwell or the 20 mm stroked valves. ex. V211, V241

## Globe Valve Actuators

### MV15B

The MV15B is a powerful 3-point floating actuator for the control of 2-way and 3-way globe valves, available in both 24 Vac and 230 Vac versions. The actuator self adjusts to the stroke of whatever valve it is connected to. The U-bolt mounting makes for a very easy and quick installation. A manual override is standard on all models.



#### Specifications

<b>Supply voltage</b>	24 Vac $\pm 10\%$ , 50/60 Hz 230 Vac $\pm 10\%$ , 50/60 Hz
<b>Power consumption</b>	12 VA
<b>Transformer sizing</b>	15 VA
<b>Running speed</b>	0.75 mm/s
<b>Stroke range</b>	9 to 52 mm
<b>Thrust</b>	1500 N
<b>Running time for 20 mm</b>	27s
<b>Enclosure rating</b>	IP 55
<b>Wiring entry</b>	
<b>Conduit connection</b>	2 x PG13.5 capped hole
<b>Cable gland</b>	1 x 6–12 mm O/D
<b>Environment</b>	
<b>Operating temperature</b>	15 to 50 °C
<b>Storage temperature</b>	-25 to 65 °C
<b>Main construction materials</b>	
<b>Housing</b>	Aluminium
<b>Cover</b>	ABS plastic
<b>Color</b>	Aluminium
<b>Optional auxiliary travel switch</b>	S2-MV15B
<b>Type</b>	SPDT 10A (resistive), 3A (inductive)
<b>Capacity</b>	250 V

#### MV15B actuators

Part number	Description	Power supply
		Vac $\pm 10\%$ / $-10\%$
8800460000	MV15B-230	230
8800462000	MV15B-24	24

#### MV15B accessories and linkage kits

Part number	Description
8800126000	Linkage M700-Satchwell L7SV
8800469000	Switch S2-MV15B
8800109000	Yoke Heater for amb. temp -10 °C, media temp -8 °C

## SpaceLogic M700 - Spring Return

The **SpaceLogic M700** is a spring return actuator for control of longer stroked and larger size globe valves. It utilizes the same flexible platform functionality as in the M310, M400, M800, M1500, M3000 Non-spring return actuators so it has the same capability for self-adapting to the valve stroke, and the same flexibility in set-up configuration. The U-bolt mounting makes for quick installation. Manual override is standard on all models.



### Specifications

<b>Supply voltage</b>	24 Vac +25%/-30%, 50/60 Hz
<b>Power consumption</b>	Average 30 VA
<b>Transformer sizing</b>	50 VA
<b>Spring return close off time at power failure</b>	Less than 50 seconds
<b>20 mm stroke</b>	Less than 95 seconds
<b>45 mm stroke</b>	
<b>Stroke range</b>	9 to 52 mm
<b>Thrust</b>	700 N
<b>Duty cycle</b>	Max. 20%/60 minutes
<b>Running time</b>	
<b>Modulating 10 to 25 mm</b>	15s
<b>Modulating 25 to 32 mm</b>	20s
<b>Modulating 10 to 52 mm</b>	30s
<b>Increase/decrease</b>	300s/60s
<b>Enclosure rating</b>	IP 54
<b>Wiring entry</b>	
<b>Conduit connection</b>	2 x PG13,5 capped hole
<b>Cable gland</b>	1 x 6-12 mm O/D
<b>Environment</b>	
<b>Operating temperature</b>	-10 to 50 °C
<b>Storage temperature</b>	-10 to 50 °C
<b>Humidity</b>	Max. 90% RH
<b>Analog input</b>	
<b>Voltage</b>	0 to 10V/2 to 10V/0 to 5V/5 to 10V/2 to 6V/6 to 10V
<b>Impedance</b>	Min. 100 kΩ
<b>Digital inputs VH-VC</b>	
<b>Voltage across open input</b>	24 Vac
<b>Current through closed input</b>	5 mA
<b>Pulse time</b>	Min. 20 ms
<b>Position feedback</b>	
<b>Voltage</b>	2 to 10V (0 to 100%)
<b>Load</b>	2mA

Part number	Description
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8800430000	M700-SRSU
8800431000	M700-S2-SRSU
8800440000	M700-SRSD
8800441000	M700-S2-SRSD

### Accessories

Part number	Description
8800126000	Linkage M700-Satchwell L7SV
8800109000	Yoke Heater for amb. temp -10 °C, media temp -8 °C

S2- Auxiliary end point switch  
 SRSU - spring return stem up  
 SRSD - spring return stem down  
 L7SV - Satchwell linkage to VZ and MZ valves



## SpaceLogic M400, M800, M1500, MG600C

### Electrical accessories

Part number	Description
8800104000	S2 – 2 x SPDT Axillary End Point Switches (24 Vac 4A AC-1)
8800109000	Yoke Heater for amb. temp -10 °C, media temp -8 °C

## SpaceLogic M400, M800, M1500

### Linkage Kits to other valves

Part number	Description
8800124000	Linkage Satchwell L2SV: VSF-MJF-MZ, VZ-MZF- VZF
8800116000	Linkage Honeywell M6 and 6.25 mm (1/4") stem
8800118000	Linkage Siemens
8800125000	Linkage Danfoss
8800129000	Linkage Spirax Sarco (M30 x1.5 :KE, KF, and KL; DN15 to 100)
	Linkage – Controlli threaded valves with M30 bonnet types: VSB, VMB, VSB_F, VMB_F
8800128000	Linkage – Controlli Flanged Valves with M40 threaded bonnet VBG, SS, DS, VSS, VBA, 3V, VMS VSG, VMB16, SSGA
8800135000	Linkage Satchwell VZ 7*** and MZ 7*** series
	Regin/Osby: NTVS/GTRS/GTVS, 2SAS/2SBS, MTVS/MTRS, MRT and FRS
8800252000	Linkage TAC V298, DN15
8800253000	Linkage kit for old TAC DN15 valves -V282/ V294/ V384/ V386/ V394
8800130000	V321 DN65 to DN100 to M800/M1500/M3000 (convert from M16 actuator)
AV-821	Linkage to VB-7000 valves (Siebe/TAC)
AV-822	Linkage to VB-8000/VB-9000 valves (Siebe/TAC)
AV-823	Stem extension for VG210R/VG310R

# Pressure Independent Balancing Control Valves and Actuators

## VP228E, VP229E, VP220E

The **SpaceLogic** VP228E, VP229E, and VP220E are threaded pressure independent balance and control valves for use in heating and cooling circuits.

- Stable hydronic flow, independent of any change in system pressure.
- Without an actuator, the valve can be operated as an automatic balancing valve for flow limiting applications.
- Simple to calculate and adjust to the needed flow setting

Specifications		
<b>Pressure class</b>	PN16	
<b>Function</b>	Normally open/Stem up	
<b>End connection</b>	External Thread, ISO228/1	
<b>Media temperature</b>	-10 to 120 °C	
<b>Leakage (ISO 5208)</b>	Tight - no visible leakage	
DN10 to DN32	Max. 0.05% of Q <sub>nom</sub>	
DN40 to DN50		
<b>Stroke</b>		
VP228E	2.25 mm	
VP229E (DN15 to DN20)	4.0 mm	
VP229E (DN25 to DN32)	4.5 mm	
VP220E	10 mm	
<b>Materials</b>		
	<b>DN10 to 32</b>	<b>DN40 to 50</b>
<b>Valve body</b>	DZR brass	GG 25
<b>Control valve, cone</b>	Brass CW 614N	Brass CW 614N
<b>Seat</b>	DZR brass	SS 1.4305
<b>Seals</b>	EPDM	EPDM

Accessories		
Part number	Description	Quantity per pack
9114060000	Commissioning Label Set/Flow Tag Hanger ID	48



DN10-32



DN40-50

DN	Litres/hour		Litres/second		Cubic meters/hour		$\Delta P$ (Q <sub>nom</sub> ) (kPa)	Connection Ext. Thread (ISO 228/1)	Part no.		Suitable actuator
	Q <sub>min</sub>	Q <sub>nom</sub> (100%)	Q <sub>min</sub>	Q <sub>nom</sub> (100%)	Q <sub>min</sub>	Q <sub>nom</sub> (100%)			Without T/P ports	With T/P Ports	
DN10	30	150	0.008	0.04	0.03	0.15	16-600	G 1/2A	VP228E-10BQLNT	VP228E-10BQL	SP90 MP120 NC MP140 NO MP130 MP300-SR
	55	275	0.015	0.08	0.06	0.28			VP228E-10BQSNT	VP228E-10BQS	
DN15	55	275	0.015	0.08	0.06	0.28		G 3/4 A	VP228E-15BQLNT	VP228E-15BQL	
	90	450	0.025	0.13	0.09	0.45			VP228E-15BQSNT	VP228E-15BQS	
	227	1135	0.063	0.32	0.23	1.14			VP229E-15BQHNT		
DN20	180	900	0.050	0.25	0.18	0.90		G 1A	VP228E-20BQSNT	VP228E-20BQS	
	340	1700	0.094	0.47	0.34	1.70	VP229E-20BQHNT				
DN25	340	1799	0.09	0.47	0.34	1.70	G 1 1/4A	VP229E-25BQSNT	VP229E-25BQS		
	545	2700	0.15	0.76	0.54	2.70		VP229E-25BQHNT			
DN32	640	3200	0.18	0.89	0.64	3.20	G 1 1/2A	VP229E-32BQSNT	VP229E-32BQS		
	800	4000	0.22	1.1	0.80	4.00		VP229E-32BQHNT			
DN40	3200	7500	0.8	2.08	3.0	7.5	G 2A		VP220E-40CQS	MP500C	
DN50	5000	12550	1.4	3.47	5.0	12.5	G 2 1/2A		VP220E-50CQS	MP500C-SR	

Note: A Higher flow (Q max) is achievable on some sizes by increasing the pressure drop through the valve; please refer to specific technical data sheets.

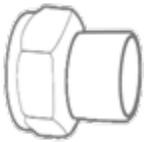
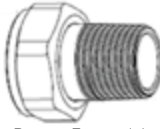
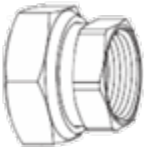
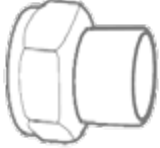
$\Delta P$  : Differential Pressure Operating range. The differential pressure across the valve must be within the range specified for predictable, stable and fully adjustable flow to the limits detailed within.

## Pipe connections

The VP228E, VP229E and VP220E have externally threaded end connections for the attachment of various types of pipe connections.

Pipe connections are supplied in pairs and are typically a two piece + gasket separable design allowing the valve to be removed with minimal disruption to the pipework. On some sizes a one piece + gasket inseparable design is necessary and additional couplings may be required for practical disassembly.

Two end connection sets per pack. Order one pack per valve.

Valve DN	Pipe connection type	Part number	Valve connection	End fitting connection	
DN10	 <p>Solder</p>	9112113010	G1/2	15 mm*	
DN15		9112113015	G3/4	15 mm*	
DN20		9112113115		22 mm *	
DN25		9112113020	G1	15 mm	
DN32		9112113120		22 mm	
DN40		9112113025	G1 1/4	28 mm	
DN50		9112113032	G1 1/2	35 mm	
DN10		 <p>R taper External thread</p>	9112113040	G2	42 mm
DN15			9112113050	G2 1/2	54 mm
DN20			9112112010	G1/2	R 3/8
DN25	9112112015		G3/4	R 1/2	
DN32	9112112020		G1	R 3/4	
DN40	9112112025		G1 1/4	R 1	
DN50	9112112032		G1 1/2	R 1. 1/4	
DN10	 <p>Internal thread</p>		9112112040	G2	R 1.1/2
DN15			9112112050	G2 1/2	R 2
DN20			9112111010	G1/2	Rp 1/2*
DN25		9112111015	G3/4	Rp 1/2*	
DN32		9112111020	G1	Rp 1/2*	
DN40		9112111025	G1 1/4	Rp 3/4	
DN50		9112111032	G1 1/2	Rp 1	
DN10		 <p>Weld</p>	9112111040	G2	Rp 1.1/4
DN15			9112111050	G2 1/2	Rp 1.1/2
DN20			9112115020	G1	26.9 mm
DN25	9112115025		G1 1/4	33.7 mm	
DN32	9112115032		G1 1/2	42.4 mm	
DN40	9112115040		G2	48.3 mm	
DN50	9112115050	G2 1/2	60.3 mm		

\* One-piece compact design (inseparable); additional coupler may be needed to ease assembly/disassembly.

## VP220F, VP221F, VP222F

If The **SpaceLogic** VP220F, VP221F, and VP222F are flanged pressure independent balance and control valves for large flows in heating and cooling circuits.

- Stable Hydronic flow is independent of any change in system pressure.
- Without an actuator, the valve can be operated as an automatic balancing valve for flow limiting applications.

Specifications				
<b>Pressure class</b>	PN16			
<b>Function</b>	Stem up valve open			
<b>End connection</b>	Flanged PN16, ISO7005-2			
<b>Media temperature</b>	-20 to 120 °C			
<b>Leakage (ISO 5208)</b>				
<b>DN50 to DN100</b>	0.05 % of $Q_{nom}$			
<b>DN125 to DN250</b>	0.01 % of $Q_{nom}$			
Materials				
	DN50 to 100	DN125	DN150 to 250	
<b>Valve body</b>	GG25	GG 25	GG 25	
<b>Seals</b>		EPDM		
<b>Membranes</b>	EPDM	1.4571	EPDM	
<b>Cone</b>	CW 614N	1 (W.Nr.1.4404NC)	1.4021	
<b>Seat</b>	1.4305	1.4305	1.4027	
<b>Springs</b>	1.4568/1.4310	1.4401	1.4310	
<b>Gaskets</b>	NBR	Graphite	Non-asbestos	



### Accessories, stem lock handles

Converts a standard PIBCV valve to automatic flow regulation valve/flow controller which provides a fixed flow against varying pressure, Stem Lock Handle are fitted in replacement of an actuator.

\*DN10-32 valves are supplied with a plastic flow setting cap for the same purpose.

Part number	Valve size
9114070000	DN40 to 100
9114071000	DN125 to 150
9114072000	DN200 to 250

DN	Litres/hour		Litres/second		Cubic meters/hour		$\Delta P (Q_{nom})$ (kPa)	Part number	Suitable actuator
	$Q_{min}$	$Q_{nom}$ (100%)	$Q_{min}$	$Q_{nom}$ (100%)	$Q_{min}$	$Q_{nom}$ (100%)			
DN50	5,000	12,500	1.4	0.04	5.0	12.5	30-600	VP220F-50CQS VP220F-65CQS VP220F-65CQH VP220F-80CQS VP220F-80CQH VP220F-100CQS VP220F-100CQH VP221F-125CQS VP221F-125CQH VP221F-150CQS VP221F-150CQH VP222F-200CQS VP222F-200CQH VP222F-250CQS VP222F-250CQH	MP500C MP500C-SR
	8,000	20,000	2.2		8.0	20.0	30-600		
DN65	10,000	25,000	2.8	0.13	10.0	25.0	60-600		
	11,200	28,000	3.1	0.25	11.2	28.0	30-600		
DN80	16,000	40,000	4.4	0.47	16.0	40.0	60-600		
	15,200	38,000	4.2	0.47	15.2	38.0	30-600		
DN100	23,600	59,000	6.6	0.76	23.6	59.0	60-600		
	36,000	90,000	10.0	0.89	36.0	90.0	60-600		
DN125	44,000	110,000	12	1.1	44	110	60-600		
	58,000	145,000	16	2.08	58	145	40-600		
DN150	76,000	190,000	21		76	190	60-600		
	76,000	200,000	21	3.47	76	200	40-600		
DN200	100,000	270,000	28		100	270	60-600		
	112,000	300,000	31		112	300	40-600		
DN250	148,000	370,000	41		148	370	60-600		

## MP130 Actuators

The MP130 is a family of compact and low power motoric actuators that drive the DN10 to 32 SpaceLogic PIBCV in various hydronic HVAC applications.

The modulating actuators have fine positional control and are self calibrating to the adjustable stroke/ flow setting in the VP228E and VP229E valves which provide optimal hydronic control.

- Low noise operation
- Overload protection
- Manual override in all models

Specifications	
Close off force	130 N
Stroke	5 mm
Max medium temperature	120 °C
Media temperature	-20 to 120 °C
Environment	
Operating temperature	0 to 55 °C
Storage/transportation	-40 to 70 °C
Sound power level	Max 35 dB(A)
Relative humidity	max. 95 %
Enclosure rating	IP 42
Weight	0.3 kg



Part number	Control signal (Y)	Speed (s/mm)	Position feedback (U)	Cable length (m)	Voltage (50/60 Hz)	Power consumption running (standby)
MP130-24M	0 (2) to 10Vdc	24	-	1.5	24 Vac	2 VA (.5 w)
MP130-24M-10M				10		
MP130-24MP				1.5		1.5 VA (.4 W)
MP130-24MP-10M				10		
MP130-24T					1 VA	
MP130-230T	Two-position	12	-	1.5	230 Vac	8 VA
MP130-24F	Floating	24	-	10	24 Vac	1 VA (0W)
MP130-24F-10M						
MP130-230F						

Note: Actuators with 5m and 10m cable length are produced on request. Please note this increases lead time.

## MP120/MP140

MP120NC and MP140NO are small thermoelectric valve actuators for two-point or pulse-width-modulated (PWM) regulation of the DN10–32 **SpaceLogic** PIBCV valves. The MP120 has a manual override operation for easy flushing.

- Water-protected housing design in all mounting positions
- Pluggable cable for easy installation and servicing (MP120)
- Low power consumption – allowing many actuators to be driven from the same controller
- Visual indicator showing valve position and type of action (NO or NC)
- Silent Operation

### Specifications

<b>Power supply</b>	
<b>24 V Models</b>	
MP120NC-24T, MP140NO-24T	24 Vac/Vdc ± 20%
<b>230 V Models</b>	
MP120NC-230T, MP140NO-230T	230 Vac + 10% to -15%
<b>Power consumption</b>	2 W
<b>Environment</b>	
Operating temperature	Max. 50 °C
<b>Protection standard</b>	IP44 in all mounting positions
<b>Cable length (standard)</b>	1.5 m
<b>Cable size</b>	2 x 0.5 mm <sup>2</sup>
<b>Medium temperature</b>	Max. 120 °C
<b>Nominal Force</b>	
MP120	120N
MP140	140N
<b>Valve connection</b>	M30 x 1.5
<b>Stroke range</b>	
MP120NC	8 mm
MP140NO	4 mm



MP120 NC



MP140 NO

Part number	Valve size	Voltage	Operational Flow Range	
			VP228E	VP229E
MP120NC-24T	Normally closed (Stem down)	24 Vac/Vdc	20 to 120%	20 to 110%
MP120NC-230T		230 Vac		
MP140NO-24T	Normally open (Stem up)	24 Vac/Vdc	20 to 100%	DN15 to 20: 20 to 65% DN25 to 32: 20 to 50%
MP140NO-230T		230 Vac		

## MP300-SR

MP300-SR actuators with Floating and Proportional control are low voltage motoric actuators for the Smart X PIBCV DN10-32 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. The MP300-SR actuator is not suitable for use in very quiet applications like hotel guest rooms.

### Specifications

<b>Power supply</b>	24 V; +10 to -15 %; AC
<b>Frequency</b>	50/60 Hz
<b>Power consumption</b>	9 VA
<b>Control input Y</b>	0 to 10 (2 to 10) V 0 to 20 (4 to 20) mA
<b>Output signal U</b>	0 to 10 (2 to 10) V
<b>Speed</b>	11.75 (50 hz) s/mm
<b>Max. medium temperature</b>	120 °C
<b>Nominal Force</b>	300 N
<b>Environment</b>	
<b>Operating temperature</b>	0 to 55 °C
<b>Sound power level</b>	40 dB(A)
<b>Enclosure rating</b>	IP 54
<b>Weight</b>	0.8 kg



Part number	Spring return direction	Linkage type (included with actuator)
MP300-SRU	Up - normally open	Adapter
MP300-SRD	Down - normally closed	Spacer



## SP90

Schneider Electric's **SpaceLogic** SP90 is a high accuracy multi-function field bus actuator, specifically designed for use in combination with DN10 to 32 **SpaceLogic** PIBCV valves.

The high positional accuracy, together with the linear flow characteristic of the **SpaceLogic** PIBCV valve, allow the **SpaceLogic** SP90 to be used as a flow indicator. When the SP90 is connected to temperature sensors across a coil, heat consumption will also be calculated.

- All Remote design flow settings made from the BMS
- Pluggable cables with Daisy chain connectivity allowing for super quick installation and reduction of mis-wiring
- LED status indication
- Auto MAC addressing
- Alarm reporting
- Spare 0 to 10V and 2xPt1000 input
- Additional 0 to 10V output

Setup of the actuator and valve parameters are all made via fieldbus. The remote flow adjustment saves considerable time during mechanical installation/flow balancing with no need to adjust the flow setting dial on the valve. Dedicated 6-way change over valves can also be used in combination with the SP90.



Specifications	
<b>Power supply range</b>	24 V ac/dc, ± 25%, 50/60 Hz
<b>Power consumption</b>	Running: 3.9 VA Standby: 0.9 W
<b>Protection class</b>	III safety extra-low voltage
<b>Electrical connection</b>	Pre-molded plug connector
<b>Control signals</b>	BACnet MS/TP, Modbus 0 to 10Vdc, 4 to 20 mA
<b>Actuator speed selections (sec/mm)</b>	3, 6, 12, 24, Constant Time
<b>Stroke</b>	7 mm
<b>Force</b>	90 N
<b>Positional accuracy</b>	± 0.05 mm
<b>Accuracy, calculated energy usage</b>	+/- 10%
<b>Working ambient temp.</b>	-10° C to 50° C
<b>Max. medium temp.</b>	120° C
<b>Storage temp. range</b>	-40 to 70° C
<b>Sound power level</b>	Max. 30 dB(A)
<b>Enclosure rating</b>	IP54 (IP40 upside-down)
<b>Weight</b>	0.4 kg

Cable accessories			
Type	Length (m)	Connections	Part number
Digital	1.5	bus/power	9114401500
	10.0	bus/power	9114410000
Daisy chain	0.5	actuator/actuator	9114500500
	1.5		9114501500
	5.0		9114505000
	10.0		9114510000
Analogue + I/O		Actuator/free wires	9114601500
Energy	1.5	PT1000 surface mount temp sensors	9114701500
		PT1000 Immersed temp sensors	9114801500

Note: Cables are not included with actuator and must be ordered separately

Part number	Description
<b>SP90-24BMM</b>	Fieldbus PIBCV Actuator

### Accessory Pockets/Wells for Insertion Probe Sensors

Description	Brass Part no.	Stainless steel part no.
<b>Immersion pocket, 50 mm, G1/2</b>	9121040000	9121050000
<b>Immersion pocket, 100 mm, G1/2</b>	9121041000	9121051000
<b>Immersion pocket, 150 mm, G1/2</b>	9121042000	9121052000
<b>Immersion pocket, 200 mm, G1/2</b>	9121043000	9121053000

Note: 2 x Immersion Pockets/Wells required per device

### Modbus RTU data

<b>Supported baud rates</b>	Auto baud rate detection/9600 bps/19200 bps/38400 bps/56700 bps/76800 bps/115200bps
<b>Supported transmission modes</b>	Parity: None (1-8-N-2)/Odd (1-8-O-1)/Even (1-8-E-1)/None (1-8-N-1) Data format: Parity (Start bit - Data bits - Parity - Stop bits)

### BACnet data

<b>BACnet device profile</b>	DZR M
<b>BACnet protocol</b>	BACnet Master Slave/Token Passing (MS/TP)
<b>BACnet baud rates supported</b>	Auto baud rate detection/9600 bps/19200 bps/38400 bps/56700 bps/76800 bps/115200bps

## MP500C

MP500C linear electro-mechanical actuator for the control of the VP220 **SpaceLogic** PIBCV, DN40 to 100.

MP500C is controls either by an Increase/decrease floating signal or by a range of modulating control signals between the span of 0 to 10V.

- High resolution control for precise fluid control.
- Working range and end point switches calibrate to any stroke and flow setting of the valve.
- Proportional running time is 15s regardless of valve stroke.
- Multi-signal control for either 3-point Increase/decrease signal or various modulating control signals including sequencing.
- Stroke Indicators on the yoke provide clear visual indication to the valves opening position.

Specifications	
<b>Supply voltage</b>	24 Vac +/- 20%, 50 to 60Hz 24 Vdc +/- 20%
<b>Power consumption</b>	average 15 VA
<b>Transformer sizing</b>	50 VA
<b>Running time modulating</b>	15 s
<b>Increase/decrease</b>	300 s/60 s
<b>Duty cycle</b>	max. 20%/60 minutes
<b>Analog input (Y-M)</b>	0 to 10Vdc
<b>Voltage Range</b>	2 to 10V, 0 to 5 V, 2 to 6 V,
<b>Selectable Input signals</b>	5 to 10V, 6 to 10V
<b>Impedance</b>	minimum 100 k Ohm
<b>Digital input (Y2-Y1)</b>	
<b>Voltage across open input</b>	24 Vac
<b>Current through closed input</b>	5 mA
<b>Minimum pulse time</b>	20 ms
<b>Output U (position feedback signal)</b>	2 to 10V
<b>Load</b>	2 mA
<b>Wiring entry</b>	
<b>Conduit connection</b>	2 x M20 knockout
<b>Cable gland</b>	1 x 6–12 mm O/D
<b>Environment</b>	
<b>Operating temperature</b>	-10 to +50 °C
<b>Storage temperature</b>	-25 to +65 °C
<b>Humidity</b>	max. 90% RH non-condensing
<b>Enclosure rating</b>	IP 54 (NEMA 2)
<b>Sound power level</b>	max. 32 dBA
<b>Material</b>	
<b>Housing</b>	Aluminium
<b>Cover</b>	ABS/PC plastic
<b>Color</b>	aluminium/grey
<b>Weight</b>	1.8 kg (3.96 lb.)



Part number	Description	Valve size
<b>MP500C</b>	<b>SpaceLogic</b> Multi-Signal Control Actuator	DN40 to 100
<b>8800104000</b>	S2 (Aux End switch)	

## MP500C-SR

The MP500C-SR is spring return linear electro-mechanical actuator for the control of the VP220 SpaceLogic PIBCV, DN40-100.

- Features universal control input and self-calibration to any valve setting.
- High resolution control board allows precise fluid control.
- Working range and end point switches calibrate to any stroke and flow setting of the valve.
- Proportional running time is 15s regardless of valve stroke.
- Stroke indicators on the yoke provide clear visual indication to the valves opening position.



### Specifications

<b>MP500C-SRU</b>	Stem up (retract)
<b>MP500C-SRD</b>	Stem down (extend)
<b>Voltage supply</b>	24 Vac $\pm$ 10% 50-60Hz
<b>Power consumption</b>	
Running	30 VA (21 W)
Rest	7 W
<b>Running time</b>	
Modulating	15 sec.
Increase/decrease	60/300 sec. (selectable)
Spring return	13 sec.
<b>Transformer sizing</b>	50 VA
<b>Stroke range</b>	2 to 35 mm
<b>Force, nominal</b>	500 N
<b>Analog input voltage range</b>	0 to 10Vdc
<b>Selectable input signals</b>	0 to 10, 2 to 10, 0 to 5, 2 to 6, 5 to 10, 6 to 10Vdc
<b>Digital inputs, Y1, Y2</b>	
Voltage across open input	24 Vac
Current through closed input	5 mA
Minimum pulse time	20 ms
<b>Output, Y (Feedback)</b>	2 to 10Vdc or 0 to 5 Vdc (0-100%) - Load 2 mA
<b>Wiring entry</b>	
Conduit connection	4 x M20 capped holes
Cable gland	1 x 6-12 mm O/D, IP68
<b>Environment</b>	
Operating and Storage temperature	-10/+50 °C
Humidity	max 90% RH
<b>Enclosure rating</b>	IP54
<b>Sound power level</b>	43 dBa
<b>Max cable core diameter</b>	2.5 mm <sup>2</sup>
<b>S2 Auxiliary Switch Relay (optional accessory)</b>	SPDT, 24 Vac 4A AC1 (contacts made at 5% and 95% of end stroke)
<b>Weight</b>	2.8 Kg

Part number	Description	Function on power failure	Valve size
<b>MP500C-SRU</b>	Spring return (stem up)	Valve open	DN40 to 100
<b>MP500C-SRD</b>	Spring return (stem down)	Valve closed	
<b>8800104000</b>	S2 auxiliary end point switches		

## MP2000

MP2000 actuator is used with pressure independent balancing and control large valve type **SpaceLogic** PIBCV DN125 and DN150. The actuator has universal control inputs and is self-calibrating.

- Overload protected
- Diagnostic LED for operational data capture and self-stroking feature.
- Manual override



### Specifications

<b>Power supply</b>	24 Vac, +10 to -15%
<b>Power consumption</b>	9 VA
<b>Frequency</b>	50/60 Hz
<b>Control signal input</b>	Modulating and 3 Point floating
<b>Control input Y</b>	0 to 10V (2 to 10) Ri = 24 kΩ 0 to 20 mA (4 to 20) Ri = 500 Ω
<b>Output signal X</b>	0 to 10V (2 to 10)
<b>Speed</b>	8 s/mm
<b>Max. medium temperature</b>	200 °C
<b>Environment</b>	
<b>Operating</b>	0 to 55 °C
<b>Storage/transp. temp</b>	-40 to +70 °C
<b>Protection class</b>	III safety extra-low voltage
<b>Enclosure rating</b>	IP 54
<b>Weight</b>	7.5 kg

Part number	Description	Valve size
MP2000	Multi-Signal Actuator, Fail in Place	DN125 to 150

## MP2000-SR

The MP2000-SR is a spring return actuator used with the DN125 to 150 **SpaceLogic** PIBCV.

The actuator has universal control inputs and is self-calibrating.

- Manual operation mechanical and/or electrical
- Position indication, LED signalization
- Selectable speed 4 or 6 s/mm
- Integrated external switch
- Linear to EQ% Curve Adaptation
- Anti-oscillation function
- 3-point floating or modulating control selection
- Thermal and overload protection
- Precise regulation and fast response on 3-point signal (0.01 s)

Specifications	
Nominal voltage	24 Vac/Vdc, 50 Hz/60 Hz
Power consumption	15 VA
Control input signal	Modulating or 3-point floating
Control input Y	0 to 10V (2 to 10V) Ri = 24 kΩ 0 to 20 mA (4 to 20 mA) Ri = 500 Ω
Position feedback U	0 to 10V (2 to 10V)
Speed (selectable)	4 or 6 s/mm
Environment	
Operating temperature	0 to + 55 °C
Enclosure rating	IP 54
Weight	8.6 kg
Safety function runtime/50 mm stroke	120 s
Manual operation	Electrical and Mechanical



Part number	Description	Valve size
MP2000-SRU	Stem up, retracts (valve open)	DN125 to 150
MP2000-SRD	Stem down, extends (valve closed)	

## MP2000-SR-230

The MP2000-SR-230 is a line voltage spring return actuator for the DN125 to 150 SmartX PIBCV.

The actuator has universal control inputs and is self-calibrating.

- Manual operation mechanical and/or electrical
- Position indication, LED signalization
- Integrated external switch
- 3-point or modulating control selection

Specifications	
Nominal voltage	230 Vac, 50 Hz/60 Hz
Control input signal	Modulating or 3-point
Control input Y	0 to 10Vdc (2 to 10) 0 to 20 mA (4 to 20) 3-point
Control output U	0 to 10Vdc (2 to 10) 0 to 20 mA (4 to 20)
Speed (selectable)	2 or 6 s/mm
Temperature Operating	0 to + 55 °C
Humidity	5 to 95%
Enclosure rating	IP 54
Power consumption	35.7 VA
Weight	8.6 Kg
Safety function runtime/50 mm stroke	120 s.
Manual operation	Electrical and Mechanical

Part number	Description	Valve size
MP2000-SRU-230	Stem up (valve open)	DN125 to DN150
MP2000-SRD-230	Stem down (valve closed)	



## MP4000

The MP4000 is a powerful universal control actuator for the DN200 and DN250 **SpaceLogic** PIBCV.

- Universal input control and self-calibrating.
- Manual operation mechanical and/or electrical
- Position indication, LED signalization
- Integrated external switch
- Characteristic optimization
- 3-point floating or modulating control selection
- Thermic and overload protection
- Precise regulation and fast response on 3-point signal (0.01 s)

### Specifications

<b>Power supply</b>	24 Vac/Vdc (+10, -15%)
<b>Power consumption</b>	15 VA
<b>Signal</b>	10 mA
<b>Frequency</b>	50/60 Hz
<b>Control input Y</b>	0 to 10Vdc (2 to 10Vdc); 0 to 20 mA (4 to 20 mA)
<b>Control output U</b>	0 to 10Vdc (2 to 10Vdc); 0 to 20 mA (4 to 20 mA)
<b>Speed (selectable)</b>	3 s/mm or 6 s/mm
<b>Max. spindle travel</b>	80 mm
<b>Max. medium temperature</b>	200 °C
<b>Environment</b>	
<b>Ambient Temperature</b>	0 to + 55 °C
<b>Storage/transport Temperature</b>	-40 to +70 °C
<b>Humidity</b>	5 to 95%
<b>Humidity</b>	II
<b>Enclosure rating</b>	IP 54, Type 2
<b>Electrical connection</b>	conduit
<b>Weight</b>	7.5 Kg
<b>Manual operation</b>	Electrical and mechanical
<b>Power failure response</b>	Stem remains in last position



Part number	Description	Valve size
MP4000	Multi-signal control, Fail in place	DN200-250



# Radiator Valve Actuators

## MR95

The MR95 is a small thermoelectric linear radiator valve actuator used in room applications for time-controlled two-point (On/Off) and pulse-width-modulated (PWM) regulation radiators or underfloor heating manifolds.

The MR95 is a discreet design silent operating actuator suitable for living space installations.

Specifications	
Max. stroke	4mm
Supply voltage	MR95xx-24T: 24 Vac/Vdc $\pm$ 20% MR95xx-230T: 230 Vac +10%-15%
Stem force	95 N
Temperature range	Max. 50 °C
Power consumption	2 W
Protection standard	IP44 in all mounting positions
Cable length (standard)	1.0 m
Cable size	2 x 0.5 mm <sup>2</sup>
Medium temperature	Max. 120 °C
Radiator connection	M30 x 1.5



Part number	Type designation	Action <sup>1</sup>	Voltage
MR95NC-24T	MR95-NCD-24T 1.0M44 00	Normally closed (stem down)	24 Vac/Vdc
MR95NO-24T	MR95-NOU-24T 1.0M44 00	Normally open (stem up)	
MR95NC-230T	MR95-NCD-230T 1.0M44 00	Normally closed (stem down)	230 Vac
MR95NO-230T	MR95-NOU-230T 1.0M44 00	Normally open (stem up)	

1- Without power, in combination with standard radiator valve.

"Normally closed" = Actuator stem extends downward without power closing the valve, retracts when powered to open the valve.

"Normally open" = Actuator stem retracts upward without power opening the valve, extending when powered to close the valve.

Compatible radiator valves	
Manufacturer	Type
Drayton	TRV 4
Honeywell	M30x1.5, all
Empur	
Heimeier	
Junkers	M30x1.5
Oventrop	
Siemens	Duogyr, M30x1.5
TA	M30x1.5 <sup>2</sup>

2 - Some older TA valves are M28 and not suitable for the MR95.

Accessories	
Part number	Description
9114202500	Additional cable set 2.5M, 10 pcs
9114205000	Additional cable set 5M, 10 pcs
9114210000	Additional cable set 10M, 10 pcs

## MZ09L

The MZ09L LON® actuator is designed for decentralised building structures and gives customers an effective new capability in energy management and product flexibility. The actuator works with standard SNVTs to provide interoperability with controllers based on LonWorks® technology.

The MZ09L small linear actuator is specifically designed to provide LonMark® capabilities together with radiator valves and is used in fan coil units, induction units, small reheaters and recoolers, and for zone control applications. The MZ09L actuator is suitable for LonWorks technology. Using standard Echelon configuration tools, the actuator can be configured with job specific settings.

Specifications	
Power supply	24 Vac, ± 20%, 50/60 Hz
Power consumption	1.4 VA
Control signal	SNVT_lev_percent 0 to 100%
Network protocol	LonTalk®
Channel	FTT10A
Stroke	2.5 mm
Running time	53s at 50 Hz 44s at 60 Hz
Stem force	90 N (for valves DN15 to 20)
Insulation class	III
Connection cables	1.5 m, three leads 1.5 m, two leads
Coupling ring	M 30 x 1.5
Environment Operating temperature	0 to 55 °C
Enclosure rating	IP 42



MZ09L Actuator for Radiator Valves		
Part number	Description	
8455112000	MZ 09L(LON) 2.5 mm	
Suitable Valves		
Manufacturer	Valve type	Adapter
Honeywell	V100, V200	Not required
Heimeier		Not required
Siemens LandS	Duogyr	Not required
Danfoss	Series RA2000, RA-PN, RA-N, RA-U, RA-G	9112075000
Danfoss	Series RAVL	9112074000

## MZ09B

The MZ09B actuator is designed to provide 3-point control together with radiator valves. The MZ09B actuator is used for radiator valves in fan coil units, induction units, small reheaters and recoolers, and for zone control applications. The absence of end switches and feedback potentiometer provides longtime reliability.

Specifications	
Power supply	24 Vac, ± 20%, 50/60 Hz
Power consumption	1.4 VA
Control signal	SNVT_lev_percent 0 to 100%
Network protocol	LonTalk®
Channel	FTT10A
Stroke	2.5 mm
Running time	53s at 50 Hz 44s at 60 Hz
Stem force	90 N (for valves DN15 to 20)
Insulation class	III
Connection cables	1.5 m, three leads 1.5 m, two leads
Coupling ring	M 30 x 1.5
Environment Operating temperature	0 to 55 °C
Enclosure rating	IP 42



MZ09B actuator for radiator valves		
Part number	Description	
8455111000	MZ 09B 2.5 mm	
Suitable Valves		
Manufacturer	Valve type	Adapter
Honeywell	V100, V200	Not required
Heimeier		Not required
Siemens LandS	Duogyr	Not required
Danfoss	Series RA2000, RA-PN, RA-N, RA-U, RA-G, RA-UR, RA-KE, RA-K	911-2075-000
Danfoss	Series RAVL	911-2074-000

# Shoe Valves and Actuators

## MB

The MB is a 3-port screwed rotary shoe valve.

Specifications	
Design	3-way rotary shoe valve
Pressure class	PN10
Flow characteristic	Port 2 Modified parabolic
Operating angle	90°
Rangeability (Kvs/Kvmin.)	>50
Leakage	0.5% (%of Kvs)
Max. temperature of medium	120 °C
Min. temperature of medium	2 °C
Connection	Screwed Parallel (female) BSP to BS21
<b>Main construction materials</b>	
Body 12.7 to 25.4 mm (½" to 1") valves	Close Grained Cast Iron BS1452 Grade 260
Body 31.75 to 50.8 mm (1¼" to 2" valves)	Close Grained Cast Iron BS1452 Grade 260 or 220High
Body 65 mm to 100 mm	Close Grained Cast Iron BS1452 Grade 260 or 220High
Spindle	Tensile Brass to BS2874 CZ114
O rings	EPDM



MB					Max close-off pressure kPa	
Valve Part number	Size mm (inches)	Reconditioning Kit Part number	Kvs	Rangeability	RM XRM	MD10B MD10A
					2Nm	10Nm
MB1402	Rp 1/2	0617-9-410	2.0	>50	70	35
MB1452	Rp 3/4	0617-9-410	4.0			
MB1502	Rp 1	0617-9-410	8.3			
MB1552	Rp 1¼	0617-9-411	12.5			
MB1602	RP 1½	0617-9-412	21			
MB1652	Rp 2	0617-9-413	33			

The MD10 is a damper actuator requiring a linkage kit for use with the MB shoe valves. (LMD/MB linkage kit Part number 9141071000). Order auxiliary switches separately, type MD-S2 Part number 9141061000, type MD-S1, Part number 9141060000.

# Shoe Valves and Actuators

## VTRE

The VTRE is a 3-way flanged rotary hydronic shoe valve. The valve is delivered with a handle for manual operation.



### Specifications

<b>Valve type</b>	3-way rotary shoe
<b>Pressure class</b>	PN6
<b>Flow characteristic</b>	Modified linear
<b>Operating angle</b>	90°
<b>Water temperature</b>	
Max.	110 °C
Min.	-10 °C
<b>Leakage</b>	Max. 1% of Kvs
<b>Max glycol concentration</b>	50%
<b>Max pressure drop</b>	50 kPa
<b>Main construction materials</b>	
Body	Cast iron
Sleeve	Brass
Connections	Flanged DIN 2531

VTRE			Max close-off pressure kPa	
			Mixing application	Diverting application
Part number	DN	Kvs	EM9, M9B	
			15Nm	
731 7039000	20	12	50	
731 7041000	25	18		
731 7045000	32	28		
731 7049000	40	44		
731 7053000	50	60		
731 7057000	65	90		
731 7061000	80	150		
731 7065000	100	225		
731 7067000	125	280		
731 7069000	150	400		

## RM, XRM

These actuators operate the MB Shoe Valves. The XRM Actuator is designed to be operated by a three point floating controller providing an output of 24 Vac. The RM Actuator is a main voltage reversing actuator, designed for two-position control when used with a changeover type thermostat or modulating control when used with an appropriate controller. On power failure the actuator can be operated manually.

Specifications	
<b>Input voltage XRM</b>	24 Vac, 50 Hz, 0.5VA
<b>Input voltage RM</b>	230 Vac, 50 Hz, 5VA
<b>Stroke</b>	90° angular. Reversing
<b>Running time</b>	240 secs
<b>Torque</b>	2Nm
<b>Protection standard</b>	IP 41
<b>Environment</b>	
<b>Operating temperature</b>	-20 °C to +35 °C with water at 120 °C



RM, XRM Actuators for MB Valves		Torque
Part number	Description	Nm
XRM3201	Rotary 24 Vac 3-point	2
RM3601	Rotary 230 Vac 2-point reversing/modulating	

## EM9, M9B

The EM9/M9B are electronic actuators for motorizing VTRE rotary shoe valves. EM9 operates on 24 V and is controlled by selectable 0 to 10Vdc, 2 to 10Vdc, 0 to 20 mA or 4 to 20 mA control signal. The running time can be programmed. EM9/M9B can be operated manually and has a valve position indicator on the front of the unit.



Specifications	
<b>Power consumption</b>	3 VA
<b>Duty cycle</b>	10%
<b>Torque</b>	15 Nm
<b>Environment</b>	
<b>Operating temperature</b>	-15 to +55 °C
<b>Protection class</b>	IP 54
<b>Material</b>	
<b>Enclosure material</b>	Reinforced plastic PA66
<b>Color</b>	Black/Red

M9B, EM9 Linkage Kits for other valves	
Part number	Description

8600990000	Linkage E/M9-VTRA
8600991000	Linkage E/M9-TRV <sup>2</sup>

2 - NOTE: Not suitable for TRV-S

M9B, EM9 Actuators for Valves VTRE		Control signal	Working range	Running time	Power
Part number	Description				Vac ±10%
8601010000	M9B/24	3-point	30-180°	90° 4 min	24
8601020000	M9B/230				230
8601110000	EM9/90/180	modulating <sup>1</sup>	90° or 180°	60/90/120s (90°) or 120/180/240s (180°)	24

1 - Selectable 0 to 10V, 2 to 10V, 0 to 20 mA, 4 to 20 mA

# Specialist products

## VZ22, VZ32, VZ42

These long stroke (6.5 mm) zone valves have a very high working pressure capability and can be driven from a wide range of actuators including types with LON communication. The VZ22, VZ32 and VZ42 valves are a robust range of zone valves in 2-way, 3-way and 3-way with 4 ports.

With this range of products, the same valve body can be driven by both a thermal and motoric actuator.

Specifications	
<b>Valve types</b>	
2-way valve	VZ22
3-way valve	VZ32
3-way with bypass	VZ42
<b>Nominal pressure rating</b>	PN16 (232 psi)
<b>Flow characteristics</b>	Equal percentage port A-AB Linear for bypass B-AB
<b>Rangeability</b>	
2-way valve	50:1
3-way valve	50:1 for controlled port
<b>Leakage rate</b>	< 0.02% of kv
<b>Connections</b>	External thread
<b>Suitable medium</b>	Water according to VDI 2035
<b>Max. glycol concentration</b>	50%
<b>Controlled water temperature</b>	2 to 120 °C (36 to 248°F)
<b>Material</b>	
Valve body	DN15 yellow brass DN20 red brass
Stem	Stainless steel
Plug	Brass
<b>Function</b>	
2-way valve	Stem up to open port A to B
3-way valve	Stem up to close port A to AB
<b>Stroke</b>	6.5 mm (0.26 in.)



1 - Up to 1000 kPa system pressure

For fittings please see the tables "Connections for VZ\*08 Series Zone Valves" on page 21 and "Connections for VZ\*19 Series Zone Valves" on page 23.

VZ22		Max close-off pressure kPa		
Part number	Size (mm)	Kv	MZ18L/ Z18A/MZ18B	MZ10T / MZ95
			180N	95N
7210702000	15	0.16	1600	600
7210706000		0.25		
7210710000		0.4		
7210714000		0.63		
7210718000		1		
7210722000	1.6	1200	180	
7210726000	20	2.5	400	501
7210730000		4		

VZ42		MZ18L/ MZ18A/ MZ18B			MZ10T/ MZ95
Part number	Size (mm)	Kv		180N	95N
		A-AB	B-AB		
7410706000	15	0.25	0.16	800	500
7410710000		0.4	0.25		
7410714000		0.63	0.4		
7410718000		1.0	0.63		
7410722000		1.6	1.0		
7410726000	20	2.5	1.6	240	-
7410730000		4.0	2.5		

VZ32		MZ18L/ MZ18A/ MZ18B			MZ10T / MZ95
Part number	Size (mm)	Kv		180N	95N
		A-AB	B-AB		
7310706000	15	0.25	0.16	800	600
7310710000		0.4	0.25		
7310714000		0.63	0.4		
7310718000		1.0	0.63		
7310722000		1.6	1.0		
7310726000	20	2.5	1.6	240	-
7310730000		4.0	2.5		
7310727000		2.5	1.6		
7310731000		4.0	2.5		

### MZ18A, MZ18B, MZ18L

For VZ22, VZ32, VZ42 Zone Valves, the MZ18 is a compact electro-mechanical zone valve actuator designed for use with the VZ\*2 valves.

These actuators feature reliable long term operation ensured from a simple design without the need for end switches. Visual position indication on all models.

Specifications	
Supply voltage	24 Vac
Running time (full stroke, 50 Hz)	150 s
Stroke	6.5 mm
Force	180 N
Connection cable	1.5 m
Coupling ring	M 30 x 1.5
Enclosure rating	IP 42

Part number	Description	Control	Power consumption	Ambient temperature
8455100000	MZ18A-24	0 to 10V, 2 to 10V, Direct/ Reverse	1.4 VA	0 to 55 °C
8455101000	MZ18B	3 Point Floating	0.7 VA	0 to 60 °C
8455102000	MZ18L (LON)	SNVT_lev_percent 0 to 100%	1.4 VA	0 to 55 °C



### MZ95

The MZ95 is a thermal zone valve actuator designed for use with the VZ\*2 Valves.

Normally used for on/off two-position control but PWM is possible with the appropriate controller.

A discreet design with high IP rating in any orientation, clear position indication and alternative cable lengths.

Specifications	
Supply voltage	24 Vac
Power consumption	2 W
Stroke	8 mm
Force	95 N
Connection cable	2.5 m
Coupling ring	M 30 x 1.5
Ambient operating temperature	0 to 55 °C
Enclosure rating	IP 44



Part number	Voltage	Actuator stem action (2-way valve function)
MZ95NC-24T	24 Vac/ Vdc	Stem down (normally closed)
MZ95NO-24T		Stem up (normally open)
MZ95NC-230T	230 Vac	Stem down (normally closed)
MZ95NO-230T		Stem up (normally open)

#### Additional cable set, MZ95

Part number	Cable length	Qty in pack
9114205000	5.0 m	10 pcs
9114210000	10.0 m	



## V222

The V222 is a large flanged balanced globe valve, suitable for control of large flows in heating and air conditioning systems. The balanced plug enables a low actuating force to control the valve. A stainless steel seat allows a large pressure drop across the valve.

Suitable for a wide range of applications using hot water or de-aerated cooling water.

Specifications	
<b>Design</b>	2-way pressure balanced plug valve, stem down, closed
<b>Pressure class</b>	PN16
<b>Flow characteristic</b>	Equal Percentage
<b>Stroke</b>	
DN65 to DN100	30 mm
DN125 to DN150	50 mm
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage</b>	<0.5% (%of Kvs)
<b>Stem</b>	M8
DN 65 to 100	M16 (fitted with Hex Bush for M22/M50 actuators)
DN 125 to 150	
<b>Max. temperature of medium</b>	150 °C
<b>Min. temperature of medium</b>	-10 °C
<b>Connection</b>	Flange according ISO 7005-2
<b>Max. glycol/concentration</b>	50%
<b>Main construction materials</b>	
<b>Body</b>	Grey Cast Iron GG25
<b>Stem</b>	Stainless steel SS 1.4021
<b>Plug</b>	Stainless steel SS 1.4021
<b>Seat</b>	Stainless steel SS 1.4021
<b>Packing box</b>	Spring-loaded PTFE-V-ring



Part number	DN	Kvs	ΔPm (kPa)	Rangeability	Max close-off pressure (kPa)							
					Non-spring return actuators						Spring return	
					M800	M1500	MV15B (1500N)	M3000	M22 (2200N)	M50 (5000N)		M700
7212254010	65	63	800	>50	1500	1600	1600	1600	-	-	1200	
7212258010	80	85	400									
7212262010	100	130	150		1100							800
7212266000	125	250	100						1600	1600	-	
7212270000	150	350							1400			

**Service kit:**

Replacement stem packing box:

  DN65 to DN100: 100108201

  DN125 to DN150: 100108210

Stem Heater

  DN65 to DN100: 8800112000

  DN125 to DN150: 8800113000

Replacement stem adaptor/hex bush:

  DN125 to DN150: 8800134000

## V321

The V321 is a large flanged valve with a stainless steel seat for high pressure drops.

The valve is suitable for a wide range of mixing applications with hot or chilled water in heating cooling and air handling systems.

If the valve is used for media at temperatures below 0 °C , it should be equipped with a heater to prevent ice formation on the valve stem.

Specifications	
<b>Design</b>	3-way plug mixing valve stem up closed (A port/B-AB open)
<b>Pressure class</b>	PN16
<b>Flow characteristics</b>	
<b>A – AB</b>	Equal Percentage
<b>B – AB</b>	Linear
<b>DN 65 to 100</b>	30 mm
<b>DN 125 to 150</b>	40 mm
<b>Leakage</b>	
<b>A – AB</b>	<0.5% (% of Kvs)
<b>B – AB</b>	<0.5% (% of Kvs)
<b>Stem</b>	
<b>DN 65 to 100</b>	Ø10 mm, M10 thread connection (fitted with <b>SpaceLogic</b> stem adaptor to M8)
<b>DN 125 to 150</b>	Ø10 mm, M10 thread connection (fitted with Hex Bush for M22/M50)
<b>Max. temperature of medium</b>	130 °C
<b>Min. temperature of medium</b>	-10 °C
<b>Max. glycol/concentration</b>	50%
<b>Main construction materials</b>	
<b>Body</b>	Grey Cast Iron GG25
<b>Stem</b>	
<b>DN 65 to 100</b>	Stainless steel SS 1.4571
<b>DN 125 to 150</b>	Stainless steel SS 1.4021
<b>Plug</b>	Stainless steel SS 1.4021
<b>Seat</b>	Stainless steel SS 1.4021
<b>Stem packing</b>	EPDM



### Mixing Application

V321					Max close-off pressure (kPa)						
					Non-spring return actuators						Spring return
Part number	DN	Kvs	ΔPm	Rangeability	M800	M1500	MV15B (1500N)	M3000	M22 (2200N)	M50 (5000N)	M700
7312153020	65	63	100	>30	140	290	290	700	-	-	80
7312157020	80	100	80		80	180	180	440			40
7312161020	100	160	60		40	110	110	280	-		
7312165010	125	220			90	340					
7312169010	150	320			60	240					

Service kit: Replacement stem packing box:  
 DN65 to DN150: 100108220  
 Pre 2007, DN125 to DN150 with 18 mm stem dia: 100108210  
 Conversion kit V321 with old M16 actuator to **SpaceLogic** connection: 8800130000

Stem Heater:  
 DN65 to DN100: 8800110000  
 DN125 to DN150: 8800111000  
 Replacement Stem adaptors  
 DN65 to DN100: 8800133000  
 DN125 to DN150: 100108240

### Diverting Application

Size		Kvs	ΔPm	Max close pressure, ΔPC (kPa)					
DN	In.	m3/h	kPa	SpaceLogic M800	SpaceLogic M1500/MV15B	SpaceLogic M3000	SpaceLogic M700 SR	M22**	M50**
65	2½"	63	100	70	145	350	40	-	-
80	3"	100	80	45	60	220	20	-	-
100	4"	160	60	25	55	140	-	-	-
125	5"	220	60	-	-	-	-	55	165
150	6"	320	60	-	-	-	-	35	110

ΔPc = Maximum allowed pressure differential across a closed valve (a function of actuator performance)  
 ΔPm = Maximum allowed pressure drop across a fully 'open' valve (a function of hydraulic valve performance)  
 \*\*M22 and M50 actuators will not fit to valves DN65 to 100  
 Note: Never exceed a fluid velocity above 2m/s

## M22, M50

The M22 and M50 Actuators are powerful actuators suitable for driving DN125 and DN150 sizes of valve types V222, V292 and V321. The actuators are available in modulating or 3-point floating versions. The 3-point floating versions are available in 24 Vac or 230 Vac voltages with and without end switches.



### Specifications

<b>Supply voltage</b>	24 Vac +10%/-15%, 50/60 Hz
<b>Power consumption</b>	Average 15 VA
<b>Running time</b>	0 to 50 mm 50Hz, 132s 60Hz,112s
<b>Duty cycle</b>	Max. 80%/60 minutes
<b>Analog input</b>	
<b>Voltage</b>	0 (2) to 10V
<b>Impedance</b>	30 kOhm
<b>Current</b>	0 (4) to 20 mA
<b>Impedance</b>	125 Ohm
<b>Environment</b>	
<b>Operating temperature</b>	-20 to +70 °C
<b>Storage temperature</b>	-20 to +70 °C
<b>Humidity</b>	<95 %RH
<b>Enclosure rating</b>	IP 65
<b>Standards</b>	EN 50081-1: 03.1993
<b>Emission</b>	EN 50082-1: 11.1997
<b>Immunity</b>	EN 50082-2:02.1996
<b>Material</b>	
<b>Housing</b>	CoPA – Grivory GV-4H
<b>Cover</b>	PC – Polycarbonate
<b>Weight</b>	5
<b>M22A</b>	.4 kg
<b>M50A</b>	6.0 kg
<b>Optional travel switch S2</b>	
<b>Type</b>	Zero potential
<b>Capacity</b>	10A, 250 V

### Modulating Actuators

Part number	Description	Force (N)
8900104000	M22A-24 V	2200
8900204000	M50A-24 V	5000

### M22B, M50B 3-Point Floating Actuators

Part number	Description	Force (N)	Power supply Vac +10%/-15%	Power consumption 50 Hz
8900106000	M22B-24V	2200	24	12 VA
8900108000	M22B-24V-S2			
8900110000	M22B-230V		230	11 VA
8900112000	M22B-230V-S2			
8900206000	M50B-24V	5000	24	19 VA
8900208000	M50B-24V-S2			
8900210000	M50B-230V		230	28 VA
8900212000	M50B-230V-S2			

## MBF

The MBF is a 3-port flanged rotary shoe valve suitable for both mixing and diverting circuits. The Valve is operated with a linkage kit and the MD20 Damper Actuator.

Specifications	
<b>Design</b>	3-way rotary shoe valve
<b>Pressure class</b>	PN6
<b>Flow characteristics</b>	Port 3 Linear
<b>Operating angle</b>	90°
<b>Rangeability (Kvs/Kvmin.)</b>	>50
<b>Leakage</b>	0.5% (%of Kvs)
<b>Max. temperature of medium</b>	110 °C
<b>Min. temperature of medium</b>	2 °C
<b>Connection</b>	
<b>MBF</b>	Flanged BS4504, Table 6/11
<b>Main construction materials</b>	
<b>Body 12.7 to 25.4 mm (½" to 1") valves</b>	Hot Pressed Brass to BS218
<b>Body 31.75 to 50.8 (1¼" to 2") valves</b>	Close Grained Cast Iron BS1452 Grade 260
<b>Body 65 mm to 100 mm</b>	Close Grained Cast Iron BS1452 Grade 260 or 220
<b>Spindle</b>	High Tensile Brass to BS2874 CZ114
<b>O Rings</b>	EPDM



MBF					Max close-off pressure kPa
Valve number	DN	Spares Conditioning Kit	Kvs	Rangeability	MD20B MD20A
					20Nm
<b>MBF4732</b>	65	0618 9 510	65	>50	35
<b>MBF4782</b>	80	0618 9 511	83		25
<b>MBF4857</b>	100	0618 9 512	125		

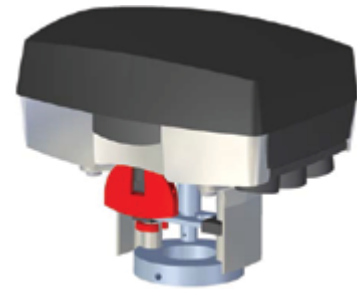
The MD20A/B is a damper actuator requiring linkage kit (LMD/MBF Part number 9141070000).  
 Order auxiliary switches separately:  
 Type MD-S2 Part number: 9141061000  
 Type MD-S1 Part number: 9141060000.

## M315

M315 has an electro-mechanical actuator for the control of V294, V282 and V394 Valves:

M315 utilizes the **SpaceLogic** universal functionality and may be controlled by an Increase/decrease signal or by a modulating 0–10V control signal.

Specifications	
<b>Part number</b>	8800070030
<b>Supply voltage</b>	24 V AC +25%/ -35%, 50–60 Hz
<b>Power consumption</b>	6 VA
<b>Transformer sizing</b>	30 VA
<b>Stroke</b>	
Range	9 to 15 mm (0.35 to 0.59 in.)
Factory set stroke	15 mm (0.59 in.)
<b>Thrust</b>	300 N (67 lbf.)
<b>Duty cycle</b>	Max. 20%/60 minutes
<b>Running time</b>	
Modulating 9–25 mm (0.35 - 1 in.)	15s
Increase/decrease	300s/60s
<b>Analog input</b>	
Voltage	0–10V
Impedance	Min. 100 kW
<b>Digital inputs VH–VC</b>	
Voltage across open input	24 Vac
Current through closed input	5 mA
Pulse time	Min. 20 ms
<b>Output, G1</b>	
Voltage	16 Vdc ±0.3 V
Load	25 mA, short-circuit proof
<b>Output, Y</b>	
Voltage	2 to 10V (0 to 100%)
Load	2 mA
<b>Wiring entry</b>	
Conduit connection	3 x M20 screwed
Cable gland	1 x 6–12 mm O/D, IP68
<b>Environment</b>	
Operating temperature	-10 to 50 °C
Storage temperature	-10 to 50 °C
Humidity	Max. 90% RH
<b>Enclosure rating</b>	IP 54
<b>Main construction materials</b>	
Housing	Aluminium
Cover	ABS/PC plastic
Color	Aluminium/black
<b>Weight</b>	1.8 kg (3.96 lb.)



Accessories	
<b>S2-SpaceLogic Aux Switch Relay</b>	8800104000
<b>Replacement Circuit Board M315</b>	100106750

### MG350S

The MG350S is a compact electro-mechanical actuator for controlling the VZX and MZX 2-Way and 3-Way Linear Globe Valves. The MG350S actuators are primarily designed for applications where the demands on speed and thrust are relatively small.

- Stable force control with stall protection
- Hysteresis control - intelligent response to fluctuating control signals, extending actuator life and better plant regulation
- High resolution PCBA and motor transmission for fine valve plug position and excellent flow control.
- Low power holding
- Auto adaptation to valve end stroke limits upon first power up
  - LED status indication
- Tri-color LED for operation, calibration, and alarm notification
- Removable terminal block and cable gland for ease installation

Specifications	
<b>Supply voltage</b>	24 Vac/Vdc ±20% 50/60 Hz
<b>Power consumption (50Hz)</b>	
Running: MG350S-24M	7.2 VA (3.5 W)
MG350S-24F	5 VA (3.5 W)
Holding (modulating only)	1.2 VA
<b>Transformer sizing</b>	(same as Power consumption)
<b>Running time</b>	8 s/mm (Full stroke time = 102 sec)
<b>Max. stroke</b>	16.5 mm
<b>Nominal Force</b>	350 N
<b>Control (Floating/Digital)</b>	
<b>Dependant upon wiring</b>	
3 wire Floating	24 Vac/Vdc or 0 V
2 Position on/off	NO or NC
Minimum input pulse	100 msec
<b>Control (modulating)</b>	
Selectable input signals	0 to 10Vdc, 2 to 10Vdc
Impedance	min. 100 kΩ
<b>Environment</b>	
Operating temperature	-5 to +55 °C (for valve fluid temperatures up to 130 °C)
Storage	-40 to +70 °C
<b>Humidity</b>	max . 95% RH (NC)
<b>Enclosure rating</b>	IP 53 (vertically mounted)
<b>Sound power level</b>	max. 30 dBA
<b>Weight (shipping)</b>	0.36 kg
<b>Material</b>	
Yoke	Aluminum
Material Housing (Covers)	PBT/PC
<b>Mechanical</b>	
Manual override	3 mm Hex
<b>Position indication</b>	Red and blue position markers for hot and cold pipe indication (green position indicator for closed valve)
<b>Cable Gland wire size</b>	6 to 12 mm
<b>Conduit hole</b>	M20



Part number	Control
MG350S-24M	Modulating
MG350S-24F	Floating

### MZ300S

The MZ300S Actuator is a universal actuator this can drive many valves with an M30 Bonnet. It is supplied with an adapter to drive the Satchwell VUE, MEU and FEU Zone Valves, the VP224R PICV Valve and for a specific 230 Vac model, the VZX and MZX Globe Valve.

Proportional models are equipped with 3 operation and alarm LED's.

Specifications	
<b>Power supply</b>	
MZ300S-24x	24 Vac ±10%
MZ300S-230F	230 Vac ±10%
<b>Power consumption</b>	
MZ300S-24F	2.2 VA/2.2 W
MZ300S-24M	3.6 VA/3 W
MZ300S-230F	16.2 VA/1.1 W
<b>Frequency</b>	50/60Hz
<b>Speed</b>	11.5s/mm at 50Hz - 9.4s/mm at 60Hz
<b>Force</b>	300 N
<b>Environment</b>	
Operating temperature	-5 to 55 °C
Storage temperature	-25 to 65 °C
<b>Protection class</b>	II
<b>Connection cable</b>	
MZ300-24F/MZ300-230F	3-wire 1.5m
for MZ300S-24M	5-wire 1.5m
(CEI20-22/II)	
<b>Protection degree</b>	IP43
<b>Weight</b>	0.250 kg
<b>Feedback signal (MZ300-24M)</b>	2 to 10V reversible (according to dip switch configuration)



Part number	Control signal	Power supply	Max. stroke
MZ300S-230F	3 point - ON/OFF	230 Vac	16 mm
MZ300S-24F		24Vac	
MZ300S-24M	0 to 10V Modulating		

### MC52

MC52 is an zone actuator designed to provide modulating control together with the old V354 valves using an adapter. Due to an automatic synchronization function the close-off point is self-adjusting. Based on a running time of 155 s, valve positioning and flow adjustment is very exact.

Specifications	
<b>Range</b>	7 different command field to be selected with embedded dip-switches and direct/reverse action
<b>Input voltage</b>	24 Vac 50/60 Hz
<b>Power consumption</b>	1 VA
<b>Speed</b>	18 s/mm (50 Hz) - 15 s/mm (60 Hz)
<b>Environment</b>	
Operating temperature	-5 to 55 °C
Storage temperature	-25 to 65 °C
Stem force	200 N (45 lbf)
<b>Max stroke</b>	8.5 mm
<b>Connection cable</b>	3 wires 1.5 m (5 ft)
<b>Protection class</b>	IP43 (for vertical mounting)
<b>Suitable valve</b>	V354 - PN 731-5425-000



MC52 Actuator

Adapter

Part number	Description	Control	Input voltage
8532221010	MC52A-24	Modulating	24 Vac 50/60 Hz
8531320000	MC52B-230	Floating	230 Vc 50/60 Hz
8532320000	MC52B-24		24 Vac 50/60 Hz



### MP140

MP140 is a thermoelectric actuator designed to provide two-position on/off control together VP223R Pressure Independent Control Valves.

The MP140, when connected to the VP223R Valve, provides pressure independent flow limiting on/off control. Versions are available for normally open and normally closed duties.

Specifications	
Stem force	140N
Max stroke	4 mm
Coupling ring	M30x 1.5
Power cable	twin core (0,35 mm <sup>2</sup> )
Suitable valve	VP223R (DN15 to 32)
Nominal Power supply	
MZ140-24T	21.8 to 26.8 Vac 50/60 Hz
MZ140-230T	110 to 250 Vac 50/60 Hz
Starting current	
24 V models	0.17A
230 V models	0.25A
Working current	
24 V models	75 mA
30 V models	8 mA
Power consumption	
24 V models	2W
230 V models	2W
Environmental	
Ambient working temperature	+2 to +50 °C
Storage temperature	-45 to +60 °C
Humidity	max. 95% Non-condensing
Material: Fire-resistant case	Class V0
Protection class	IP44/IP41



Normally open



Normally closed

Part number	Function	Voltage
MP140NC-24T	Normally closed	24 Vac 50/60 Hz
MP140NO-24T	Normally open	24 Vac 50/60 Hz
MP140NC-230T	Normally closed	110 - 230 Vac 50/60 Hz
MP140NO-230T	Normally open	110 - 230 Vac 50/60 Hz

### MP200

MP200 is an compact linear actuator for driving the 5 mm Frese Optima Compact PIBCV and the former VP223R Short Stroke Pressure Independent Control Valve. Versions available as either 3 point floating or 0 to 10Vdc modulating control. A full stroke run time of 60 seconds provides very precise flow control. Stroke indication and manual override on all models.

Specifications	
Force	200 N
Stroke range	3.5 mm to 5 mm
Speed	18s/mm (50Hz), 15s/mm (60Hz)
Connection cable	3 wire 1.5 m
Full stroke time on VP223R valve	63s (50Hz), 52s (60Hz)
Recommended controller 'time out' function	120% of full stroke time (floating modules)
Supply voltage	
MP200-24F/MP200-24M	21.6 to 26.4 Vac (50/60Hz)
MP200-230F	207 to 253 Vac (50/60Hz)
Power consumption	
MP200-24F	0.6W (0.7VA)
MP200-230F	1W (5VA)
MP200-24M	1.0W (1VA)
Environmental	
Working temperature	-5 to 55 °C
Storage temperature	-25 to 65 °C
Protection class	IP43/IP41 dependant on mounting orientation)
Sound power level	35 dBa
Weight	162g
Humidity	Max 95% non-condensing



Part number	Control	Voltage
MP200-24M	Modulating Control	0 to 10V
MP200-24F	3 Point Floating	24 V
MP200-230F		230 V

Note: The floating actuators (MP200-24F/MP200-230F) have no end switches for automatic shut off when the valve is fully open or closed. These floating actuators are intended for use with controllers with a time out facility. If the floating actuators are to be used with an on/off thermostat, a separate delay off timer should be used to cut the driven power to the actuator.

## MR90

The MR90 is a range of low cost and simple thermal actuators that. Available in all voltages and Normally open or Normally closed functions

Specifications	
<b>Part number</b>	
<b>MR90 NC</b>	MR90NC-230 MR90NC-24T
<b>MR90 NO</b>	MR90NO-230T MR90NO-24T
<b>Type designation</b>	
<b>MR90 NC</b>	MR90 NCD-230T 2M43 00 MR90 NCD-24T 2M43 00
<b>MR90 NO</b>	MR90 NOU-230T 2M44 00 MR90 NOU-24T 2M44 00
<b>Normal stem position (without power)</b>	
<b>MR90 NC</b>	Down (Extended)
<b>MR90 NO</b>	Up (Retracted)
<b>Input voltage</b>	
<b>MR90NC/NO-230T</b>	110 to 230 Vac 50/60 Hz
<b>MR90NC/NO-24T</b>	24 Vac/dc 50/60 Hz
<b>Power consumption</b>	1.8 W
<b>Power consumption at start up</b>	
<b>MR90NC/NO-230T</b>	50 VA
<b>MR90NC/NO-24T</b>	4 VA
<b>Opening/closing time:</b>	Refer to specification sheet <a href="#">03-00247</a>
<b>Max. stroke</b>	4 mm
<b>Force, nominal</b>	90 N
<b>Environment</b>	
<b>Operating temperature</b>	2 to 50 °C
<b>Storage temperature</b>	-45 to 50 °C
<b>Enclosure rating</b>	
<b>MR90NC</b>	IP43 (Vertical mount) IP41 (Horizontal mount) IP40 (Upside down)
<b>MR90NO</b>	IP44
<b>Connection thread</b>	M30 x 1.5
<b>Main construction materials</b>	
<b>Fire-resistant case</b>	Class V0
<b>Cable</b>	
<b>MR90NC</b>	2 m bipolar (0.35 mm <sup>2</sup> ), white
<b>MR90NO</b>	2 m bipolar (0.75 mm <sup>2</sup> ), white
<b>Cable diameter</b>	
<b>MR90NC</b>	4.5 mm
<b>MR90NO</b>	6 mm
<b>Weight</b>	
<b>MR90NC</b>	118 gr
<b>MR90NO</b>	188 gr



MR90 NC



MR90 NO

Part number	Type designation	Voltage	Function - without power
<b>MR90NC-230T</b>	MR90 NCD-230T-2M43 00	110-230 V ac	Stem down - normally closed
<b>MR90NC-24T</b>	MR90 NCD-24T-2M43 00	24 Vac/dc	
<b>MR90NO-230T</b>	MR90 NOU-230T-2M44 00	110-230 V ac	Stem up - normally open
<b>MR90NO-24T</b>	MR90 NOU-24T-2M44 00	24 Vac/dc	

### TR32/TR60 Transformer

The TR32 and TR60 are transformers moulded in thermoset plastic and mounted in a grey enclosure made of an impact-resistant, self-extinguishing thermoplastic. They can be mounted on a wall or use snap-locking on a 35 mm DIN rail (suitable for modular equipment enclosures).

The transformers are double-insulated and do not require safety grounding. Both the TR32 and the TR60 have primary and secondary terminal blocks in different connection sections.

The transformers are protected by PTC resistors on the secondary side. Reset the protection by switching the power off for 10 seconds.

Specifications	
<b>Input voltage</b>	230 Vac 50-60Hz
<b>Output voltage</b>	24 Vac
<b>Enclosure rating</b>	IP 40
<b>Material</b>	Thermoplastic, Grey
<b>Weight</b>	
TR32	0.8 kg
TR60	1.3 kg



Model	Part no.	Power consumption
TR32	3413032000	32 VA
TR60	3413060000	60 VA

### Accessories and spare parts

Description	Part no.
Circuit board M400 Spare	100106730
Circuit board M800 Spare	100106740
Circuit board M315 Spare	100106750
Circuit board M310 Spare	100106760
Circuit board M1500 Spare	100106770
Circuit board M700-SRSU Spare	100106780
Circuit board M700-SRSD Spare	100106790
Linkage AL-TAC Vxxx L8TV	9141080000
Linkage AL-TAC VGxxx L9TVG	9141081000
Adapter DN15-V298	8800252000
Adapter DN15-V2XX/V3XX	8800253000
Stuffing box VXZ/MZX	0626-9-204
Stuffing box Type S Spare (V241, V341, V211, V211T, V311, V311T, V231, V232)	100108000
Stuffing box VG222/VG321 Spare	100108100
Stuffing box VG211 Spare	100108110

Description	Part no.
Stuffing Box V2x2 65-100 Spare	100108200
Stuffing Box V2x2 125-150 Spare	100108210
Stuffing Box V321 65-100 Spare	100108220
StuffingBox V321 125-100 Spare	100108230
Gasket VTRE-F/UF -65 Spare	0805098005
Gasket VTRE-F/UF 80-150 Spare	0805099005
Recond kit VTRE-F/UF 65 Spare	0805665005
Recond kit VTRE-F/UF 80 Spare	0805666005
Recond kit VTRE-F/UF 125 Spare	0805668005
Recond kit VTRE-F/UF 150 Spare	0805669005
GLAND KIT and GREASE (MZ [s3], VZ [s1+2] and VJF, VSF [DN15-25 only] and MJF: DN15-50	0626-9-203
REPLACEMENT GLAND KIT and GREASE (MZ [series 1])	0626-9-310
GLAND KIT/GREASE (MZ: DN65-150)	0626-9-311
VSF GLAND KIT 32 - 50MM	0667-9-201

# Zone Valves and Actuators

## VZ\*08\*

The VZ\*08\* short stroke (2.5 mm) zone valves are small linear valves designed for control of hot and chilled water in fan coils or other terminal unit applications.

These particular valves are designed to be used with thermo-electric actuators type MZ140, which is available in an on/off or a modulating variant.

### Specifications

<b>Valve types</b>	2-way, 3-way, 3-way with bypass
<b>Pressure class</b>	PN16
<b>Stroke</b>	2.5 mm
<b>Max fluid speed</b>	3 m/s
<b>Media</b>	Water, water+glycol (30% max)
<b>Temperature range</b>	5 to 95 °C
<b>Leakage</b>	0% tight close-off
<b>Main construction materials</b>	
<b>Valve body</b>	Brass (CW617N)
<b>Trim</b>	Glass reinforced PPS
<b>Stem</b>	Stainless steel (AISI 303)
<b>Stem packing</b>	Double EPDM O-ring
<b>Plug sealing</b>	EPDM



VZ\*08E



VZ\*08C

### VZ\*08E

### VZ\*08C

	Flat face	Compression*	Max close-off (kPa) MZ140
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### 2-way valves

Size	Kvs	Part number	Connection	Part number	Connection	A-AB
DN15	0.25	VZ208E-15BP01	G1/2A	VZ208C-15BP01	15 mm	400
	0.4	VZ208E-15BP02		VZ208C-15BP02		
	0.6	VZ208E-15BP03		VZ208C-15BP03		
	1	VZ208E-15BP04		VZ208C-15BP04		
	1.6	VZ208E-15BP05		VZ208C-15BP05		
DN20	2.5	VZ208E-20BP07	G3/4A	VZ208C-20BP07	22 mm	250
	4	VZ208E-20BP08				150
	6	VZ208E-20BP09				

### 3-way valves

	Kvs		Part number	Connection	Part number	Connection	A-AB	B-AB
	A-AB	B-AB						
DN15	0.25	0.25	VZ308E-15BP01	G1/2A	VZ308C-15BP01	15 mm	400	400
	0.4	0.4	VZ308E-15BP02		VZ308C-15BP02			
	0.6	0.6	VZ308E-15BP03		VZ308C-15BP03			
	1	0.8	VZ308E-15BP04		VZ308C-15BP04			
	1.6	1	VZ308E-15BP05		VZ308C-15BP05			
DN20	2.5	1.6	VZ308E-20BP07	G3/4A	VZ308C-20BP07	22 mm		
	4	2.5	VZ308E-20BP08				100	40
	6	4	VZ308E-20BP09					

### 3-way valves with integral by-pass (4 ports)

	Kvs		Part number	Connection	Part number	Connection	A-AB	B-AB
	A-AB	B-AB						
DN15	0.25	0.25	VZ408E-15BP01	G1/2A	VZ408C-15BP01	15 mm	400	400
	0.4	0.4	VZ408E-15BP02		VZ408C-15BP02			
	0.6	0.6	VZ408E-15BP03		VZ408C-15BP03			
	1	0.8	VZ408E-15BP04		VZ408C-15BP04			
	1.6	1	VZ408E-15BP05		VZ408C-15BP05			
DN20	2.5	1.6	VZ408E-20BP07	G3/4A	VZ408C-20BP07	22 mm		
	4	2.5	VZ408E-20BP08				100	40
	6	4	VZ408E-20BP09					

\* Nuts and Olives supplied with Valve

## MZ140

MZ140 thermo-electric actuators are wax filled actuators that are silent in operation, providing either on/off or modulating control for the VZ\*08\* zone valves.

Specifications	
<b>Environment</b>	
Operating temperature	2 to 50 °C
Storage temperature	-10 to 60 °C
<b>Stem force</b>	
	140N
<b>Max stroke</b>	
MZ140-24T/230T	4 mm
MZ140-24M	2.5 mm
<b>Coupling ring</b>	
	-M30 x 1.5
<b>Power cable</b>	
	2m bipolar (0.75 mm <sup>2</sup> )
<b>Main construction materials</b>	
Fire-resistant case	Class V0
Protection class	IP 44 (for vertical mounting)



MZ140-24M



MZ140-24T

Part number	Full type designation	Cable Length	Control signal	Power	Power consumption	Initial consumption
					VA	A
MZ140-230T	MZ140-110/230T 2M44 00	2m	On/Off	110-230 Vac	1.8	0.25
MZ140-24T	MZ140-24T 2M44 00			24 Vac/Vdc		0.17
MZ140-24T-5M	MZ140-24T 5M44 00	5m				
MZ140-24T-10M	MZ140-24T 10M44 00	10m				
MZ140-24M	MZ140-24M 2M44 00	2m	0 to 10V modulating	24 Vac		

### Connections for VZ\*08 Series Zone Valves

	Connection type	Pipe size	DN	a	c (mm)	d	e	Part number	Pack quantity
	Flat Face External thread to Solder *	12 mm	15	G 1/2	12	-	-	9112076000	1
		15 mm	20	G 3/4	15	-	-	9112113015	2
	External Thread	R 3/8"	15	G 1/2	-	R 3/8	-	9112078 010	10
		R 1/2"	20	G 3/4	-	R 1/2	-	9112079 010	
	Flat face external thread to compression*	15 mm	15	G 1/2	-	-	15	9112080000	1
		22 mm	20	G 3/4	-	-	22	9112081000	
	Compression Capnut and olive	15 mm	15	G1/2A	-	-	15	9112082000	10
		20 mm	20	Whitworth 1 1/8" - 14	-	-	22	9112083000	

\*One fitting required per valve port.

## Zone Valves and Actuators

### VZ\*19\*

These long stroke (5.5 mm) small linear zone valves are designed for the regulation in flow of hot and chilled water in fan coils or other terminal unit applications.

These particular valves are designed to be used with the compact electro-mechanical actuators type MZ20.

#### Specifications

<b>Pressure class</b>	PN16
<b>Stroke</b>	5.5 mm
<b>Max fluid speed</b>	3 m/s
<b>Media temperature range</b>	2 to 95 °C
<b>Max. glycol concentration</b>	30%
<b>Flow characteristics</b>	
<b>On direct (A-AB) way</b>	Equal percentage
<b>On by-pass (B-AB) way</b>	Linear
<b>Leakage</b>	0% tight close-off
<b>Rangeability</b>	50:1
<b>Main construction materials</b>	
<b>Valve body</b>	Brass (CW617N)
<b>Trim</b>	Glass reinforced PPE
<b>Stem</b>	Stainless steel (AISI 303)
<b>Stem packing</b>	Double EPDM O-ring
<b>Plug sealing</b>	EPDM



VZ\*19C



VZ\*19E

#### VZ\*19E

#### VZ\*19C

	Flat face external thread		Compression end connection*		Max close-off (kPa) MZ20	
<b>2-way valves</b>						
Size	Kv	Part number	Connection	Part number	Connection	A-AB
DN15	0.25	VZ219E-15BP01	G1/2A	VZ219C-15BP01	15 mm	400
DN15	0.4	VZ219E-15BP02		VZ219C-15BP02		
DN15	0.6	VZ219E-15BP03		VZ219C-15BP03		
DN15	1	VZ219E-15BP04		VZ219C-15BP04		
DN15	1.6	VZ219E-15BP05		VZ219C-15BP05		
DN15	2	VZ219E-15BP06		VZ219C-15BP06		
DN20	2.5	VZ219E-20BP07	G3/4A	VZ219C-20BP07	22 mm	250
DN20	4	VZ219E-20BP08				150
DN20	6	VZ219E-20BP09				

#### 3-way valves

	Kvs		Part number	Connection	Part number	Connection	A-AB	B-AB
	A-AB	B-AB						
DN15	0.25	0.25	VZ319E-15BP01	G1/2A	VZ319C-15BP01	15 mm	400	400
DN15	0.4	0.25	VZ319E-15BP02		VZ319C-15BP02			
DN15	0.6	0.4	VZ319E-15BP03		VZ319C-15BP03			
DN15	1	0.6	VZ319E-15BP04		VZ319C-15BP04			
DN15	1.6	1	VZ319E-15BP05		VZ319C-15BP05			
DN15	2	1.6	VZ319E-15BP06		VZ319C-15BP06			
DN20	2.5	1.6	VZ319E-20BP07	G3/4A	VZ319C-20BP07	22 mm	100	40
DN20	4	2.5	VZ319E-20BP08					
DN20	6	4	VZ319E-20BP09					

#### 3-way valves with integral by-pass (4 ports)

DN15	0.25	0.25	VZ419E-15BP01	G1/2A	VZ419C-15BP01	15 mm	400	400
DN15	0.4	0.25	VZ419E-15BP02		VZ419C-15BP02			
DN15	0.6	0.4	VZ419E-15BP03		VZ419C-15BP03			
DN15	1	0.6	VZ419E-15BP04		VZ419C-15BP04			
DN15	1.6	1	VZ419E-15BP05		VZ419C-15BP05			
DN15	2	1.6	VZ419E-15BP06		VZ419C-15BP06			
DN20	2.5	1.6	VZ419E-20BP07	G3/4A	VZ419C-20BP07	22 mm	100	40
DN20	4	2.5	VZ419E-20BP08					
DN20	6	4	VZ419E-20BP09					

Nuts and olives supplied with the compression end connection valve

## MZ20

The long stroke MZ20 is an electro-mechanical zone valve actuator designed for use with the VZ\*19\* valves.

The actuator provides precise valve position and flow for good hydronic control.

Reliable long term operation is provided by the optimal design without feedback potentiometer or end switches.

### Specifications

<b>Input voltage</b>	
MZ20A	24 Vac, 50/60 Hz
MZ20B	24 Vac or 230 Vac 50/60 Hz
<b>Power consumption</b>	
MZ20A	1 VA
MZ20B-24	0.7 VA
MZ20B-230	5 VA
<b>Speed</b>	18 s/mm (50 Hz) to 15 s/mm (60 Hz)
<b>Temperature</b>	
Working	-5 to +55 °C
Storage	-25 to +65 °C
<b>Stem force</b>	200 N
<b>Max stroke</b>	5.5 mm
<b>Connection cable</b>	3 wires 1.5 m
<b>Protection class</b>	IP 43 (for vertical mounting)
<b>Sound power level</b>	35 dB(A)



### MZ20A/B zone valve actuator for VZ\*19 valves

Part number	Description	Control
8455051000	MZ20A	Selectable*
8455052000	MZ20A-R	0 to 10V
8455001000	MZ20B-24	3P-24 Vac
8455003000	MZ20B-230	3P-230 Vac

\* 0 to 10V, 6 to 9 V, 1 to 5 V, 2 to 10V, 4 to 7 V, 6 to 10V, 8 to 11 V

### Accessory

Part number	Description
9116006000	6m 24V pluggable cable pack, 10 pieces

### Connections for VZ\*19 Series Zone Valves

	Connection type	Pipe size	DN	a	c (mm)	d	e	Part number	Pack quantity
	Flat face external thread to solder *	12 mm	15 20	G 1/2	12 15	-	-	9112076000	1
		15 mm		G 3/4				9112013015	2
	External thread	R 3/8" R 1/2"	15 20	G 1/2 G 3/4	-	R 3/8 R 1/2	-	9112078 010 9112079 010	10
	Flat face external thread to compression*	15 mm 22 mm	15 20	G 1/2 G 3/4	-	-	15 22	9112080000 9112081000	1
	Compression capnut and olive	15 mm 20 mm	15 20	G1/2A Whitworth 1 1/8" - 14	-	-	15 22	9112082000 9112083000	10

\*One fitting required per valve port.

## Erie VT Zone Valve

The industry-leading Erie Zone Valve is suitable for on/off control of hot and chilled water in terminal unit applications.

High flow capacity paddle design and the unique 'pop-top' actuator connection allows for a quick and simple installation.



### Specifications

<b>Media</b>	Hot and chilled water
<b>Media temperature</b>	0 to 93 °C
<b>Glycol concentration</b>	50%
<b>Pressure class</b>	300 psi (PN20)
<b>Seat leakage</b>	0.01% (ANSI class IV)
<b>ΔPm</b>	100kPa
<b>Main construction materials</b>	
Valve body	Forged Brass Nickel-plated Brass
Stem	Brass
Seat	Buna-N/EPDM
Paddle/stem o-rings	

### 2-way valves

Thread	Kvs	Part number	Max ΔP (kPa) AG-Actuators	Max ΔP (kPa) AH-Actuators
<b>Rp 1/2</b>	0.85	VT2231	410	515
	2.2	VT2232	275	340
	3.0	VT2233	170	205
<b>Rp 3/4</b>	2.2	VT2332	275	340
	3.0	VT2333	170	205
	4.3	VT2335	135	170
	6.5	VT2337	115	135
<b>Rp 1</b>	6.9	VT2437		

### 3-way valves

<b>Rp 1/2</b>	1.3	VT3231	410	515
	2.6	VT3232	275	340
	3.5	VT3233	170	205
<b>Rp 3/4</b>	2.6	VT3332	275	340
	3.5	VT3333	170	205
	4.3	VT3335	135	170
	6.5	VT3337	115	135
<b>Rp 1</b>	6.9	VT3437		



## Erie AG/AH Zone Actuator

The AG (General Closeoff) and AH (High Closeoff) actuators are spring return, two-position actuators for coupling to the VT Series Valves.

The pop-top connection allows for quick and simple assembly, all normally closed actuators feature a manual override lever.



### Specifications

<b>Supply voltage</b>	24 Vac @ 50/60 Hz 230 Vac @ 50 Hz	
<b>Power consumption</b>	6.5 watts, 7.5 VA	
<b>End switch</b>	24 to 240 Vac (101 mA min. to 5 A)	9-30 Vdc (100 mA max.)
<b>Control signal</b>	On/Off, 2 position, spring return	
<b>Full running time</b>	30 Sec (50 Hz) 9 Sec (S.R. function)	
<b>Enclosure</b>	IP31	
<b>Main construction materials</b>		
<b>Base plate</b>	Stainless steel	
<b>Cover</b>	Aluminium	
<b>Environment</b>		
<b>Shipping and storage</b>	-40 to 71 °C	
<b>Operating temperature</b>	40°	
<b>Humidity</b>	5 to 95% RH, non-condensing	

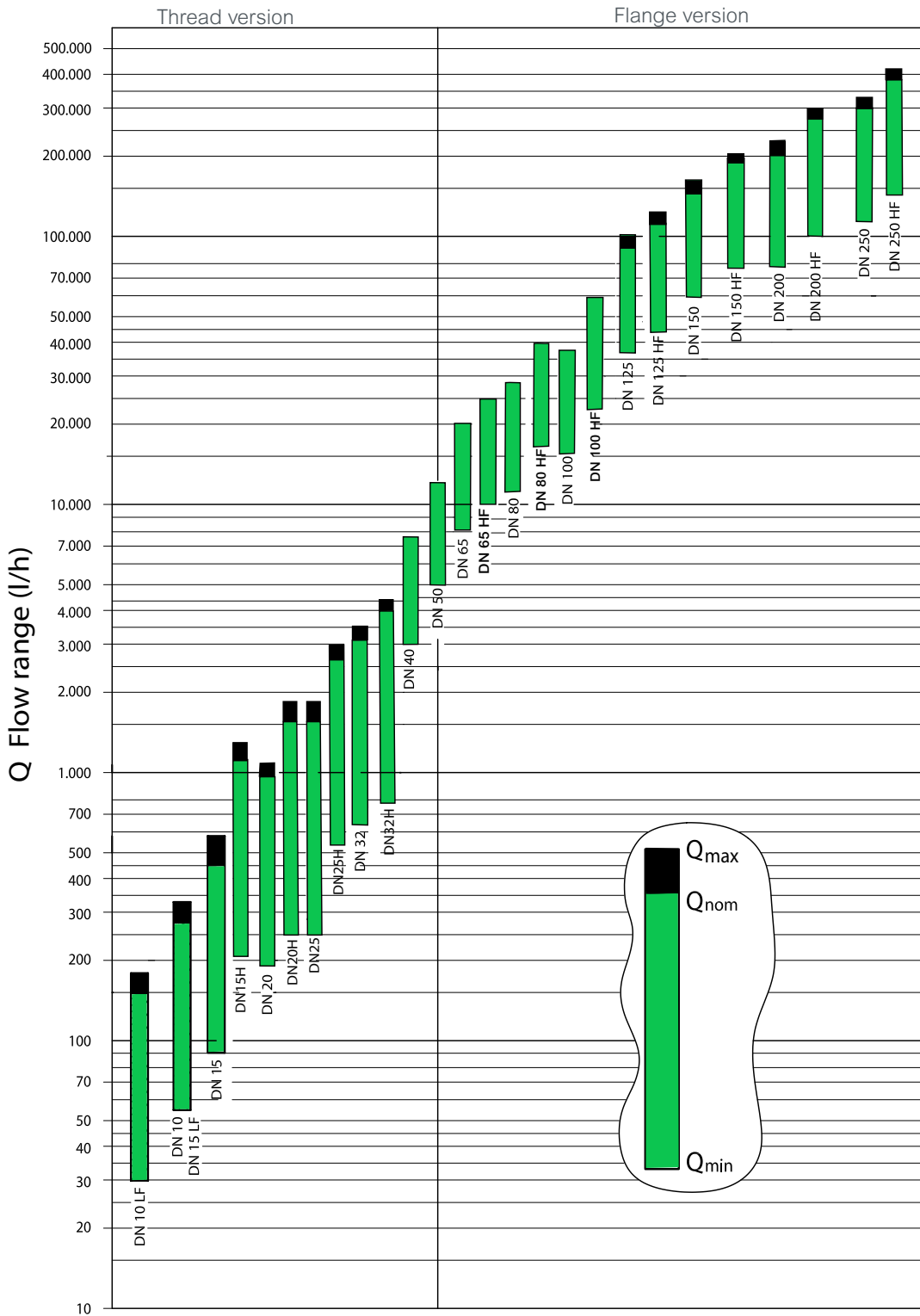
### General Close-Off Actuator

Part number	Voltage	End switch	Control	Spring return valve function	Cable
AG13A230	24 Vac	-	On/Off	Normally closed	910 mm (36")
AG13A23A		yes			
AG13U230	230 Vac	-			
AG13U23A		yes			
AG23A230	24 Vac	-		Normally open	
AG23A23A		yes			
AG23U230	230 Vac	-			

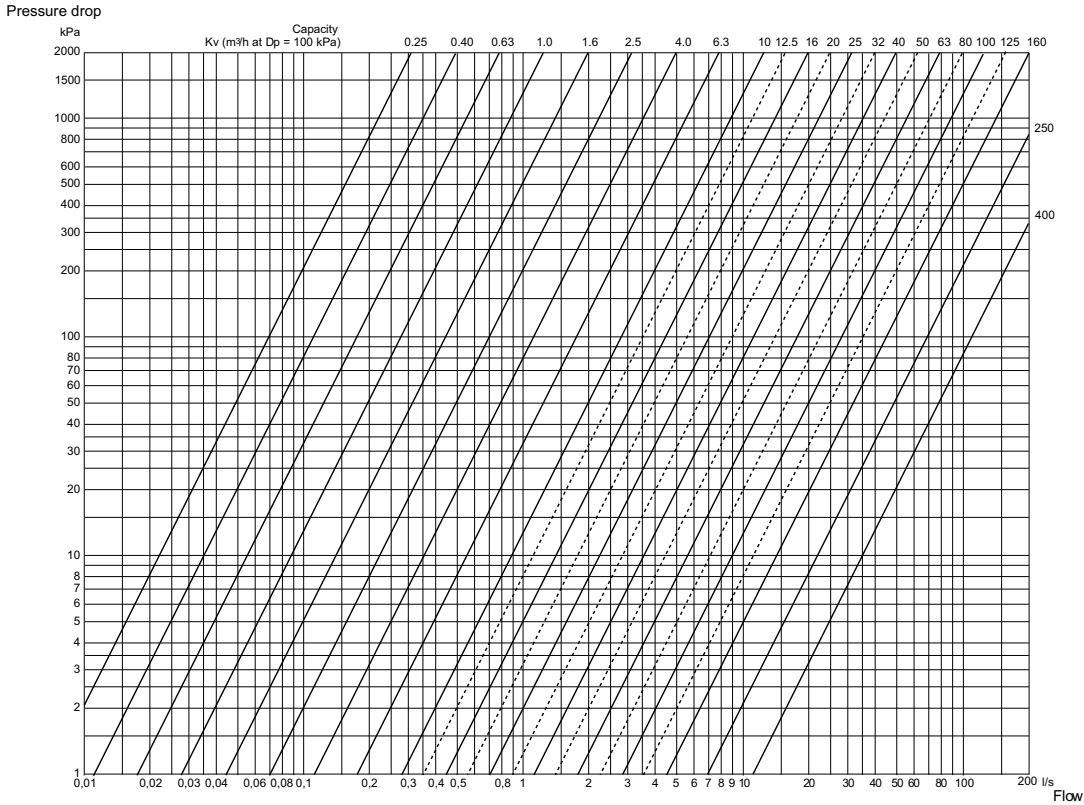
### High Close-Off Actuator

AH13A230	24 Vac	-	On/Off	Normally closed	910 mm (36")
AH13U230	230 Vac	-			
AH13U23A		yes			

## PIBCV Flow Selection Chart



## Water Valve Sizing Chart, Traditional Pressure Dependant Valves



1 litre per second = 3.6m<sup>3</sup>/h  
 100 kPa = 1 Bar. = 14.5psi

Valve sizing formulae for water service

To size a valve, the following must be known: The volumetric flow rate through the valve, Q.  
 The differential pressure across the valve, ΔP.

Calculation of valve flow coefficient, Kv

$$Kv = Q \times \sqrt{\frac{\rho}{\Delta P}}$$

Kv = Valve Capacity (m<sup>3</sup>/h)  
 Q - Volume flow (m<sup>3</sup>/h)  
 ΔP = Pressure drop across valve (bar)  
 ρ = Specific gravity of fluid (kg/m<sup>3</sup>)

Calculation of valve flow rate, Q

$$Q = Kv \times \sqrt{\frac{\Delta P}{\rho}}$$

Calculation of Pressure drop, ΔP

$$\Delta P = \rho \times \left(\frac{Q}{Kv}\right)^2$$

## Steam Valve Sizing Chart

Example for saturated steam:

Flow rate, (G) 4700 Kg/h  
 Abs. pressure upstream (p1) 850 kPa  
 Load pressure ( $\Delta P_v$ ) 160 kPa

Mark the point of intersection [3] between the line originating from the absolute upstream pressure [1] and the inclined line corresponding to the load pressure (valve pressure drop)[2].  
 Identify the point of intersection between point [3] found above and the flow rate of Saturated steam [4]  
 The last found point would corresponds to a valve with a Kvs of 63 [5]

$$P_2 > \frac{P_1}{2}$$

$$K_{vs} = \frac{G}{31.6} \times \sqrt{\frac{v_2}{\Delta p}}$$

$$\Delta P > \frac{P_1}{2}$$

$$P_2 < \frac{P_1}{2}$$

$$K_{vs} = \frac{G}{31.6} \times \sqrt{\frac{2 \times v^*}{p_1}}$$

$$\Delta P > \frac{P_1}{2}$$

Key:

Kvs = Valve flow co-efficient, (Control valve fully open).

G = Mass flow rate (Kg/h)

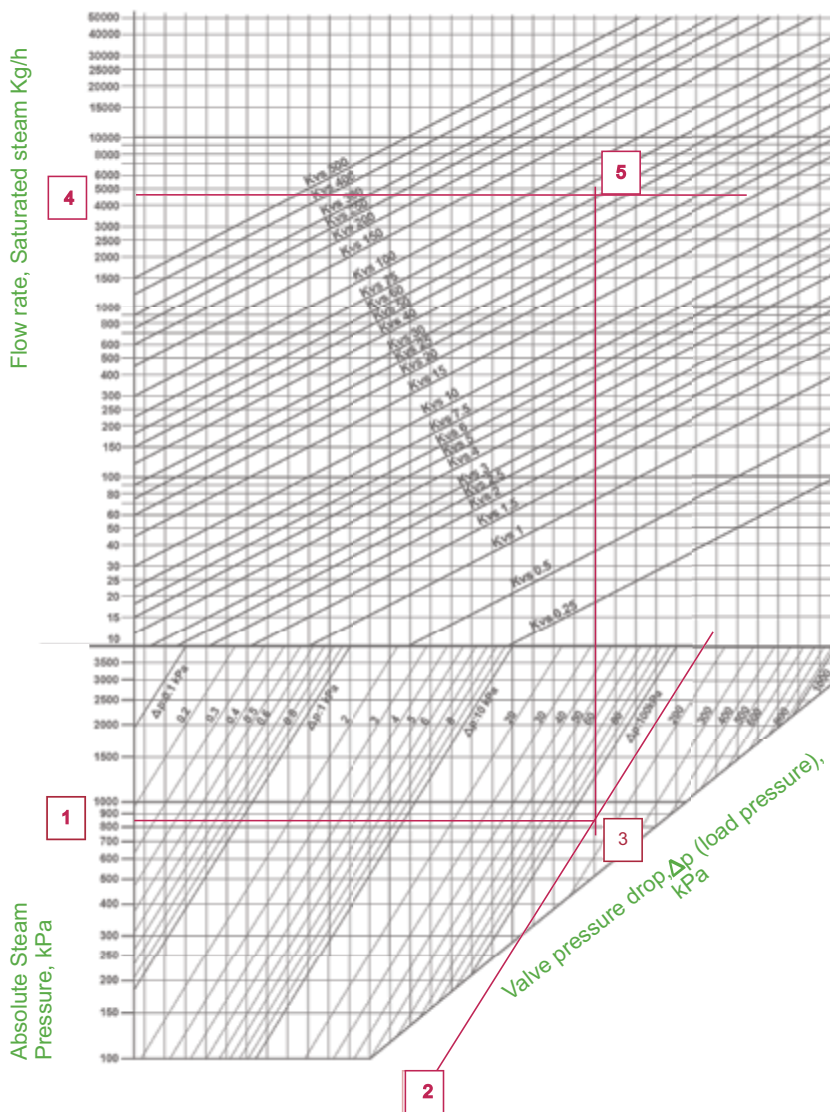
v2 = Specific volume (from steam table) for p2 and t1 condition

V\* = Specific volume (from steam table) for  $\frac{P_1}{2}$  and t1 condition

p1 = pressure before valve

p2 = pressure after valve

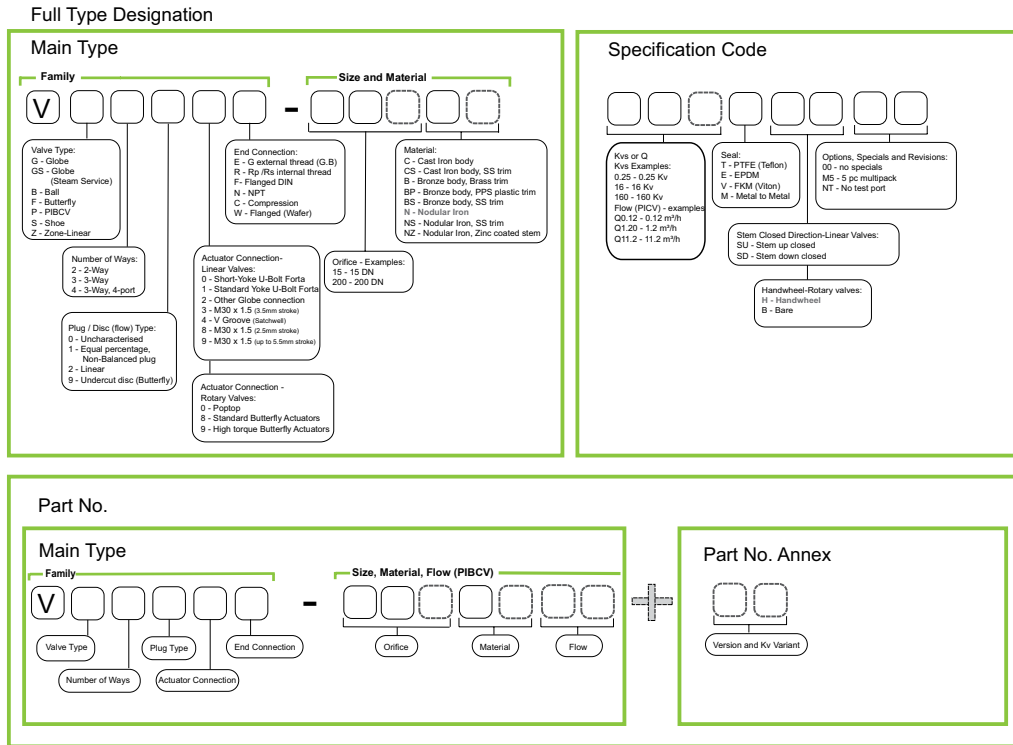
$\Delta p$  = Valve Pressure drop (bar)



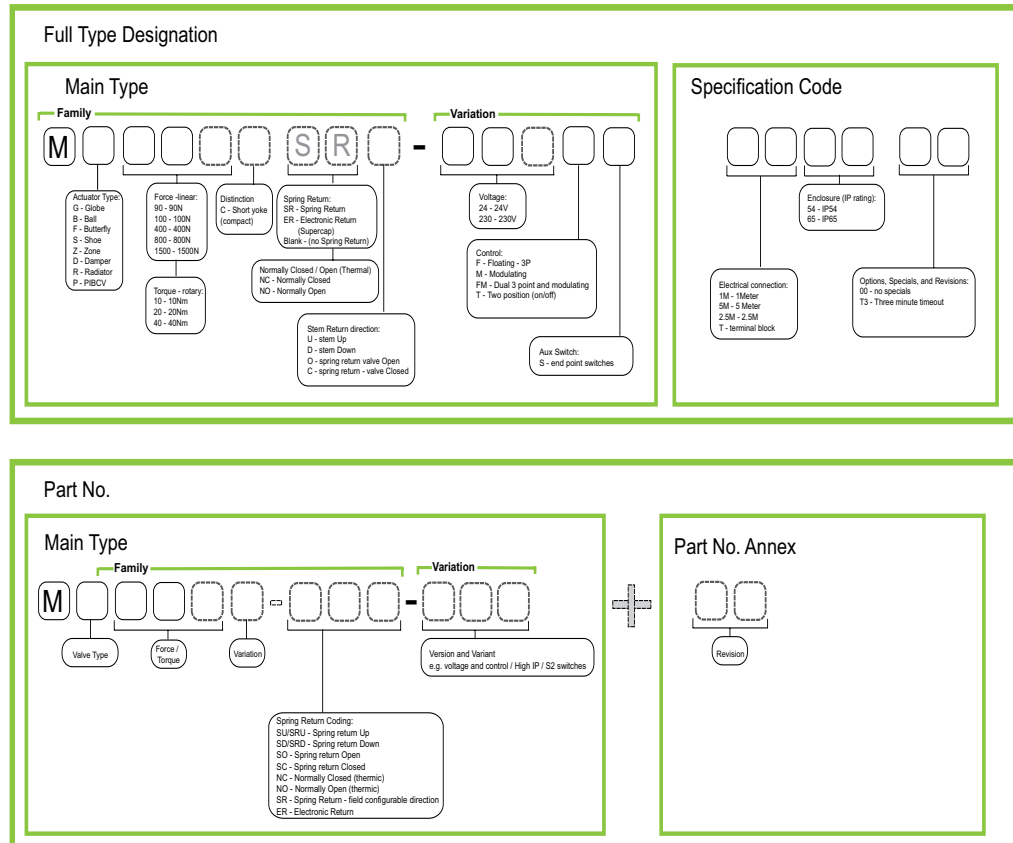
## Type Designation Guide

This guide details the type designation coding applicable on all new products launched from June 2009.

### Build Up Code - Valve Body Type Designation



### Build Up Code - Valve Actuators Type Designation





# North American Product Listing

Life Is On



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## Disclaimers

- Not all products in the guide may be available in every country, please check availability with the local Schneider Electric office.
- Some product images are not images of the exact model, but are represented by a "series" image.
- Information within this guide is subject to change without notice.
- Schneider Electric is not responsible for inadvertent typographical errors or omissions.

# Ball Valves and Actuators

## Overview VBB/VBS Valves with M2/M3 Actuators

### 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 the 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 tool 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 2-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 VCD, 0 – 10 Vdc, 5 – 10 Vdc, or 4 – 20 mA dc)
- Proportional actuator is direct or reverse acting.
- RoHS Compliant (VBS AAssemblies)
- Reach compliant

### Applicable literature

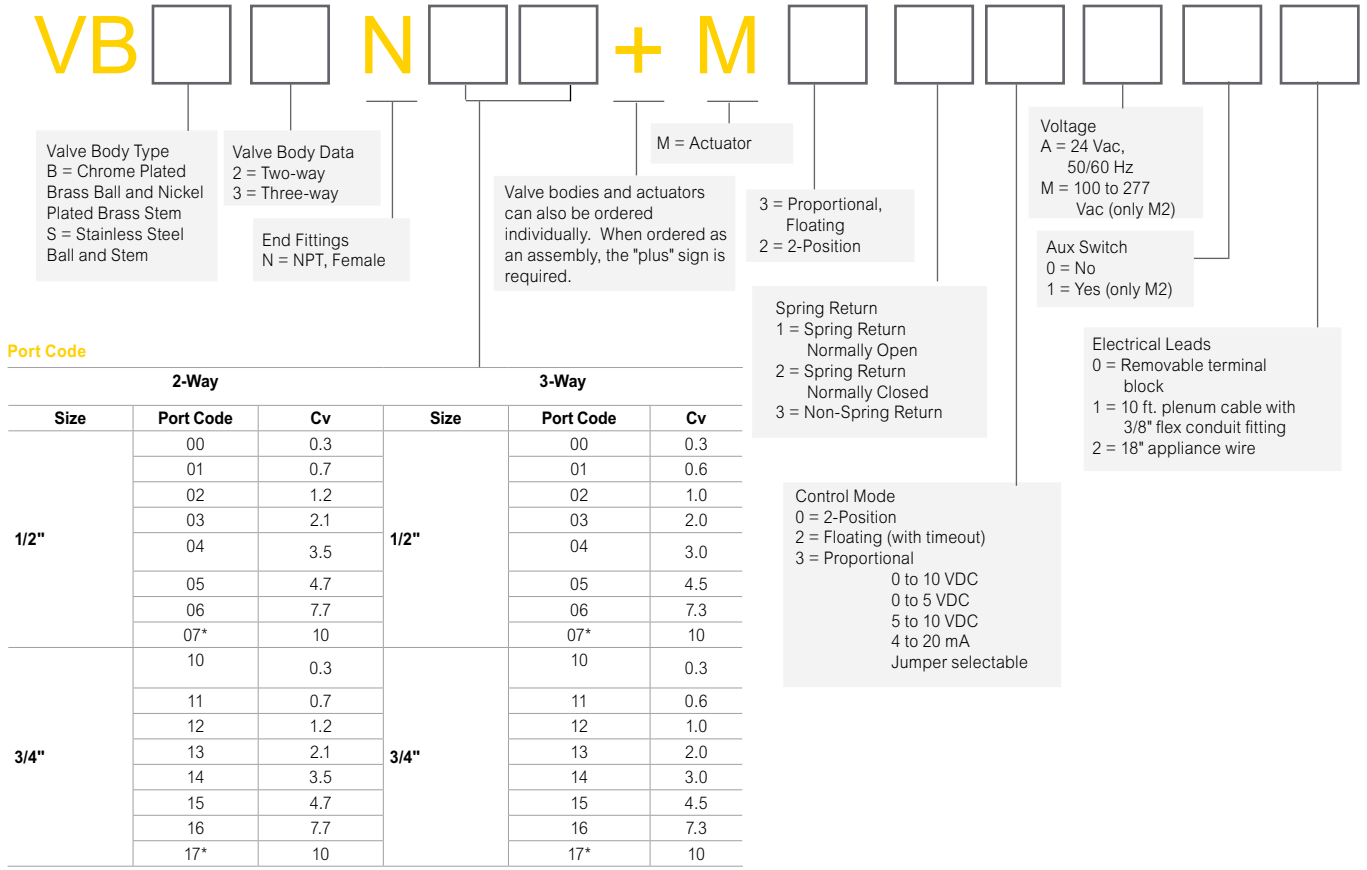
- VBB and VBS Series Two-position Spring-Return Ball Valves installation instructions, F-27392
- VBB and VBS Series Floating Spring Return and Non-spring Return Ball Valves installation instructions, F-27393
- VBB and VBS Series Proportional Spring Return and Non-spring Return Ball Valves installation 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





## Ordering VBB/VBS Ball Valve Assemblies

Specify nine part number fields to determine the Valve Actuator Assembly part number.

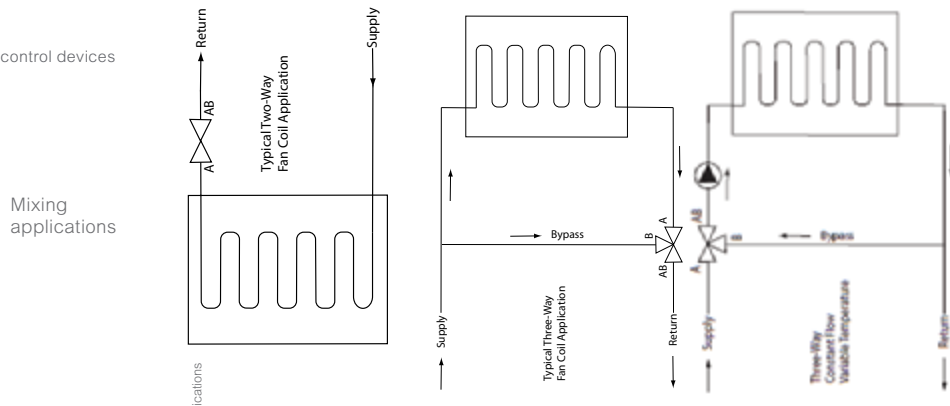


\* full port

## M2/M3 Actuator/Valve specifications

### Application Schematics Typical applications

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



Mixing applications

Specifications	
<b>Actuator</b>	
<b>Supply voltage</b>	24 Vac for floating and proportional 100–277 Vac for two position multi-voltage types
<b>Power Requirements</b>	See Table-1, Table-2, and Table-3.
<b>Control Signal</b>	2-Position, Floating, or Proportional; half wave rectified power supply
<b>Timing, Full Open to Full Close</b>	See Table-1, Table-2 and Table-3.
<b>Manual Operating Lever / Position Indicator</b>	Standard on all models.
<b>Auxiliary End Switch (optional)</b>	SPST 24 Vac/Vdc, 101 mA–5 A max.
<b>Materials</b>	Thermoplastic base and cover. Approved for use in air plenums.
<b>Shipping &amp; Storage Temperature Limit</b>	–40–169 °F (-40–76°C).
<b>Operating Temperature Limit at max fluid temp.</b>	
<b>Floating</b>	32–140 °F (0–60 °C)
<b>Proportional</b>	32–140 °F (0–60 °C)
<b>Two-Position</b>	32–169 °F (0–76 °C)
<b>Humidity</b>	5–95% relative humidity, non-condensing.
<b>Locations</b>	NEMA 2, IEC IP31. Indoor Use Only.
<b>Valve</b>	
<b>Service<sup>a</sup></b>	Hot and chilled water, up–60% glycol.
<b>System Static Pressure Limit</b>	600 psi (4137 kPa).
<b>Fluid Temperature Limit</b>	20–250°F (-7–121°C).
<b>Cv (Kv)</b>	See Tables 4 through 7.
<b>Close-off Pressure<sup>b</sup></b>	30 psi 2-Way; 70 psi 3-Way
<b>Differential Pressure</b>	30 psi normal operation 20 psi quiet operation.
<b>Seat Material</b>	PTFE
<b>Characterized Insert</b>	Glass-filled PEEK
<b>Seat Leakage</b>	ANSI class IV (0.01%) at both A and B ports with pressure at inlet.
<b>End Connections</b>	NPT threaded (VBxxNxx)
<b>Rangeability</b>	Greater than 300:1.
<b>Body Material</b>	Forged brass.
<b>Stem Material</b>	Stainless steel anti-blow out stem with dual Viton™ o-rings.
<b>Ball Material</b>	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	
<b>Supply voltage</b>	24 Vac for floating and proportional 100–277 Vac for two position multi-voltage types
<b>Power Requirements</b>	See Table-1, Table-2, and Table-3.
<b>Control Signal</b>	2-Position, Floating, or Proportional; half wave rectified power supply
<b>Timing, Full Open to Full Close</b>	See Table-1, Table-2 and Table-3.
<b>Manual Operating Lever / Position Indicator</b>	Standard on all models.
<b>Auxiliary End Switch (optional)</b>	SPST 24 Vac/Vdc, 101 mA–5 A max.
<b>Materials</b>	Thermoplastic base and cover. Approved for use in air plenums.
<b>Shipping &amp; Storage Temperature Limit</b>	–40–169 °F (-40–76°C).
<b>Operating Temperature Limit at max fluid temp.</b>	
<b>Floating</b>	32–140 °F (0–60 °C)
<b>Proportional</b>	32–140 °F (0–60 °C)
<b>Two-Position</b>	32–169 °F (0–76 °C)
<b>Humidity</b>	5–95% relative humidity, non-condensing.
<b>Locations</b>	NEMA 2, IEC IP31. Indoor Use Only.

## M2/M3 and Valve Selection and Flow Direction

### Ball Valve Assembly Selection Procedure

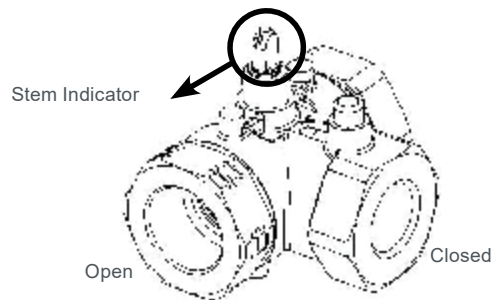
1. Select the actuator. When selecting a ball valve assembly, you must know the control signal type and voltage to first select an actuator. Consult the following tables: Table-1 covers two-position actuator specifications and model numbers, Table 2 covers floating actuator specifications and model numbers 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

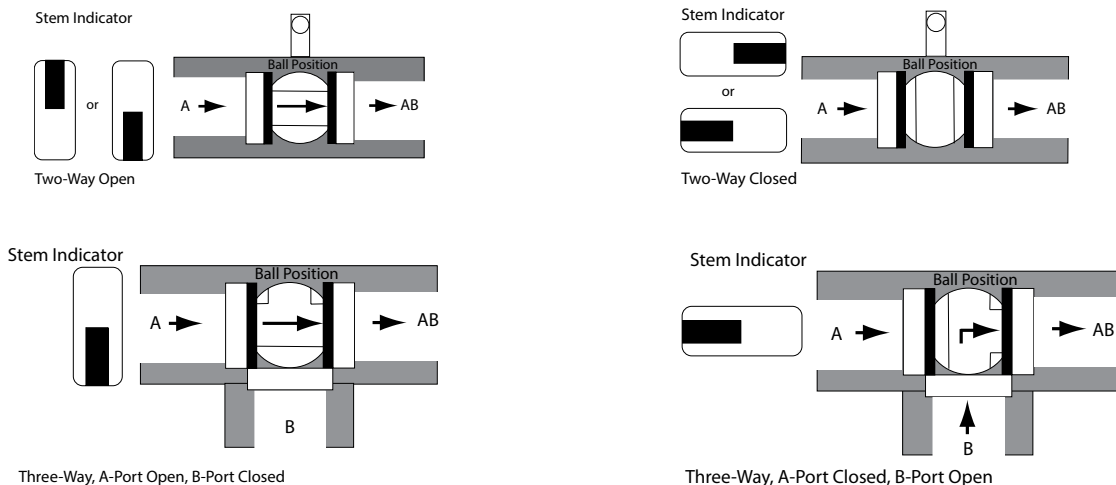
1. General service conditions: Make sure the actuator is suitable for the anticipated ambient conditions and that the valve body is compatible with the system fluid temperature and pressure requirements.
2. Close-off pressure: Confirm that the VBB/VBS ball valve's close off rating is suitable for the valve control application.
3. Space requirements: If mounting space limitations are a consideration, check the actuator/valve assembly dimensions.
4. Pipe reducers: Refer to the tables herein (F-27395) 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.



## M2/M3 Two-position, Floating, and Proportional Actuators

### Product Selection: Actuators

Table-1: Two-Position Actuators

Part Number	Control Signal	Power Loss Action (Valve Normal Position)	VA / Voltage	Leads	Stroke Timing	Spring Return Timing	End Switch
M210A00	Two- Position	Normally Open	3.5/1.8 at 24 Vac/24 Vdc	Removeable Terminal Block <sup>b</sup>	50 sec	35 sec.	
M210A01				10 ft. (3.05 m) Plenum Cable <sup>c</sup>			SPST
M210A11							
M210A02				18 in. (45 cm) Appliance Wire			SPST
M210A12							
M210M02				6.0/6.0 at 100–277 Vac, 50/60 Hz			18 in. (45 cm) Appliance Wire
M210M12							
M220A00		Normally Closed	3.5/1.8 at 24 Vac/24 Vdc	Removeable Terminal Block <sup>b</sup>			
M220A01				10 ft. (3.05 m) Plenum Cable <sup>c</sup>			SPST
M220A11							
M220A02				18 in. (45 cm) Appliance Wire			SPST
M220A12							
M220M02			6.0/6.0 at 100–277 Vac, 50/60 Hz				
M220M12							SPST

Table-2 Floating Actuators

Part Number	Control Signal	Power Loss 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	(Non-Spring Return)	2.3/2.4	Terminal Block <sup>b</sup>	159/135	181 Sec
M332A01				10 ft. (3.05 m) Plenum Cable <sup>c</sup>		
M312A00		Normally Open	3.2/3.3 <sup>d</sup>	Terminal Block <sup>b</sup>		
M312A01				10 ft. (3.05 m) Plenum Cable <sup>c</sup>		
M322A00		Normally Closed		Terminal Block <sup>b</sup>		
M322A01			10 ft. (3.05 m) Plenum Cable <sup>c</sup>			

Table-3 Proportional Actuators

Part Number	Control Signal	Power Loss 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 <sup>g</sup> (Vdc : 0–5, 0–10, 2–10, 5–10, 4–20 mA <sup>dce</sup> )	(Non-Spring Return)	2.7/2.8	Terminal Block <sup>b</sup>	159/135	200/166
M333A01				10 ft. (3.05 m) Plenum Cable <sup>c</sup>		
M313A00		Normally Open	2.7/2.8 <sup>d</sup>	Terminal Block <sup>b</sup>		
M313A01				10 ft. (3.05 m) Plenum Cable <sup>c</sup>		
M323A00		Normally Closed		Terminal Block <sup>b</sup>		
M323A01			10 ft. (3.05 m) Plenum Cable <sup>c</sup>			

- 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.

## 2- and 3-Way Brass and Stainless Steel Trim Valves

### Brass Trim Valves

**Table-4. 2-Way Brass Trim Valve Bodies**  
End Connection: NPT

Size	Part Number	Cv (Kv)
1/2"	VBB2N00	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**  
End Connection: NPT

Size	Part Number	Cv (Kv) A Port	Cv (Kv) B Port
1/2"	VBB3N00	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)
	VBB3N07b	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)
	VBB3N17b	10.0 (8.7)	4.8 (4.1)

b. Full Port Model without characterized disc.

### Stainless Steel Trim Valves

**Table-6. 2-Way Stainless Steel Trim Valve Bodies**  
End Connection: NPT

Size	Part Number	Cv (Kv)
1/2"	VBS2N00	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**  
End Connection: NPT

Size	Part Number	Cv (Kv) A Port	Cv (Kv) B Port
1/2"	VBS3N00	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)
	VBS3N07b	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)
	VBS3N17b	10.0 (8.7)	4.8 (4.1)

b. Full Port Model without characterized disc.

### Application Note for 2 and 3-Way Valves

VBB/VBS Series Ball Valves are Characterized Control Ball Valves designed so that flow through the A-port exhibits equal percentage flow, thus the A-port is the control port. In a 3-way valve, the B-port is the bypass port and flow through 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 seen by the coil supplied by the A-port.

## VB-2000 Series Ball Valves with SmartX Actuators

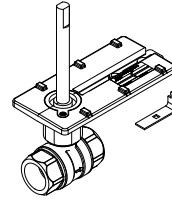
### Product description

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.

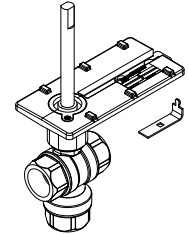
### Applicable literature

For installation details and considerations, refer to the full Selection Guide F-27086, Ball Valve Assemblies with SmartX Actuators

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

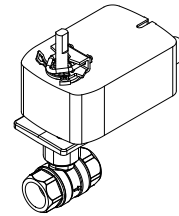


**VB-2253-500-9-xx**  
Body/Linkage Assembly  
with 2-Way Ball Valve

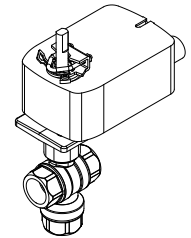


**VB-2313-500-9-xx**  
Body/Linkage Assembly  
with 3-Way Ball Valve

Ball Valve Body/Linkage Assemblies allow field mounting of SmartX Actuators.

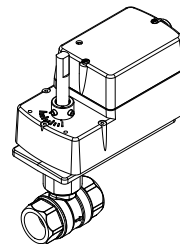


**Vx-22x3-5xx-9-xx**  
2-Way Assembly with  
Spring Return Actuator

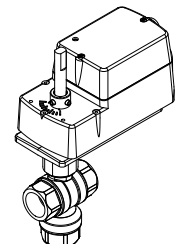


**Vx-2313-5xx-9-xx**  
3-Way Assembly with  
Spring Return Actuator

Vx-2xx3-5xx-9-xx Series Ball Valve Assemblies are available with either spring return or non-spring return SmartX Actuators.



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



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

Vx-2xx3-8xx-9-xx Spring Return Valve Assemblies equipped with Mx4D-x0x3 SmartX Actuators, respectively.

## Features & Benefits, and Ball Valve Assembly selection

### 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 and 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 Sizing and Selection to calculate the required Cv.
  - b. Select the nearest available Cv and corresponding valve body port code.
3. Actuator  
Select the appropriate actuator and code according to Ball Valve Assemblies, based on the Control signal type, required valve normal position, and voltage requirements. For detailed actuator information, refer to the applicable actuator specifications.  
NOTE: 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-2513-500-9-xx). For information on switch-equipped actuators, refer to actuator specifications.
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  
Check the appropriate dimensional figure (Figure 1 through Figure 6) and its accompanying data table for dimension details.

Feature	Benefit
Close-offs of 40 to 130 psi.	Accommodates most close-off requirements
Available in full range of line sizes, 1/2" to 3" for 2-way valves and 1/2" to 2" 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 VB-2000 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

## VB-2000 Series Actuator part numbering

Specify five part number fields to determine the Valve Actuator Assembly part number

### SmartX 5xx Actuators

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

**Control Signal Type**  
A = Two Position  
F = Floating  
S = Proportional  
B = Valve Body & Linkage<sup>a</sup> (less actuator)

**Configuration**  
2 = 2-Way  
3 = 3-Way

**Material**  
1 = Nickel/Chromium Plated Brass <sup>4</sup>  
5 = Stainless Steel <sup>3</sup>

**Connection**  
3 = Threaded NPT

**Port Code**  
Refer to separate Port Code table

Actuator Code <sup>1</sup> <sup>2</sup>				Valves Used On <sup>3</sup> <sup>4</sup>					
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
<b>Two-Position</b>									
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
<b>Floating</b>									
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
<b>Proportional</b>									
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
<b>Valve Body/Linkage Assembly<sup>a</sup></b>				<b>VB-22x3-500-9-xx, VB-2313-500-9-xx</b>					

SR = Spring Return  
NSR = Non-Spring Return

<sup>a</sup> 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.

### SmartX 8xx Actuators

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

**Control Signal Type**  
A = Two Position  
F = Floating  
S = Proportional  
B = Valve Body & Linkage<sup>c</sup> (less actuator)

**Configuration**  
2 = 2-Way  
3 = 3-Way

**Material**  
1 = Nickel/Chromium Plated Brass <sup>4</sup>  
5 = Stainless Steel <sup>3</sup>

**Connection**  
3 = Threaded NPT

**Port Code**  
Refer to separate Port Code table

Actuator Code <sup>1</sup>					Valves Used On <sup>3</sup> <sup>4</sup>			
Model	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
<b>Two-Position</b>								
MA4D-7030 <sup>a</sup>	815	SR Open	120 Vac	—	X	X	—	—
MA4D-8030 <sup>a</sup>	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	—	—
<b>Floating</b>								
MF4D-7033-100	821	SR Open	24 Vac	—	X	X	—	—
MF4D-8033-100	831	SR Closed	24 Vac	—	X	X	—	—
<b>Proportional</b>								
MS4D-7033-100	821	SR Open	24 Vac	2-10 Vdc	X	X	—	—
MS4D-7033-150	N/A <sup>b</sup>	SR Open	24 Vac	0-10 Vdc	X	X	—	—
MS4D-7033-160	N/A <sup>b</sup>	SR Open	24 Vac	4-20 mA	X	X	—	—
MS4D-8033-100	831	SR Closed	24 Vac	2-10 Vdc	X	X	—	—
MS4D-8033-150	N/A <sup>b</sup>	SR Closed	24 Vac	0-10 Vdc	X	X	—	—
MS4D-8033-160	N/A <sup>b</sup>	SR Closed	24 Vac	4-20 mA	X	X	—	—
<b>Valve Body/Linkage Assembly<sup>c</sup></b>				<b>VB-22x3-500-9-xx, VB-2313-500-9-xx</b>				

SR = Spring Return  
NSR = Non-Spring Return

a - 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.



## VB-2000 Series 2- and 3-Way sizes, port codes, Cv/Kvs

### Port codes

#### 2-Way Ball Valve Assemblies with sizes, port codes, and Cvs.

Size in.	2-Way			
	Port code	Cva	Kvsa	
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 <sup>b</sup>	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 <sup>b</sup>	12.7	
	18	28.6 <sup>b</sup>	24.7	
1	21	4.4	3.8	
	22	9.0	7.8	
	23	15.3	13.2	
	24	26.1	22.6	
	25	28.4 <sup>b</sup>	24.6	
	26	43.9 <sup>b</sup>	38.0	
	27	54.2 <sup>b</sup>	46.9	
	1 1/4	41	4.4	3.8
42		8.3	7.2	
43		14.9	12.9	
44		36.5	31.6	
45		41.1 <sup>b</sup>	35.6	
46		102.3 <sup>b</sup>	88.5	
1 1/2		51	22.8	19.7
	52	41.3	35.7	
	53	73.9 <sup>b</sup>	63.9	
	54	171.7 <sup>b</sup>	148.5	
	2	61	41.7	36.1
63		71.1	61.5	
65		108 <sup>b</sup>	93.4	
66		210	181.7	
67		266 <sup>b</sup>	230.1	
2 1/2		71	45	38.9
		72	55	47.6
	73	72.3	62.5	
	74	101	87.4	
	75	162	140.1	
	76	202 <sup>b</sup>	174.7	
3	82	63	54.5	
	85	145 <sup>b</sup>	125.4	

$$a - C_v = \frac{\text{gpm}}{\sqrt{\Delta P}} \text{ (where DP is measured in psi)} \quad kvs = \frac{C_v}{1.156}$$

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

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

#### 3-Way Ball Valve Assemblies - sizes, port codes, and Cvs

Size in.	3-Way		
	Port code	A port Cva b	Kvsa
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 <sup>c</sup>	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 <sup>c</sup>	9.5
	1	21	0.40
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 <sup>c</sup>	19.3
31		30.8 <sup>c</sup>	26.6
1 1/4	41	4.1	3.5
	43	8.7	7.5
	44	12.7	11.0
	45	19.4 <sup>c</sup>	16.8
	46	34.1 <sup>c</sup>	29.5
	1 1/2	51	4
52		8.3	7.2
53		13.4	11.6
54		23.5	20.3
55		32 <sup>c</sup>	27.7
56		61.1 <sup>c</sup>	52.8
2	61	23.9	20.7
	62	38.2	33.0
	63	56.7 <sup>c</sup>	49.0
	64	108.5 <sup>c</sup>	93.8

$$a - C_v = \frac{\text{gpm}}{\sqrt{\Delta P}} \text{ (where DP is measured in psi)} \quad kvs = \frac{C_v}{1.156}$$

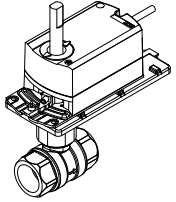
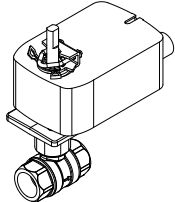
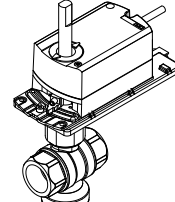
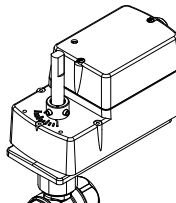
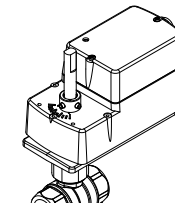
$$kvs = \frac{\text{m}^3/\text{h}}{\sqrt{\Delta P}} \text{ (where DP is measured in bar; 1 bar = 100 kPa)}$$

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

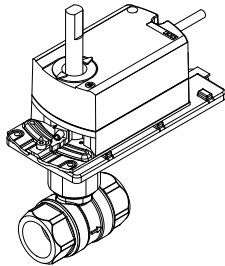
c - Denotes a full port valve, without the characterized insert.

VB-2000 Series 2- and 3-Way Ball Valve Specifications

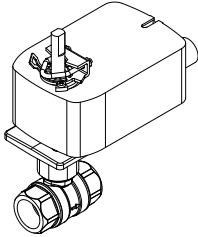
Ball Valve specifications

Valve assembly series		2-Way		3-Way		
Ball Valve Assemblies using SmartX Actuators	 <p><b>Non-Spring Return</b> Vx-22x3-505-9-P Vx-22x3-506-9-P</p>		 <p><b>Spring Return</b> Vx-22x3-5xx-9-P</p>		 <p><b>Non-Spring Return</b> Vx-2313-505-9-P Vx-2313-506-9-P</p>	
	 <p><b>Spring Return</b> VA-22x3-81x-9-P Vx-22x3-82x-9-P Vx-22x3-83x-9-P</p>		 <p><b>Spring Return</b> VA-2313-81x-9-P Vx-2313-82x-9-P Vx-2313-83x-9-P</p>			
<b>Applications</b>		Chilled or hot water, up to 50% Glycol Solution				
<b>Type of end fitting</b>		NPT Screwed				
<b>Size</b>		1/2" through 3"		1/2" through 2"		
<b>Valve assembly series</b>		Vx-22x3-xxx-9-P		Vx-2313-xxx-9-P		
<b>Flow type</b>		Equal Percentage				
<b>Body</b>		Forged Brass (ASTM B283-06)				
<b>Ball</b>		1 = Nickel/Chromium-Plated Brass 5 = Stainless Steel		Nickel/Chromium-Plated Brass		
<b>Material</b>		Glass-filled Noryl				
<b>Characterizing insert</b>		Glass-filled Noryl				
<b>Stem</b>		Stainless Steel				
<b>Ball seals</b>		Reinforced Teflon® Seals with EPDM O-Rings				
<b>Stem seals</b>		EPDM O-Rings				
<b>Mounting plate</b>		Glass-filled Polymer				
<b>Maximum static pressure</b>		360 psig (25 bar) at 250 °F (121 °C)				
<b>Maximum operating differential pressure</b>		Same as close-off pressures shown in Table-4 or Table-6. Refer to Pg. 107, Cavitation limitations on valve pressure drop .				
<b>Seat leakage</b>		ANSI Class IV (0.01% of Cv)		ANSI Class IV (0.01% of Cv), piped coil-side outlet to A only		
<b>Fluid (water) temp.</b>		<b>Minimum</b>		20 °F (-7 °C)		
		<b>Maximum</b>		250 °F (121 °C)		

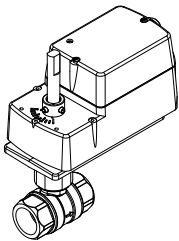
VB-2000 2-Way Ball Valve Assemblies with SmartX Actuators



Vx-22x3-505-9-P

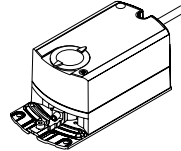


Vx-22x3-5xx-9-P

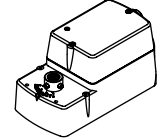
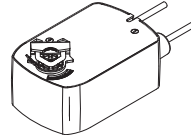


**Spring Return**  
VA-22x3-81x-9-P  
Vx-22x3-82x-9-P  
Vx-22x3-83x-9-P

Non-Spring Return



Spring Return



Actuator models (Actuator codes)

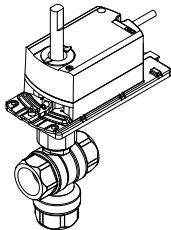
24 Vac			
<b>Floating</b> MF41-6043 (505)	<b>Floating</b> MF41-6083 (506)	<b>Two-position</b> MA40-7043 (N.C.) (526) MA40-7043 (N.O.) (536) MA40-7043-501	<b>Two-position</b> MA4D-7033-100 (N.O.) (821) MA4D-8033-100 (N.C.) (831)
<b>Proportional</b> MS41-6043 (505)	<b>Proportional</b> MS41-6083 (506)	<b>Floating</b> MF40-7043 (N.C.) (526) MF40-7043 (N.O.) (536) MF40-7043-501	<b>Floating</b> MF4D-7033-100 (N.O.) (821) MF4D-8033-100 (N.C.) (831)
		<b>Proportional</b> MS40-7043 (N.C.) (526) MS40-7043 (N.O.) (536) MS40-7043-501 MS40-7043-MP MS40-7043-MP5	<b>Proportional</b> MS4D-7033-100 (N.O.) (821) MS4D-7033-150 MS4D-7033-160 MS4D-8033-100 (N.C.) (831) MS4D-8033-150 MS4D-8033-160
120 Vac			
		<b>Two-position</b> MA40-7040 (N.C.) (522) MA40-7040 (N.O.) (532) MA40-7040-501	<b>Two-position</b> MA4D-7030 (N.O.) (815) MA4D-8030 (N.C.) (817)
230 Vac			
		MA40-7041 MA40-7041-501	

Valve assembly part number	Size (in.)	P code <sup>b</sup>	Close-off pressure, psi (kPa)		
<b>Ball Valve Assembly With SmartX Vx-22x3-5xx-9-Pc Valve/Linkage Assembly VB-2253-500-9-P</b>	½	1, 2, 3, 4, 5, 6, 7	130 (896) (field assemble)	-	130 (896) (field assemble)
	¾	11, 12, 13, 14, 15, 16, 17, 18			
	1	21, 22, 23, 24, 25, 26, 27			
	1¼	41, 42, 43, 44, 45, 46	70 (482)	70 (482)	70 (482)
	1½	51, 52, 53, 54	-		
	2	61, 63, 65, 66, 67			
	2½	71, 72, 73, 74, 75, 76			
3	82, 85				

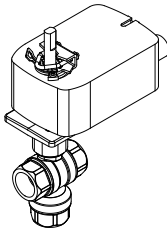
a - For non-spring return, 2-way ball valve assemblies are shipped NO (normally open).  
 b - To find the corresponding flow coefficients for these port codes, refer to Pg. 144, VB-2000 Series Actuator Part Numbering .  
 c - To determine a specific part number, identify the actuator's Control signal type ("A," "F," or "S"), Actuator code, and P code. Refer to Pg. 145, VB-2000 Series 2- and 3-Way Sizes, Port Codes, Cv/Kvs .

## VB-2000 3-Way Assemblies with SmartX Actuators

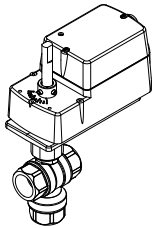
Note: Not all model configurations are available as factory assemblies. You can purchase the the actuator and a VB-2253-500-9-xx valve body and linkage separately for field assembly. All valve sizes - ANSI Class IV (0.01% of CK) shut-off piped coil-side outlet to A.



Vx-2313-505-9-P  
Vx-2313-506-9-P

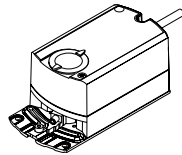


Vx-2313-5xx-9-P

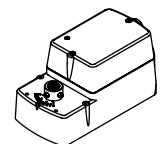
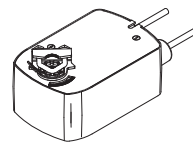


**Spring Return**  
VA-2313-81x-9-P  
Vx-2313-82x-9-P  
Vx-2313-83x-9-P

### Non-Spring Return



### Spring Return



### Actuator models (Actuator codes)

#### 24 Vac

Non-Spring Return		Spring Return	
<b>Floating</b> MF41-6043 (505)	<b>Floating</b> MF41-6083 (506)	<b>Two-position</b> MA40-7043 (N.C.) (526) MA40-7043 (N.O.) (536) MA40-7043-501	<b>Two-position</b> MA4D-7033-100 (N.O.) (821) MA4D-8033-100 (N.C.) (831)
<b>Proportional</b> MS41-6043 (505)	<b>Proportional</b> MS41-6083 (506)	<b>Floating</b> MF40-7043 (N.C.) (526) MF40-7043 (N.O.) (536) MF40-7043-501	<b>Floating</b> MF4D-7033-100 (N.O.) (821) MF4D-8033-100 (N.C.) (831)
		<b>Proportional</b> MS40-7043 (N.C.) (526) MS40-7043 (N.O.) (536) MS40-7043-501 MS40-7043-MP MS40-7043-MP5	<b>Proportional</b> MS4D-7033-100 (N.O.) (821) MS4D-7033-150 MS4D-7033-160 MS4D-8033-100 (N.C.) (831) MS4D-8033-150 MS4D-8033-160
		120 Vac	
		<b>Two-position</b> MA40-7040 (N.C.) (522) MA40-7040 (N.O.) (532) MA40-7040-501	<b>Two-position</b> MA4D-7030 (N.O.) (815) MA4D-8030 (N.C.) (817)
		230 Vac	
		MA40-7041 MA40-7041-501	

Valve assembly part number	Size (in.)	P code	Close-off pressure, psi (kPa)		
<b>Ball Valve Assembly with SmartX VX-2313-5xx 9-P Valve/Linkage Assembly VB-2313-500-9-P</b>	½	1, 2, 3, 4, 5, 6,	50(344)	-	50 (344) (field assemble)
	¾	11, 12, 13, 14, 15, 16	(field assemble)		
	1	21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31	50 (344)	40 (275)	40 (275)
	1¼	41, 42, 43, 44, 45, 46	40 (275)		
	1½	51, 52, 53, 54	-		
	2	61, 62, 63, 64	-		

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

b - Spring return -3-way valves are normally closed, A to AB and 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 Sizes, Port Codes and CVS."

d - To determine a specific part number, identify the actuator's Control signal type ("A," "F," or "S"), Actuator code, and P code.

## VB-2000 SR and NSR SmartX Actuator specifications

### Specifications

#### MF/MS41-6043/83 NSR SmartX Actuators

<b>Inputs</b>	Control Signal		
<b>MF41-6043 and MF41-6083</b>	Floating three-position control, 24 Vac		
<b>MS41-6043 and MS41-6083</b>	Proportional, 0–10 Vdc; input		
<b>Power Requirements (see table)</b>			
<b>Connections</b>	All 24 Vac circuits are Class 2 3 ft. (0.9 m) long, 18 AWG plenum rated leads		
<b>Motor Type</b>	Synchronous		
<b>Outputs</b>			
<b>Electrical</b>			
<b>Position feedback voltage for MS41-6043/6083</b>	0–10 Vdc, 1 mA		
<b>Timing: 90°</b>			
<b>Timing in Sec.</b>	At 60 Hz	At 50 Hz	
<b>MF41-6043 and MS41-6043</b>	90	108	
<b>MF41-6043 and MS41-6083</b>	125	150	
<b>Outputs</b>	44 lb-in. (5 N-m) for Mx41-6043		
<b>Electrical</b>	88 lb-in./ (10 N-m) for Mx41-6083		
<b>Output torque rating</b>	Normal angle of rotation is 90 limited to a maximum of 95		
<b>Stroke</b>	Field adjustable to limit travel on either end of stroke		
<b>Position indicator</b>	Adjustable pointer is provided for position indication.		
<b>Output shaft setscrew</b>			
<b>Tightening torque</b>	50–60 lb-in. (6.3–6.8 N-m)		
<b>Environmental</b>			
<b>Temperature limits</b>	-40–70C (-40–158F) ambient		
<b>Shipping and storage</b>	-32–55C (-25–130F) ambient		
<b>Operating</b>			
<b>Note: Check the valve operating temperature limit. The minimum valve media temperature limit -7 C (20 F)</b>			
<b>Humidity</b>	5–95%, RH, non-condensing		
<b>Enclosure rating</b>	IEC IP54 (NEMA Type 3)		
<b>Agency Listings (Actuator)</b>			
<b>UL</b>	UL-873, Underwriters Laboratories		
<b>cUL</b>	Canadian Standards C22.2 No. 24-83		
<b>European Community</b>	EMC Directive (89/336/EEC) Emissions (EN50081-1) Immunity (EN50081-2)		

### Power input @ 50/60 Hz

Part Number	Voltage	Power input @ 50/60 Hz		Watts
		Running VA	Holding VA	
MF41-6043 adn MF41-6083	24 Vac – 20/-15%	2.3	–	2.0
M41-6043 and MS41-6083		3.3	1.2	3.0

### Specifications

#### Mx40-704x SR SmartX Actuators

<b>Inputs</b>	Control Signal	
<b>MA40-7043</b>	ON/OFF SPST control contacts or Triacs (500 mA rated)	
<b>MS40-7043</b>	Proportional 0–10 Vdc or 4–20 mA D C with 500 ohm resistor	
<b>MS40-7043 MP/MP5</b>	Proportional 6–9 Vdc	
<b>MF40-7043</b>	Floating point control, 24 Vac	
<b>Power Requirements (see table)</b>		
<b>Connections</b>	All 24 Vac circuits are Class 2	
<b>MA40-704x and MA40-704x-501</b>		
<b>MF40-7043 and MA40-7043-501,</b>	3 ft. (0.9 m) long, appliance cable for M20 Metric conduit use AM-756 adaptor	
<b>MS40-7043 and MS40-7043-501</b>		
<b>Motor Type</b>	Brush DC Brushless DC	
<b>MA40-704x</b>		
<b>MF40-7043, MS40-7043</b>		
<b>Outputs</b>		
<b>Electrical</b>		
<b>Mx40-7043-501 and MS40-7043-501</b>	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	
<b>MA40-7040-501</b>	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.	
<b>Position feedback voltage</b>	For 2–10 Vdc proportional actuators, the feedback signal is the same voltage range as the input signal. 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 (proportional (MS) models only).	
<b>Control mode</b>	Switch provided for selection of direct acting or reverse acting control mode on proportional models	
<b>Timing</b>		
<b>MA40-704x</b>	Approximately 50 sec.	
<b>MF40 and MS40-7043</b>	Approximately 130 sec.	
<b>Auxiliary Power Supply</b>		
<b>MS40-7043-MP and MS40-7043</b>	+20 Vdc @ 25mA (max.)	
<b>Position indicator</b>	Visual scale numbered from 0–90, provided for position indication	
<b>Mechanical</b>		
<b>Stroke</b>	Angle of rotation is limited to a maximum of 95, with mechanical stop	
<b>Output torque rating</b>		
<b>Mx40-704x</b>	35 lb-in. (4 N-m)	
<b>Environmental</b>		
<b>Temperature limits</b>	-40–71C (-40–160F) ambient	
<b>Shipping and storage</b>	-30–60C (-22–140F) ambient	
<b>Operating</b>		
<b>Note: Check the valve operating temperature limit. The minimum valve media temperature limit -7 C (20 F)</b>		
<b>Humidity</b>	5–95%, RH, non-condensing	
<b>Enclosure rating</b>	IEC IP54 (NEMA 2, UL Type 2)	
<b>Agency Listings (Actuator)</b>		
<b>UL</b>	UL-873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment)	
<b>cUL</b>	Canadian Standards C22.2 No. 24-93.	
<b>European Community</b>	EMC Directive (89/336 EEC) Low Voltage Directive (72/23/EEC)	
<b>Australia</b>	This product meets requirements to bear the RSM according to the terms specified by the Communications Authority under the Radio communications Act 1992	

## VB-2000 SR and NSR SmartX Actuator specifications

### Mx4D-7033/8033-xxx SmartX Actuators

#### Inputs

##### Control Signal and Power Requirements (see table)

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 ½" (13 mm) conduit connector. For M20 Metric conduit, use AM-756 adaptor

#### Motor type

Brush DC

#### Outputs

##### Electrical, Timing, Approximate Timing in Sec. @ 70 °F (21 °C)

Part Number	Powered	Spring return	
		CCWb	CWb
MA4D-7033-100	56	26	–
MF4D-7033-100	85	21	–
MS4D-7033-100	85	21	–
MA4D-8033-100	56	–	26
MF4D-8033-100	85	–	21
MS4D-8033-1x0	85	–	21

Position feedback voltage: For 0–3 Vdc, 0–9 Vdc, 2–10Vdc and 0–10Vdc proportional actuators, the feedback signal is the same voltage range as the input signal. The 4–20 mA proportional actuators and floating actuators have 2–10 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 rztng

30 lb-in (3.4 N-m)

##### RA/DA Jumper

Permits selection of reverse acting or direct acting control

##### (Proportional Models)

##### Position indicator

Visual indicator

#### Environmental

##### Temperature Limits

##### Shipping and storage

-40–160 °F (-40 –71 °C) ambient

##### Operating

-22–140 °F (-30–60 °C) ambient

NOTE: Check the valve operating temperature limit. The minimum valve media temperature limit is 20 °F (6.7 °C)

##### Humidity

15 to 95% RH, non-condensing

#### Enclosure Rating

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 (73/23/EEC). This product fits into Intallation Category (Overvoltage category)

#### Australia

II per EN 61010-1. This product meets requirements to bear the RCM mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992

## VB-2000 SR and NSR SmartX Actuator specifications

Part Number	Voltage 50/60 Hz	Voltage Vdc	Running				Holding (Hz)	
			50 Hz		60 Hz		50	60
			VA	W	VA	W	W	W
<b>MA40-7043</b>	24 Vac ± 20%	22-30	4.4	2.9	4.4	2.9	0.8	0.8
<b>MA40-7043-501</b>								
<b>MS40-7043</b>			5.6	4.2	5.6	4.2	2.4	2.4
<b>MS40-7043-501</b>								
<b>MF40-7043</b>			5.9	4.4	5.9	4.4	2.9	2.9
<b>MF40-7043-501</b>								
<b>MS40-7043-MP*</b>			6.9	5.0	6.6	5.0	3.2	3.2
<b>MS40-7043-MP5*</b>								
<b>MA40-7040*</b>	120 Vac ± 10%	-	6.4	3.8	4.3	3.4	1.6	1.2
<b>MA40-7040-501*</b>								
<b>MA40-7041</b>	230 Vac		5.8	4.1	4.6	3.9	1.5	
<b>MA40-7041-501</b>								

Part Number	Control signal	Voltage	Actuator power input			
			Running			Holding
			50/60 Hz		DC Amps	50/60 Hz
			VA	W		W
<b>MA4D-x033-100</b>	2 position	24 Vac ± 20% or 20 to 30 Vdc	5.1	3.6	0.14	1.3
<b>MF4D-x033-100</b>	Floating		6.8	4.2	0.15	1.9
<b>MS4D-x033-100</b>	2 to 10 Vdca Proportional		6.1	3.4	0.12	1.4
<b>MS4D-x033-150</b>	0 to 10 Vdc Proportional					
<b>MS4D-x033-160</b>	4 to 20 mAdc Proportional					

VB-2000 2-Way Ball Valve Assembly dimensions (44/88 lb-in.)

2-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code <sup>a</sup>	Valve Dimensions in inches (mm) Refer to Figure 1			
			A	B	C	D
<b>2-Way</b> <b>VF-22x3-505-9-P</b> <b>VF-22x3-506-9-P</b> <b>VS-22x3-505-9-P</b> <b>VS-22x3-506-9-P</b>	½	1, 2, 3, 4, 5, 7	2-3/8 (60)	7 (178)	8¼ (210)	3-1/8 (79)
		6	2-5/8 (67)	7 (178)	8½ (216)	3-3/8 (86)
	¾	11, 12, 13, 14, 15, 17	2-7/16 (62)	7 (178)	8¼ (210)	3¼ (83)
		16, 18	2¾ (70)	7 (178)	8½ (216)	3-3/8 (86)
	1	21, 23	3-1/16 (78)	7 (178)	8-7/8 (225)	3-5/8 (92)
		22, 25	2¾ (70)	7 (178)	8½ (216)	3-3/8 (86)
		24, 26	4½ (114)	7-3/8 (187)	9-3/8 (238)	3-7/8 (98)
		27	3 (76)	7 (178)	8-7/8 (225)	3-5/8 (92)
	1¼	41, 42, 43, 45	3 (76)	7 (178)	8-7/8 (225)	3-5/8 (92)
		44, 46	3-5/8 (92)	7-1/8 (181)	9-3/8 (238)	3-¾ (95)
	1½	51, 53	3-7/16 (87)	7-1/8 (181)	9-3/8 (238)	3-¾ (95)
		52, 54	4-1/16 (103)	7¼ (184)	9-7/8 (251)	4-1/16 (103)
	2	61, 65	3-15/16 (100)	7¼ (184)	9-7/8 (251)	4 (102)
		63, 66, 67	4-15/16 (125)	7-¾ (197)	10½ (267)	4-7/16 (113)
	2½	71, 72, 76, 73, 74, 75	5-3/8 (137)	8 (203)	10-¾ (273)	4½ (114)
	3	82, 85	5-11/16 (144)	8-1/8 (206)	10-11/16 (271)	4¼ (108)

a - To find the corresponding flow coefficients for these port codes, refer to "2-Way Ball Valve Assemblies with Sizes, Port Codes, and Cvs."

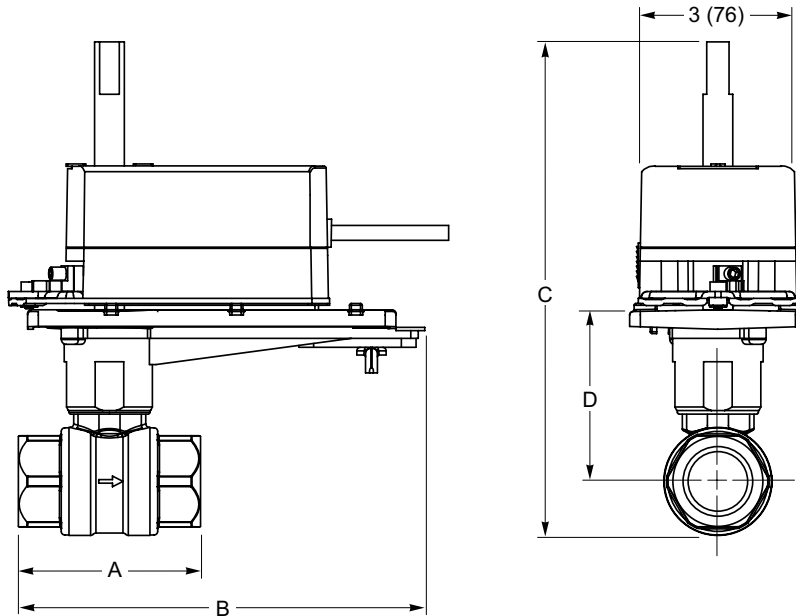


Figure 1. Mx41-6043 or Mx41-6083 with 2-Way Ball Valve.



VB-2000 3-Way Ball Valve Assembly dimensions (44/88 lb-in.)

3-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code <sup>a</sup>	Valve Dimensions in inches (mm) Refer to Figure 2				
			A	B	C	D	E
<b>3-Way</b> <b>VF-2313-505-9-P</b> <b>VF-2313-506-9-P</b> <b>VS-2313-505-9-P</b> <b>VS-2313-506-9-P</b>	½	1, 2, 3, 4, 5, 6	2-5/8 (67)	7 (178)	9-¾ (248)	3-5/16 (84)	2 (51)
	¾	11, 12, 13, 14, 15, 16	2¾ (70)	7 (178)	9-¾ (248)	¾ (83)	2 (51)
	1	21, 22, 23, 24, 25, 28	2¾ (70)	7 (178)	9-13/16 (249)	¾ (83)	2-1/8 (54)
			27, 30	4¼ (108)	7-3/8 (187)	11-5/8 (295)	3-5/8 (92)
		26, 29, 31	4¼ (108)	7½ (191)	11½ (292)	¾ (89)	3-1/8 (79)
	1¼	45	3 (76)	7 (178)	10-5/8 (270)	3-5/8 (92)	2-3/8 (60)
		41, 43, 44, 46	3-5/8 (92)	7-1/8 (181)	10-7/8 (276)	¾ (89)	2¾ (70)
	1½	51, 52, 53, 55	3-5/8 (92)	7-1/8 (181)	10-7/8 (276)	3-5/8 (92)	2¾ (70)
			54	4 (102)	7¼ (184)	11-¾ (298)	4 (102)
		56	4 (102)	7-¾ (197)	11-¾ (298)	4 (102)	¾ (83)
	2	61, 63	3-15/16 (100)	7¼ (184)	11-¾ (298)	3-7/8 (98)	3-1/16 (78)
			62, 64	4-7/8 (124)	7-¾ (197)	12-11/16 (322)	4½ (114)

a - To find the corresponding flow coefficients for these port codes, refer to "3-Way Ball Valve Assemblies with Sizes, Port Codes, and Cvs"

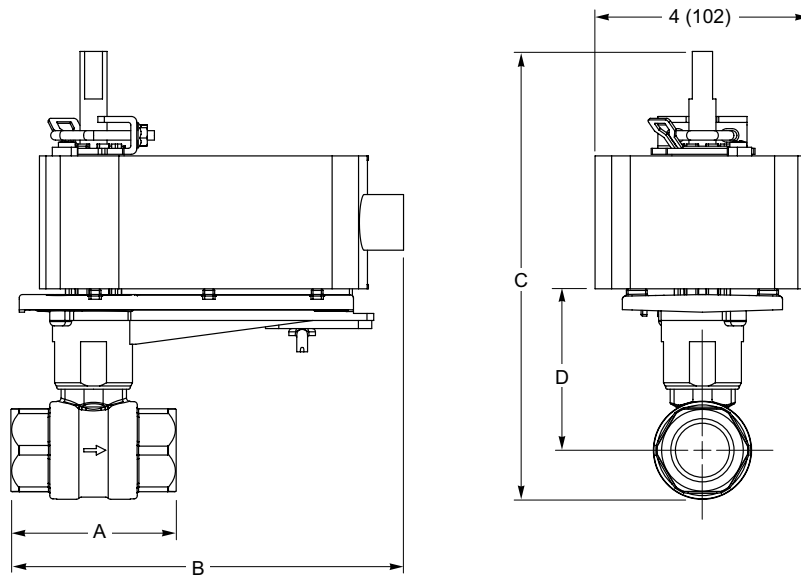


Figure 2. Mx41-6043 or Mx41-6083 with 3-Way Ball Valve.

VB-2000 2-Way Ball Valve Assembly dimensions (35 lb-in.)

2-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code <sup>a</sup>	Valve Dimensions in inches (mm) Refer to Figure 2					
			A	B	C	D	E	
<b>3-Way</b> <b>VF-2313-505-9-P</b> <b>VF-2313-506-9-P</b> <b>VS-2313-505-9-P</b> <b>VS-2313-506-9-P</b>	½	1, 2, 3, 4, 5, 6	2-5/8 (67)	7 (178)	9-¾ (248)	3-5/16 (84)	2 (51)	
	¾	11, 12, 13, 14, 15, 16	2¾ (70)	7 (178)	9-¾ (248)	¾ (83)	2 (51)	
	1	21, 22, 23, 24, 25, 28	27, 30	2¾ (70)	7 (178)	9-13/16 (249)	¾ (83)	2-1/8 (54)
			26, 29, 31	4¼ (108)	7-3/8 (187)	11-5/8 (295)	3-5/8 (92)	3-1/16 (78)
			45	4¼ (108)	7½ (191)	11½ (292)	¾ (89)	3-1/8 (79)
	1¼	41, 43, 44, 46	45	3 (76)	7 (178)	10-5/8 (270)	3-5/8 (92)	2-3/8 (60)
			41, 43, 44, 46	3-5/8 (92)	7-1/8 (181)	10-7/8 (276)	¾ (89)	2¾ (70)
	1½	51, 52, 53, 55	51, 52, 53, 55	3-5/8 (92)	7-1/8 (181)	10-7/8 (276)	3-5/8 (92)	2¾ (70)
			54	4 (102)	7¼ (184)	11-¾ (298)	4 (102)	¾ (83)
			56	4 (102)	7-¾ (197)	11-¾ (298)	4 (102)	¾ (83)
	2	61, 63	61, 63	3-15/16 (100)	7¼ (184)	11-¾ (298)	3-7/8 (98)	3-1/16 (78)
			62, 64	4-7/8 (124)	7-¾ (197)	12-11/16 (322)	4½ (114)	3-7/8 (98)

a - To find the corresponding flow coefficients for these port codes, refer to "3-Way Ball Valve Assemblies with Sizes, Port Codes, and Cvs" .

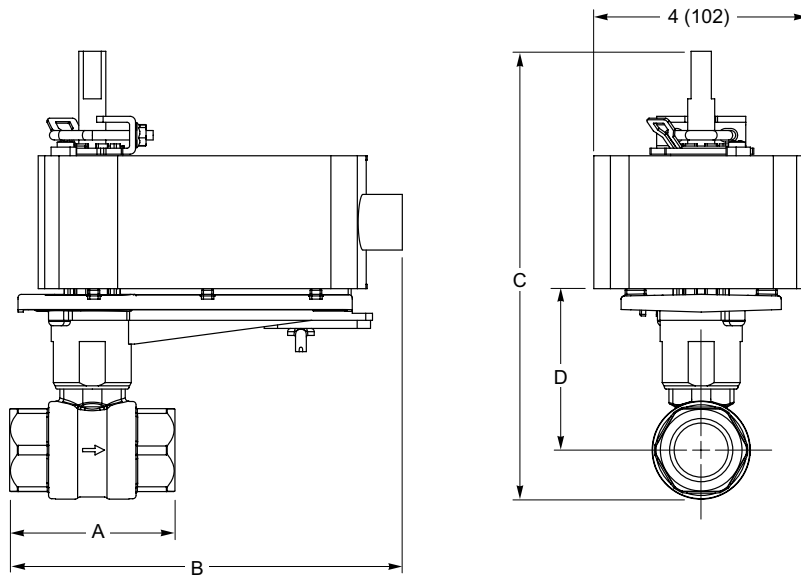


Figure 2. Mx41-6043 or Mx41-6083 with 3-Way Ball Valve.

VB-2000 3-Way Ball Valve Assembly dimensions (35 lb-in.)

3 - Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code <sup>a</sup>	Valve Dimensions in inches (mm) Refer to Figure 4				
			A	B	C	D	E
<b>3-Way</b> <b>VA-2313-526-9-P</b> <b>VA-2313-536-9-P</b> <b>VF-2313-526-9-P</b> <b>VF-2313-536-9-P</b> <b>VS-2313-526-9-P</b> <b>VS-2313-536-9-P</b>	½	1, 2, 3, 4, 5, 6	2-5/8 (67)	7-3/8 (187)	9-¾ (248)	3-5/16 (84)	2 (51)
	¾	11, 12, 13, 14, 15, 16	2¾ (70)	7-3/8 (187)	9-¾ (248)	¾ (83)	2 (51)
	1	21, 22, 23, 24, 25, 28	2¾ (70)	7-3/8 (187)	9-13/16 (249)	¾ (83)	2-1/8 (54)
			27, 30	4¼ (108)	8 (203)	11-5/8 (295)	3-5/8 (92)
		26, 29, 31	4¼ (108)	8-1/8 (206)	11½ (292)	¾ (89)	3-1/8 (79)
	1¼	45	3 (76)	7-3/8 (187)	10-5/8 (270)	3-5/8 (92)	2-3/8 (60)
		41, 43, 44, 46	3-5/8 (92)	7-¾ (197)	10-7/8 (276)	¾ (89)	2¾ (70)
	1½	51, 52, 53, 55	3-5/8 (92)	7-¾ (197)	10-7/8 (276)	3-5/8 (92)	2¾ (70)
		54	4 (102)	7-7/8 (200)	11-¾ (298)	4 (102)	¾ (83)
		56	4 (102)	8-3/8 (213)	11-¾ (298)	4 (102)	¾ (83)
	2	61, 63	3-15/16 (100)	7-7/8 (200)	11-¾ (298)	3-7/8 (98)	3-1/16 (78)
		62, 64	4-7/8 (124)	8-3/8 (213)	12-11/16 (322)	4½ (114)	3-7/8 (98)

a - To find the corresponding flow coefficients for these port codes, refer to "3-Way Ball Valve Assemblies with Sizes, Port Codes, and Cvs"

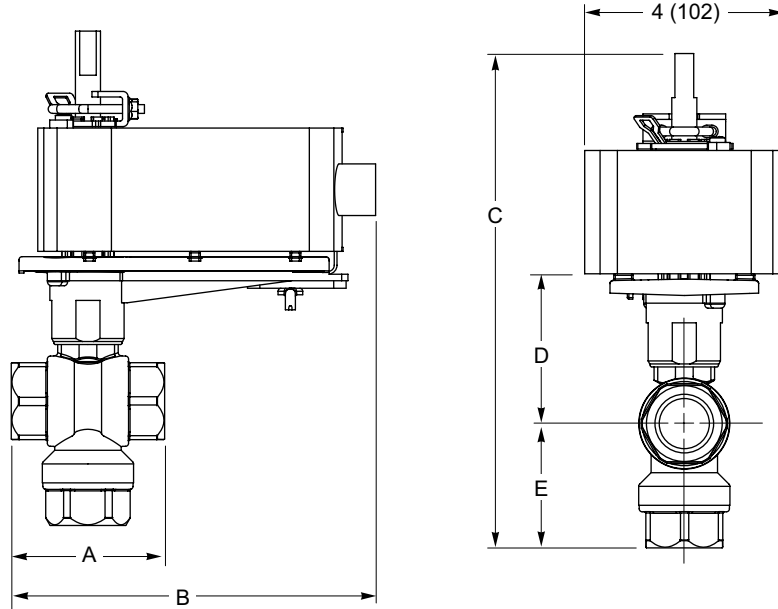


Figure 4. Mx40-704x with 3-Way Ball Valve.

VB-2000 2-Way Ball Valve Assembly dimensions (30 lb-in.)

2-Way Ball Valve Assembly Dimensions

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

a - To find the corresponding flow coefficients for these port codes, refer to "2-Way Ball Valve Assemblies with Sizes, Port Codes, and Cvs."

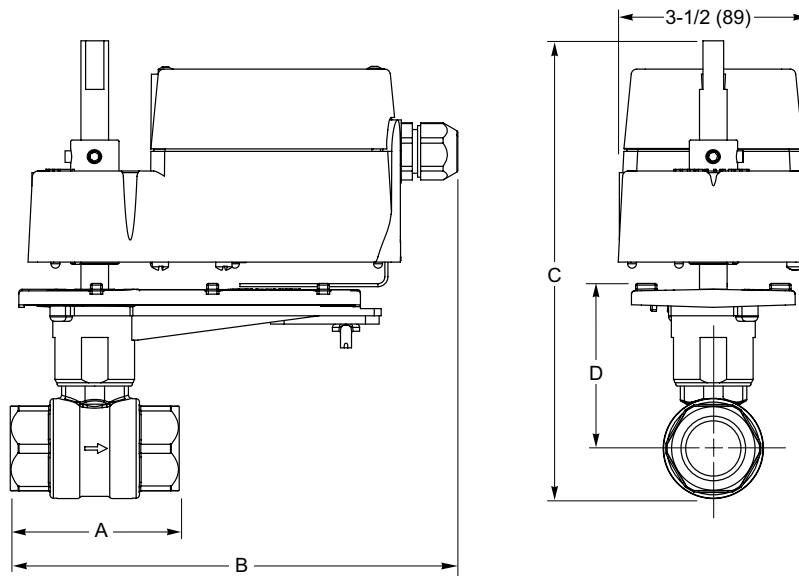


Figure 5. MA4D-7033, MF4D-7033, MS4D-7033, MA4D-8033, MF4D-8033, or MS4D-8033 with 2-Way Ball Valve.

VB-2000 3-Way Ball Valve Assembly dimensions (30 lb-in.)

3-Way Ball Valve Assembly Dimensions

Valve Assembly Part Number	Valve Size in.	P Code <sup>a</sup>	Valve Dimensions in inches (mm) Refer to Figure 6				
			A	B	C	D	E
<b>3-Way</b> <b>VA-2313-815-9-P</b> <b>VA-2313-817-9-P</b> <b>VA-2313-821-9-P</b> <b>VA-2313-831-9-P</b>  <b>VF-2313-821-9-P</b> <b>VF-2313-831-9-P</b>  <b>VS-2313-821-9-P</b> <b>VS-2313-831-9-P</b>	½	1, 2, 3, 4, 5, 6	2-5/8 (67)	8½ (216)	9-¾ (248)	3-5/16 (84)	2 (51)
	¾	11, 12, 13, 14, 15, 16	2¾ (70)	8½ (216)	9-¾ (248)	¾ (83)	2 (51)
	1	21, 22, 23, 24, 25, 28	2¾ (70)	8½ (216)	9-13/16 (249)	¾ (83)	2-1/8 (54)
		27, 30	4¼ (108)	8-7/8 (225)	11-5/8 (295)	3-5/8 (92)	3-1/16 (78)
	1	26, 29, 31	4¼ (108)	9 (229)	11½ (292)	¾ (89)	3-1/8 (79)

a - To find the corresponding flow coefficients for these port codes, refer to "3-Way Ball Valve Assemblies with Sizes, Port Codes, and Cvs" on page 4.

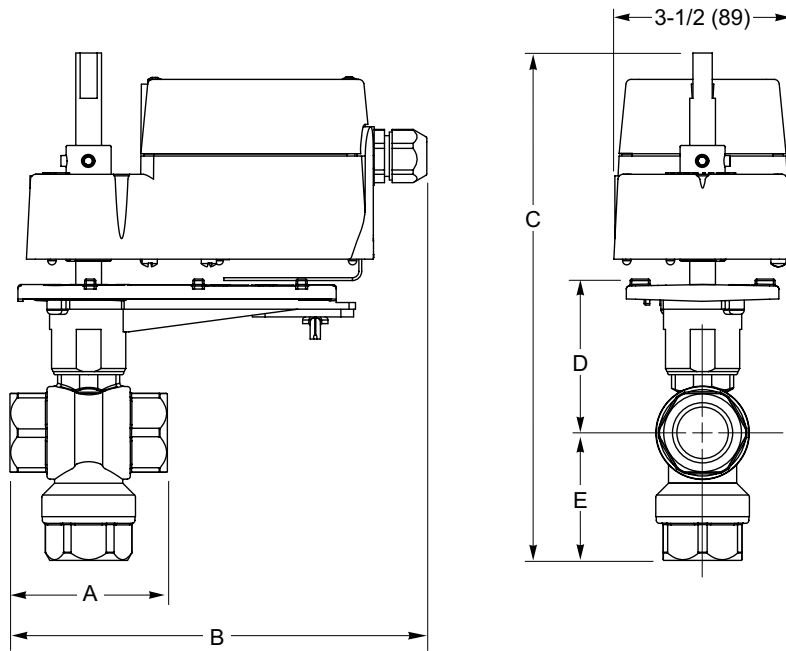


Figure 6. MA4D-7033, MF4D-7033, MS4D-7033, MA4D-8033, MF4D-8033, or MS4D-8033 with 3-Way Ball Valve.

# Butterfly Valve and Actuators

## Butterfly Valve Assembly Overview and 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 to 18" two-way assemblies and 2 to 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



## Ordering Butterfly Valve Assemblies

Specify nine part number fields for the Butterfly Valve assembly part number.

Flow Pattern <sup>b</sup>			
0 = 2-Way C = 3-Way			
Configuration Number	Main Valve <sup>a</sup>	Main Valve Position <sup>c</sup>	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.

**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<sup>\*</sup>  
 SS = Stainless Steel Disc<sup>\*</sup>  
<sup>\*</sup>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"  
<sup>\*</sup>Note: Larger Sizes (Consult Factory)

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## Butterfly Valve Actuators & Assembly Ordering

**Table 1: Actuator Codes and Part Numbers<sup>a</sup>**

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

<b>Table 1: Actuator Codes and Part Numbers<sup>a</sup></b>			
<b>Refer to the part numbering system illustration on the previous page.</b>			
<b>Actuator Code<sup>b</sup></b>	<b>On/Off or Floating SR</b>	<b>Actuator Code<sup>b</sup></b>	<b>Modulating (2–10 Vdc, 4–20mA) SR with the addition of a 500 ohm resistor</b>
<b>556</b>	MA41-7153 (VAx) (On/Off)	556	MS41-7153 (VSx)
<b>556D</b>	2 MA41-7153 (VAx) (On/Off)	556D	2 MS41-7153 (VSx) (Modulating)
<b>556</b>	MF41-7153 (VFx) (Floating)	–	–
<b>556D</b>	2 MF41-7153 (VFx) (Floating)		
<b>Actuator Code<sup>b</sup></b>	<b>On/Off or Floating SR with Two SPDT Auxiliary Switches</b>	<b>Actuator Code<sup>b</sup></b>	<b>Modulating (2–10 Vdc, 4–20 mA) SR with the addition of a 500 ohm resistor with Two Auxiliary Switches</b>
<b>556</b>	1 MA41-7153-502 (VAxS) (On/Off)	556	MS41-7153-502 (VSxS) (Modulated)
<b>556D</b>	1 MA41-7153 & 1 MA41-7153-502 (VAxS) (On/Off)	556D	1 MS41-7153 & 1 MS41-7153-502 (VSxS) (Modulated)
<b>556</b>	1 MF41-7153-502 (VFxS) (Floating)	–	–
<b>556D</b>	1 MF41-7153 & 1 MF41-7153-502 (VFxS) (Floating)		
<b>Actuator Code<sup>b</sup></b>	<b>On/Off or Floating NSR</b>	<b>Actuator Code<sup>b</sup></b>	<b>Modulating (0–10 Vdc, 4–20 mA) NSR</b>
<b>E24</b>	NR-2216-521 (VFx)	E24	NR-2216-541 (VSx)
<b>E25</b>	NR-2224-521 (VFx)	E25	NR-2224-541 (VSx)
<b>E25D</b>	2 NR-2224-521 (VFx)	E25D	2 NR-2224-541 (VSx)
<b>Actuator Code<sup>b</sup></b>	<b>On/Off or Floating NSR with Two SPDT Auxiliary Switches</b>	<b>Actuator Code<sup>b</sup></b>	<b>Modulating (0–10 Vdc, 4–20 mA) NSR with Two SPDT Auxiliary Switches</b>
<b>E24</b>	NR-2216-522 (VFxS)	E24	NR-2216-542 (VSxS)
<b>E25</b>	NR-2224-522 (VFxS)	E25	NR-2224-542 (VSxS)
<b>E25D</b>	1 NR-2224-521 & 1 NR-2224-522 (VFxS)	E25D	1 NR-2224-541 & 1 NR-2224-542 (VSxS)
<b>Actuator Code<sup>c</sup></b>	<b>On/Off NSR with Two SPDT Auxiliary Switches and Heater<sup>c</sup></b>	<b>Actuator Code<sup>c</sup></b>	<b>Modulating (0–10 Vdc, 4–20 mA) NSR with Two SPDT Auxiliary Switches and Heater<sup>c</sup></b>
<b>E10</b>	S70-120-0061-H (VAxS)	E12	S70-120-0061-SV (VSxS)
<b>E20</b>	S70-120-0121-H (VAxS)	E22	S70-120-0121-SV (VSxS)
<b>E30</b>	S70-120-0201-H (VAxS)	E32	S70-120-0201-SV (VSxS)
<b>E40</b>	S70-120-0301-H (VAxS)	E42	S70-120-0301-SV (VSxS)
<b>E50</b>	S70-120-0501-H (VAxS)	E52	S70-120-0501-SV (VSxS)
<b>E60 (120 Vac only)</b>	S70-120-0651-H (VAxS)	E62 (120 Vac only)	S70-120-0651-SV (VSxS)
<b>E70 (120 Vac only)</b>	S70-120-1300-H (VAxS)	E72 (120 Vac only)	S70-120-1300-SV (VSxS)
<b>E80 (120 Vac only)</b>	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. E1x through E5x available as 24 Vac powered: change actuator code E to "F" and 120 to 24, e.g. E10 to F10, then "S70-24-0061-H"

## Butterfly Valve Actuators & Assembly Ordering

**Table 1:** Actuator Codes and Part Numbers<sup>a</sup>

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

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

Size	Close off	2-Way Butterfly Valve Assemblies <sup>a</sup>				3-Way Butterfly Valve Assemblies <sup>a</sup>			
		Schneider Electric SmartX™ SR <sup>b</sup>	Direct Coupled NSR <sup>c</sup>	NEMA 4 with Hand Wheel NSR <sup>c</sup>		Schneider Electric SmartX™ SR <sup>b</sup>	Direct Coupled NSR <sup>c</sup>	NEMA 4 with Hand Wheel NSR <sup>c</sup>	
				2 Pos <sup>d</sup>	Mod <sup>d</sup>			2 Pos <sup>d</sup>	Mod <sup>d</sup>
2"	175	556	E24	E10	E12	556	E24	E10	E12
2.5"	175					556 D	E25		
		285	-						
3"	175	556 D	E25			556 D	E25	E10	E12
	285	-							
4"	50	556 D	E25			556 D	E25	E10	E12
	175		E25 D				E25 D		
	285		-	E10	E12				
5"	50		E25				E25 D	E10	E12
	175		-	E20	E22				
	285								
6"	50		E25 D				E25 D	E20	E22
	175			E10	E12				
	285			E20	E22				
8"	50							E20	E22
	175			E30	E32			E30	E32
	285								
10"	50							E30	E32
	175			E40	E42			E50	E52
	285								
12"	50							E50	E52
	175			E50	E52			E60	E62 <sup>e</sup>
	285								
14"	50							E50	E52
	150								
	285			E60	E62				
16"	50							E60	E62 <sup>e</sup>
	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. E1x through E5x available as 24 Vac powered: change actuator code E to "F" and 120 to 24, e.g. E10 to F10, then "S70-24-0061-H"
- e. 120 Vac only: E6x, E7x, E8x.

**Table 3:** Actuator Features

Actuator Family	Spring Return	Available Input Signals	Available Options
<b>Schneider Electric SmartX SR MX41-7153</b>	Yes	24 Vac. Two Position, Floating, 2–10 Vdc, 4–20 mA with the addition of a 500 ohm resistor, Proportional	Auxiliary Switch
<b>Direct Coupled NSR NR-22xx</b>	No	24 Vac. Three Wire Two Position, Floating, 0–10 Vdc, 4–20 mA, Proportional	Auxiliary Switch
<b>NEMA 4 with Hand Wheel NSR S70-xxx-</b>	No	120 Vac. or 24 Vac. Three Wire Two Position, Floating, 0–10 Vdc, 4–20 mA, Proportional	Auxiliary Switch (standard) and Heater (standard)



## 2" to 4" 2 and 3-Way SR SmartX Actuators



SmartX Spring Return  
Mx41-7153 Actuator



### Specifications

Actuator code 556, 556D (Mx41-7153 Series)

Power loss mode	Spring return
Control signal On/off, floating, or proportional	2 to 10 VDC., 4 to 20 mA with the addition of a 500 ohm resistor
Power Requirements	24 Vac $\pm$ 20%, 22 to 30 VDC, 9.7VA.
Environment	NEMA 2
Ambient temperatures	-22 to 140 °F (-12 to 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.

Model number	Actuator code	Power	Input signal	Feedback	Power loss mode	Optional accessories
MA41-7153	556 or 556D <sup>b</sup>	24 Vac	On/off	-	SR	Two SPDT Auxiliary switches <sup>a</sup>
MF41-7153			Floating			
MS41-7153			2 to 10 VDC	2 to 10 VDC		
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

## NR-22xx 2" to 6" 2 and 3-Way NSR Actuators



Non-Spring Return  
NR-22xx-5xx Actuator

### Specifications

Actuator code E24, E25, E25D (NR-2000 Series)

Power loss mode	NSR
Control signal	On/off, floating, or 2 to 10 VDC, 4 to 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.

Model number	Actuator code	Power	Input signal	Feedback	Power loss mode	Optional accessories
NR-2216-521	E24	24 Vac	On/off, floating	-	NSR	-
NR-2216-522			0 to 10 VDC , 4 to 20 mA			0 to 10 VDC
NR-2216-541			On/off, floating	-		-
NR-2216-542			0 to 10 VDC , 4 to 20 mA			0 to 10 VDC
NR-2224-521	E25 or E25D <sup>b</sup>	24 Vac	On/off, floating	-	NSR	-
NR-2224-522			0 to 10 VDC , 4 to 20 mA			0 to 10 VDC
NR-2224-541			On/off, floating	-		-
NR-2224-542			0 to 10 VDC , 4 to 20 mA			0 to 10 VDC

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

## S70 2"…18" 2-Way & 2"…16" 3-Way NSR Actuators

### Specifications Actuator Code (70 Series)

<b>Power Loss Mode</b>	Non-spring return
<b>Control Signal</b>	-40 to 500 °F
<b>Actuator Code</b>	Ex0 (120 Vac) or Fx0 (24 Vac) On/off, floating
<b>Actuator Code</b>	Ex2 (120 Vac) or Fx2 (24 Vac)
<b>Factory configured for input impedance, field</b>	4...20 mA with a 250 W configurable for 0...10 Vdc or 2...10 Vdc
<b>Power Requirements</b>	120 Vac or 24 Vac, 50/60 Hz.
<b>E1x/F1x</b>	1.5 <sup>a</sup>
<b>E2x/F2x, E3x/F3x</b>	2.1 <sup>a</sup>
<b>E4x/F4x, E5x/F5x, E6x</b>	3.0 <sup>a</sup>
<b>Environment</b>	NEMA 4.
<b>Ambient Temperatures</b>	-40...150 °F (-40...60 °C).
<b>Regulatory Compliance</b>	c-UL-us LISTED mark and CE mark
<b>Standard Auxiliary Switch 10 A resistive at 125/250 Vac, Heater</b>	(Included) 1/2 A at 125 Vdc. 15W.
<b>Manual Operator with Disconnect disconnect provided on all S70 actuator models.</b>	Hand wheel with power.



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 <sup>a</sup>	Input signal	Feedback	Power loss mode	Optional 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.

## 2.5" to 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
- Blowout-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
Fluid temperature Limits	-40 to 500 °F
Max Steam Pressure	On/Off 150 PSI Proportional 50 PSI
Sizes	2.5" to 18"
Flow Characteristic	Modified Equal Percentage
Leakage	Bubble Tight
Materials	
Body	Carbon steel
Stem	17-4 stainless steel
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 <sup>a</sup>	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

- 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
- E60/62 E70/72 E80/82 only available in 120 Vac.

## 2-Way High Performance Butterfly Actuator codes

Actuator code table

VxxS-6200/630x-Exx/Fxx -L-xx

Actuator codes	Model prefix	Actuator model
E10	VAxS	S70-0051-H
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
E22		S70-0121-SVH
E32		S70-0201-SVH
E42		S70-0301-SVH
E52		S70-0501-SVH
E62		S70-0651-SVH

Actuator code table

VxxS-6200/630x-Exx/Fxx-L-xx

Actuator codes	Model prefix	Actuator model
F10	VAxS	S70-24-0051-H
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
F22		S70-24-0121-SVH
F32		S70-24-0201-SVH
F42		S70-24-0301-SVH
F52		S70-24-0501-SVH

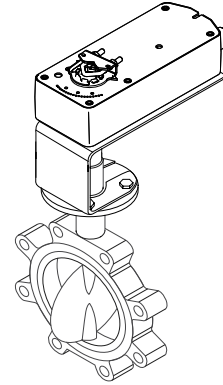
E Series: 120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override

F Series: 24 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override

## 2" to 4" Lug Bodies 2-Way SR NC and NO Assemblies

### Specifications

<b>Flow type</b>	Equal % bidirectional
<b>Body</b>	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges
<b>Seat</b>	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured
<b>Material</b>	
<b>Stem</b>	Stainless steel double D stem
<b>Stem Seals</b>	Self adjusting double U cup
<b>Disc</b>	Ductile iron nylon 11 coated disc
<b>Fluid Temperatures</b>	-40 to 250°F (-40 to 121°C)
<b>Close-off rating</b>	ANSI VI Bubble tight
<b>Application</b>	Chilled or hot water up to 60% glycol



### Two-Way Normally Closed/Open Assemblies

Size in.	Cv (Kvs) @ 90°	Close-off pressure psi (kPa)	Two-position	Floating	Proportional	Voltage vac
2	144 (125)	175 (1207)	VAF-62x0-556-L-11	VFF-62x0-556-L-11	VSF-62x0-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-62x0-556-L-12	VFF-62x0-556-L-12	VSF-62x0-556-L-12	24
3	461 (399)	175 (1207)	VAF-62x0-556D-L-13	VFF-62x0-556D-L-13	VSF-62x0-556D-L-13	24
4	841 (727)	50 (345)	VAU-62x0-556D-L-14	VFF-62x0-556D-L-14	VSF-62x0-556D-L-14	24

x - 6220 normally closed; 6210 normally open

Actuator codes	Model prefix <sup>a</sup>	Actuator model	Description
556 <sup>b</sup>	VAx	MA41-7153	24 Vac, on/off, SR
556 <sup>b,c</sup>	VAxS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches
556 <sup>b</sup>	VFx	MF41-7153	24 Vac, Floating, SR
556 <sup>b,c</sup>	VFxS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches
556 <sup>b</sup>	VSx	MS41-7153	24 Vac, Modulating, SR
556 <sup>b,c</sup>	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. e.g. VxxS

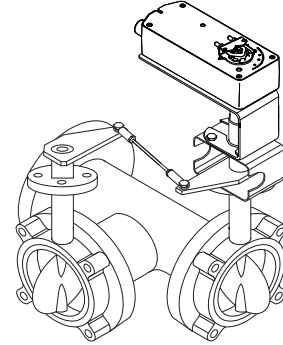
b - D = Dual mounting

c - Dual mounted application. One Mx41-7153 and one Mx41-7153-502 are supplied

## 2" to 4" Lug Bodies 3-Way SR NC and NO Assemblies

### Specifications

<b>Flow type</b>	Equal % bidirectional
<b>Body</b>	Mixing or diverting configurations Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges
<b>Seat</b>	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured
<b>Material</b>	
<b>Stem</b>	Stainless steel double D stem
<b>Stem Seals</b>	Self adjusting double U cup
<b>Disc</b>	Ductile iron nylon 11 coated disc
<b>Fluid Temperatures</b>	-40 to 250°F (-40 to 121°C)
<b>Close-off rating</b>	ANSI VI Bubble tight
<b>Application</b>	Chilled or hot water up to 60% glycol



### Three-Way Normally Closed (632x-) / Normally Open (631x-) Assemblies

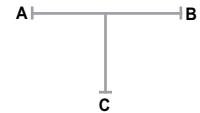
Size in.	Cv (Kvs) @ 90°	Close-off pressure psi (kPa)	Two-positiona	Floatinga	Proportionala	Voltage vac
2	144 (125)	175 (1207)	VAF-63nx-556-L-11	VFF-63nx-556-L-11	VSF-63nx-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-63nx-556-L-12	VFF-63nx-556-L-12	VSF-63nx-556-L-12	24
3	461 (399)	175 (1207)	VAF-63nx-556D-L-13	VFF-63nx-556D-L-13	VSF-63nx-556D-L-13	24
4	841 (727)	50 (345)	VAU-63nx-556D-L-14	VFF-63nx-556D-L-14	VSF-63nx-556D-L-14	24

n - 632x normally closed; 631x normally open

a - x = Select 1, 2 or C :

- 1 = Actuator is mounted on the main valve at "A" and is NC/NO
- 2 = Actuator is mounted on the main valve at "B" and is NC/NO.
- The linked valve for 1 and 2 is "C."

C = Configurable option at time of ordering in iPortal



Actuator codes	Model prefix	Actuator model	Description
556 <sup>b</sup>	VAxx	MA41-7153	24 Vac, on/off, SR
556 <sup>bc</sup>	VAXS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches
556 <sup>b</sup>	VFxx	MF41-7153	24 Vac, Floating, SR
556 <sup>bc</sup>	VFXS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches
556 <sup>b</sup>	VSxx	MS41-7153	24 Vac, Modulating, SR
556 <sup>bc</sup>	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. e.g. VxxS

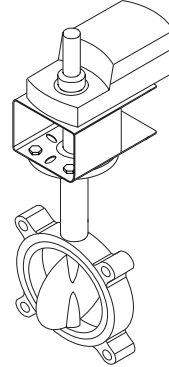
b - D = Dual mounting

c - Dual mounted application. One Mx41-7153 and one Mx41-7153-502 are supplied

## 2" to 6" Lug Bodies 2-Way NSR Assemblies

### Specifications

<b>Flow type</b>	Equal % bidirectional
<b>Body</b>	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges
<b>Seat</b>	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured
<b>Material</b>	
<b>Stem</b>	Stainless steel double D stem
<b>Stem Seals</b>	Self adjusting double U cup
<b>Disc</b>	Ductile iron nylon 11 coated disc
<b>Fluid Temperatures</b>	-40 to 250°F (-40 to 121°C)
<b>Close-off rating</b>	ANSI VI Bubble tight
<b>Application</b>	Chilled or hot water up to 60% glycol



Size in.	Cv (Kvs) @ 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-E25-L-12	VSF-6200-E25-L-12	24
3	461 (399)	175 (1207)	VFF-6200-E25-L-13	VSF-6200-E25-L-13	24
4	841 (727)	175 (1207)	VFF-6200-E25D-L-14	VSF-6200-E25D-L-14	24
		50 (345)	VFU-6200-E25-L-14	VSU-6200-E25-L-14	24
5	1376 (1190)	50 (345)	VFU-6200-E25D-L-15	VSU-6200-E25D-L-15	24
6	1850 (1600)		VFU-6200-E25D-L-16	VSU-6200-E25D-L-16	24

Actuator codes	Model prefix <sup>a</sup>	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 <sup>b</sup>	VFxx	NR-2224-521	24 Vac, Floating, on/off, NSR
E25 <sup>b,c</sup>	VFxS	NR-2224-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux switch
E25 <sup>b</sup>	VSxx	NR-2224-541	24 Vac, Modulated, NSR
E25 <sup>b,c</sup>	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. e.g. VxxS

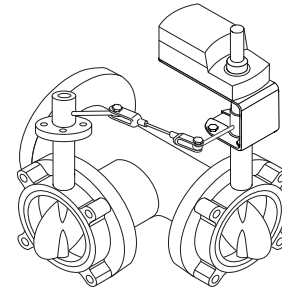
b - D = Dual mounting (E25D).

c - Dual mounted application. One NR-22xx-5x1 and one NR-22xx-5x2 are supplied.

## 2" to 6" Lug Bodies 3-Way NSR Assemblies

### Specifications

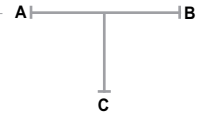
<b>Flow type</b>	Equal % bidirectional Mixing or diverting applications
<b>Body</b>	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges
<b>Seat</b>	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured
<b>Material</b>	
<b>Stem</b>	Stainless steel double D stem
<b>Stem Seals</b>	Self adjusting double U cup
<b>Disc</b>	Ductile iron nylon 11 coated disc
<b>Fluid Temperatures</b>	-40 to 250°F (-40 to 121°C)
<b>Close-off rating</b>	ANSI VI Bubble tight
<b>Application</b>	Chilled or hot water up to 60% glycol



Size in.	Cv (Kvs) @ 90°	Close-off pressure psi (kPa)	On/off or floating <sup>a</sup>	Proportional <sup>a</sup>	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".



Actuator codes	Model prefixa	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 <sup>b</sup>	VFxx	NR-2224-521	24 Vac, Floating, on/off, NSR
E25 <sup>b,c</sup>	VFxS	NR-2224-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux switch
E25 <sup>b</sup>	VSxx	NR-2224-541	24 Vac, Modulated, NSR
E25 <sup>b,c</sup>	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. e.g. VxxS.

b - D = Dual mounting (E25D).

c - Dual mounted application. One NR-22xx-5x1 and one NR-22xx-5x2 are supplied.

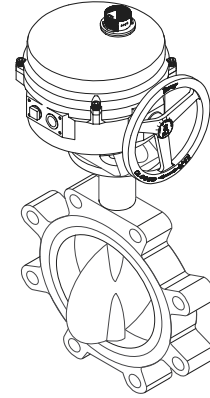


## Butterfly Valve Assemblies

### 2" to 18" Lug Bodies 2-Way NSR with Hand Wheel Assemblies

#### Specifications

<b>Flow type</b>	Equal % bidirectional Mixing or diverting applications
<b>Body</b>	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges
<b>Seat</b>	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured
<b>Material</b>	
<b>Stem</b>	Stainless steel double D stem
<b>Stem Seals</b>	Self adjusting double U cup
<b>Disc</b>	Ductile iron nylon 11 coated disc
<b>Fluid Temperatures</b>	-40 to 250°F (-40 to 121°C)
<b>Close-off rating</b>	ANSI VI Bubble tight
<b>Application</b>	Chilled or hot water up to 60% glycol



Size in.	Cv (Kvs) @ 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
		17214 (14890)	50 (345)	VAUS-6200-E60-L-22	VSUS-6200-E62-L-22

\* For 24 VAC powered change Two-position or proportional "E" code to "F," e.g. VAFS-6200-F10-L-11."

# Damper Actuators

## Spring Return Direct Coupled SmartX Actuators

### 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
- Floating and proportional models automatically adjust input span to match the damper/valve travel



### 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 to 4 actuators
- MS40-717x models provide position feedback signal



### High performance HVAC applications

#### Mx70-704x 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 counter clockwise 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



#### Mx41-7xx 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
- Operational 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 side.
- Models for auxiliary switch applications.
- 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° to – 95°
- Can be double-mounted (gang mounting) to accommodate high torque application requirements.



# Damper Actuators

	Torque lb-in minimum	Control Type						2...10 VDC 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 <sup>a</sup> VDC	4...20 mA								6...9 VDC	Running					Holding
MA4D-7030	30											7.8	5.0	2.5	<56	<23		CCW		
MA4D-7033-100												5.1								
MA4D-8030												7.8	5.0	2.5						
MA4D-8033-100												5.1							CW	
MF4D-7033-100																			CCW	
MF4D-8033-100												6.8	4.2	1.9					CW	
MS4D-7033-100																				
MS4D-7033-150																			CCW	
MS4D-7033-160																				
MS4D-8033-100												6.1	3.4	1.4						
MS4D-8033-150																				
MS4D-8033-160																			CW	
MA40-7040		35																		
MA40-7040-501													4.3	3.4	1.2	<80	<40	1		
MA40-7041																				
MA40-7041-501												4.6	3.9	1.2	<50	<28	1			
MA40-7043																				
MA40-7043-501												4.4	2.9	0.8			1			
MF40-7043																				
MF40-7043-501												5.9	4.4	2.9			1			
MS40-7043																				
MS40-7043-501												5.6	4.2	2.4	<130	<25	1			
MS40-7043-MP																				
MS40-7043-MPS												6.6	5.0	3.2			1			
MA41-7070	60																			
MA41-7070-502													5.6	3.6	1.2	<80	<40	2		
MA41-7071																				
MA41-7071-502												8.0	4.0	1.4	<80	<40	2			
MA41-7073																				
MA41-7073-502												4.8	3.2	0.8			2			
MF41-7073																				
MF41-7073-502												6.2	4.8	2.8			2			
MS41-7073																				
MS41-7073-502												5.8	4.6	2.3	<195		2			
MA41-7150		133																		
MA41-7150-502													10.0	8.4	3.3			2		
MA41-7151																				
MA41-7151-502													10.6	8.5	5.0		<30	2		
MA41-7153																				
MA41-7153-502																				
MF41-7153												9.7	7.7	3.2			2			
MF41-7153-502																				
MS41-7153																				
MS41-7153-502																				
MA40-7170	150																			
MA40-7170													8.4			<162	<82			
MS40-7170													8.5							
MS40-7171													10.8			<147	<65			
MA40-7173												7.4			<162	<82				
MF40-7173												8.1			<162	<82				
MS40-7173											7.8			<147	<65					
MA41-7303	270																			
MA41-7303-502												16 <sup>1</sup>								
MA41-7300																				
MA41-7300-502												21								
MS41-7303 <sup>3</sup>													9.5		4.5					
MS41-7303-502 <sup>3</sup>												16 <sup>1</sup>								
MS41-7303-W02 <sup>3</sup>																				
MS41-7303-W02 <sup>3</sup>																				
MS41-7303-WH2 <sup>3</sup>												16	9.5		150 <sup>4</sup>					
MS41-7303-WH2 <sup>3</sup>												21 w/ heater <sup>1</sup>	21 w/ heater							

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.

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

### Product description

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

### 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.

Specifications	
<b>Control signal</b>	Refer to the tables for actuator models and control types
<b>Power inputs</b>	See table.
<b>Connections</b>	3 ft (91 cm) appliance (see * in table below) or 10 ft. (3m) plenum cables enclosure accepts 1/2” (13mm) conduit connector.
<b>Electrical outputs</b>	Position Feedback voltage (proportional or floating only): For voltage rangers, 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.
<b>Mechanical outputs</b>	Travel: 95° nominal. Manual override: allows positioning of damper or valve using manual crank. RA/DA Jumper: Permits reverse acting/direct acting control (MS4D models only/)
<b>Ambient Temperature Limits</b>	Shipping and storage: -40–160°F (-40–71°C) Operating: -22–140°F(-30–60°C) Humidity: 15–95% RH, non-condensing
<b>Location</b>	NEMA 1, NEMA 2, UL Type 2 (IEC IP54) with customer supplied water tight conduit connectors. Enclosure is air plenum rated.
<b>Agency Listings</b>	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.



Part number	Torque Nm	Spring Return	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F					
			Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered	Spring Return				
MA4D-7033-100	30 (3.4)	CCW	2 position	24 Vac/dc	5.1	-	No	56	23 MD5B-230 MD5B-230-S MD5B-24 MD5B-24-S				
MA4D-7030				120 Vac	7.8								
MA4D-8033-100				24 Vac/dc	5.1								
MA4D-8030				120 Vac	7.8								
MF4D-7033-100		CCW		Floating	24 Vac/dc					6.8	2–10 vdc	85	21
MF4D-8033-100													
MS4D-7033-100		CCW		2–10 vdc						0–10 vdc			
MS4D-7033-150				0–10 vdc						2–10 vdc			
MS4D-7033-160			4–20 ma	0–10 vdc									
MS4D-8033-100		CW	2–10 vdc	2–10 vdc									
MS4D-8033-150			0–10 vdc	0–10 vdc									
MS4D-8033-160			2–10 vdc	2–10 vdc									
			4–20 ma	2–10 vdc									

## Mx4D-703x and Mx4D-803x Series 35 lb-in SmartX Direct Coupled Damper Actuators

### 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 ball valves.

### Features

- Direct mount to round or square damper shaft
- Overload protection throughout rotation
- Optional built-in auxiliary switches
- True mechanical clockwise or counter clockwise 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

Specifications	
<b>Control signal</b>	On-off, SPST control contacts or Triacs (500 mA rated).
<b>Power inputs</b>	See table.
<b>Connections</b>	MA40-704x and MA40-704x-501 – 3ft. (91 cm) long , appliance cables, 1/2" conduit connector. For M20 Metric conduit, use AM-756 adaptor: MF40-7043 and MF40-7043-501 – 3ft. (91 cm) long, plenum-related cables, 1/2" conduit connector. For M20 Metric conduit, use AM-756 adaptor.
<b>Electrical outputs</b>	Position Feedback voltage "AO" 2–10 Vdc (maximum 0.5mA) output signal for position feedback or operation of up to four slave actuators. One auxiliary switch (select models). SPDT 6a resistive @ 24 Vac or 250 Vac.
<b>Mechanical outputs</b>	Travel rotation is limited to 95° ± 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).
<b>Ambient Temperature Limits</b>	Shipping and storage: -40–160°F (-40–71°C) Operating: -22–140°F (-30–60°C) Humidity: 5–95% RH, non-condensing
<b>Location</b>	NEMA 2 IEC IP54
<b>Agency Listings</b>	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.



Part number	Torque Nm	Spring Return	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F			
			Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	Powered	Spring Return		
MA40-7040	30 (4)	CW/ CCW	2 position	120 Vac	4.3	-	-	<50	<28		
MA40-7040-501							1-SPDT (250)Vac				
MA40-7041				230 Vac	4.6		-				
MA40-7041-501							1-SPDT (250)Vac				
MA40-7043				4.4	-						
MA40-7043-501					1-SPDT (24)Vac						
MF40-7043			24 Vac/dc	Floating	5.9	-	2–10 vdc	<130	<25		
MF40-7043-501						1-SPDT (24)Vac					
MS40-7043						2–10 vdc				5.9	-
MS40-7043-501											1-SPDT (24)Vac
MS40-7043-MPa						6–9 vdc				6.6	-
MS40-7043-MP5a											1-SPDT (24)Vac

a - For MP and MP5; Provides auxiliary power supply +20 Vdc 25 mA maximum.

# Damper Actuators

## Mx41-7000 Series 60 lb-in and 133 lb-in SmartX Direct Coupled Damper Actuators

### Product description

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

### Features

- Direct mount to round or square damper shaft
- 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
- 5-year warranty

### Specifications

<b>Control signal</b>	On-off, SPST control contacts or Triacs (500 mA rated) Floating point control, 24 Vac. 10 Vdc or 4 to 20 mA dc with a 500 Ω resistor.
<b>Power inputs</b>	See table.
<b>Connections</b>	3 ft. appliance cables, 1/2 in. conduit connector
<b>Electrical outputs</b>	Position Feedback voltage "AO" 2–10 Vdc (maximum 0.5mA) 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.
<b>Mechanical outputs</b>	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°
<b>Ambient Temperature Limits</b>	Shipping and storage: -40–160°F (-40–71°C) Operating: -22–140°F (-30–60°C) Humidity: 5–95% RH, non-condensing
<b>Location</b>	NEMA 1, NEMA 2 (IEC IP54) with conduit connector in down pos.
<b>Agency Listings</b>	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.



Part number	Torque Nm	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					8.0		2-SPDT (250)Vac		
MA41-7071				230 Vac	-				
MA41-7071-502					2-SPDT (250)Vac				
MA41-7073				24 Vac/dc	-				
MA41-7073-502					2-SPDT (24)Vac				
MA41-7150	133 (15)		CW/ CCW	2 position	120 Vac	10.0	-	<190	<30
MA41-7150-502						10.6	2-SPDT (250)Vac		
MA41-7151					230 Vac	-			
MA41-7151-502						2-SPDT (250)Vac			
MA41-7153					9.7	-			
MA41-7153-502						2-SPDT (24)Vac			
MF41-7073	60 (7)	CW/ CCW	Floating	24 Vac/dc	6.2	-	<195	<30	
MF41-7073-502					9.7	2-SPDT (24)Vac			
MF41-7153	133 (15)		2-10 vdc	2-10 vdc	9.7	-	<195	<190	
MF41-7153-502						2-SPDT (24)Vac			
MS41-7073	60 (7)		CW/ CCW	2-10 vdc	2-10 vdc	5.8	-	<195	<190
MS41-7073-502						9.7	2-SPDT (24)Vac		
MS41-7153	133 (15)			2-10 vdc	2-10 vdc	9.7	-	<195	<190
MS41-7153-502							2-SPDT (24)Vac		

## Damper Actuators

### Mx40-717x Series 150 lb-in SmartX Direct Coupled Damper Actuators

#### Product description

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

#### Features

- Direct mount to round or square damper shaft
- 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
- Can be double-mounted(gang mounting) to accommodate high torque application requirements (2 to 4 actuators)
- MS40-717x models produce position feedback signal
- Linkage required for Globe Valve Assembly



Specifications	
<b>Control signal</b>	Two wire, SPST or Triacs (500 mA rated) SPDT floating control output, Triacs (500 mA rated), or 2 SPST contacts. Proportional 2 to 10 Vdc or 4 to 20 mA dc with a 500 $\Omega$ (not included).
<b>Power inputs</b>	See table.
<b>Connections</b>	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.
<b>Electrical outputs</b>	Travel: Electronically limited to 92° $\pm$ 1° (MS). MF-MA Mechanically limited to 101° $\pm$ 1°
<b>Mechanical outputs</b>	Position indicator: pointer and scale are provided
<b>Ambient Temperature Limits</b>	Shipping and storage: -40–160°F (-40–71°C) Operating: -22–140°F (-30–60°C) Humidity: 5–95% RH, non-condensing
<b>Location</b>	NEMA 1, NEMA 2 (IEC IP54) with customer supplied water tight conduit connectors.
<b>Agency Listings</b>	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.

Part number	Torque Nm	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							

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

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 models for other input signals such as floating and pulse width modulating (PWM).

### Features

- Mechanical spring return, manual override and Brushless DC Motor
- Stall protected throughout rotation and reversible mounting.
- Models for auxiliary switch applications
- Direct mount to 1/2"–3/4" round or 1/2"–11/16" square damper shafts of to 3/4"–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

### Specifications

<b>Control signal</b>	Two position, 2–10 Vdc <sup>1</sup>
<b>Optional control signal (MS41 models only)</b>	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
<b>Power inputs</b>	See table.
<b>Connections</b>	3' appliance cable with 18 Ga. (0.9 mm) conductors and one 1/2" conduit connector -WO2/-WH2 models: Removable terminal blocks.
<b>Electrical outputs</b>	Position feedback: 2–10 Vdc, 0.5 mA max, adjustable with optional BEL-ZTH US Handheld Interfact Module for Field Programming. Auxiliary Switch: 2SPDT 3A (0.5 A) @ 250 Vac (see table)
<b>Mechanical outputs</b>	Travel: Angle of rotation 95° max. Position indicator: graduated position indicator showing 0°–95° Manual override: Actuators provided with 5 mm hex crank
<b>Ambient Temperature Limits</b>	Shipping and storage: -40–176°F (-40–80°C) Operating: -22–122°F (-30–50°C) Humidity: 5–95% RH, non-condensing
<b>Location</b>	NEMA 2 and NEMA 4 (select models; see table)
<b>Agency Listings</b>	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].



<sup>1</sup> Also compatible with two position, floating, PWM, and proportional input signals, refer to the SmartX Actuators Spring Return Damper Mx 730x Series Installation Instructions, F27870.

Part number	Torque Nm	Spring Return	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F			
			Control	Voltage	VA @ 60Hz	Feedback	Auxiliary 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					2						
MA41-7300-502			2–10 vdc	24 Vac	16 VA	10.8 7.8	2	150	Yes	Yes	
MS41-7303											
MS41-7303-502											
MS41-7303-W02											
MS41-7303-WH2	16 VA and 21 W heater										



## Overview - NSR SmartX Damper Actuators

### 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 (Mx41-6083-502).
- Feedback position output signal available (MS41-6043/6083 series).
- 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,
- Independently adjustable dual auxiliary switches option available (MS41-6153-502),
- 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 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).
- 5 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.



	Min	Max Stall	Floating	Proportional			0...10 VDC	24 VAC, 24 VDC	24 VAC	120 VAC	VA @60Hz	Watts		Powered	SPDT, 6A, Resistive, 24 VAC	SPDT, 4A Resistive, 24 VAC
				0...10 VDC	2...10 VDC <sup>a</sup>	4...20 mA						Running	Holding			
MF41-6043	44									2.3			90			
MS41-6043										3.3			90			
MF41-6083										2.3						
MF41-6083-502															2	
MS41-6083	88									3.3						
MS41-6083-502													125		2	
MF41-6153										3						
MS41-6153	133									5	4	4				
MS41-6153-502											1				2	
MF41-6343										5.7	3.9	2.8	<162			
MS41-6343	300	650								5.6	3.6	2.4				
MS41-6340										7.5	4.7	3.0	<145			

<sup>a</sup> - Proportional models with a 2...10 VDC control signal accept a 4...20 mA signal with the use of a 500 ohm resistor.

## Damper Actuators

### Mx41-60x3 Series 44 and 88 lb-in NSR SmartX Direct Coupled Damper Actuators

These direct coupled 24 Vac non-spring return rotary electric SmartX Actuators are designed for three position (floating) control of the dampers

#### Features

- Compact, lightweight design.
- Easy-to-see position indicator.
- Self-adapting capability for maximum flexibility in damper positioning.
- Quiet, low-power operation.
- Plenum cable standard.
- Independently adjustable dual auxiliary switches option available (Mx41-6083-502).
- Feedback position output signal available (MS41-6043/6083 series).

Specifications	
<b>Control signal</b>	MF41-60x3 – Floating three-position control, 24 Vac. MS41-60x3 – Proportional, 0 to 10 Vdc; input resistance 100 kW
<b>Power inputs</b>	See table.
<b>Connections</b>	3' (0.9 m) appliance cable, 18 AWG plenum-related leads
<b>Electrical outputs</b>	Position feedback for MS41-6043/6083: 0–10 Vdc, 1mA. Auxiliary switches: dual auxiliary switches available with MF41-6083-502, MS41-6083-502 when these actuators are ordered as separate units. Auxiliary switches are not offered with factory ball valve assemblies
<b>Mechanical outputs</b>	Travel: Normal angle of rotation is 90° limited to a maximum of 95°. Field adjustable to limit travel on either end of stroke.
<b>Ambient Temperature Limits</b>	Shipping and storage: -40–158°F (-40–70°C) Operating: -25–130°F (-32–55°C) NOTE: Check the valve operating temperature limit. The minimum valve temperature limit is 20°F (6.7°C) 5–95% non-condensing.
<b>Location</b>	NEMA Type 2 (IEC IP54)
<b>Agency Listings</b>	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directive LVD, EMC, RoHS2.



Part number	Torque Nm	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F
		Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	
MF41-6043	44(5)	Floating	24 Vac	2.3	–	–	90
MF41-6083	88(10)						125
MF41-6083-502							2-SPDT
MS41-6043	44(5)	0–10 Vdc	24 Vac	3.3	0–10 Vdc	–	90
MS41-6083	88(10)						125
MS41-6083-502							2-SPDT

## Mx41-6153 Series 133 lb-in NSR SmartX Direct Coupled Damper Actuators

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

### Features

- Synchronous motor technology with stall protection
- Unique self-centering shaft coupling
- 5° preload as shipped from factory
- Mechanical range adjustment capabilities
- Independently adjustable dual auxiliary switches option available (MS41-6043-502).
- Built-in 1/2" conduit connection

### Specifications

<b>Control signal</b>	MF41-6153 – floating three-position control, 24 Vac. MS41-6153, MS41-6153-502 – Proportional, 0 to 10 Vdc; input resistance 100 kW.
<b>Power inputs</b>	See table.
<b>Connections</b>	3' (0.9 m) long, 18 AWG leads
<b>Electrical outputs</b>	Position output signal (wires 9-2) MS41-6153 Series Voltage-output 0–10 Vdc. Maximum output current 1 ± mA
<b>Mechanical outputs</b>	Nominal angle of rotation is 90° Maximum angular rotation 95°
<b>Ambient Temperature Limits</b>	Shipping and storage: -40–158°F (-40–70°C) Operating: -25–130°F (-32–55°C) Ambient humidity: 95% non-condensing.
<b>Location</b>	NEMA1/IP54 according to EN 60 529
<b>Agency Listings</b>	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, RoHS2.



Part number	Torque Nm	Actuator Inputs			Outputs		Approximate Timing in seconds @ 70°F
		Control	Voltage	VA @ 60Hz	Feedback	Auxiliary Switch	
							Powered
MF41-6153	133 (15)	Floating	24Vac	3	–	125	
MS41-6153		0–10 Vdc		5	0–10 Vdc		
MS41-6153-502					2-SPDT		

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

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 0–10 Vdc or 4–20 mA dc<sup>a</sup> control signals.

### Features

- 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
- Clockwise or counterclockwise rotation is determined by actuator mounting position
- Accurate 92° travel digitally controlled
- Integral position indication scale
- Oil immersed gear train provides continuous lubrication
- Rated for operating temperatures up to 140 F (60 C)
- 5 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

### Specifications

<b>Control signal</b>	SPDT floating control input; Triacs (500 mA rated) or 2 SPST contacts Floating: 24 Vac ± 20% Proportional: 2–10 Vdc 4–20 mAdc <sup>a</sup>
<b>Power inputs</b>	See table.
<b>Connections</b>	3' (91 cm) Appliance cable, 1/2" conduit connectors
<b>Electrical outputs</b>	Travel: Mechanically limited to 101° ±1°
<b>Mechanical outputs</b>	Overload Protection: Throughout rotation. Nominal angle of rotation is 93° Position Indication: Scale numbered 0–95° Manual override: allows manual positioning.
<b>Ambient Temperature Limits</b>	Shipping and storage: -40–160°F (-40–71°C) Operating: -25–140°F(-32–60°C) Ambient humidity: 5–95% non-condensing.
<b>Location</b>	NEMA Type 1. NEMA Type 4 (IEC IP56) with customer supplied water tight conduit connectors.
<b>Agency Listings</b>	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, RoHS2.

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



Part number	Torque Nm	Actuator Inputs			Outputs		Approximate Timing in seconds @ 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				7.5			

## 0453X Series Two-position Damper Actuators

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.

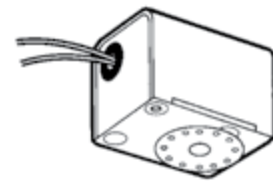
The 0453H medium duty Damper Actuators are designed for a variety of Two-position, spring return damper applications. The 0453H uses a two-wire thermostat control.

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.

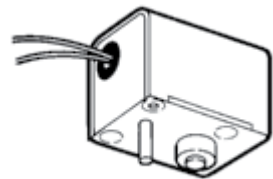
### Features

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

Specifications	
<b>Inputs</b>	
<b>Voltage</b>	24 Vac @ 50/60 Hz, 110/120 Vac @ 50/60 Hz, 220/230 Vac @ 50/60 Hz.
<b>Power</b>	See Model table
<b>Connections</b>	Internal junction box, 18" leads, cord sets.
<b>Outputs</b>	
<b>Mechanical</b>	Optional End Switch ;10 A @ 120 Vac.
<b>Direction of rotation</b>	CW or CCW rotation is available.
<b>Linkage</b>	Customer supplied.
<b>Direct drive</b>	For 5/16" maximum damper output shaft with maximum engagement of 7/8".
<b>Environment temperature limits:</b>	
<b>Shipping and storage</b>	-40 to 169°F (-40 to 71°C)
<b>Operating humidity</b>	0 to 120°F (-17 to 49°C) Non-condensing.
<b>Shipping weight</b>	0453L & 0453H: 1.2 lbs (544 g); 0453R: 1.7 lbs (771 g).
<b>Location</b>	NEMA 1
<b>Regulatory compliance</b> (All are rated for use in Plenum spaces).	
<b>Models 0453L, 0453H</b>	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).
<b>Models 453L, 453H, 453R:</b>	CE Mark compliant, safety evaluated per EN 60730-1 & -2-14, (including EN 61000-6-2 EU immunity & EN 61000-6-3 EU emissions).
<b>Optional accessories</b>	
<b>453-52</b>	6 to 12" damper shaft kit.
<b>453-69</b>	12 to 20" damper shaft kit.



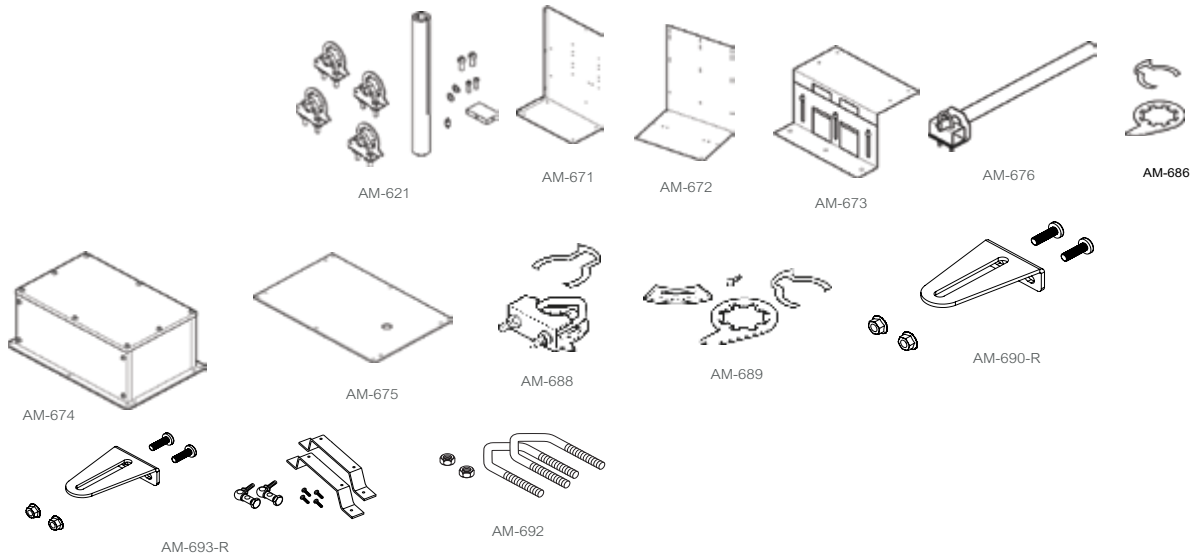
Linkage Drive



Direct Drive

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		
<b>0453L</b>	45	25	17	25	6.5	7	18 @ 60 Hz 22 @ 50 Hz	6 @ 50/60 Hz
<b>0453H</b>	55	35	35	55	6.5	10	27 @ 60 Hz 32 @ 50 Hz	8 @ 50/60 Hz
<b>0453R</b>	150	150	-	-	6.5	7	37 @ 60 Hz 45 @ 50 Hz	-

## Damper Accessories



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

a - AM-693 crank arm kit required.

b - Cannot be used with Mx41-634x or Mx40-717x series actuators.

c - Drill appropriate mounting holes where needed.

d - The large "C"-shaped clamps included in AM-693 crank arm kit are required for mounting the actuator. Drill appropriate mounting holes where needed.

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

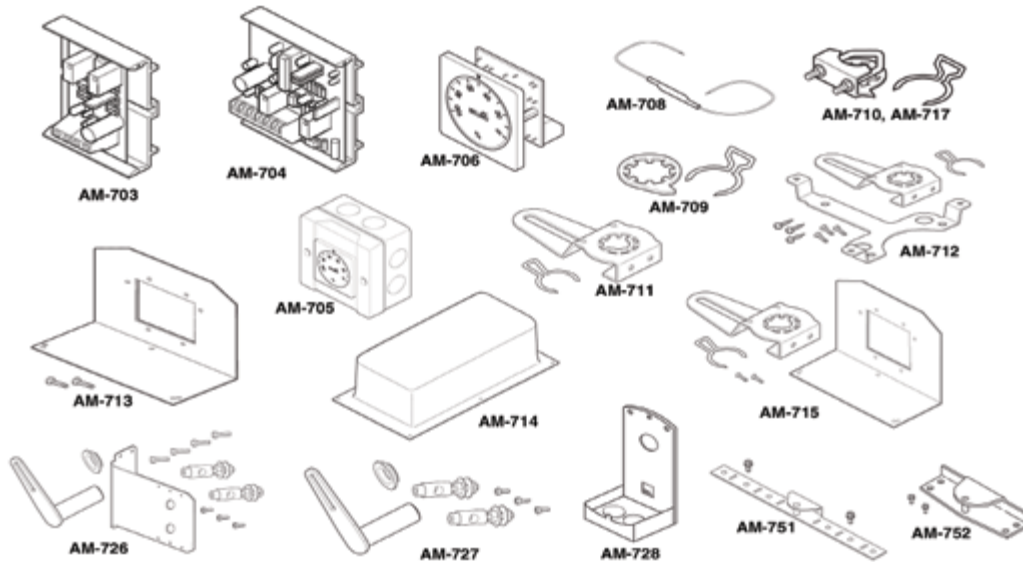
f - For shafts to 3/4" and 1.05" diameter (with AM-690 and AM-691, respectively).

g - Use the self-tapping screws and flat washers provided in kit to mount actuator.

h - AM-692 V-bolt kit required. The AM-693-R damper linkage kit is used in conjunction with the AM-687 or AM-688 universal clamps to provide a mechanical linkage between the damper actuator and the damper shaft when a direct coupling is not possible.

i - Used in conjunction with the AM-687 or AM-688 universal clamps for crankarm functionality in non-direct mounting applications.

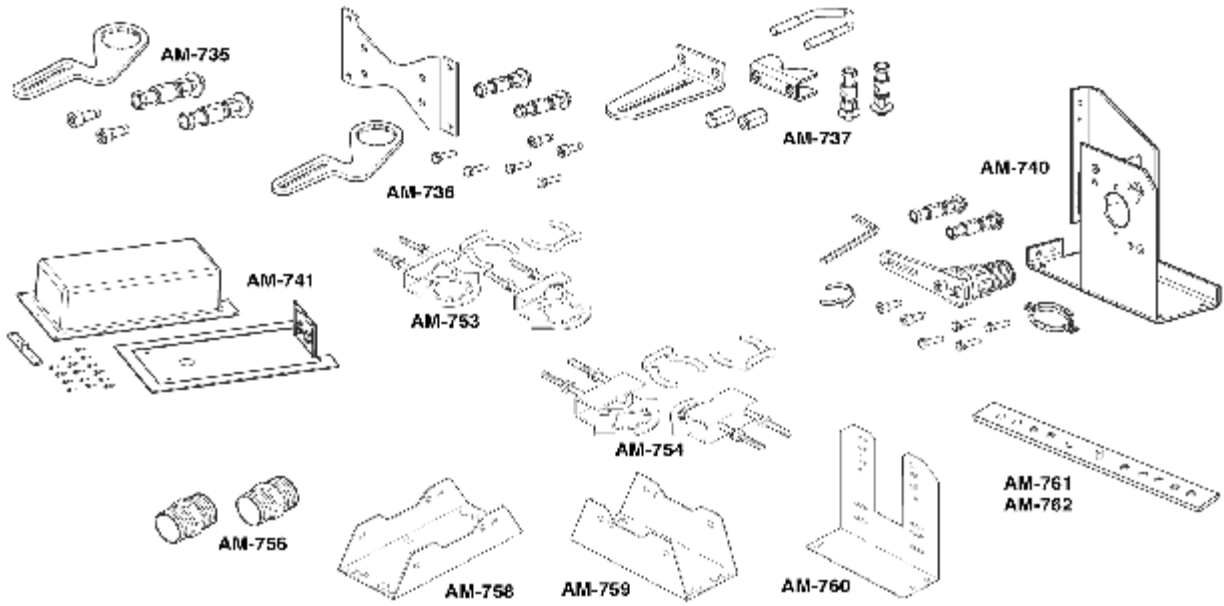
## Damper Accessories



Part Number	Description	Spring Return Actuators								Non Spring Return Actuators									
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717x MF40-7173	MS40-7173	MS4D-x033	MF41-6043	MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	IMx41-730x
AM-703	Span Adjustment																		
AM-705	Positioner																		
AM-706																			
AM-708																			
AM-709	Position Indicator & Stroke Limiter																		
AM-710 <sup>a</sup>	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 <sup>b</sup>	Conduit Adaptor																		
AM-751	Anti-rotation Bracket																		
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.

Damper Accessories



Part Number	Description	Spring Return Actuators								Non Spring Return Actuators						
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717X MF40-7173	MS40-7173	MS4D-x033	MF41-6043 MS41-6043	MF41-6083	MS41-6083	MF41-6153 MS41-6153	MF41-6343	MS41-6343
AM-735	Crank Arm Kit															
AM-737	Universal Crank Arm <sup>a</sup>															
AM-741	Weather Shield															
AM-753 <sup>b</sup>	Mounting Clamp															
AM-754 <sup>c</sup>																
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															

a - For Honeywell Floor Mount Mod. Motor.  
 b - For shafts 3/8" (19 mm) round and 5/8" (15.9 mm) square.  
 c - For shafts 3/8"...1/2" (10...13 mm) round and square.  
 d - Only used on Mx41-707x-xxx, Mx41-715x-xxx.



# Foot Mounted Actuators

## Overview: Foot Mount Actuators

### Product Overview

**MA-3/4xx Series:** These actuators provide two-position operation of dampers, valves, and other equipment requiring the return to normal position upon power interruption.

**MC-351/421/431:** These actuators provide two-position operation of dampers or valves in heating, ventilating, and air conditioning systems, and similar applications where return-to-normal position is not required.

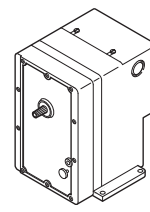
**MP-3xx Series, MP-4xx Series, MP-2xxx Series, and MP-4xxx Series:** These actuators are used for two-position, floating, and proportional control of dampers, valves, and program switches in heating, ventilating, air conditioning, and similar applications. Hazardous location models offer a sturdy cast aluminum case with bolted cover. They have two 3/4" pipe tapped openings for joints with rigid metal conduit. All wiring is brought out to separate terminals for ease of installation. These factory enclosure and actuator assemblies are Underwriters Laboratories Listed.

**MP-9xxx Series Reversible and Proportional Electric Actuators:** These actuators provide control of heavy dampers, large valves, and other high torque applications in heating, ventilating, air conditioning, and similar applications which do not require return to a normal position.

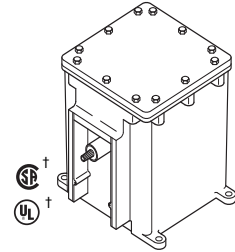
The CP-8301-xxx electronic actuator drive is designed to process a variable 2 to 15 Vdc signal from a controller to provide proportional control of an electric gear train actuator.

The CP-8391-716 and 913 electronic actuator drives are designed to process a variable 4 to 20 mA dc signal from a controller to provide proportional control of an electric gear train actuator.

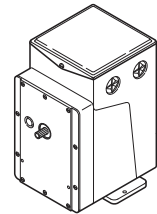
The CP-9301 and CP-9302 electronic actuator drives process a variable input signal from a controller to provide proportional control of an electric gear train actuator.



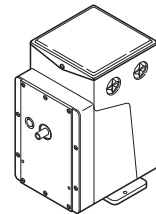
MA-3xx, MA-4xx (Standard)



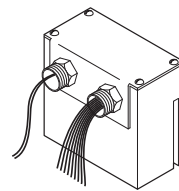
MA6-3xx, MA6-4xx, MA8-4xx, MA7-4xx  
† Hazardous Locations



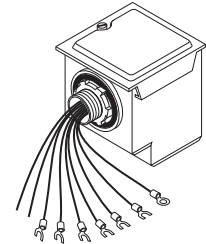
Spring Return MP-3/-4xxx Series, MP-2/-4xxx Series



Non-Spring Return Spring Return MP-3/-4xxx Series, MP-2/-4xxx Series, MC-351/421/431



CP-8301-xxxx, CP-8391-913



CP-9301/9302

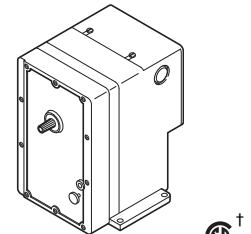


## MA-3/4xx Series Two-position Oil-Submerged Actuators

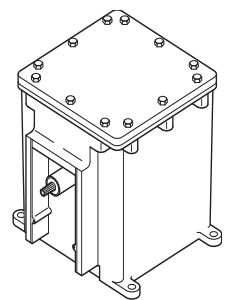
These actuators provide two-position operation of dampers, valves, and other equipment requiring the return to normal position upon power interruption.

### Features

- SPST controller.
- Spring return.
- 24, 120 and 240 Vac models.
- SPDT auxiliary switch if actuator part number suffix is “-500.”
- Rugged die cast aluminum.
- Oil immersed motor and gear train.
- Models for hazardous locations are only available as a factory enclosure/actuator assemblies.
- NEMA 4 with optional watertight conduit connectors, field supplies



MA-3xx, MA-4xx,  
(Standard)



MA6-3xx, MA6-4xx,  
MA8-4xx, MA7-4xx †  
Hazardous Locations

### Specifications

<b>Control circuit</b>	24 Vac @ 50/60 Hz, 110/120 Vac @ 50/60 Hz, 220/230 Vac @ 50/60 Hz.
<b>Spring return</b>	CCW to original position when actuator is de-energized
<b>Auxiliary switch</b>	(-500 models) SPDT makes (or breaks) circuit at powered end of stroke (fixed)
<b>Nominal damper area</b>	Actuator sizing should be done in accordance with damper manufacturer's specifications
<b>Environment</b>	
<b>Ambient temperature limits</b>	
<b>Shipping and storage</b>	-40 to 136°F (-40 to 58°C)
<b>Operating</b>	-40 to 136°F (-40 to 58°C)
<b>Humidity</b>	5 to 95% RH, non-condensing
<b>Locations</b>	NEMA 4a
<b>Connections</b>	Coded screw terminals
<b>Case</b>	Die cast aluminum with two 1/2 in. conduit openings
<b>Mounting</b>	Allow 6 in. (152 mm) clearance above the actuator wiring compartment Refer to Model Table for additional data
<b>Dimensions</b>	
<b>Base actuators</b>	5-3/4 H x 5-3/8 W x 6-9/16 D in. (146 x 136 x 167 mm)
<b>Hazardous location actuators</b>	8-7/8 H x 8-1/2 W x 10-5/8 D in. (225 x 216 x 167 mm)
<b>No load timing<sup>b</sup> at 75 F (24 C)</b>	20 seconds
<b>Agency Listings</b>	UL 873 File E9429 Temperature Indicating and Regulating Equipment CSA C22.2 No. 24 File LR 3728 Installation Instructions F-06491
<b>Installation Instructions</b>	F-06491

a - When used with gasket (provided) and water-tight conduit connectors (not provided).  
b - Spring return timing with full load opposing spring approximately 60 seconds

### Model table

Model No.	Power Supply		Aux.a Switch	Input (Watts)	Va Running/ Holding	Rated Torque lb-in. (N-m)	Application and Mounting	Shaft Rotation
	Vac	Hz						
MA-305	24	60	No	25	56/56	16 (1.8)	Damper actuators. Upright position preferred.	CW 180° when power is applied.
MA-305-500	24		Yes					
MA-405	120		No					
MA-405-500	120		Yes					
MA-318	24		No	70 Running 25 Holding	92/32	60 (6.8)	Damper and valve actuators. Output shaft horizontal.	CW 170° when power is applied.
MA-318-500	24		Yes					
MA-418	120		No					
MA-418-500	120		Yes					
MA-419	240		No	50	120/39			
MA-419-500	240		Yes					
MA5-419	240		No					
MA5-419-500	240		Yes					

a - 2 FLA, 12 LRA at 24/120 Vac; 1 FLA, 6 LRA 2 240 Vac. † Models for hazardous locations are only available as factory enclosure/actuator assemblies.

### Part Numbers for Hazardous Location Applications<sup>a,b</sup>

Model No.	Damper Actuator Part Numbers for Hazardous Locations	Valve Actuator Part Numbers for Hazardous Locations
MA-305	-	-
MA-305-500	-	-
MA-405	MA6-405	-
MA-405-500	MA6-405-500	-
MA-318	-	-
MA-318-500	MA6-318-500	-
MA-418	MA6-418	MA8-418
MA-418-500	MA6-418-500	MA8-418-500
MA-419	-	-
MA-419-500	MA6-419-500	-
MA5-419	-	-
MA5-419-500	MA7-419-500	MA7-419-500

a - Class 1, Groups C and D, and Class 2, Groups E, F and G, hazardous locations. Ref. EN-56-2, F-18451.  
b - Models for hazardous locations are only available as factory enclosure/actuator assemblies.

## MC-351/421/431 NSR Two-Position Actuators

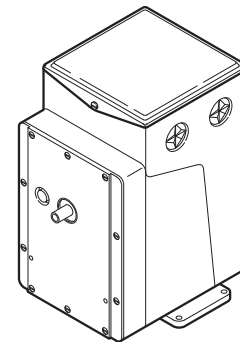
This actuator provides two-position operation of dampers or valves in heating, ventilating, and air conditioning systems, and similar applications where return-to-normal position is not required.

### Features

- Two-position actuators controlled by SPDT controller.
- Non-spring return.
- 24 and 120 Vac models available.
- SPDT auxiliary switch is standard.
- Rugged die cast aluminum housings.
- Oil immersed motor and gear train.

### Specifications

<b>Control circuit</b>	Three wire, SPDT snap acting switch provided by a thermostat, pressure switch, or relay
<b>Shaft Rotation</b>	Unidirectional clockwise 180° when power is applied
<b>Auxiliary switch</b>	Adjustable SPDT is standard. Factory set to make (or break) at mid-stroke
<b>Nominal damper area</b>	Actuator sizing should be done in accordance with damper manufacturer's specifications
<b>Environment</b>	
Shipping and storage	-40 to 136°F (-40 to 58°C)
Operating	-40 to 136°F (-40 to 58°C)
Humidity	5 to 95% RH, non-condensing
<b>Locations</b>	NEMA Type 1. NEMA 4 with AM-363
<b>Connections</b>	Coded screw terminals
<b>Case</b>	Die cast aluminum with two 1/2 in. conduit knock-outs on each side Allow 6 in. (152 mm) clearance above the actuator wiring compartment
<b>Mounting</b>	Any position
<b>Dampers</b>	
<b>Valves</b>	In any upright position with actuator above the center line of the valve body.
<b>Dimensions</b>	7 H x 5-3/8 W x 6-5/16 D in. (178 x 137 x 160 mm).
<b>Installation Instructions</b>	F-08366.



### Model Table

Model No.	Input				No Load Timing (sec/180°)	Rated Torque lb-in. (N-m)
	Volts	Hz	Watts	VA Rating		
MC-351	24	60	28	53	70	220 (25)
MC-421	120	60	50	96	20	175 (19)
MC-431	120	60	50	96	30	220 (25)

### Adjustable Auxiliary Switch SPDT Rating Amps

Type	120 V
Running	5.8
Locked Rotor	34.8
Non-Inductive	12.0

## MP-3/-4xx, MP-2/-4xxx Series Reversible and Proportional Electric Actuators

The MP Series Actuators are used for two-position, floating, and proportional control of dampers, valves, and program switches in heating, ventilation, and air conditioning applications or similar applications.

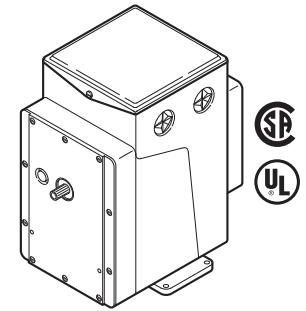
### Features

- Proportional actuators with built-in feedback potentiometers.
- Spring return and non-spring return models available.
- 24 Vac, 120 Vac, and 240 Vac models are available.
- Die cast housings with four 1/2 in. conduit openings.
- Oil-immersed motor and gear train.

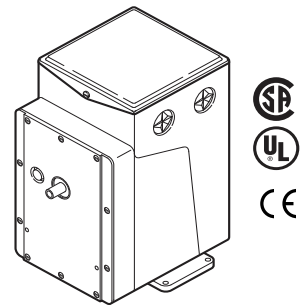
### Specifications

**Input Control signals: Refer to the Model Table for input control signal capability versus specific actuator models.**

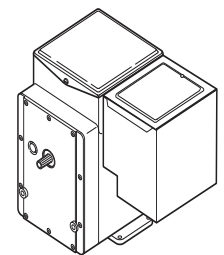
<b>Floating</b>	Requires one Single Pole Double Throw (SPDT) switch with floating (center off) position rated at 0.9 amps at 24 Vac or two Single Pole Single Throw (SPST) switches rated at 0.9 amps at 24 Vac
<b>Two-position SPDT SPST</b>	Requires snap acting switch rated at 0.9 amps at 24 Vac Can be used with certain spring return actuators. Switch must be rated to handle actuator power requirements
<b>Microtherm Proportional</b>	Electrical system with the following typical controllers: PP-22x Series, TP-1xx Series, TP-2xx Series, TP-3xx Series, TP-4xx Series, TP-1xxx Series, and TP-1xxxx Series
<b>Standard Sequencing</b>	Control of a single actuator Five-position Used typically for adjustable minimum position (five positions) of an economizer actuator Control of two actuators in sequence
<b>Slidewire and paralleling</b>	Requires AE-504 paralleling relay AE-504 accepts 100Ω to 1000Ω slidewires
<b>Voltage</b>	Vdc (TAC System 8000) Requires CP-8301-xxx or CP-9301-xxx Series of solid state actuator drives. Refer to the Model Table
<b>Current mAdc</b>	Requires CP-9302-xxx Series of solid state actuator drives. Refer to the Model Table
<b>Connections</b>	MP-3xx, 4xx, 2xxx, 4xxx Coded screw terminals Models -600 Suffix Coded screw terminals except for input signal which are color coded pigtailed
<b>Power Requirements</b>	Refer to the Model Table to determine power requirements
<b>Torque</b>	Refer to the Model Table to determine the actuator torque rating
<b>Nominal damper area</b>	Actuator sizing should be done in accordance with damper manufacturer's specifications
<b>Spring return</b>	Refer to the Model Table for models that are spring return
<b>Environment</b>	
<b>Shipping and storage</b>	-40 to 160°F (-40 to 71°C)
<b>Operating</b>	-40 to 136°F (-40 to 58°C)
<b>Humidity</b>	5 to 95% RH, non-condensing
<b>Locations</b>	NEMA 1; NEMA 4 for non-spring return actuators with AM-363
<b>Dimensions</b>	NSR Models MP-3xx, 4xx, 2xxx, 4xxx 7 H x 5-3/8 W x 6-5/16 D in. (178 x 136 x 160 mm) SR Models -600 Suffix 7 H x 5-3/8 W x 8-1/8 D in. (178 x 136 x 206 mm) SR plus actuator drive housing
<b>Agency Listings</b>	UL 873 File E9429 Temperature Indicating and Regulating Equipment CUL Canadian Standard #LR 3728 European Community EMC Directive 89/336/EEC and 92/31 EEC Low voltage Directive 72/23 EEC Units with a "-xxx-x-2" suffix identify models that are in compliance with CE Example: MP-xxxx-xxx-x-2
<b>Installation Instructions</b>	F-15479.



Spring return



Non-spring return



-6xx with CP-9301 or CP-9302 installed

### Model Table MP-3xx Series

Model No.	Application	Solid State Drive CP-8301-xxx, CP-9301 CP-9302	Power Requirements			Output Shaft			Spring Return	Aux. Switch	Built-in Transformer <sup>a</sup>
			Volts	Hz	Amps	Torque lb.-in. (N-m)	Timing Seconds (No Load)	Degrees of Rotation			
MP-361	Proportional	Available	24	60	2.5	50 (5.6)	90	180 (Adj. <sup>b</sup> )	CW	-	
MP-361-600c		CP-8301-024 Included									
MP-371	Available	180 (non Adj.)						CCW			
MP-371-600 c	CP-8301-024 Included										
MP-377	Sequencing	—			2.2	220 (24.9)	130	130 to 1300	180 (Adj. <sup>b</sup> )	No	SPDT
MP-381	Proportional	Available									
MP-382	Proportional	Available									
MP-387	Sequencing	Available					130				SPST

a - Units with a "-2" suffix, e.g. MP-xxx-xxx-2-x, include a built-in transformer (used for Microtherm or with AE-504) with secondary loads wired externally to terminals seven and eight of the actuator. Red (24 Vac) to terminal eight and Blue (12 Vac) to terminal seven. When these actuators are used with controllers other than Microtherm or AE-504, disconnect the Red and Blue leads and tape off. Note: Models prior to "-2" suffix had transformer wired directly to potentiometer. To disconnect the transformer, remove the back plate of the actuator, disconnect, and tape the transformer leads.

b - Rotation adjustable 45 to 320. Caution: On actuators with proportional input signals changing the rotation will affect the control, since the internal feedback potentiometer's travel is fixed.

c - Integral solid state drive CP-8301 accepts 6-9 Vdc voltage with 20 Vdc power supply included.

## MP-3/-4xx, MP-2/-4xxx Series Reversible and Proportional Electric Actuators

MP-4xx Series Model Table

Model No.	Application	Solid State Drive CP-8301-xxx, CP-9301, CP-9302	Power Requirements			Output Shaft				Aux. Switch	Built-in Transformer						
			Volts	Hz	Amps	Torque lb.-in. (N-m)	Timing Seconds (No Load)	Degrees of Rotation	Spring Return								
MP-422	Proportional	Available	120	60	0.65	60 (6.8)	25 to 250	180 (Adj. b)	No	SPDT	-						
MP-423							13										
MP-424							13 to 130										
MP-451						80											
MP-452						80 to 800											
MP-453						40											
MP-454						40 to 400											
MP-461-600	6 to 9 V Proportional	CP-8301-120 Included			120	60	0.5	50 (5.6)	90	180 (Adj. b)	CW	-					
MP-465	Proportional	Available								180 (non-adj.)	SPDT	-					
MP-471-600	6 to 9 V Proportional	CP-8301-120 Included															
MP-475	Proportional	Available															
MP-481	Proportional	Available															
MP-481-600	6 to 9 V Proportional	CP-8301-120 Included								180 (Adj. b)	No	SPDT	-				
MP-481-691 c		CP-9301 Included															
MP-483	Proportional	Available	120	60			0.5	50 (5.6)	90	65	90 (Adj. b)	SPDT	Yes				
MP-485										130							
MP-486										130 to 1300							
MP-495										180b							
										0.95	450 (50.9)	130					

a - Units with a "-2" suffix, e.g. MP-xxxx-xxx-2-x, include a built-in transformer (used for Microtherm or with AE-504) with secondary loads wired externally to terminals seven and eight of the actuator. Red (24 Vac) to terminal eight and Blue (12 Vac) to terminal seven. When these actuators are used with controllers other than Microtherm or AE-504, disconnect the Red and Blue leads and tape off. Note: Models prior to "-2" suffix had transformer wired directly to potentiometer. To disconnect the transformer, remove the back plate of the actuator, disconnect, and tape the transformer leads.

b - Rotation adjustable 45 to 320°. Caution: On actuators with proportional input signals changing the rotation will affect the control, since the internal feedback potentiometer's travel is fixed.

MP-2xxx Series

Model No.	Application	Solid State Drive CP-8301-xxx, CP-9301, CP-9302	Power Requirements			Output Shaft				Aux. Switch	Built-in Transformer
			Volts	Hz	Amps	Torque lb.-in. (N-m)	Timing Seconds (No Load)	Degrees of Rotation	Spring Return		
MP-2113-500	Proportional	Available	24	60	2.2	50 (5.6)	25	180 (non-Adj.)	No	SPDT	-
MP-2130-500			120		0.5			90 (non-Adj.)			
MP-2150-500			180 (non-Adj.)								

a - Units with a "-2" suffix, e.g. MP-xxxx-xxx-2-x, include a built-in transformer (used for Microtherm or with AE-504) with secondary loads wired externally to terminals seven and eight of the actuator. Red (24 Vac) to terminal eight and Blue (12 Vac) to terminal seven. When these actuators are used with controllers other than Microtherm or AE-504, disconnect the Red and Blue leads and tape off. Note: Models prior to "-2" suffix had transformer wired directly to potentiometer. To disconnect the transformer, remove the back plate of the actuator, disconnect, and tape the transformer lead.

MP-4xxx Series

Model No.	Application	Solid State Drive CP-9301 CP-9302	Power Requirements			Output Shaft				Aux. Switch	Built-in Transformer
			Volts	Hz	Amps	Torque lb.-in. (N-m)	Timing Seconds (No Load)	Degrees of Rotation	Spring Return		
MP5-4751	Proportional	Available	240	50	0.25	50 (5.6)	108	180 (non-Adj.)	CCW	SPDT	Yes

a - Units with a "-2" suffix, e.g. MP-xxxx-xxx-2-x, include a built-in transformer (used for Microtherm or with AE-504) with secondary loads wired externally to terminals seven and eight of the actuator. Red (24 Vac) to terminal eight and Blue (12 Vac) to terminal seven. When these actuators are used with controllers other than Microtherm or AE-504, disconnect the Red and Blue leads and tape off. Note: Models prior to "-2" suffix had transformer wired directly to potentiometer. To disconnect the transformer, remove the back plate of the actuator, disconnect, and tape the transformer leads.

## MP-9xxx Series Reversible and Proportional Electronic Actuators

### Reversible and Proportional Electric Actuators

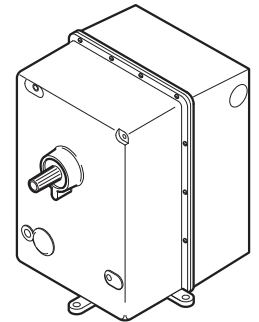
These actuators provide control of heavy dampers, large valves, and other high torque applications in heating, ventilating, air conditioning, and similar applications which do not require return to a normal position.

### Features

- High torque proportional gear train actuators accept the following signals:
  - 100 to 1,000 slidewire (requires AE-504).
  - SPDT floating or snap-acting controller.
  - Variable Vdc.
  - Variable mAdc.
- Torque to 1,600 lb-in.
- Available in 120 Vac models.
- Standard SPDT auxiliary switch.
- Rugged die cast aluminum housings.
- Oil immersed motor and gear train.

### Specifications

<b>Control circuit</b>	Requires SPDT switch with neutral (floating) or two-position and proportional
<b>Shaft Rotation</b>	Reversible proportional can stop at any point in the stroke
<b>Auxiliary switch</b>	Adjustable SPDT snap-acting Factory set to close one contact and open the other at end of CW stroke.
<b>Environment</b>	
Shipping and storage	-40 to 130°F (-40 to 54°C)
Operating	-40 to 130°F (-40 to 54°C)
Humidity	5 to 95% RH
<b>Locations</b>	NEMA Type 1 (NEMA 4 with AM-369)
<b>Connections</b>	Coded screw terminals
<b>Case</b>	Die cast aluminum with two 1/2 in. conduit knock-outs on each side
<b>Mounting</b>	
Dampers	Upright preferred
Valves	Upright with actuator above the center line of the valve body
<b>Dimensions</b>	9-9/16 H x 9-1/2 W x 10-1/2 D in. (243 x 241 x 267 mm)
<b>Agency Listing</b>	MP-9750 only UL Listed
<b>Installation Instructions</b>	F-11331



MP-9750 only

### Model Table

Model No.	Control		Input	Torque Lb-in. <sup>a</sup>	Timing Sec.	Stroke	Misc.
	Type	Amp Rating					
MP-9750b	1, 2	0.9 at 120 Vac	120 Vac, 60 Hz, 0.9 A	800	135	180	Built-in Trans. <sup>c</sup>
MP-9810	3, 4	1.8 at 120 Vac	120 Vac, 60 Hz, 1.8 A	1300	115	180	—
MP-9830				1300	60	90	
MP-9910				1600	145	180	

a - 1 lb-in. = 0.113 N-m.

b - U Listed.

c - Note: MP-9750-xxx-2-x includes a built-in transformer with secondary leads wired externally to terminals 7 and 8 — Red (24 Vac) to 8 and Blue (12 Vac) to 7.

### Compatible Actuators

Actuators	Actuator Drives Input Type			
	Vdc	mA	Vdc/mA	mA/Vdc
Actuator Model	CP-8301-xxxxa	CP-8391-716a	CP-9301	CP-9302
MP-9750	X		X	X
MP-9810				
MP-9830		X		
MP-9910				

a May require close nipple conduit extensions for mounting x-6680.

## CP-8301 2 to 15 VDC Electronic Actuator Drive

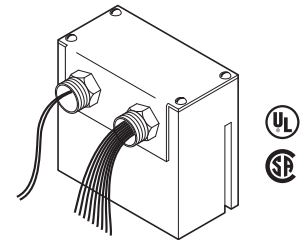
### 2–15 Vdc Input Electronic Actuator Drive

The CP-8301-xxx Series electronic actuator drive is designed to process a variable 2 to 15 Vdc signal from a controller to provide pro- portional control of an electric gear train actuator.

#### Features

- Mounts directly onto proportional, electric, gear train actuators.
- 24 and 120 Vac models available.
- Color-coded pigtail leads.

Specifications	
<b>Inputs Control signal</b>	
Range	2 to 15 Vdc
Span, Start point	Refer to Model Table
Power requirements	Refer to Model Table
Power supplies	Refer to Model Table
<b>Outputs</b>	
Connections	Color coded pigtail leads.
Mounting	Directly to an actuator
Case	Bakelite
<b>Connections</b>	Adjustable SPDT snap-acting Factory set to close one contact and open the other at end of CW stroke.
<b>Environment</b>	
Shipping and storage	-40 to 140°F (-40 to 60°C)
Operating	-40 to 140°F (-40 to 60°C)
Humidity	5 to 95% RH, non-condensing
<b>Locations</b>	NEMA Type 1
<b>Dimensions</b>	4 H x 4 W x 3-1/4 D in. (102 x 102 x 83 mm)
<b>Agency Listing</b>	
UL	File #E9429 Category Temperature-Indicating and Regulating Equipment
CSA	C22.2 No. 24-93
<b>Installation Instructions</b>	F-14940



#### Model Table

Model No.	Power Requirement Vac, 4.8 VA 50/60 Hz (+10/-15%)	Power Supply <sup>a</sup>	Start Point of Actuator	Span
CP-8301-024	24	20 Vdc, 50 mA regulated and filtered.	Adjustable from 2 to 12 Vdc input. Factory set at 6 Vdc.	Fixed at 3 Vdc for full actuator stroke.
CP-8301-120	120			

a - The power supply must not be connected to +20 (red) of other supplies.

#### Compatible Actuators

Actuator Series	Power		Torque		Stroke Degrees	Spring Return
	Vac 60 Hz	Amp	Lb-in.	N-m		
MP-2113-500	24	2.2	50	5.6	180	-
MP-361		2.5				CCW
MP-371						CCW
MP-381						220
MP-465 a	120	0.5	50	5.6	90	CW
MP-475 a			220	24.9		CCW
MP-483 a						-
MP-485 a		0.95	450	50.8	180	-
MP-486 a						-
MP-495 a						-
MP-9750 a	120	0.9				

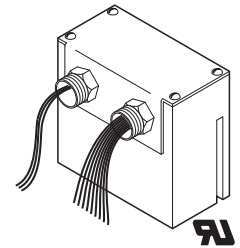
a - CAUTION: Remove red and blue transformer wires from terminals 7 and 8 of actuator and tape.

## CP-8391-716 Series 4 to 20 mA Electronic Actuator Drive

The CP-8391-716 Series electronic actuator drive is designed to process a variable 4 to 20 mAdc signal from a controller to provide proportional control of an electric gear train actuator.

### Features

- Mounts directly onto proportional, electric, gear train actuators.
- 4 to 20 mAdc operating range. with 250 impedance with field adjustable ranges of 2 through 7, 2 through 12, 7 through 12, 4 through 12, and 12 through 20 mAdc.
- 120 Vac applications.
- Color-coded pigtail leads



### Specifications

<b>Inputs Control signal</b>	
Range	4 to 20 mAdc, non-adjustable
Span	Adjustable 4 to 16 mAdc
Start point	Adjustable from 2 to 16 mAdc
Impedance	250 Ω
Grounding	Either input wire can be grounded and will not cause damage, provided the electric gear train actuator is ungrounded
Hysteresis	3 to 5% of 16 mAdc span, nonadjustable (Hysteresis is the difference in input signal between that signal which will drive the actuator shaft one way and the signal which will drive it the other way)
<b>Power requirements</b>	120 Vac ±10%, fixed input signal offset ±1% maximum
<b>Power consumption</b>	3.5 Va.
<b>Linearity</b>	0.15% of actuator rotation
<b>Outputs</b>	To control windings of gear train actuators, see "Typical Actuators"
<b>Connections</b>	Color coded pigtail leads
<b>Mounting</b>	Directly to an actuator. The upright position is preferred, but other positions are acceptable
<b>Case</b>	Bakelite
<b>Environment</b>	
Shipping and storage	-40 to 140°F (-40 to 60°C)
Operating	-13 to 140°F (-25 to 60°C)
Humidity	5 to 95% RH, non-condensing
<b>Vibration</b>	1G maximum in any plane
<b>Dimensions</b>	4 H x 4 W x 3-1/4 D in. (102 x 102 x 83 mm)
<b>Agency Listing</b>	UL Recognized
<b>Installation Instructions</b>	F-21220

### Compatible Actuators

Actuator Series	Power		Torque		Stroke Degrees	Spring Return
	Vac 60 Hz	Amp	Lb-in.	N-m		
MP-2130-500 <sup>a,b</sup>	120	0.5	50	5.6	90	CW CCW
MP-2150-500 <sup>a,b</sup>					180	
MP-465 <sup>a,b</sup>		0.5	50	5.6	90	
MP-475 <sup>a,b</sup>						
MP-483 <sup>a,b</sup>		220	24.9	180		
MP-485 <sup>a,b</sup>						
MP-486 <sup>a,b</sup>		0.95	450	50.8	90	
MP-495 <sup>a,b</sup>						
MP-9750 <sup>a,b</sup>		0.9	800	90	180	
MP-9830 <sup>c</sup>						
MP-9910 <sup>c</sup>		1.8	1300	146.9	90	

a CAUTION: Remove red and blue transformer wires from terminals 7 and 8 of actuator and tape.

b CP-9302 drive may be an alternative solution.

c NOTE: Some MP-9xxx will require two X6880 mounting extensions



## CP-8391-913 Series Electronic Actuator Drive

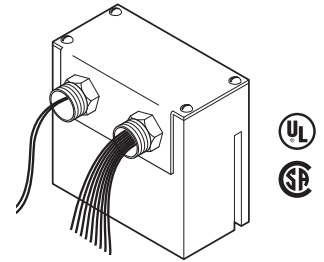
The CP-8391-913 electronic actuator drive is designed to process a variable 4 to 20 mAdc signal from a controller to provide proportional control of an electric gear train actuator.

### Features

- Mounts directly onto proportional, electric, gear train actuators.
- Fixed 4 to 20 mAdc operating range. with 250Ω impedance.
- 24 and 120 Vac models available.
- Color-coded pigtail leads.

### Specifications

<b>Inputs Control signal</b>	
Range	4 to 20 mAdc, non-adjustable
Span	16 mAdc
Start point	4 mAdc
Impedance	250 Ω
Grounding	Either input wire can be grounded and will not cause damage, provided the electric gear train actuator is ungrounded
Hysteresis	6 to 9% of 16 mAdc span, nonadjustable (Hysteresis is the difference in input signal between that signal which will drive the actuator shaft one way and the signal which will drive it the other way)
<b>Power requirements</b>	Refer to Model Table
<b>Power consumption</b>	Refer to Model Table
<b>Linearity</b>	0.15% of 16 mAdc span
<b>Outputs</b>	To control windings of gear train actuators, see "Typical Actuators"
<b>Connections</b>	Color coded pigtail leads
<b>Mounting</b>	Directly to an actuator. The upright position is preferred, but other positions are acceptable
<b>Case</b>	Bakelite
<b>Environment</b>	
Shipping and storage	-40 to 140°F (-40 to 60°C)
Operating	-40 to 140°F (-40 to 60°C)
Humidity	5 to 95% RH, non-condensing
<b>Vibration</b>	1G maximum in any plane
<b>Agency Listing</b>	
UL 873	File #E9429 Category Temperature-Indicating and Regulating Equipment
CSA	C22.2 No. 24-93
<b>Installation Instructions</b>	F-22453



### Model Table

Model No.	Power Requirement Vac, 50/60 Hz (+10/- 15%)	Power Consumption	Start Point of Actuator	Span
CP-8391-913	24	4.8 VA	Factory set at 4 mAdc non-adjustable.	Fixed at 16 mAdc for full actuator stroke.

### Compatible Actuators

Actuator Series	Power		Torque		Stroke Degrees	Spring Return
	Vac 60 Hz	Amp	Lb-in.	N-m		
MP-2113-500 <sup>a</sup>	24	2.2	50	5.6	180	-
MP-361 <sup>a</sup>		2.5				220
MP-371 <sup>a</sup>			0.5	50		
MP-381 <sup>a</sup>		120				0.95
MP-465 <sup>a,b</sup>	0.9		450	50.8	CW	
MP-475 <sup>a,b</sup>					0.9	800
MP-483 <sup>a,b</sup>	0.9		450	50.8		
MP-485 <sup>a,b</sup>					0.9	800
MP-486 <sup>a,b</sup>	0.9		800	90		
MP-495 <sup>a,b</sup>					0.9	800
MP-9750 <sup>a</sup>	0.9		800	90		

a - CP-9301 may be an alternative solution.

b - CAUTION: Remove red and blue transformer wires from terminals 7 and 8 of actuator and tape.

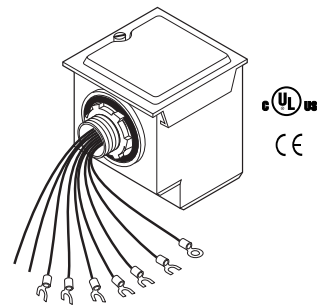
## CP-9301 Series Electronic Actuator Drive

The CP-9301 and CP-9302 electronic actuator drives process a variable input signal from a controller to provide proportional control of an electric gear train actuator. The CP-9301 is preset at the factory for voltage input. The CP-9302 is factory preset for current input and has additional wiring for connection to an override switch, for those applications requiring an external override of the input signal. These drives are equipped with built-in jumpers and adjustable potentiometers, so that the type of input signal, deadband, input span, and start point may be reset in the field when necessary.

### Features

- Mounts directly onto proportional, electric, gear train actuators.
- Power is supplied directly from the actuator.
- Jumpers for selecting either voltage or current input, as well as 3% or 5% deadband.
- Adjustable span and start point potentiometers.

Specifications	
<b>Mounting</b>	Directly to an actuator. The drive may be mounted on either the left or right side of the actuator, in a conduit opening adjacent to the low voltage wiring compartment.
<b>Case</b>	Injection molded plastic with stamped aluminum cover
<b>Inputs Control signal</b>	
<b>Span</b>	Refer to Model Table
<b>Start point</b>	Refer to Model Table
<b>Impedance</b>	
<b>Voltage Input</b>	Greater than 10,000 Ω
<b>Current Input</b>	250 Ω
<b>Power supply</b>	Power shall be supplied directly from the shading coil windings provided on the shaded pole reversible motor of the gear train actuator (less than 30 Vac)
<b>Outputs</b>	
<b>Connections</b>	Color-coded leads with crimped screw terminal connectors Purge override (input signal override) leads are color-coded pigtailed
<b>Shading Coil Triac Output</b>	1.2 A RMS
<b>Deadband</b>	Refer to Model Table
<b>Connections</b>	Color coded pigtail leads
<b>Environment</b>	
<b>Shipping and storage</b>	-40 to 160°F (-40 to 71°C)
<b>Operating</b>	-40 to 136°F (-40 to 58°C)
<b>Humidity</b>	5 to 95% RH, non-condensing
<b>Locations</b>	NEMA Type 4; IEC IP56.
<b>Agency Listing</b>	
<b>UL 873</b>	File #E9429 Category Temperature-Indicating and Regulating Equipment
<b>CUL</b>	C22.2 No. 24-93
<b>European community</b>	EMC Directive 89/336/EEC
<b>Installation Instructions</b>	F-26563



### Model Table

Part Number	Input Signal Override	Factory Jumper Settings				Jumper Settings		Potentiometer Adjustment Ranges	
		Input Signal	Deadband	Start Point	Input Span	Input Signal	Deadband	Input Span	Start Point
CP-9301	Not Available	Voltage (6 to 9 Vdc)	3% of Input Span	6 Vdc	3 Vdc	Voltage or Current	3% or 5% of Input Span	3.0 to 16.5 Vdc or 8 to 16 mAdc	0 to 10 Vdc or 2 to 16 mAdc
CP-9301-456		Voltage (0 to 10 Vdc)		0 Vdc	10 Vdc				
CP-9302	Available (Use is Optional)	Current (4 to 20 mAdc)	5% of Input Span	4 mAdc	16 mAdc				
CP-9302-702									

### Compatible Actuators

Actuator Series	Power		Torque		Stroke Degrees	Spring Return	Internal Transformer <sup>a</sup>
	Vac 60 Hz	Amp	Lb-in.	N-m			
MP-2113-500	24	2.2	50	5.6	180	–	No
MP-361	24	2.5	50	5.6	180	CW	No
MP-371	24	2.5	50	5.6	180	CCW	No
MP-381	24	2.5	220	24.9	180	–	No
MP-465	120	0.5	50	5.6	180	CW	Yes
MP-475	120	0.5	50	5.6	180	CCW	No
MP-483	120	0.5	220	24.9	90	–	Yes
MP-485	120	0.5	220	24.9	180	–	Yes
MP-495	120	0.95	450	50.8	180	–	Yes
MP-9750	120	0.9	800	90.3	180	–	Yes

a - Units with a "-2" suffix, e.g. MP-xxxx-xxx-2-x, include a built-in transformer (used for Microtherm® or with AE-504) with secondary leads wired externally to terminals 7 (Blue, 12 Vac) and 8 (Red, Vac) of the actuator. Caution: When using the CP-9301 or CP-9302 with actuators containing an internal transformer, disconnect and tape off the red and blue leads before installing and powering the device. Failure to do so can result in damage to the actuator drive. Note: Models prior to "-2" suffix had transformer wired directly to potentiometer. To disconnect the transformer, remove the back plate of the actuator, then disconnect and tape the transformer leads.

# Globe Valves and Actuators

## Overview VB-7000 Series Globe Valves

### 2-way and 3-way globe valves

The Venta VB-7200 Series ½" to 2" 2-way globe valves feature the industry's most high-performing, energy-efficient control valves for chilled water, hot water, and steam applications. The Venta VB-7300 Series ½" to 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

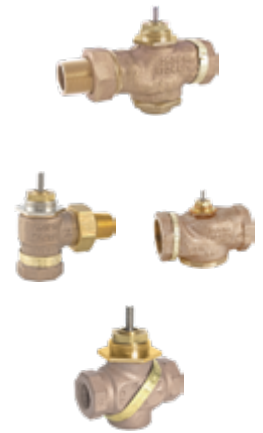


**DANGER:** Do not use these valves for combustible gas applications. They are not rated for combustible applications; use in these applications could result in gas leaks and explosions.

### More information

[F-26752](#)

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"	•		
2 1/2"		•	•
3"		•	•
4"		•	•
5"		•	•
6"		•	•



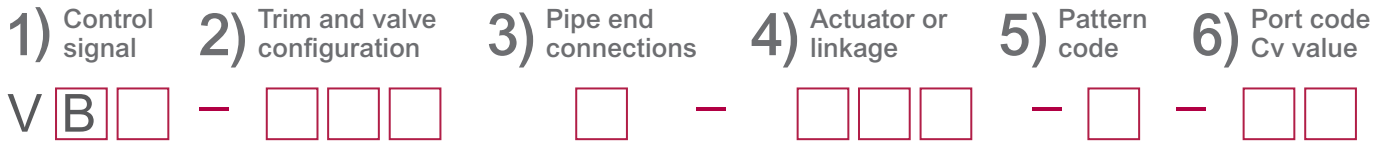
Venta VB-7200 Series  
2-way globe valves



Venta VB-7300 Series  
3-way globe valves

## Ordering VB-7000 Series Globe Valves

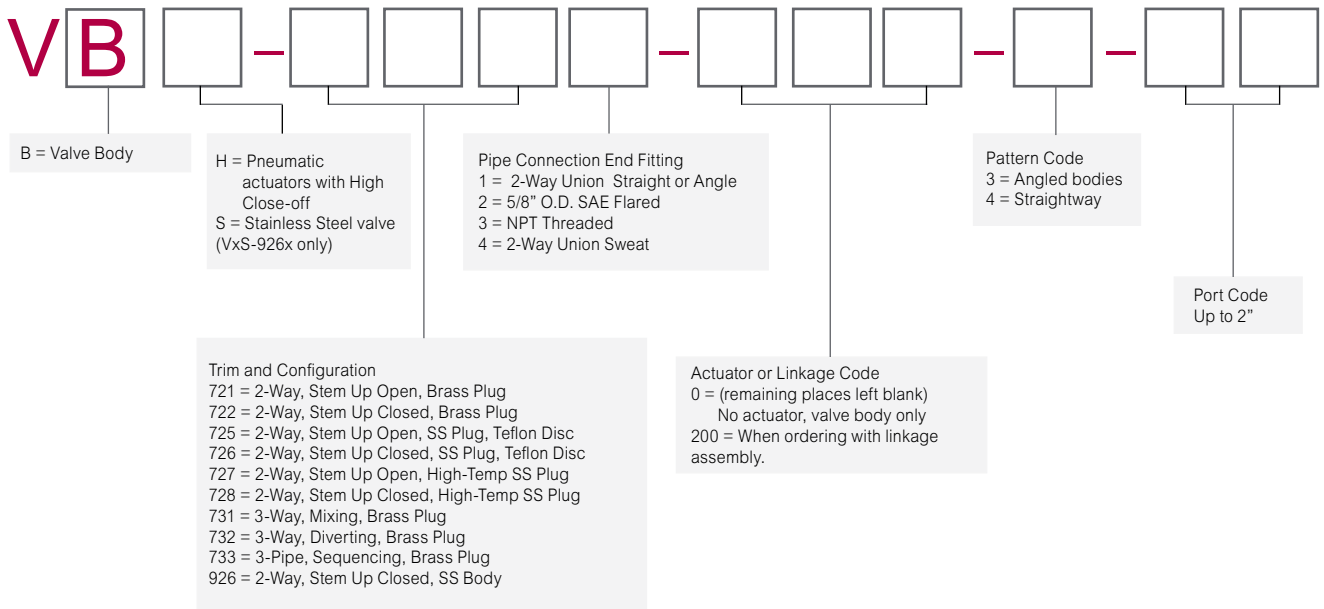
To determine the valve actuator assembly part number, specify the following six part number fields.



Refer to the guide below.

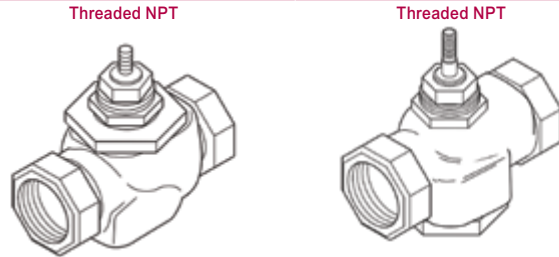
For water, steam, glycol and similar non flammable, non toxic fluids, choose based on the Pg. 36, 2. *VB-7000 sizing and selection* Above 2", go to Pg. 97, 5. *VB-8/9000 Series Globe Valves sizing and selection* .

## Ordering VB-7000 Series Valves



## 2-Way Brass Trim Valves with Soft Seats

2-Way Brass Trim



<b>Series part number</b>	VB-7213-0-4-		VB-7223-0-4-
<b>Pipe sizes</b>	½" to 2"		
<b>Stem action</b>	Up open		Up closed
<b>ANSI pressure class</b>	250 psi (up to 400 psi below 150°F)		
<b>ANSI seat leakage<sup>c</sup></b>	Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off. Long term seat leakage dependent on proper water conditioning maintenance of the system		
<b>Control media and temperature</b>	20 to 281°F (-7 to 138°C) water (up to 60% glycol/water solution), low pressure, saturated, treated steam		
<b>Flow curve</b>	Modified equal percentage		
<b>Allowable ΔP for water<sup>b</sup></b>	87 psi (600 kPa) Max. for normal life <sup>a</sup>		
<b>Max. inlet pressure, saturated steam</b>	35 psi (240 kPa)		
<b>Max ΔP for sizing, saturated steam<sup>b</sup></b>	80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet		
<b>Max ΔP at close-off, saturated steam<sup>b</sup></b>	Inlet pressure (35 psi) (actuator must be rated to provide close-off pressure)		
<b>Size</b>	<b>Cv</b>	<b>Kvs</b>	<b>Valve body part numbers</b>
½"	0.4	0.3	VB-7213-0-4-01
	1.3	1.1	VB-7213-0-4-02
	2.2	1.9	VB-7213-0-4-03
	4.4	3.8	VB-7213-0-4-04
¾"	5.5	4.8	VB-7213-0-4-05
	7.5	6.5	VB-7213-0-4-06
1"	10	8.7	VB-7213-0-4-07
	14	12.1	VB-7213-0-4-08
1¼"	20	17.3	VB-7213-0-4-09
1½"	28	24.2	VB-7213-0-4-10
2"	40	34.6	VB-7213-0-4-11

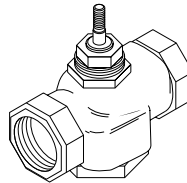
a - To minimize noise, ensure the flow rate in the piping is less than 10 ft (3m) / second and the differential pressure is less than 35 psi (241 kPa). Operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation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

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

c - Refer to Seat Leakage Classes table.

## 2-Way Stainless Trim Valves with Soft Seats

Threaded NPT



2-Way Stainless Trim (soft seats)

<b>Series part number</b>	VB-7253-0-4-	VB-7263-0-4-			
<b>Pipe sizes</b>	½" to 2"	½" to 2"			
<b>Stem action</b>	Up open	Up closed			
<b>ANSI pressure class</b>	250 psi (up to 400 psi below 150°F)				
<b>ANSI seat leakage<sup>c</sup></b>	Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off. Long term seat leakage dependent on proper water conditioning maintenance of the system.				
<b>Control media and temperature</b>	20 to 340°F (-7 to 171°C) water (up to 60% glycol/water solution), low pressure, treated steam				
<b>Flow curve</b>	Modified Linear				
<b>Allowable ΔP for water<sup>b</sup></b>	87 psi (600 kPa) Max. for normal life <sup>a</sup>				
<b>Max. inlet pressure, saturated steam</b>	100 psi (690 kPa)				
<b>Max ΔP for sizing, saturated steam<sup>b</sup></b>	80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet				
<b>Max ΔP at close-off, saturated steam<sup>b</sup></b>	Inlet pressure (100 psi) (actuator must be rated to provide close-off pressure)				
<b>Size</b>	<b>Cv</b>	<b>Kvs</b>	<b>Rangeability greater than</b>	<b>Valve body part numbers</b>	
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	
5.5	4.8	VB-7253-0-4-05		VB-7263-0-4-05	
¾"	6.3	5.4	-	VB-7263-0-4-41	
	7.5	6.5	VB-7253-0-4-06	VB-7263-0-4-06	
	8.2	7.1	-	VB-7263-0-4-51	
1"	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.

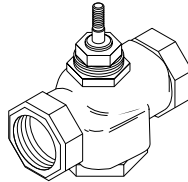
b - Maximum recommended differential pressure in open position. Do not exceed recommended differential pressure (pressure drop), as integrity of parts may be affected. Exceeding maximum recommended differential pressure voids product warranty.

c - Refer to Seat Leakage Classes table.

## 2-Way Stainless Trim Valves with Metal Seats Stainless Steel Trim with Metal to Metal Seats

Threaded NPT

2-Way Stainless Trim  
(Metal to Metal)



<b>Series part number</b>	VB-7273-0-4-		VB-7283-0-4-		
<b>Pipe sizes</b>	½" to 2"				
<b>Stem action</b>	Up open	Up closed			
<b>ANSI pressure class</b>	250 psi (up to 400 psig below 150°F)				
<b>ANSI seat leakage<sup>c</sup></b>	ANSI III				
<b>Control media and temperature</b>	20 to 400°F (-7 to 204°C) water (up to 60% glycol/water solution), low pressure, treated steam				
<b>Flow curve</b>	Modified linear				
<b>Allowable ΔP for water<sup>b</sup></b>	87 psi (600 kPa) max. for normal life <sup>a</sup>				
<b>Max inlet pressure, saturated steam</b>	150 psi (1034 kPa)				
<b>Max ΔP for sizing, saturated steam<sup>b</sup></b>	80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet				
<b>Max ΔP at close-off, saturated steam<sup>b</sup></b>	Inlet pressure (150 psi) (actuator must be rated to provide close-off pressure)				
<b>Size</b>	<b>Cv</b>	<b>Kvs</b>	<b>Rangeability</b>	<b>Valve body part numbers</b>	
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.

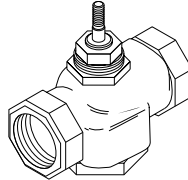
c - Refer to Seat Leakage Classes table.

More information

[F-26752](#)

## VBS-9263 1/2" & 3/4" 2-Way Stainless Valves with Soft Seats 316 Stainless Bodies with Soft Seats

Threaded NPT - 316 Stainless Body



2-Way Stainless Valve and Trim with Soft Seats

<b>Series part number</b>	VBS-9263-0-4-xx			
<b>Pipe sizes</b>	1/2" & 3/4"			
<b>Stem action</b>	Up closed only			
<b>Seats</b>	316 Stainless on PTFE			
<b>ANSI pressure class</b>	300 psi (up to 400 psig below 150°F)			
<b>ANSI seat leakage<sup>b</sup></b>	ANSI IV			
<b>Control media and temperature</b>	20 to 400°F (-7 to 204°C)			
<b>Flow curve</b>	Modified linear			
<b>Allowable ΔP for water</b>	35 psi (241 kPa) Max. for normal life <sup>a</sup>			
<b>Max inlet pressure, saturated steam</b>	100 psi (690 kPa)			
<b>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 - refer to steam charts.			
<b>Max ΔP at close-off, saturated steam</b>	Inlet pressure (100 psi) (actuator must be rated to provide close-off pressure) and withstand media temperature			
<b>Size</b>	<b>Cv</b>	<b>Kvs</b>	<b>Rangeability</b>	<b>Valve body part numbers</b>
1/2"	0.1	0.087	5:1	VBS-9263-0-4-31
	0.22	0.19	5:1	VBS-9263-0-4-33
	0.3	0.26	5:1	VBS-9263-0-4-34
	0.4	0.3	5:1	VBS-9263-0-4-1
	0.75	0.65	15:1	VBS-9263-0-4-35
	0.95	0.82	15:1	VBS-9263-0-4-36
	1.3	1.1	15:1	VBS-9263-0-4-2
	1.75	1.5	25:1	VBS-9263-0-4-37
	2.2	1.9	25:1	VBS-9263-0-4-3
	2.8	2.4	35:1	VBS-9263-0-4-38
	3.25	2.8	35:1	VBS-9263-0-4-39
3.6	3.0	35:1	VBS-9263-0-4-4	
3/4"	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

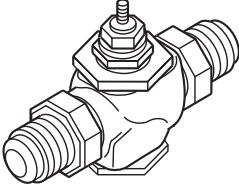
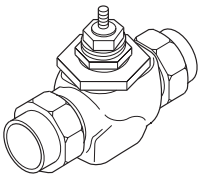
**CAUTION:**  
Pressure reducers do not lower temperatures from boilers significantly. Select only valve actuators that withstand actual pipe temperatures near the boiler output temperature.

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.



## VBS-9263 1/2" & 3/4" 2-Way Stainless Valves with Soft Seats, Union Brass Trim with Soft Seats - Copper Connection

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	1/2" I.D.		1/2" to 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 <sup>a</sup>	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 to 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 <sup>b</sup>	35 psi (241 kPa) Max. for normal life <sup>a</sup>		87 psi (600 kPa) Max. for normal life <sup>a</sup>				
Max. inlet pressure, saturated steam	35 psi (240 kPa)						
Max ΔP for sizing, saturated steam <sup>b</sup>	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 <sup>b</sup>	Inlet pressure (actuator must be rated to provide close-off pressure)						
Size	Cv	Kvs	Rangeability <sup>c</sup>	Valve body part numbers			
1/2"	0.4	0.3	5:1	VB-7212-0-4-01	VB-7222-0-4-01	VB-7214-0-4-01 <sup>e</sup>	VB-7224-0-4-01 <sup>e</sup>
	1.3	1.1	15:1	VB-7212-0-4-02	VB-7222-0-4-02	VB-7214-0-4-02 <sup>e</sup>	VB-7224-0-4-02 <sup>e</sup>
	2.2	1.9	25:1	VB-7212-0-4-03	VB-7222-0-4-03	VB-7214-0-4-03 <sup>e</sup>	VB-7224-0-4-03 <sup>e</sup>
	4.4	3.8	40:1	VB-7212-0-4-04	VB-7222-0-4-04	VB-7214-0-4-04 <sup>e</sup>	VB-7224-0-4-04 <sup>e</sup>
3/4"	5.5	4.8	50:1			VB-7214-0-4-05 <sup>e</sup>	VB-7224-0-4-05 <sup>e</sup>
	7.5	6.5	60:1			VB-7214-0-4-06 <sup>e</sup>	VB-7224-0-4-06 <sup>e</sup>
1"	10	8.7	60:1			VB-7214-0-4-07 <sup>cd</sup>	VB-7224-0-4-07 <sup>cd</sup>
	14	12.1	60:1			VB-7214-0-4-08 <sup>cd</sup>	VB-7224-0-4-08 <sup>cd</sup>
1 1/4"	20	17.3	75:1			VB-7214-0-4-09 <sup>cd</sup>	VB-7224-0-4-09 <sup>cd</sup>
1 1/2"	28	24.2	75:1			VB-7214-0-4-10 <sup>cd</sup>	VB-7224-0-4-10 <sup>cd</sup>
2"	40	34.6	75:1			VB-7214-0-4-11 <sup>cd</sup>	VB-7224-0-4-11 <sup>cd</sup>

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- 1/2" to 2" series valves all have rangeabilities greater than 100:1.

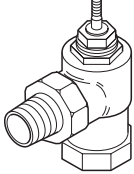
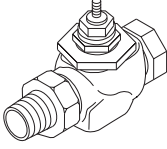
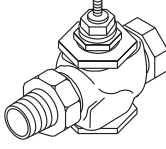
d - These part numbers do not have RoHs compliant nuts and tail pieces.

e - Refer to Seat Leakage Classes table.

More information

[E-26752](#)

## 2-Way Brass Trim Valves with Soft Seats, 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
						
<b>Series part number</b>				VB-7211-0-3-	VB-7211-0-4-	VB-7221-0-4-
<b>Pipe sizes</b>				½" to 1¼"		
<b>Stem action</b>				Up Open	Up Open	Up Closed
<b>ANSI pressure class</b>				250 psi (up to 400 psig below 150°F)		
<b>ANSI seat leakage<sup>a</sup></b>				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.	
<b>Control media and temperature</b>				20 to 281°F (-7 to 138°C) water (up to 60% glycol/water solution), low pressure, treated steam		
<b>Flow curve</b>				Modified Equal Percentage		
<b>Allowable ΔP for water<sup>b</sup></b>				35 psi (241 kPa) Max. for normal life <sup>a</sup>	87 psi (600 kPa) Max. for normal life <sup>a</sup>	
<b>Max inlet pressure for saturated steam</b>				35 psi (240 kPa)		
<b>Max ΔP for sizing, saturated steam<sup>b</sup></b>				80% of inlet pressure up to 15 psig and 42% of absolute (gauge pressure plus 14.7) inlet pressure above 15 psig inlet		
<b>Max ΔP at close-off, saturated steam<sup>b</sup></b>				Inlet pressure (35 psi) (actuator must be rated to provide close-off pressure)		
Size	Cv	Kvs	Rangeability Greater Than <sup>c</sup>	Valve body part numbers		
½"	0.4	0.3	5:1	VB-7211-0-3-01	VB-7211-0-4-01 <sup>e</sup>	VB-7221-0-4-01 <sup>e</sup>
	1.3	1.1	15:1	VB-7211-0-3-02	VB-7211-0-4-02 <sup>e</sup>	VB-7221-0-4-02 <sup>e</sup>
	2.2	1.9	25:1	VB-7211-0-3-03	VB-7211-0-4-03 <sup>e</sup>	VB-7221-0-4-03 <sup>e</sup>
	4.4	3.8	40:1	–	VB-7211-0-4-04 <sup>e</sup>	VB-7221-0-4-04 <sup>e</sup>
	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 <sup>e</sup>	VB-7221-0-4-05 <sup>e</sup>
	7.5	6.5	60:1	–	VB-7211-0-4-06 <sup>e</sup>	VB-7221-0-4-06 <sup>e</sup>
	8.5	7.4	50:1	VB-7211-0-3-06	–	–
1"	10	8.7	60:1	–	VB-7211-0-4-07 <sup>e</sup>	VB-7221-0-4-07 <sup>e</sup>
	14	12.1	60:1	VB-7211-0-3-07	VB-7211-0-4-08 <sup>e</sup>	VB-7221-0-4-08 <sup>e</sup>
	16	13.8	75:1	VB-7211-0-3-08	–	–
1¼"	20	17.3	75:1	–	VB-7211-0-4-09 <sup>e</sup>	VB-7221-0-4-09 <sup>e</sup>
	22	19	75:1	VB-7211-0-3-09	–	–

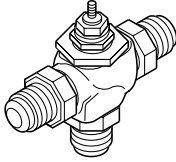
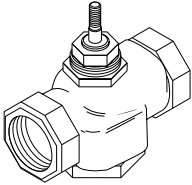
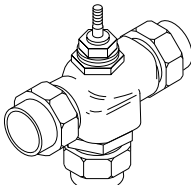
a - To minimize noise, ensure the flow rate in the piping is less than 10 ft (3m) / second and the differential pressure is less than 35 psi (241 kPa). Operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation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

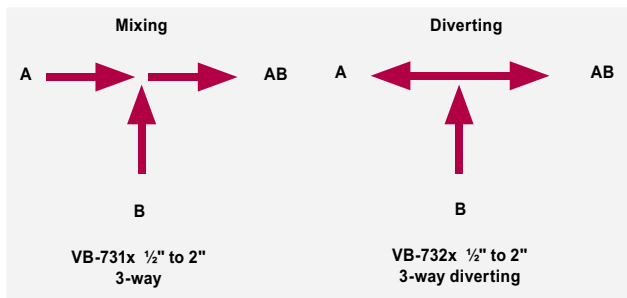
### 3-way valves Mixing Valves

	5/8" OD 45° SAE Flared	Threaded NPT	Union Sweat
<b>3-Way Brass Trim Mixing Valves Body Type<sup>b</sup></b>			
<b>Series part numbers</b>	VB-7312-0-4-	VB-7313-0-4-	VB-7314-0-4-
<b>Pipe size</b>	1/2" I.D.	1/2" to 2"	
<b>Stem flow action</b>	Stem up closes A port and opens B port to the common AB port		
<b>ANSI pressure class</b>	250 psi (up to 400 psi below 150°F)		
<b>ANSI A port seat leaked</b>	ANSI Class III <sup>a</sup>	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	
<b>ANSI B port seat leaked</b>	ANSI Class III		
<b>Control media and temperature</b>	20 to 281°F (-7 to 138°C) water (up to 60% glycol/water solution)		
<b>Water flow curve</b>	Modified linear		
<b>Allowable ΔP for water</b>	35 psi (241 kPa) <sup>a</sup>	87 psi (600 kPa) Max. for normal life <sup>a</sup>	
<b>Size</b>	<b>Cv</b>	<b>Kvs</b>	<b>Valve body part numbers</b>
1/2"	2.2	1.9	VB-7312-0-4-02
	4.4	3.8	VB-7312-0-4-04
3/4"	7.5	6.5	VB-7313-0-4-06
1"	12	10.4	–
	14	12.1	VB-7313-0-4-08
1 1/4"	20	17.3	VB-7313-0-4-09
1 1/2"	28	24.2	VB-7313-0-4-10
	36	31.3	–
2"	41	35.5	VB-7313-0-4-11
			VB-7314-0-4-02
			VB-7314-0-4-04
			VB-7314-0-4-06
			VB-7314-0-4-08 <sup>c</sup>
			VB-7314-0-4-09 <sup>c</sup>
			VB-7314-0-4-10 <sup>c</sup>
			VB-7314-0-4-11 <sup>c</sup>

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

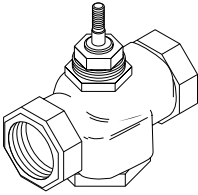
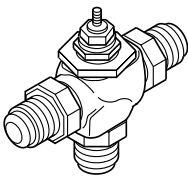
More information  
F-26752

### 3-Way flow patterns

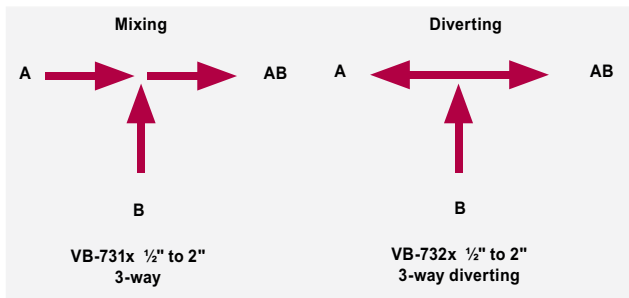


### 3-way diverting and sequencing valves

#### Diverting and Sequencing Valve

3-Way Brass Trim Diverting and Sequencing Valves Body Types	Diverting Threaded NPT	5/8" OD 45° SAE Flared Sequencing	
			
<b>Series part numbers</b>	VB-7323-0-4-	VB-7332-0-4-	
<b>Pipe size</b>	½" to 2"	½" I.D.	
<b>Stem flow action</b>	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	
<b>Stem force allowed</b>	300 Lbs.		
<b>ANSI pressure class</b>	250 psi (up to 400 psi below 150°F)	250 psi (up to 400 psi below 150°F)	
<b>ANSI A port seat leakage</b>	ANSI Class III		
<b>Control media and temperature</b>	20 to 281°F (-7 to 138°C) water (up to 60% glycol/water solution)		
<b>Water flow curve</b>	Modified linear	Sequencing, modified linear	
<b>Allowable ΔP for water</b>	35 psi (241 kPa) max. for normal life		
<b>Size</b>	<b>Cv</b>	<b>Kvs</b>	<b>Valve body part numbers</b>
½"	2.2	1.9	–
	4.4	3.8	VB-7323-0-4-04
¾"	7.5	6.5	VB-7323-0-4-06
1"	14	12.1	VB-7323-0-4-08
1¼"	20	17.3	VB-7323-0-4-09
1½"	28	24.2	VB-7323-0-4-10
2"	40	34.6	VB-7323-0-4-11

### 3-Way flow patterns



## 2- & 3-way valves sizing for water

### Two-position

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

### Proportional and floating

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

### 2.1 Conventional heating system

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

### Reducer affects

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

### Cv (Flow coefficient) determination

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

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

### Where:

Cv = Coefficient of flow

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

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

ΔP = Differential pressure in psi (pressure drop)

### Proportional 3-way valves

Recommended pressure drop - bypass application: 50% of available pressure, or equal to pressure drop through the load at full flow.

3-way valves in the return used to control output by throttling water flow to the load (bypass applications) are controlling output in the same manner as throttling 2-Way valves, and must be selected using the same high pressure drops if good control results are to be obtained.

Recommended pressure drop - constant flow applications: 20% of available pressure, or equal to 1/4 of the pressure drop through the load at full flow.

3-way valves used with individual pumps to control output by varying water temperature to the load (constant flow applications) are controlling output by mixing two water sources at different temperatures and do not require high pressure drops for good control results.

### Water capacity graph instructions

To select the appropriate valve Cv from the graph:

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

### Additional water valve sizing information

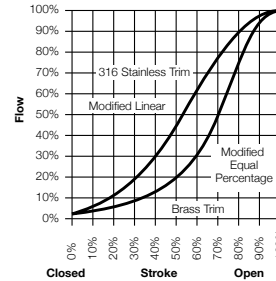
For more information, download these documents from our website.

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

## 2-way flow, temperature and materials

### 2.2 Flow characteristics

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

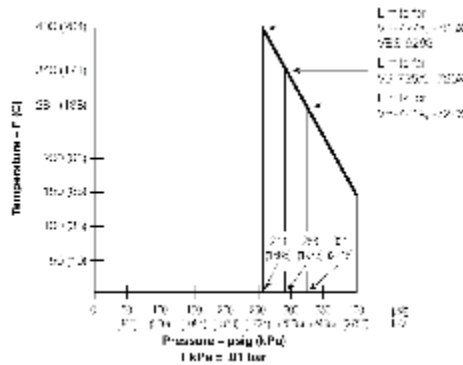


### 2.3 Temperature pressure ratings

Consult the appropriate valve linkage Installation instructions for the effect of valve body ambient temperatures on specific actuators. Ratings conform to published values and disclaimer.

VB-72xx-0-4-P (Cast Bronze Body)

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



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

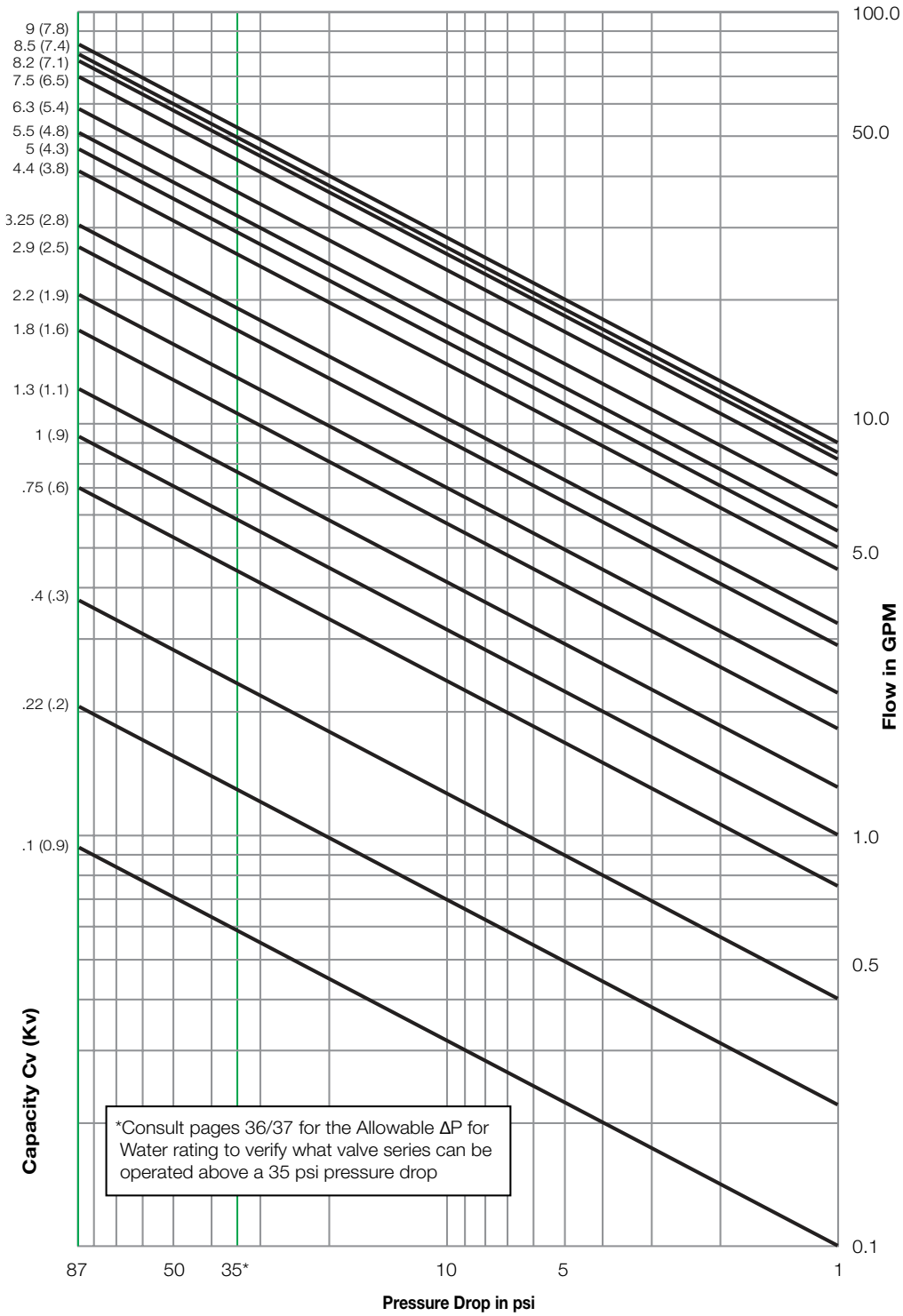
### 2.4 VB-7200 2-Way Globe Valves Material Specifications

VB-7200 Valve Series to	VB-7211-0-4 (½" to 1¼"), VB-7213, VB-7221-0-4 (½" to 1¼"), VB-7223, VB-7214, VB-7224	VB-7211-0-3 (½" to 1¼"), VB-7212 (½"), VB-7222 (½")	VB-7253, VB-7263	VB-7273, VB-7283	VBS-9263
<b>Body</b>	Bronze, ASTM B584				316 SS
<b>Seat</b>	Bronze, ASTM B584		316 stainless steel		
<b>Stem</b>	316 stainless steel				
<b>Plug</b>	Brass		316 stainless steel		
<b>Packing</b>	Spring-loaded PTFE/EPDM				PTFE
<b>Seal</b>	½" & ¾"	PTFE	EPDM	PTFE	Metal to metal 316 stainless steel
	1" to 2"	EPDM			

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

## Water capacity for 0.1 to 9.0 Cv valves

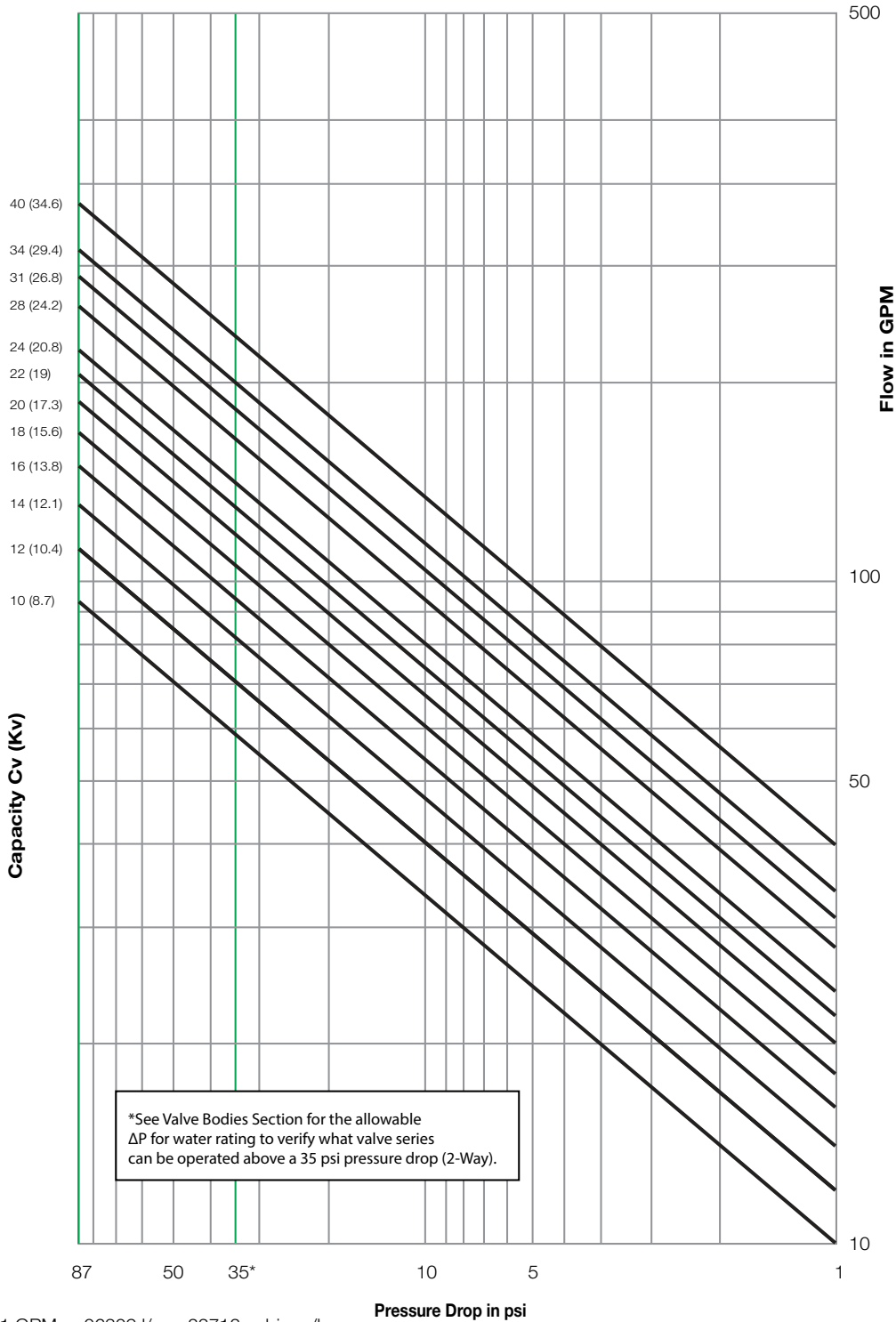
### 2.5 Water capacity for 0.1 to 9.0 Cv valves



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

## Water capacity for 10 to 40 Cv valves

### 2.6 Water capacity for 10 to 40 Cv valves





### 3-way flow, temperature and materials

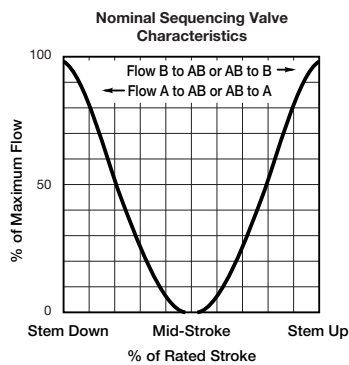
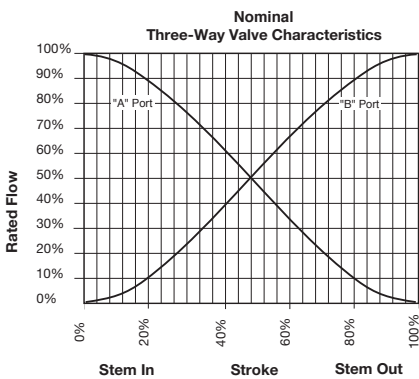
#### 2.7 Flow characteristics

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

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

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

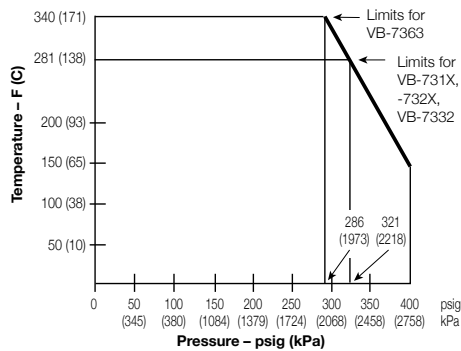
Rangeability is greater than 100:1 for both the A and B ports.



#### 2.3 Temperature pressure ratings

Consult the appropriate valve linkage Installation instructions for the effect of valve body ambient temperatures on specific actuators. Ratings conform to published values and disclaimer. VB-72xx-0-4-P (Cast Bronze Body) Standards: Pressure to ANSI B16.15 Class 250 with 400 psig up to 150° F decreasing to 321 psig at 281° F, ASTM B584

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



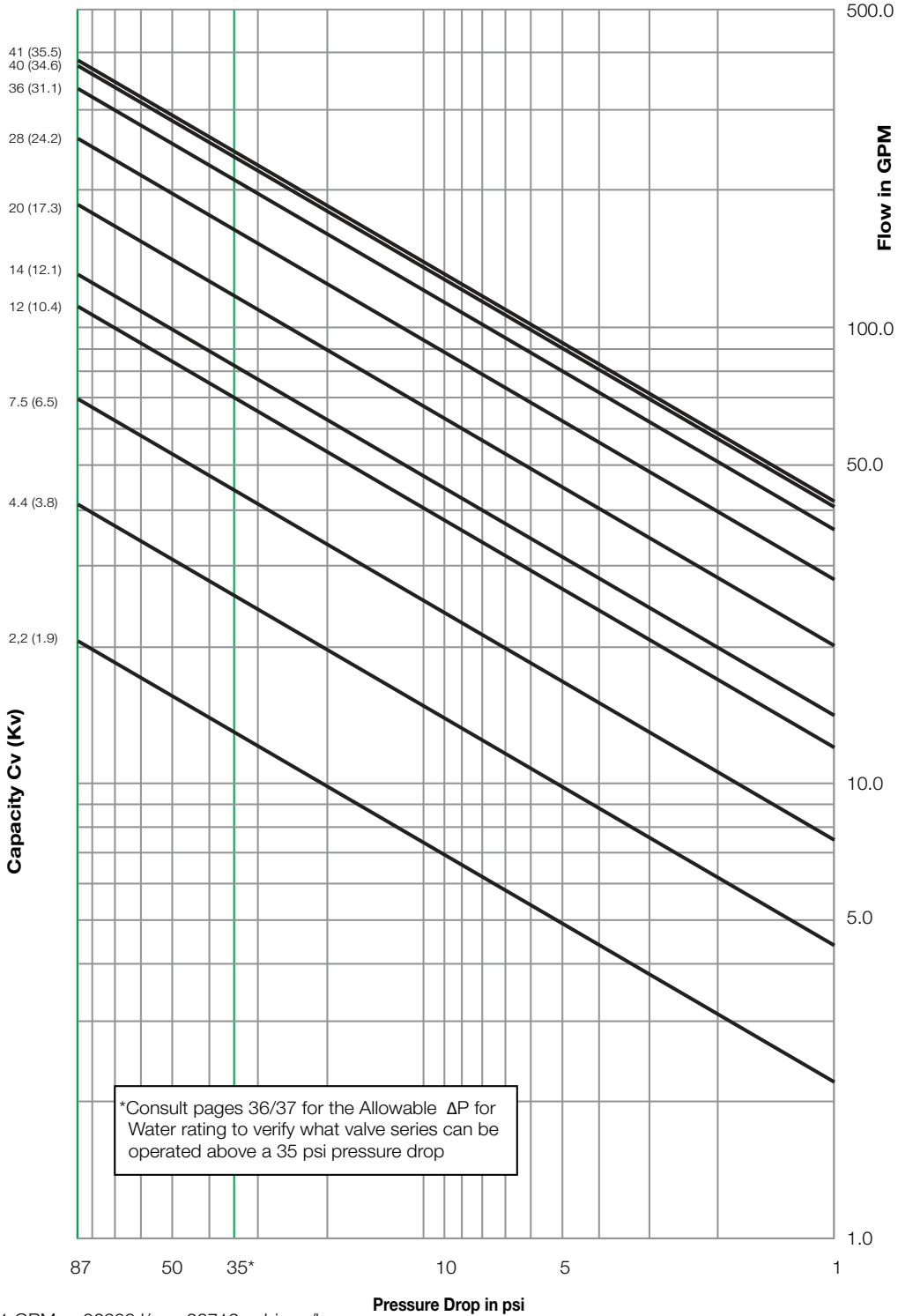
#### 2.9 VB-7300 3-Way Globe Valves Material Specifications

Material	VB-7313, VB-7314	VB-7312, VB-7332, VB-7323	VB-7363
Body	Bronze ASTM, B584		
A port seat	Brass		316 stainless steel
B port seat	Bronze ASTM, B584		
Stem	316 stainless steel		
Plug	Brass		316 stainless steel
Packing	Spring-Loaded PTFE/EPDM		
A port seal	1/2" and 3/4"	PTFE	Metal to metal
	1" to 2"	EPDM	
B port seal	1/2" and 3/4"	Metal to metal	Metal to metal 316 stainless steel
	1" to 2"		

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

Water capacity

2.10 Water capacity



## Cavitation limitations on valve pressure drop

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

Do not exceed the maximum differential pressure (pressure drop) for the valve selected. The following formula can be used on higher temperature water systems, where cavitation could be a problem, to estimate the maximum allowable pressure drop across the valve:

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

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:

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

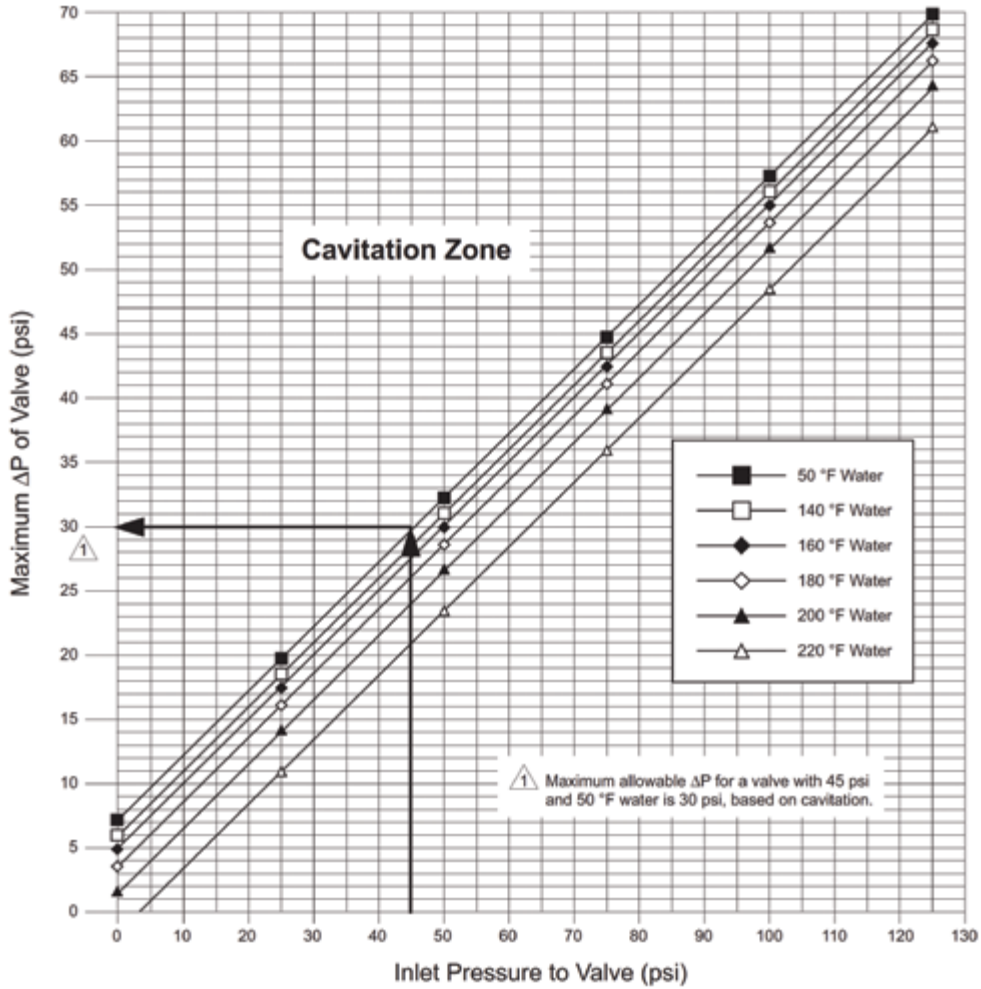
(Vapor pressure of 200°F water is 11.53 psia)

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.

### 2.11 Vapor pressure of water

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

## 2.12 Cavitation limitations on valve pressure drop



Maximum Allowable Differential Pressure (ΔP) for Water Valves.

## Saturated steam valve selection for 1/2" to 6" valves (2-way only)

### Selection instructions

**Warning:** pressure reducers do not lower boiler temperatures significantly, resulting in superheated steam.

Select only steam valves which can withstand temperatures near the original boiler temperature.

**Caution:** Do not size a steam valve with a pressure drop greater than 42% of the absolute pressure.

Actuator must be rated to provide adequate Close off pressure.

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

### Proportional

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

### Reference

For further information, download CA-28 Control valve sizing, F-13755, from iPortal.

The following is the terminology and the equations for the table above:

“Low Pressure” steam (Up to 15 psig.)

$$Cv = Q / (2.1 \times (\Delta P \times (P_1 + P_2))^{0.5})$$

“High Pressure” steam (Above 15 psig.)

$$Cv = Q / (1.38 \times P_1^{0.5})$$

Cv = Flow Coefficient

Q = Lbs. per hour of steam

ΔP = Differential pressure in psi (pressure drop)

P<sub>2</sub> = Outlet pressure in psia (absolute)  
psig + 14.7 = psia (absolute)

K = 1 + (0.0007 x °F super-heat)

### Saturated Steam Valve Selection

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

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

## VB-7000 & VBS 9263 ½” to 2” Hydraulic & Electric Close-Off

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

### 2.14 Seat leakage classes

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

### Close-off ratings

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

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

### 2.15 Electric Spring Return (SR)

#### VB-7000 & VBS-9263 Hydraulic & Electric Close-Off (psi)

Stem Up Open, Closed & Mixing

All are 250 psi. close-off. VB-7323 Diverting: Bottom port is common.

	MP/MPR-5200	MA-5200	M40-704x	Mx51-710x	Mx41-707x	M900Ax-VB	Mx51-720x	M41-715x	M40-717x			
Linkage	AV-7600		AV-611	None	AV-602	None		AV-602				
Actuator code	Choose code from assembly and actuator sections.											
Pipe size	Power Down Closed a,c,d	Spring Up Closed b,c,d	Power Down Closed a,c,d	Spring Up Closed b,c,d	Power or Spring							
						N.O.a	N.C.b					
½”	130	130	130	200	250	250	250	250	250	250	250	250
¾”	80	80	80	130	250	200	200	250	250	250	250	250
1”	40	40	40	50	125	150	90	180	180	230	250	250
1¼”	25	25	25	35	75	90	60	120	110	150	200	250
1½”	15	25	60	35	50	60	35	80	75	100	140	160
2”	10	14	35	20	25	32	20	40	40	65	80	120

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

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

c With appropriate AV-7600 springs.

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

### 2.16 Electric Non-Spring Return (NSR)

#### VB-7000 & VBS-9263 Electric Close-Off (psi)

Stem Up Open, Closed & Mixing. VB-7323 Diverting: Bottom port is the common. All are 250 psi. close-off

	M400A-VB	Mx41-6043	Mx41-6083	M800A-VB	Mx41-6153	M1500-VB
Linkage	None	AV-611	AV-611	None	AV-611	None
Actuator code	Choose code from assembly and actuator sections					
Pipe size	250	225	250	250	250	250
½”						
¾”	198	225	200	250	250	250
1”	92	100	130	207	250	250
1¼”	56	60	100	130	225	250
1½”	37	40	70	88	140	177
2”	19	20	40	48	80	98

## 1/2" to 2" pneumatic close-off ratings

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

### 2.17 VB-7000 Pneumatic Close-Off Ratings (psi)

<b>Actuator</b>										MK-2690 (6 square inch)								
<b>Optional positioner</b>										AK-42309-500								
<b>Linkage</b>										AV-7400								
<b>Spring range</b>										3 to 7 psi.			5 to 10 psi.			8 to 13 psi.		
<b>Actuator code</b>										201			202			203		
<b>Supply air (Psi.)</b>										15/20	15	20	15/20	15	20	15/20	15	20
<b>Stem closed positiona</b>										Up N.C.	Down	Down	Up N.C.	Down	Down	Up N.C.	Down	Down
<b>Two-way and mixing</b>	1/2"	-	130	220	50	60	170	130	-	90								
	3/4"	-	80	130	30	40	120	60	-	60								
	1"	-	35	70	9	15	50	30	-	25								
	1 1/4"	-	20	40	-	8	30	15	-	15								
	1 1/2"	-	14	29	-	5	20	10	-	9								
	2"	-	6	14	-	-	10	-	-	-								

**Diverting: bottom port as the common. Use MK-46xx below for tightest close-off.**

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

### 2.18 VB-7000 Pneumatic Close-Off Ratings (psi)

<b>Actuator</b>										MK-46xx (11 square inch)								
<b>Optional Positioner</b>										AK-42309-500								
<b>Linkage</b>										AV-401								
<b>Spring Range</b>										3 to 7 psi.			5 to 10 psi.			8 to 13 psi.		
<b>Actuator code</b>										301			302			303		
<b>Supply Air (Psi.)</b>										15/20	15	20	15/20	15	20	15/20	15	20
<b>Stem closed positiona</b>										Up N.C.	Down	Down	Up N.C.	Down	Down	Up N.C.	Down	Down
<b>Two Way and Mixing</b>	1/2"	30	250	250	100	120	250	250	10	200								
	3/4"	20	180	250	70	80	180	160	-	120								
	1"	5	90	150	30	35	100	60	-	65								
	1 1/4"	-	50	90	15	20	60	40	-	40								
	1 1/2"	-	30	60	10	10	40	35	-	25								
	2"	-	15	30	-	-	25	15	-	10								

**Diverting: bottom port as the common. All sizes are balanced for 250 psi close-off.**

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

### 2.19 VB-7000 Pneumatic Close-Off Ratings (psi)

<b>Actuator</b>										MK-66xx (50 square inch, half inch stroke)								
<b>Optional positioner</b>										AK-42309-500								
<b>Actuator and linkage</b>										MK-6601-301			MK-6611-302			MK-6621-303		
<b>Linkage</b>										AV-430								
<b>Spring range</b>										3 to 8			5 to 10			8 to 13		
<b>Actuator code</b>										611			612			613		
<b>Supply air (Psi.)</b>										15/20	15	20	15/20	15	20	15/20	15	20
<b>Stem closed positiona</b>										Up N.C.	Down	Down	Up N.C.	Down	Down	Up N.C.	Down	Down
<b>Two-way and mixing</b>	1 1/2"	40	170	250	80	110	230	170	40	160								
	2"	20	90	160	50	60	120	90	20	90								

**Caution! Diverting: bottom port as common. Actuator may be too strong, use smaller actuator.**

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

## Overview of VB-7000 1/2" to 2" Valve Actuator Assemblies

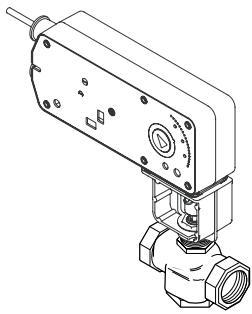
### Globe valve assemblies

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 1/2" to 2" (15 mm to 50 mm) 2-way and 3-way globe valve bodies, using a specially designed linkage assembly. 3-way assemblies are available for mixing (1/2" to 2") and diverting (1/2" to 2") applications.

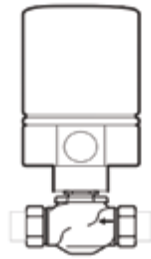
Typical applications include reheat on VAV boxes, fan coil units, hot and chilled water coils in air handling units, unit ventilators, and central system applications.

Kits are available separately to allow field assembly of SmartX actuators to valve bodies.

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



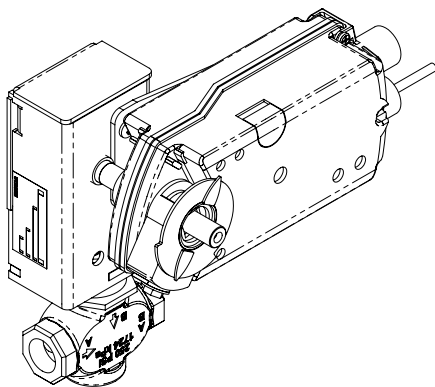
VB-73xx Series 1/2" to 2" 3-Way Assembly with SmartX Linear SR Actuators



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

#### Seat leakage classes

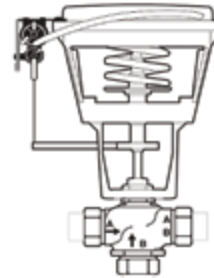
ANSI/FCI 70-2 leakage class	Maximum seat leakage
Class II	0.5% of rated Cv
Class III	0.1% of Rated Cv
Class IV	0.01% of Rated Cv
Class V	0.0005 ml per minute per inch of orifice diameter per psi differential



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



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



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

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 pages that follow. 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:

Refer to Sizing and Selection to calculate the required Cv.

Select the nearest available Cv value and corresponding valve body port code from Assembly Ordering.

### 3. Actuator and linkages

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. 65, 4. VB-7000 Series Globe Valve Actuators and Linkages for applicable actuator specifications.

**Note:** Linkages shown in Specification tables are supplied with the actuator. When shown in Optional accessories the linkage must be ordered separately.

### 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.

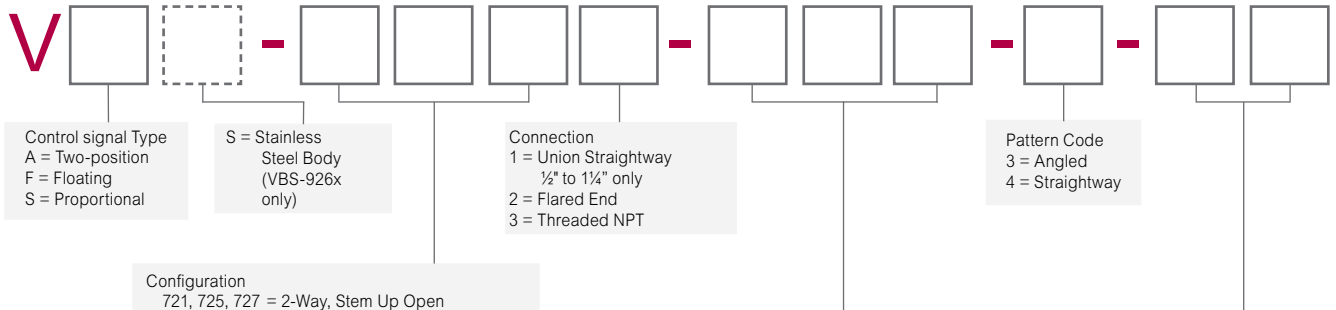
Range name	Description	Family	Electric Non-Spring Return Operation				Electric Spring Return Operation			Pneumatic Spring Return Operation	
			Proportional	Floating	Pulse Width Modulated	Two Position	Proportional	Floating	Two Position	Two position	Proportional with Positive Positioner
SmartX	Originally 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 (Coming soon to North America!)					•		• 3-Wire		
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.

## Ordering VB-7000 Globe Valve Assemblies SmartX Actuators

Specify Seven Part Number Fields  
to determine the Valve Actuator Assembly Part Number



**Configuration**  
 721, 725, 727 = 2-Way, Stem Up Open  
 722, 726, 728 = 2-Way, Stem Up Closed  
 731 = 3-Way, Mixing  
 732 = 3-Way, Diverting  
 926 = 2-Way, Stem Up Closed (SS)

**Actuator code**  
**Two-position, SR**  
 MA51-7100 = 801  
 MA51-7101 = N/Ad MA51-7103-100 = 804  
 MA51-7200 = N/Ad  
 MA51-7201 = N/Ad  
 MA51-7203 = 593  
 MA40-7040 = N/Ad  
 MA40-7040-501 = N/Ad  
 MA40-7041 = N/Ad  
 MA40-7041-501 = N/Ad  
 MA40-7043 = N/Ad  
 MA40-7043-501 = N/Ad  
 MA41-7070 = N/Ad  
 MA41-7070-502 = N/Ad  
 MA41-7071 = N/Ad  
 MA41-7071-502 = N/Ad  
 MA41-7073 = N/Ad  
 MA41-7073-502 = N/Ad  
 MA41-7150 = N/Ad  
 MA41-7150-502 = N/Ad  
 MA41-7151 = N/Ad  
 MA41-7151-502 = N/Ad  
 MA41-7153 = N/Ad  
 MA41-7153-502 = N/Ad  
 MA40-7170 = N/Ad  
 MA40-7173 = N/Ad

**Actuator code**  
**PROPORTIONAL, SR**  
 MS51-7103-100 = 804  
 MS51-7103-130 = N/Ad  
 MS51-7103-140 = N/Ad  
 MS51-7103-150 = 812  
 MS51-7103-160 = 814  
 MS51-7203 = 593  
 MS51-7203-040 = N/Ad  
 MS51-7203-050 = N/Ad  
 MS40-7043 = 536  
 MS40-7043-501 = 537  
 MS40-7043-MP = N/Ad  
 MS40-7043-MP5 = N/Ad  
 MS41-7073 = 546  
 MS41-7073-502 = 547  
 MS41-7153 = 556  
 MS41-7153-502 = 557  
 MS40-7170 = N/Ad  
 MS40-7173 = 576  
**Non-Spring Return NSR**  
 MS41-6043 = N/Ad  
 MS41-6083 = N/Ad  
 MS41-6083-502 = N/Ad  
 MS41-6153 = N/Ad  
 MS41-6153-502 = N/Ad  
 MG350V-24M = 110  
 MGF350V-24MP = 112

**Actuator code**  
**FLOATING, SR**  
 MF51-7103-100 = 804  
 MF51-7203 = N/Ad  
 MF40-7043 = N/Ad  
 MF40-7043-501 = N/Ad  
 MF41-7073 = N/Ad  
 MF41-7073-502 = N/Ad  
 MF41-7153 = N/Ad  
 MF41-7153-502 = N/Ad  
 MF40-7173 = N/Ad  
**Non-Spring Return NSR**  
 MF41-6043 = N/Ad  
 MF41-6083 = N/Ad  
 MF41-6083-502 = N/Ad  
 MF41-6153 = N/Ad  
 MG350V-24F = 110  
 MGF350V-24FP = 112

**Port Code**

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

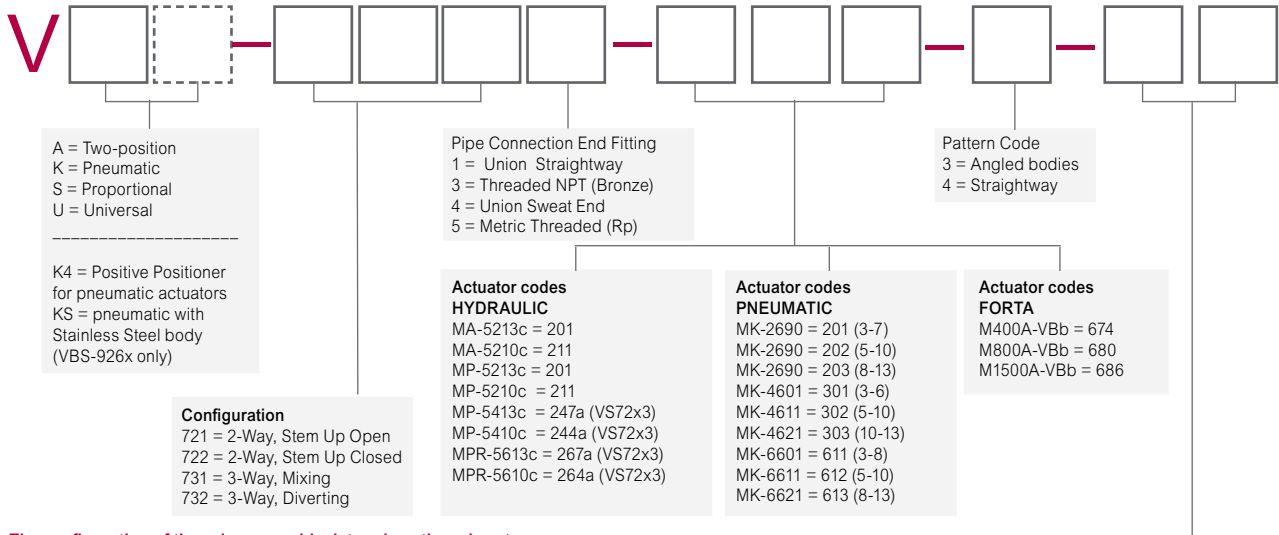
d - Factory assemblies not available. Purchase actuator and valve body separately and field assemble.

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

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

## Ordering VB-7000 Globe Valve Assemblies (Other Actuators) Hydraulic, Pneumatic & Forta Actuators

Specify Six Part Number Fields to determine the Valve Actuator Assembly Part Number



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		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

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.

Port Code Up to 2" (Cv of 41)

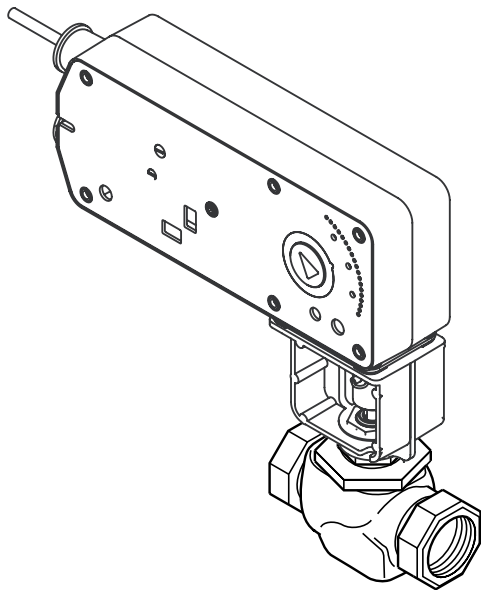
Body Size	2-Way		3-Way		Port Code
	Cv*	Port Code	Mixing	Diverting	
½"	0.4	01	-	-	
	1.3	02	2.2	2.2	02
	2.2	03	-	-	
¾"	4.4	04	4.4	4.4	04
	5.5	05	-	-	
1"	7.5	06	7.5	7.5	06
	10.0	07	-	-	
1¼"	14.0	08	14.0	15.0	08
	20	09	20.0	20.0	09
1½"	28	10	28.0	28.0	10
2"	40	11	41.0	40.0	11

\*Brass trim models listed.

## 1/2" to 2" 2-Way Globe Valves with Linear SR Actuators 2-Way Linked Globe Valve Assemblies with Linear Series Spring Return Actuators

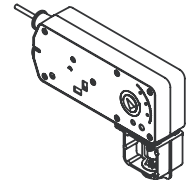
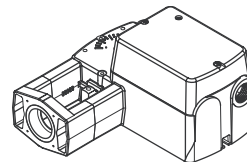
Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

### 2-Way Linked Globe Valve Assemblies



Mx51-710x

Mx51-720x



#### Actuator force rating

105 lbf (467 N)

220 lbf (979 N)

#### Actuator model (Actuator code)

**Two-position**  
MA51-7100 (801)  
MA51-7101  
MA51-7103-100 (804)

**Two-position**  
MA51-7200  
MA51-7201  
MA51-7203 (593)

**Floating**  
MF51-7103-100 (804)

**Floating**  
MF51-7203 (593)

**Proportional**  
MS51-7103-100 (804)  
MS51-7103-130  
MS51-7103-140  
MS51-7103-150 (812)  
MS51-7103-160 (814)

**Proportional**  
MS51-7203 (593)  
MS51-7203-040  
MS51-7203-050

Valve assembly part number bj	P code	Valve size in. (mm)	Cvc	kvsc	Actuator close-off pressure pside		
					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	1/2 (15)	0.4	0.3	250	250	
	2		1.3	1.1			
	3		2.2	1.9			
	4		4.4	3.8			
	5	3/4 (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	1 1/4 (32)	20.0	17	90	60	
Vx-72x3-xxx-4-P Vx-72x5-xxx-4-Ph	10	1 1/2 (40)	28.0	24	60	35	100
	11	2 (50)	40.0	35	32	20	65

b - To determine a specific part number, see Pg. 50, Ordering VB-7000 Globe Valve Assemblies for the relevant part series.

$$c - Cv = \frac{GPM}{\sqrt{\Delta P}} \quad \text{Where } \Delta P \text{ is measured in psi} \quad kvs = \frac{Cv}{1.156} \quad kvs = \frac{m^3/h}{\sqrt{\Delta P}} \quad \text{Where } \Delta P \text{ is measured in bar} = 100 \text{ kPa}$$

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

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

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

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

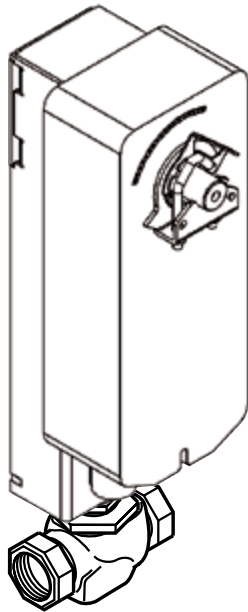
h - Metric thread 15 to 80 mm (Rp 1/2 to Rp 3).

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.

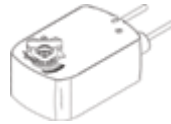
1/2" to 2" 2-Way Globe Valves with Linked SR Actuators  
2-Way Linked Globe Valve Assemblies with Spring Return Actuators

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

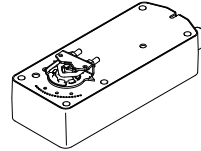
2-Way Spring Return  
Linked Globe Valve Assemblies



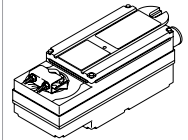
Mx40-704x



Mx41-7xxx



Mx40-717x



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)	Two-position MA41-707x	Two-position MA41-715x	Two-position MA40-717x
<b>Floating</b> MF40-7043 (536)	<b>Floating</b> MF41-7073	<b>Floating</b> MF41-7153	<b>Floating</b> MF40-7173
<b>Proportional</b> MS40-7043 (536) MS40-7043-501 (537)	<b>Proportional</b> MS41-7073 (546) MS41-7073-502 (547)	<b>Proportional</b> MS41-7153 (556) MS41-7153-502 (557)	<b>Proportional</b> MS40-717x (576)

Note: Not all factory Actuator codes are available.

Linkage kit part number

AV-611 (1/2" to 2")	AV-602 (1" to 2")	AV-602 (1 1/4" to 2")
---------------------	-------------------	-----------------------

Valve assembly part number <sup>a</sup>	P code	Valve size in. (mm)	Cv <sup>b</sup>	kvs <sup>b</sup>	Actuator close-off pressure psi <sup>d</sup>			
					Single actuator			
					AV-611 (1/2" to 2")	AV-602 (1" to 2")	AV-602 (1 1/4" to 2")	
Vx-7214-xxx-4-P Vx-7224-xxx-4-P Vx-7211-xxx-4-P Vx-7213-xxx-4-P Vx-7221-xxx-4-P Vx-7223-xxx-4-P Vx-7253-xxx-4-P Vx-7263-xxx-4-P Vx-7273-xxx-4-P Vx-7283-xxx-4-P VxS-9263-xxx-4-P	01	1/2 (15)	0.4	0.3	250	-	-	-
	02		1.3	1.1				
	03		2.2	1.9				
	04		4.4	3.8				
	05	3/4 (20)	5.5	4.8	125	180	-	-
	06		7.5	6.5				
	07	1 (25)	10.0	8.7	125	180	200	-
	08		14.0	12	125	180		
	09	1 1/4 (32)	20.0	17	75	120	200	-
	Vx-7213-xxx-4-P Vx-7223-xxx-4-P	10	1 1/2 (40)	28.0	24	50	80	140
11		2 (50)	40.0	35	25	40	80	120

a - To determine a specific part number, see Pg. 50, Ordering VB-7000 Globe Valve Assemblies for the relevant part series.

b - kvs = m3/h (ΔP = 100 kPa)    kvs = Cv / 1.156    Cv = kvs x 1.156

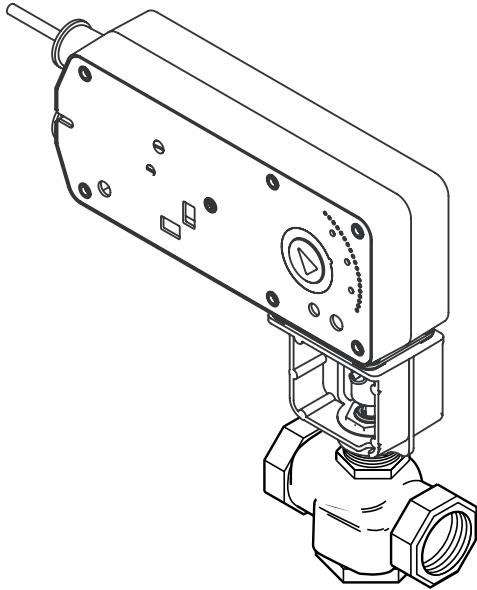
c - All Vx-72xx leakage ratings are ANSI V to 35psi and ANSI IV above 35psi; with the exception of Vx-7273 and Vx-7283 (ANSI III).

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

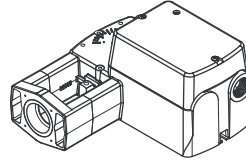
## 1/2" to 2" 3-Way Globe Valves with Linear SR Actuators

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.

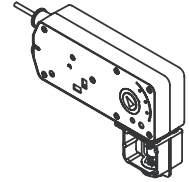
### 3-Way Linked Globe Valve Assemblies



Mx51-710x



Mx51-720x



#### Actuator force rating

105 lbf (467 N)	220 lbf (979 N)
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#### Actuator model (Actuator code)<sup>b</sup>

Two-position	Two-position
MA51-7100	MA51-7200
MA51-7101	MA51-7201
MA51-7103-100 (804)	MA51-7203 (593)
Floating	Floating
MF51-7103-100 (804)	MF51-7203
Proportional	Proportional
MS51-7103-100 (804)	MS51-7203 (593)
MS51-7103-130	MS51-7203-040
MS51-7103-140	MS51-7203-050
MS51-7103-150 (812)	
MS51-7103-160 (814)	

Valve assembly part number <sup>c</sup>	P code	Valve size in. (mm)	Cvd	kvs <sup>d</sup>	Actuator close-off pressure psi <sup>e</sup>		
<b>Mixing</b> 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	150	
	9	1 1/4 (32)	20.0	17	60		
	10	1 1/2 (40)	28	24	35		100
	11	2 (50)	41	36	20		65
<b>Diverting</b> 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. 50, Ordering VB-7000 Globe Valve Assemblies for the relevant part series.

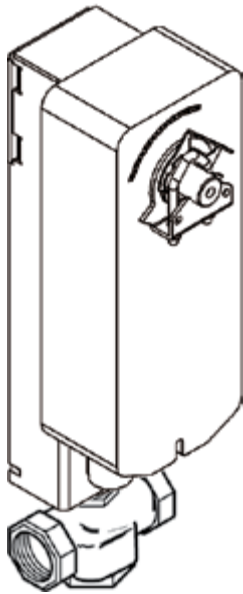
d -  $C_v = \text{gpm} / \sqrt{\Delta P}$  (where  $\Delta P$  is measured in psi.)  $kvs = C_v / 1.156$

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

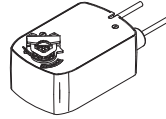
## 1/2" to 2" 3-Way Globe Valves with Linked SR Actuators 3-Way Linked Globe Valve Assemblies with Spring Return Actuators

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.

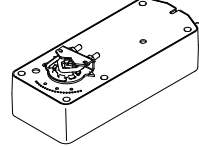
### 3-Way Spring Return Linked Globe Valve Assemblies



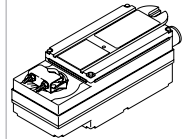
Mx40-704x



Mx41-7xxx



Mx40-7173



#### 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)
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#### Actuator model (Actuator code)

<b>Two-position</b> MA40-7040 MA40-7041 MA40-7043 (536)  <b>Floating</b> MF40-7043 (536)  <b>Proportional</b> MS40-7043 (536) MS40-7043-502 (537)	<b>Two-position</b> MA41-707x  <b>Floating</b> MF41-7073  <b>Proportional</b> MS41-7073 (546) MS41-7073-502 (547)	<b>Two-position</b> MA41-715x  <b>Floating</b> MF41-7153  <b>Proportional</b> MS41-7153 (556) MS41-7153-502 (557)	<b>Two-position</b> -  <b>Floating</b> MF40-7173  <b>Proportional</b> MS40-7173 (576)
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Note: Not all factory Actuator codes are available.\*

#### Linkage kit part number

AV-611 (1/2" to 2")	AV-602 (1" to 2")	AV-602 (1/2" to 2")	AV-602
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#### Actuator close-off pressure psig<sup>d</sup>

Valve assembly part number <sup>a</sup>	P code	Valve size in. (mm)	Cv <sup>c</sup>	kvs <sup>c</sup>	Actuator close-off pressure psig <sup>d</sup>							
					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		
	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. 50, Ordering VB-7000 Globe Valve Assemblies for the relevant part series.

c - kvs = m<sup>3</sup>/h (ΔP = 100 kPa) kvs = Cv / 1.156 Cv = kvs x 1.156

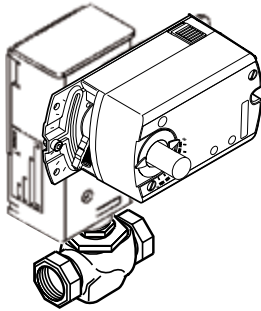
d - Mixing Valves A port seat leakage ANSI IV, B port seat leakage ANSI III, Diverting Valves seat leakage is ANSI III.

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

## 1/2" to 2" 2-Way Globe Valves with Linked NSR Actuators 2-Way Linked Globe Valve Assemblies with Non-Spring Return Actuators

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.

### 2-Way Non-Spring Return Linked Globe Valve Assemblies<sup>f</sup>



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

					Mx41-60x3	Mx41- 6153		
					<b>Actuator Torque Rating (minimum)</b>			
					44 lb-in. (5 N-m)	88 lb-in. (10 N-m)	133 lb-in. (15 N-m)	
					<b>Actuator Model (Actuator Code)</b>			
					Floating MF41-6043	Floating MF41-6083	Floating MF41- 6153	
					Proportional MS41-6043	Proportional MS41-6083	Proportional MS41- 6153	
					<b>Note: Not all factory actuator codes are available.<sup>f</sup></b>			
					<b>Linkage Kit Part Number</b>			
					AV-611			
					<b>Actuator Close-off Pressure psi<sup>d</sup></b>			
Valve Assembly Part Number <sup>a</sup>	P Code	Valve Size in. (mm)	Cv <sup>b</sup>	kvs <sup>b</sup>	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	1/2 (15)	0.4	0.3	225	-		
	02		1.3	1.1				
	03		2.2	1.9				
	04	4.4	3.8					
	05	3/4 (20)	5.5	4.8				
	06		7.5	6.5				
	07	1 (25)	10.0	8.7			100	130
	08		14.0	12				
	09	1 1/4 (32)	20.0	17			60	100
Vx-7213-xxx-4-P Vx-7223-xxx-4-P	10	1 1/2 (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. <?>, Ordering VB-7000 Globe Valve Assemblies for the relevant part series.

b - kvs = m<sup>3</sup>/h (ΔP = 100 kPa)    kvs = Cv / 1.156    Cv = kvs x 1.156

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

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

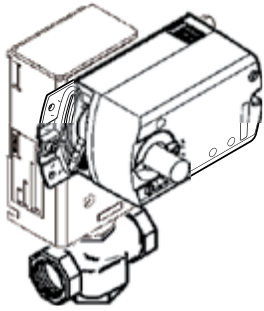
f - Shown for field assembly.



## 1/2" to 2" 3-Way Globe Valves with Linked NSR Actuators 3-Way Linked Globe Valve Assemblies with Non-Spring Return Actuators

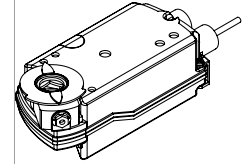
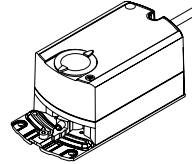
Choose a valve assembly having a close-off pressure capability sufficient for the application. Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled.

### 3-Way Non-Spring Return Linked Globe Valve Assemblies<sup>f</sup>



Mx41-60x3

Mx41-6153



**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

Floating  
MF41-6083

Floating  
MF41-6153

Proportional  
MS41-6043

Proportional  
MS41-6083

Proportional  
MS41-6153

**Note: Not all factory actuator codes are available.**

**Linkage Kit Part Number**

AV-611

Valve Assembly Part Number <sup>a</sup>	P Code	Valve Size in. (mm)	Cv <sup>b</sup>	kvs <sup>b</sup>	Actuator Close-off Pressure psi <sup>c</sup>		
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	
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. <?>, Ordering VB-7000 Globe Valve Assemblies for the relevant part series.

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

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.



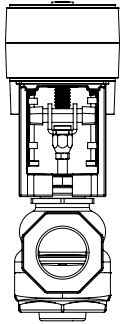
Visit:  
<http://goo.gl/BnGiYc>

## 1/2" to 2" 2- and 3-Way Globe Valves with MG350V NSR Actuators

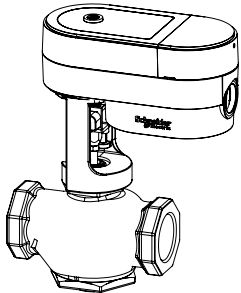
### Applicable literature

- 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

### MG350V installed on a VB-7000 Globe Valve



End View



Side View

Select valve actuator combination having sufficient close-off for application.

### Compatible Two-Way Valve Series

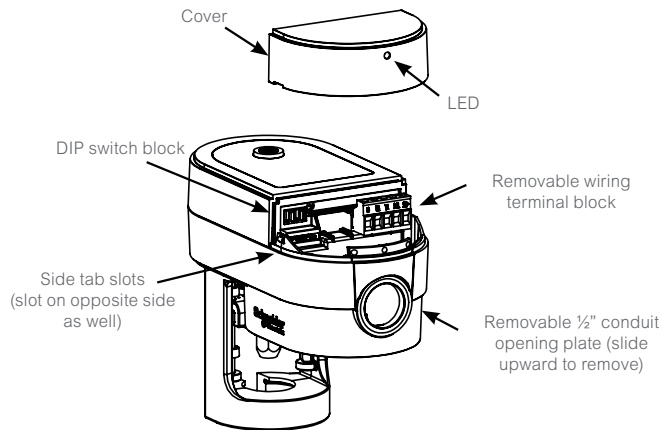
Body		Close-off Ratings, psi (kPa) <sup>a</sup>		Valve Bodies
P code	Size	MGF350V-24FP, MGF350V-24MP	MG350V-24F, MG350V-24M	
-01, -02, -03, -04	1/2" (15 mm)	219 (1510)	250 (1724)	VB-7211-0-3-P, VB-7211-0-4-P, VB-7212-0-4-P, VB-7213-0-4-P, VB-7214-0-4-P, VB-7221-0-4-P, VB-7222-0-4-P, VB-7223-0-4-P, VB-7224-0-4-P, VB-7253-0-4-P, VB-7263-0-4-Pa, VB-7273-0-4-P, VB-7283-0-4-P
-05, -06	3/4" (20 mm)	135 (931)	157 (1082)	
-07, -08	1" (25 mm)	67 (462)	79 (545)	
-09	1 1/4" (32 mm)	42 (290)	49 (338)	

### Compatible Three-Way Valve Series

-02, -04	1/2" (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, VB-7323-0-4-P
-06	3/4" (20 mm)	135 (931)	157 (1082)	
-08	1" (25 mm)	67 (462)	79 (545)	
-09	1 1/4" (32 mm)	42 (290)	49 (338)	
-04, -06, -08, -09, -10, -11	1/2" to 2"	250 (1712)		

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

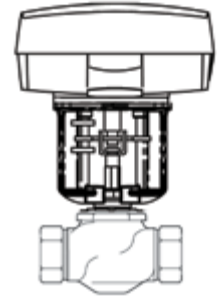
### Actuator diagram



## 1/2" to 2" 2/3-Way Globe Valves with NSR Actuators

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

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



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

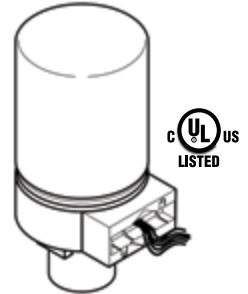
a - Not all bodies are available for all port codes.

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.

## 1/2" to 2" Globe Valves with Hydraulic SR Actuators

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



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



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

### Actuator Valves for the Hydraulic Spring Return Actuators

Actuator				MA-521x	MP-5xxx	MPR-561x
Input signal				2-Position Electric	VDC	mA <sup>dc</sup>
Actuator code (xxx)				<sup>a</sup>	<sup>a</sup>	
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

Linkage (1/2 to 2")		AV-7600-1 <sup>a</sup>		AV-7600-1			
Input signal		Electronic VDC & 4 to 20 mA		SPDT Floating & 2-Position			
Actuator code (XXX)		2XX		2XX			
Actuator type		MP-5X1X-XXX <sup>b</sup> MPR-561X		MA-521X			
Factory available valve assembly	Valve body	P code	Size (in.)	Actuator close-off pressure ratings (psi) <sup>c, d, e</sup>			
				SU <sup>f</sup> "A"	SD <sup>f</sup> "B"	SU <sup>f</sup> "A"	SD <sup>f</sup> "B"
VA-7313-XXX-4-P VS-7313-XXX-4-P	VB-7313-0-4-P VB-7314-0-4-P	-02,-04	1/2	130		200	130
		-06	3/4	80		130	80
		-08	1	40		50	40
		-09	1 1/4	25		35	25
		-10	1 1/2	15		35	25
		-11	2	10		20	14
VA-7323-XXX-4-P VS-7323-XXX-4-P	VB-7323-0-4-P	-04	1/2	250			
		-06	3/4				
		-08	1				
		-09	1 1/4				
		-10	1 1/2				
		-11	2				
VF-7313-XXX-4-P	VB-7312-0-4-P VB-7313-0-4-P VB-7314-0-4-P	-02,-04	1/2 or 5/8	-		200	130
		-06	3/4			130	80
		-08	1			50	40
		-09	1 1/4			35	25
		-10	1 1/2			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 to 10 volt and 4 to 20 mA controllers, use blue and booster springs.

c - Close-off ratings for mixing or sequencing valves: (SU = "A" port, SD = "B" port). "A" port (SU) ratings equal pressure at port "A" minus pressure at port "B"; "B" port (SD) ratings equal pressure at port "B" minus pressure at port "A".

d - Close-off pressure ratings describe only the differential pressure which the actuator can close-off to standards with adequate seating force. Consult valve body specifications for other limitations.

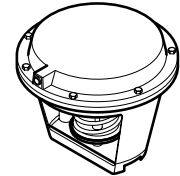
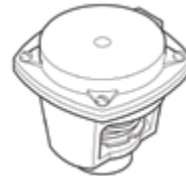
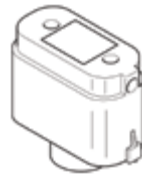
e - Diverting valves may be used in mixing applications with minor affects on flow.

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

## 1/2" to 2" 2-Way and 5/8" 3-Way Globe Valves with Pneumatic Actuators

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

### 2-Way 1/2" to 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 to 7	5 to 10	8 to 13	3 to 6	5 to 10	10 to 13	3 to 8	5 to 10	8 to 13																				
Linkage		AV-7400			AV-401						AV-430																			
Positive Positioner (VK4)		AK-42309-500			AK-42309-500						AK-42309-500																			
Factory available assembly with Positive Positioner		N.O. valves		Yes	No	Yes	No	Yes	No	Yes	No																			
		N.C. valves		No	Yes	No	Yes	No	Yes	No	Yes																			
		Actuator close-off pressure rating (psi)																												
NP	Factory available valve assembly	Valve body	P code	Size in.	Supply air pressure (psig)																									
					15	20	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	1/2	130	220	60	170	90	250	250	120	250	10	200															
			-5-6	3/4	80	130	40	120	60	180	250	80	180	120																
			-7-8	1	25	70	15	50	25	90	150	35	100	65																
			-9	1 1/4	20	40	8	30	15	50	90	20	60	40																
			-10	1 1/2	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	1/2	50		130	30	100	250																				
			-5-6	3/4	30		60	20	70	160																				
			-7-8	1	9		30	5	30	60																				
			-9	1 1/4	15		15		40																					
			-10	1 1/2	10		10		35	40	170																			
			-11	2	-		-		15	20	50	90																		

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

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

Positive Positioner		AK-42309-500						AK-42309-500																	
Actuator		MK-2690						MK-4601	MK-4611	MK-4621	MK-4621-422														
Factory Actuator code (xxx)		201	202	203	301	302	303	313																	
Spring range (psig)		3 to 7	5 to 10	8 to 13	3 to 6	5 to 10	10 to 13	10 to 11.25																	
Linkage		AV-7400						AV-401			AV-430														
		Actuator close-off pressure rating (psi) <sup>a,b</sup>																							
Supply air pressure (psig)		15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20			
Stem position		SU	SD	SD	SU	SD	SD	SU	SU	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD			
Npd	Valve assembly	Valve body	P code	Size																					
SUc	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	5/8"	-				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.

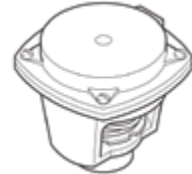
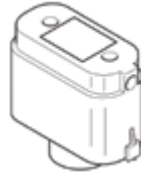
b - Close-off pressure ratings describe only the differential pressure which the actuator can close off to standards with adequate seating force. Consult valve body specifications.

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.

1/2" to 2" 3-Way & Diverting/Sequencing with Pneumatic Actuators

3-Way & Diverting/Sequencing 1/2" to 2" Globe Valves with Pneumatic Actuators



<b>Effective area</b>	6 sq. In.			11 sq. In.		
<b>Linkage</b>	AV-7400			AV-401		
<b>Positive Positioner</b>	AK-42309-500			AK-42309-500		
<b>Factory assembly with Positive Positioner</b>	No	Yes	Yes	No	Yes	Yes
<b>Actuator code (XXX)</b>	201	202	203	301	302	303
<b>Actuator</b>	MK-2690			MK-4601	MK-4611	MK-4621
<b>Spring range (psig)</b>	3 to 7	5 to 10	8 to 13	3 to 6	5 to 10	10 to 13

Actuator close-off pressure rating<sup>abc</sup>

Supply air pressure (psig)				15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	15/20	15	20	
Stem position <sup>d</sup>				SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	SU	SD	SD	
Valve assembly	Valve body	P code	Size in.	-																		
VK-7313-XXX-4-P VK4-7313-XXX-4-P VK-7314-XXX-4-P VK4-7314-XXX-4-P	VB-7313-0-4-P VB-7314-0-4-P	-2-4	1/2	150	150	50	60	170	100	90	30	250	250	100	150	250	250	35	200			
		-6	3/4	60	120	30	40	100	60	60	20	180	230	70	80	180	160	15	120			
		-8	1	30	60	9	15	50	30	25	5	90	150	30	40	100	60	5	65			
		-9	1 1/4				8	30	15	15		50	90	15	25	60	40		40			
		-10	1 1/2					20	10	9		30	60	10	15	40	35		25			
		-11	2					10	-			15	30		5	20	15		10			
VK-7323-XXX-4-P VK4-7323-XXX-4-P	VB-7323-0-4-P	-4	1/2	250																		
		-6	3/4	250																		
		-8	1	250																		
		-9	1 1/4	250																		
		-10	1 1/2	250																		
		-11	2	250																		

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. 25, 2. VB-7000 Series Globe Valves and Sizing and Selection for flow pattern, port designations and normal position.

More info

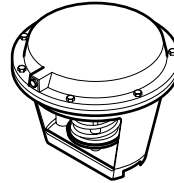
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Visit: <http://goo.gl/3ftGOA>

## 1½” to 2” 3-Way & Diverting/Sequencing with Pneumatic Actuator

### 3-Way & Diverting/Sequencing 1½” & 2” Globe Valves with Pneumatic Actuators



<b>Effective area (stroke)</b>				50 Sq. In. (½")								
<b>Linkage VB-7313-0-4-P</b>				AV-430								
<b>Linkage VB-7323-0-X-P</b>				AV-430								
<b>Positive Positioner</b>				AK-42309-500								
<b>Factory assembly with Positive Positioner</b>				No			Yes			Yes		
<b>Actuator code (XXX)</b>				611			612			613		
<b>Actuator</b>				MK-6601			MK-6611			MK-6621		
<b>Spring range (psig)</b>				3 to 8			5 to 10			8 to 13		
<b>Actuator close-off pressure rating (psi) <sup>abc</sup></b>												
<b>Supply air pressure (psig)</b>				15/20	15	20	15/20	15	20	15/20	15	20
<b>Stem Position<sup>d</sup></b>				SU	SD	SD	SU	SD	SD	SU	SD	SD
<b>Valve assembly</b>	<b>Valve body</b>	<b>P code</b>	<b>Size in.</b>	-								
<b>VK-7313-XXX-4-P</b> <b>VK4-7313-XXX-4-P</b>	VB-7313-0-4-P VB-7314-0-4-P	-10	1½	40	170	250	80	110	230	170	30	160
		-11	2	20	90	160	50	60	120	90	15	90
<b>VK-7323-XXX-4-P</b> <b>VK4-7323-XXX-4-P</b>	VB-7323-0-4-P	-10	1½	250								
		-11	2									

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

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

c - Mixing 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. 25, 2. VB-7000 Series Globe Valves and Sizing and Selection for flow pattern, port designations and normal position.

## MG350V Globe Valve NSR SpaceLogic 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" to 2" VB-7000 globe valves. The MG350V actuators are also compatible with older field installed ½" to 1¼" VB-9000 globe valves as well as other valves (with the addition of AV-800 Globe Valve Adapters).



MG350V



### 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 to 10 VDC and 0 to 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 to 2.93 sec and 0.1 to 25.5 sec input signal ranges with a position output signal
- Stall protected throughout stroke
- Manual override with automatic release.
- Position feedback output signal models include field selectable 2...10 Vdc or 0...5 Vdc output signal.
- Removable wiring screw terminal with ½" conduit opening
- Integral linkage and self-adjusting valve position indicator

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

### 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 <sup>1</sup>	-	102	21/32 (16.5)	78 (350)
MGF350V-24FP	Three-Wire Floating, PWM 1, 2	2 to 10 VDC, 0 to 5 VDC3	51		67 (300)
MG350V-24M	2 to 10 VDC, 0 to 10 VDC,	-	102		78 (350)
MGF350V-24MP	4 to 20 mA 4	2 to 10 VDC, 0 to 5 VDC3	51		67 (300)

1 Also compatible with Two-position Form A 24 Vac/VDC Input signals.

2 Field-selectable 0.59 to 2.93 sec and 0.1 to 25.5 sec PWM ranges.

3 Field selectable. The 2 to 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 <sup>a</sup>	Proportional input <sup>b</sup> (VDC)	Proportional input <sup>c</sup> (VDC, mA)	Floating, two wire (Form A) two position	PWM <sup>d</sup>	Position output signal <sup>e</sup>
MG350V-24F	VF	110	79 (350)	102	5 VA	-	-	Yes	-	-
MGF350V-24FP		112	67 (300)	51	-	-	-	Yes	2 to 10 / 0 to 5 VDC	
MG350V-24M	VS	110	79 (350)	102	7.2 VA	Yes	-	-	-	-
MGF350V-24MP		112	67 (300)	51	-	-	Yes	-	2 to 10 / 0 to 5 VDC	

a - 24 Vac (Class 2 power supply), ±20%, 50/60 Hz, 20 to 29 VDC, 5 W; see the MG350V series installation instruction (F-27852) for more information.

b - DIP switch configurable 0 to 10 VDC or 2 to 10 VDC control input, (4 to 20 mA requires an externally mounted 500 ohm resistor).

c - DIP switch configurable 0 to 10 VDC, 2 to 10 VDC, or 4 to 20 mA control input.

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

e - DIP switch configurable 2 to 10 VDC or 0 to 5 VDC.



## SpaceLogic M400 M800 and M1500 NSR Actuators

### M400A (VB) / M800A (VB) / M1500A (VB)

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 to 10, 2 to 10 VDC or 4 to 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

### Applicable literature

- Series Installation instructions, F-27599
- VB-7000 Selection Guide, F-27490
- 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



U-Bolt Style



Screw Mount Style

Specifications						
<b>U-Bolt Style</b>	M400A	M400A-S2	M800A	M800A-S2	M1500A	M1500A-S2
<b>Screw Mount Style</b>	M400A-VB	M400A-S2-VB	M800A-VB	M800A-S2-VB	M1500A-VB	M1500A-S2-VB
<b>AC power</b>	24 Vac +/- 10% 50-60 Hz					
<b>DC power</b>	20 to 29 VDC 20 W			20 to 29 VDC 30 W		
<b>Running VA</b>	6		15		24	
<b>Transformer size VA</b>	30		50		50	
<b>Floating control</b>	Yes					
<b>Proportional control</b>	0 to 10 VDC, 2 to 10 VDC or 4 to 20mA with 500 ohm resistor					
<b>Feedback</b>	2 to 10 VDC					
<b>Force</b>	90 lbf (400 N)		180 lbf (800 N)		337 lbf (1500 N)	
<b>2-SPDT aux switch</b>	No	24 Vac 4A res	No	24 Vac 4A res	No	24 Vac 4A res

### Restrictions on ambient temperature for Valve Actuators

Fluid temperature in Valve Body	Maximum Allowable Ambient Temperature <sup>a</sup>
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).

## SpaceLogic M400 M800 and M1500 NSR Actuators

### Specifications (continued)

<b>Stroke</b>	<b>M800A, M1500A</b>	U-Bolt style: >3/8" to 2" (9-52mm)
	<b>M800A-VB, M1500A-VB</b>	Screw Mount Style >3/8" to 1 7/8" (9-48mm)
	<b>M400A, M400A-VB</b>	U-Bolt and Screw Mount Style >3/8" to 1 1/4" (9-48mm)
<b>Stroke timing</b>		Floating: 60 or 300 sec selectable, Proportional: 15 sec @1/2" stroke
<b>Feedback AO</b>		2 to 10 VDC
<b>Power supply type</b>		Half Wave
<b>Motor type</b>		Brushless DC
<b>Enclosure</b>		NEMA 2 (IP 54, vertical mount only) with both conduit connectors used. NEMA 1 IP40 with one connector used
<b>Sound power level</b>		Maximum 32 dba
<b>Ambient temperature storage</b>		-13 °F to 149 °F (-25 to 65 °C) ambient
<b>Ambient temperature operational</b>		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
<b>Minimum operating temperature</b>		14 to 150 °F (-10 to 50 °C)
<b>Ambient humidity</b>		15 to 95 % RH non-condensing
<b>Housing material</b>		Die-Cast Aluminum
<b>Cover material</b>		UL94 plenum rated plastic
<b>Agency listings</b>		UL873, cULus, RCM, CE

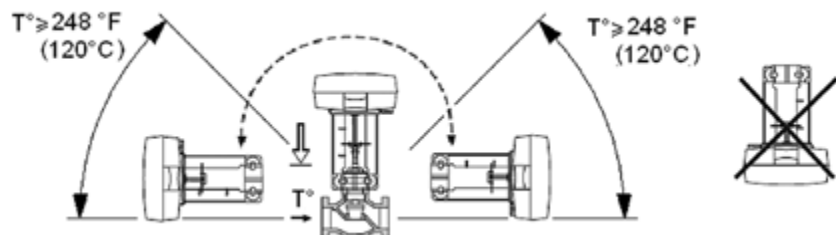
### Restrictions on ambient temperature for Valve Actuators

Fluid temperature in valve body	Maximum allowable ambient temperature <sup>a</sup>
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).

### 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.



### SpaceLogic M900Axx-VB SR Actuators

#### Applications

Schneider Electric Spring Return and Non-Spring Return **SpaceLogic** 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 (M900AxW-VB) models. Field selectable input signals include reverse and direct acting, floating or proportional 0…1 Vdc, 2…10 Vdc or 4…20 mAcd and proportional sequencing input signal ranges.

#### Applicable Literature

- Schneider Electric **SpaceLogic** M900A Datasheet, F-27682
- **SpaceLogic** M900A 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, M900AE-VB Spring extend).

##### 3. Select the SmartX Actuator and appropriate spring-return action.

Using the required close-off pressure for the application and the appropriate spring-return action, select a **SpaceLogic** actuator having sufficient close-off pressure on the valve body selected in step 2. Additional **SpaceLogic** 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 **SpaceLogic** actuator selected in Step 3. For the complete assembly part number:

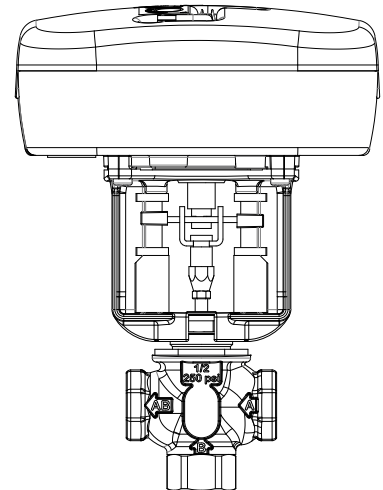
- Change the valve body part number prefix from VB to VU.
- Insert the actuator code in the third field of the part number.
- Confirm the factory assembly is available.

#### 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.)

**SpaceLogic** actuators are field configured for the desired control signal type and range plus the desired action. Consult the appropriate **SpaceLogic** Installation Instructions for further information.



## SpaceLogic M900Axx(-VB) SR & VB-7000 Valve Selection

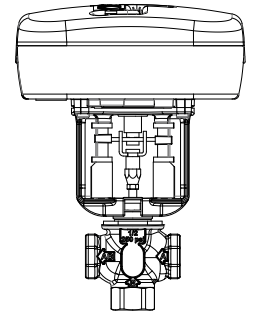
Not all valve body and actuator combinations are available factory-assembled. Some combinations must be field-assembled. Select a Valve Actuator combination having sufficient close off for the application.

Select VB-7000 Valve / M900Axx(-VB) <sup>a</sup> Spring Return Actuator				
Valve Body <sup>ac</sup>	Valve Action	P-Code	Size	Close-off Ratings PSI M900Axx <sup>b</sup>
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
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
		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.



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

## SpaceLogic M900A Factory & Field Assembly SR Models

Spring Return SpaceLogic Factory Assemblies Model Table

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

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 SpaceLogic Actuators for Field Assembly

Model	VB-7000 Mounting Kit Required	Force	Power	Running Watts	Transformer Size	Floating Control <sup>a</sup>	Proportional Control <sup>b</sup>	Feedback Voltage <sup>a</sup>	(2) SPDT Aux Switches <sup>c</sup>	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									Retract
M900ARW-S2	AV-821									
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 .

## Mx51-710x 105 lbf Linear SR SmartX Actuators

**Mx51-7103 Series  
SmartX Actuators**  
24 Vac  
105 lbf (467 N)

**MA51-7100  
MA51-7101  
SmartX Actuators**  
120 Vac/230 Vac  
105 lbf (467 N)



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



Visit:

<http://goo.gl/amkgWe>

### Specifications

<b>Connection</b>	3 ft. (0.9 m) plenum cable	
<b>Housing</b>	Polymer, NEMA 2	
<b>Dimensions</b>	6-5/16 x 6¾ x 3½ (160 x 170 x 90 mm)	
<b>Position indicator</b>	Visual indicator	
<b>Override</b>	Manual	
<b>Control signal</b>	MA51-7103-100 MF51-7103-100 MS51-7103-100: 2 to 10 VDC MS51-7103-130: 6 to 9 VDC MS51-7103-140: 6 to 9 VDC MS51-7103-150: 0 to 10 VDC MS51-7103-160: 4 to 20 mAdc The Control signal is factory set for direct action. It can be field-adjusted for reverse action.	2-position SPST
<b>Voltage</b>	24 Vac ± 20%, 20 to 30 VDC	MA51-7100: 120 Vac ± 10% MA51-7101: 230 Vac ± 10%
<b>VA@60 HZ</b>	MA51-7103-100: 5.3 MF51-7103-100: 6.9 MS51-7103-100: 6.6	MA51-7100: 7.9 MA51-7101: 7.4
<b>Watts @ 60 Hz</b>	4.7	MA51-7100: 6.2 MA51-7101: 5.4
<b>Auxiliary switch</b>	None	
<b>Timing (seconds)</b>	MA: Powered approx. 27 spring return approx. 19 MF/MS: Powered <60 spring return <16	Powered approx. <27 spring return approx. <19
<b>Feedback</b>	For voltage ranges, feedback & input signal ranges are the same. 4 to 20 mA input range has a 2 to 10 VDC position feedback signal. MS51-7103-140 has no feedback output. MF51-7103-100 has a 2 to 10VDC output.	None
<b>Installation instructions</b>	F-27169	

Mx51-720x 220 lbf Linear SR SmartX Actuators

Mx51-7203 Series  
SmartX Actuators  
24 Vac  
220 lbf (979 N)

MA51-7200  
MA51-7201  
SmartX Actuators  
120 Vac/230 Vac  
220 lbf (979 N)



Specifications

<b>Connection</b>	3 ft. (0.9 m) plenum cable	
<b>Housing</b>	Aluminum die-cast, NEMA 2	
<b>Dimensions</b>	7 x 10-5/8 x 2-9/16 (178 x 270 x 65 mm)	
<b>Position indicator</b>	Visual indicator	
<b>Override</b>	Manual	
<b>Control signal</b>	MA51-7203: 2-position SPST MF51-7203: Floating MS51-7203: 2 to 10 VDC MS51-7203-040: 6-9 VDC MS51-7203-050: 0 to 10 VDC The Control signal is factory set for direct action. It can be field-adjusted for reverse action.	MA51-7200: 2-position SPST
<b>Voltage</b>	24 Vac ± 20%, 22 to 30 VDC	MA51-7200: 120 Vac ± 10% MA51-7201: 230 Vac ± 10%
<b>VA@60 HZ</b>	9.7	MA51-7200: 10 MA51-7201: 10.6
<b>Watts @ 60 Hz</b>	MA51-7203: 7.5 MF51-7203: 7.7 MS51-7203: 7.4	MA51-7200: 8.4 MA51-7201: 8.5
<b>Auxiliary switch</b>	None	
<b>Timing (seconds)</b>	Powered <100 Spring return <35	
<b>Feedback</b>	MA51 & MF51: None MS51: 2 to 10 VDC only The MS51-7203-040 does not have a feedback output.	None
<b>Installation instructions</b>	F-27120	

## Mx40-704x 35 lb-in SR SmartX Actuators

**Mx40-704x Series  
SmartX Actuators  
24 Vac  
35 lb-in (4 N-m)**



### Specifications

<b>Connection</b>	3 ft. (0.9 m) plenum cable		
<b>Rotation</b>	Aluminum die-cast, NEMA 2		
<b>Control action</b>	7 x 10-5/8 x 2-9/16 (178 x 270 x 65 mm)		
<b>Shaft size</b>	Visual indicator		
<b>Housing</b>	Manual		
<b>Dimensions</b>	MA51-7203: 2-position SPST MF51-7203: Floating MS51-7203: 2 to 10 VDC MS51-7203-040: 6-9 VDC MS51-7203-050: 0 to 10 VDC The Control signal is factory set for direct action. It can be field-adjusted for reverse action. MA51-7200: 2-position SPST		
<b>Overload protection</b>	24 Vac ± 20%, 22 to 30 VDC MA51-7200: 120 Vac ± 10% MA51-7201: 230 Vac ± 10%		
<b>Angle of rotation</b>	9.7 MA51-7200: 10 MA51-7201: 10.6		
<b>Position indicator</b>		MA51-7203: 7.5 MF51-7203: 7.7 MS51-7203: 7.4 MA51-7200: 8.4 MA51-7201: 8.5	
<b>Built-in Auxiliary switch</b>		None	
<b>Override</b>		Powered <100 Spring return <35	
<b>Linkages</b>		MA51 & MF51: None MS51: 2 to 10 VDC only The MS51-7203-040 does not have a feedback output. None	
<b>Installation instructions</b>		F-27120	
<b>Regulatory compliance</b>		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 (sec)		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			
MF40-7043-501					One			
MS40-7043	Proportional 2...10 Vdc 4...20 mAa		5.6	2...10 Vdc	No	<130	<25	
MS40-7043-501					One			
MS40-7043-MP <sup>a</sup>	Proportional 6...9 Vdc	6.6	None	No				
MS40-7043-MP5 <sup>a</sup>				One				

a - Provides auxiliary power supply +20 Vdc 25 mA maximum.

### Application

The AM-708 500 ohm resistor converts a 4 to 20 mA signal to a 2 to 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 35 lb-in SR SmartX Actuators

### Mx40-704x Spring Return Actuator Specifications

#### Inputs

<b>Control signal</b>	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 Ω resistor. MS40-7043-MP/-MP5 – Proportional 6 to 9 VDC. MF40-7043 – Floating point control, 24 Vac.																																																																								
<b>Power requirements</b>	<p>All 24 Vac circuits are Class 2.</p> <table border="1"> <thead> <tr> <th rowspan="3">Part Number<sup>a</sup></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> </thead> <tbody> <tr> <td><b>MA40-7043</b></td> <td rowspan="6">24 Vac ± 20%</td> <td>4.4</td> <td>2.9</td> <td>4.4</td> <td>2.9</td> <td>0.8</td> <td>0.8</td> </tr> <tr> <td><b>MS40-7043</b></td> <td>5.6</td> <td>4.2</td> <td>5.6</td> <td>4.2</td> <td>2.4</td> <td>2.4</td> </tr> <tr> <td><b>MF40-7043</b></td> <td>5.9</td> <td>4.4</td> <td>5.9</td> <td>4.4</td> <td>2.9</td> <td>2.9</td> </tr> <tr> <td><b>MS40-7043-MP</b></td> <td>6.9</td> <td>5.0</td> <td>6.6</td> <td>5.0</td> <td>3.2</td> <td>3.2</td> </tr> <tr> <td><b>MS40-7043-MP5</b></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><b>MA40-7040</b></td> <td>120 Vac ± 10%</td> <td>6.4</td> <td>3.8</td> <td>4.3</td> <td>3.4</td> <td>1.6</td> <td>1.2</td> </tr> <tr> <td><b>MA40-7041</b></td> <td>230 Vac ± 10%</td> <td>5.8</td> <td>4.1</td> <td>4.6</td> <td>3.9</td> <td>1.5</td> <td>1.2</td> </tr> </tbody> </table> <p>a - See Auxiliary switches under Electrical below.</p>	Part Number <sup>a</sup>	Voltage 50/60 Hz	Running				Holding		50 Hz		60 Hz		50 Hz	60 Hz	VA	W	VA	W	W	W	<b>MA40-7043</b>	24 Vac ± 20%	4.4	2.9	4.4	2.9	0.8	0.8	<b>MS40-7043</b>	5.6	4.2	5.6	4.2	2.4	2.4	<b>MF40-7043</b>	5.9	4.4	5.9	4.4	2.9	2.9	<b>MS40-7043-MP</b>	6.9	5.0	6.6	5.0	3.2	3.2	<b>MS40-7043-MP5</b>							<b>MA40-7040</b>	120 Vac ± 10%	6.4	3.8	4.3	3.4	1.6	1.2	<b>MA40-7041</b>	230 Vac ± 10%	5.8	4.1	4.6	3.9	1.5	1.2
Part Number <sup>a</sup>	Voltage 50/60 Hz			Running				Holding																																																																	
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<b>MA40-7043</b>	24 Vac ± 20%	4.4	2.9	4.4	2.9	0.8	0.8																																																																		
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<b>MA40-7040</b>		120 Vac ± 10%	6.4	3.8	4.3	3.4	1.6	1.2																																																																	
<b>MA40-7041</b>	230 Vac ± 10%	5.8	4.1	4.6	3.9	1.5	1.2																																																																		
<b>Connections</b>	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.																																																																								
<b>Motor type</b>	MA40-704x – Brush. MF40-7043, MS40-7043 – Brushless DC.																																																																								
<b>Outputs: Electrical</b>	<p>Auxiliary switches: One Auxiliary switch available with Mx40-7043-501 and MS40-7043-MP5, SPDT 6A resistive @ 24 Vac, adjustable 0 to 95° (0 to 1 scale). Switch meets VDE requirements for 6 (1.5)A, 24 Vac.</p> <p>One Auxiliary switch available with MA40-7040-501 or MA40-7041-501, SPDT 6A resistive @ 250 Vac, adjustable 0 to 95° (0 to 1 scale). Switch meets VDE requirements for 6 (1.5)A, 250 Vac.</p> <p>Position Feedback Voltage "AO" (MS40- model only): 2 to 10 VDC (maximum 0.7 mA) output signal for position feedback or operation of up to four slave actuators.</p> <p>Control Mode: Switch provided for selection of direct acting or reverse acting control mode on proportional models.</p> <p>Timing: MA40-704x - Approx. 50 sec. MF40- and MS40-7043 - Approx. 130 sec.</p> <p>Auxiliary Power Supply: MS40-7043-MP and MS40-7043-MP5 +20 VDC @ 25 mA (max.)</p>																																																																								
<b>Mechanical</b>	<p>Stroke: Angle of rotation is limited to a maximum of 95°, with mechanical stop.</p> <p>Output torque rating: Mx40-704x 35 lb-in (4 N-m)</p> <p>Position indicator: Visual indicator with a scale numbered from 0 to 90°, provided for Position indication.</p>																																																																								
<b>Environment temperature limits</b>	Shipping and storage: -40 to 160 °F (-40 to 71 °C) ambient. Operating: -22 to 140 °F (-30 to 60 °C).																																																																								
<b>Humidity</b>	5 to 95% RH, non-condensing																																																																								
<b>Location</b>	NEMA Type 2 (IEC IP54)																																																																								

## Mx41-7073 60 lb-in SR SmartX Actuators

**Mx41-7073 Series SmartX Actuators**  
**24 Vac**  
**60 lb-in**



### Specifications

<b>Torque</b>	60 lb-in (7 N-m) minimum
<b>Connection</b>	3 ft. (0.9 m) cable, ½" conduit connectors
<b>Rotation</b>	CW or CCW spring return using reverse mounting
<b>Control action</b>	Direct/reverse signal selection (MS41- only)
<b>Shaft size</b>	¾" (19 mm) diameter, ½" (13 mm) square
<b>Housing</b>	NEMA 1, NEMA 2 (IEC IP54) with conduit connector in the down position
<b>Dimensions</b>	10½ x 4 x 3½" (287 x 100 x 89 mm)
<b>Overload protection</b>	Throughout rotation
<b>Angle of rotation</b>	93° nominal
<b>Position indicator</b>	Pointer and scale
<b>Built-in Auxiliary switch</b>	2-SPDT 7A on MA41-7073-502, MF41-7073-502, MS41-7073-502 only
<b>Override</b>	Manual
<b>Motor type</b>	All brushless DC except MA41-7073-brush
<b>Linkages</b>	AV-602
<b>Installation instructions</b>	MA41-7073: F-26642, MF41-7073: F-26644, MS41-7073: F-26645
<b>Regulatory compliance</b>	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		
<b>MA41-7073</b>	2-Position	24 Vac ± 20% 22-30 VDC	4.8	None	No	<80	<40	6.8 (3.1)	
<b>MA41-7073-502</b>					Two			7.0 (3.2)	
<b>MF41-7073</b>	Floating 24 Vac		6.2		No	<195	<30	6.5 (2.9)	
<b>MF41-7073-502</b>					Two			7.0 (3.2)	
<b>MS41-7073</b>	2 to 10 VDC 4 to 20 mA dca		5.8		2 to 10 VDC			No	6.5 (2.9)
<b>MS41-7073-502</b>								Two	

### Application

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

**AM-708**  
**500 Ohm**  
**Resistor**



### Specifications:

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

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

Mx41-707x & Mx41-715x Series SmartX Actuators  
 24 to 230 Vac  
 60/133 lb-in



Spring Return Actuator

**Specifications**

<b>Control signal</b>	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 to 10 VDC or 4 to 20 mAdc with 500 Ω resistor.							
<b>Power requirements</b>	All 24 Vac circuits are Class 2.							
	<b>Part Number</b>	<b>Voltage 50/60 Hz</b>	<b>Running</b>				<b>Holding</b>	
			<b>50 Hz</b>	<b>60 Hz</b>	<b>50 Hz</b>	<b>60 Hz</b>	<b>50 Hz</b>	<b>60 Hz</b>
			VA	W	VA	W	W	W
	<b>MA41-7153-xxx</b>		9.8	7.5	9.7	7.5	2.8	2.8
	<b>MS41-7153-xxx</b>	24 Vac ± 20%	9.8	7.4	9.7	7.4	2.9	2.9
	<b>MF41-7153-xxx</b>		9.8	7.7	9.7	7.7	3.3	3.3
	<b>MA41-7150-xxx</b>	120 Vac ± 10%	11.7	8.8	10.0	8.4	3.6	5.0
	<b>MA41-7151-xxx</b>	230 Vac ± 10%	15.5	9.5	10.6	8.5	4.6	3.3
	<b>MA41-7073-xxx</b>		4.8	3.2	4.8	3.2	0.8	0.8
<b>MS41-7073-xxx</b>	24 Vac ± 20%	5.8	4.6	5.8	4.6	2.3	2.3	
<b>MF41-7073-xxx</b>		6.2	4.8	6.2	4.8	2.8	2.8	
<b>MA41-7070-xxx</b>	120 Vac ± 10%	10.7	4.2	5.6	3.6	2.0	1.2	
<b>MA41-7071-xxx</b>	230 Vac ± 10%	17.0	5.1	8.0	4.0	2.7	1.4	
<b>Connections</b>	3 ft. (0.9 m) long appliance cable, ½" conduit connectors. For M20 metric conduit, use AM-756 adapter.							
<b>Motor type</b>	MA41-707x – Brush. MA41-715x, MF41-7073, MF41-7153, MS41-7073, MS41-7153 – Brushless DC.							
<b>Electrical</b>	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 to 85°. Switches meet VDE requirements for 7 (2.5)A, 24 Vac. Position Feedback Voltage "AO" (MS41- model only): 2 to 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.							
<b>Mechanical</b>	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 to 90°, provided for Position indication. Manual override: Rotation is adjustable from -5° to 85° by using manual override crank.							
<b>Environment temperature limits Humidity</b>	Shipping and storage: -40 to 160 °F (-40 to 71 °C) ambient. Operating: -22 to 140 °F (-30 to 60 °C). 5 to 95% RH, non-condensing							
<b>Location</b>	NEMA Type 2 (IEC IP54) with conduit connector in the down position.							
<b>Regulatory compliance</b>	RoHS and REACh							

## Mx40-717x 150 lb-in SR SmartX Actuators

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



Spring Return Actuator

### Specifications

<b>Connection</b>	2 ft. (61 cm) Appliance cable, ½" conduit connectors
<b>Rotation</b>	CW or CCW spring return using reverse mounting
<b>Shaft size</b>	Standard: 3/8 to ½" (10 to 13 mm) round or square Optional: 1.05" (25.1 mm) diameter, 5/8" (15.9 mm) square
<b>Housing</b>	NEMA 1, NEMA 4 (IEC IP56) with customer-supplied water-tight connector
<b>Dimensions</b>	10-7/8 x 4 x 4" (276 x 100 x 100 mm)
<b>Overload protection</b>	Throughout rotation
<b>Angle of rotation</b>	93° nominal
<b>Position indicator</b>	Visual indicator
<b>Built-in auxiliary switches</b>	None
<b>Override</b>	None
<b>Motor type</b>	Brushless DC
<b>Linkages</b>	AV-602
<b>Installation instructions</b>	MA40-717x: F-26742, MF40-7173: F-26749, MS40-717x: F-26748
<b>Regulatory compliance</b>	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					
MS40-7170a	2 to 10 VDC 4 to 20 mA <sup>b</sup>	120 Vac ± 10%	11.1					
MS40-7173	2 to 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 to 20 mA signal to a 2 to 10 VDC signal.

### Specifications:

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

AM-708  
500 Ohm  
Resistor



## Mx41-6043 44 lb-in NSR SmartX Actuators

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



Non-Spring Return Actuator

**Specifications**

<b>Connection</b>	3 ft. (0.9 m) 18 AWG leads, Plenum rated
<b>Rotation</b>	90° CW or CCW field selectable
<b>Shaft size</b>	3/8 to 5/8" (10 to 15.9 mm) diameter, 1/4 to 1/2" (6.4 to 13 mm) square, 9/16" (14.3 mm) hex
<b>Housing</b>	NEMA 2, (IP54 to EN60529) with conduit in the down position
<b>Dimensions</b>	5-7/16 x 2 3/4 x 3-3/8" (140 x 70 x 60 mm)
<b>Overload protection</b>	Throughout rotation
<b>Angle of rotation</b>	90° nominal (field-adjustable to limit travel on either end of stroke)
<b>Position indicator</b>	Adjustable pointer
<b>Built-in auxiliary switches</b>	(Use MF41-6083-502 and MS41-6083-502 models with Auxiliary switches.)
<b>Operating temperature limits</b>	-25 to 130°F (-32 to 55°C)
<b>Override</b>	Manual
<b>Linkages</b>	AV-611
<b>Installation instructions</b>	MF41-6043: F-27213, MS41-6043: F-27214
<b>Regulatory compliance</b>	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 to 10 VDC			0 to 10 VDC		

## Mx41-6083 88 lb-in NSR SmartX Actuators

**Mx41-6083 Series SmartX Actuators**  
**24 Vac**  
**88 lb-in (10 N-m)**



Non-Spring Return Actuator

### Specification

<b>Connection</b>	3 ft. (0.9 m) 18 AWG leads, Plenum rated
<b>Rotation</b>	90° CW or CCW field selectable
<b>Shaft size</b>	3/8 to 5/8" (10 to 15.9 mm) diameter, 1/4 to 1/2" (6.4 to 13 mm) square, 9/16" (14.3 mm) hex
<b>Housing</b>	NEMA 2, (IP54 to EN60529) with conduit in the down position
<b>Dimensions</b>	5-7/16 x 2 3/4 x 3-3/8" (140 x 70 x 60 mm)
<b>Overload protection</b>	Throughout rotation
<b>Angle of rotation</b>	90° nominal (field-adjustable to limit travel on either end of stroke)
<b>Position indicator</b>	Adjustable pointer
<b>Built-in auxiliary switches</b>	Two SPDT on MF41-6083-502, MS41-6083-522, MS41-6083-502 only
<b>Operating temperature limits</b>	-25 to 130°F (-32 to 55°C)
<b>Override</b>	Manual
<b>Linkages</b>	AV-611
<b>Installation instructions</b>	MF41-6083: F-27213, MS41-6083: F-27214
<b>Regulatory compliance</b>	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 to 10 VDC		3.3	0 to 10 VDC	No		
MS41-6083-502	0 to 10 VDC				Two		

## Mx41-6153 133 lb-in NSR SmartX Actuators

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



Non-Spring Return Actuator

**Specifications**

<b>Connection</b>	3 ft. (0.9 m) 18 AWG leads
<b>Rotation</b>	CW or CCW through reverse mounting
<b>Shaft size</b>	3/8 to 3/4" (6.4 to 19 mm) diameter, 1/4 to 1/2" (6.4 to 13 mm) square
<b>Housing</b>	NEMA 1, (IP54 to EN60529)
<b>Dimensions</b>	8-3/8 x 3 1/4 x 2-2/3" (210 x 80 x 70 mm)
<b>Overload protection</b>	Throughout rotation
<b>Angle of rotation</b>	90° nominal (field-adjustable to limit travel on either end of stroke)
<b>Position indicator</b>	Adjustable pointer
<b>Built-in auxiliary switches</b>	Two SPDT on MS41-6153-502 only
<b>Operating temperature limits</b>	-25 to 130°F (-32 to 55°C)
<b>Override</b>	Manual
<b>Linkages</b>	AV-611
<b>Installation instructions</b>	F-27215
<b>Regulatory compliance</b>	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		
MF41-6153	Floating	24 Vac +20% -15%	3.0	None	No	<125 (60 Hz)	2.2 (1)
MS41-6153	0 to 10 VDC			0 to 10 VDC	2		
MS41-6153-502							

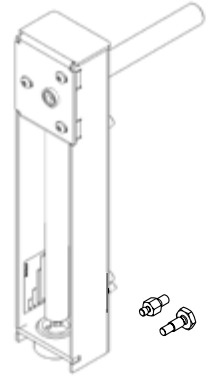
## AV-602 Linkage

### Application

The AV-602 links Schneider Electric rotary actuators to 1" to 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 to 2"	1 to 2"



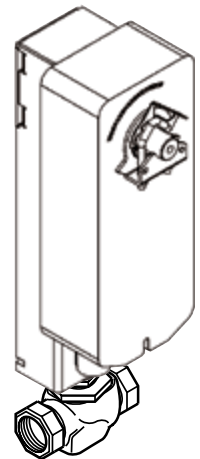
AV-602 Globe Linkage

### 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 to 2"	SR (Spring Return)
Mx41-715x	1¼" to 2"	
Mx40-717x	1½ to 2"	



Typical Actuator/Linkage Mounting



## 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" to 2" VB-7000 and ½" to 1¼" discontinued VB-9xxx 2-Way and 3-Way globe valves.

### 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.

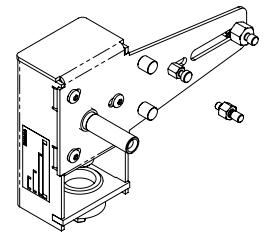
Actuators		
Actuator	Descriptions	Size
<b>MF41-6043</b>	Floating 44 lb-in non-spring return	½" to 2"
<b>MS41-6043</b>	Proportional 44 lb-in non-spring return	
<b>MF41-6083</b>	Floating 88 lb-in non-spring return	1" to 2"
<b>MS41-6083</b>	Proportional 88 lb-in non-spring return	
<b>MF41-6153</b>	Floating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

Note: The AV-611 linkage is also compatible with the actuators above with the A

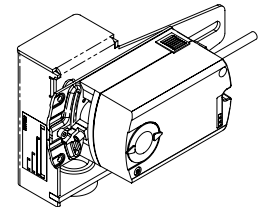
### Linkage Kits for Field Mounting Globe Valve Actuators

Linkage Kit	Actuator	Factory-assembled valve sizes 2-way & 3-way	Field-assembled to VB valve bodies 2-way & 3-way
<b>AV-611</b>	Mx41-6043	½" to 2"	½" to 2"
	Mx41-6083	1" to 2"	
	Mx41-6153	1½" to 2"	

a - Refer to linkage pages for complete details.



AV-611 SmartX Actuator  
Globe Linkage



Typical Actuator Mounting

## MA-52xx Hydraulic 2-Position SR Actuators

### Application

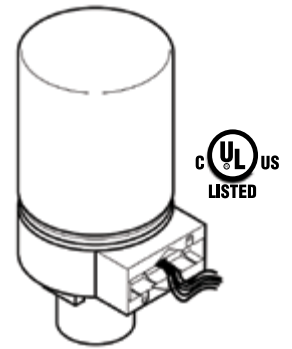
These MA-52xx Series Actuators are used for two-position control of valves that require a return to the normal position upon power interruption.

### Features

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

### Model table

Part number	Actuator power input					10 amps aux switch	Timing in seconds @ 72° F (22° C)	
	AC voltage +10 -15%	60 Hz		50 Hz			To extend (no load stroke)	Retract on power loss
		Watts	Amps	Watts	Amps			
MA-5210	120	5.4	0.14	6.0	0.17	No	60	15
MA-5210-500						Yes		
MA-5213	24	8.8	0.65	9.8	0.80	No		
MA-5213-500						Yes		



MA-52xx Spring Return Series

### Specifications

<b>Inputs</b>	
<b>Control circuit</b>	Two-wire, SPDT
<b>Power input</b>	Refer to Model table
<b>Connections</b>	Color-coded 4 ft. (1.2 m) leads.
<b>Outputs</b>	
<b>Electrical</b>	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.
<b>Mechanical</b>	Stroke, Valve: Approximately 9/16" (14.3 mm) from fully retracted to fully extended
<b>Environment</b>	
<b>Temperature limits</b>	Shipping & storage, -40 to 140° F (-40 to 61° C) Operating, -20 to 140° F (-29 to 60° C) Operating, damper -20 to 140° F (-29 to 60° C) Operating, valve: refer to restrictions on maximum allowable ambient air temperature for Valve Actuators table (next page).
<b>Humidity</b>	5 to 95% RH, non-condensing
<b>Location</b>	NEMA Type 1
<b>Dimensions</b>	6¾ x 3-23/32 x 3¼ Dia." (171 x 94 x 83 mm)
<b>Regulatory compliance</b>	RoHS and REACH

## MA-52xx Hydraulic 2-Position SR Actuators

### Restrictions on Maximum Allowable Ambient Air Temperature for Valve Actuators

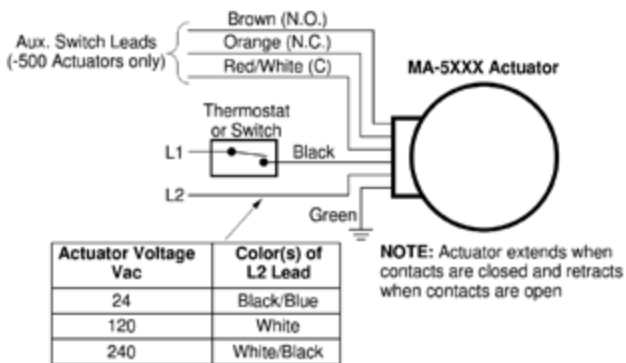
Temperature of media in the valve body (Check the rating of the valve) °F (°C)	Maximum ambient temperature of MA-521x Series	
	AV-7600-1 (Only) °F (°C)	AV-7600-1 and AV-601 °F (°C)
366 (180)	90 (32)	90 (32)
340 (171)	100 (38)	100 (38)
281 (138)	115 (46)	140 (60)a
181 (83)	140 (60)a	140 (60)a
80 (26)	140 (60)a	140 (60)a

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

### Optional accessories

#### Linkages

AV-601	Linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Linkage ½" to 2" to be used with VB-7000.



Typical Wiring for MA-5xxx Series Actuators

### Application

The AV-7600-1 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
- 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.



## MP-52xx Hydraulic Proportional SR Actuators

### Application

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

### Features

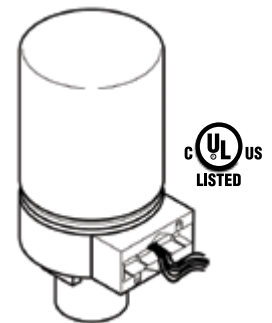
- Compatibility with 2 to 15 VDC System 8000 Input signals
- Proportional control by variable VDC Input signal
- Spring return
- Fixed 3 VDC operating span
- Non-adjustable start point and non-positive positioning. Typically, one actuator is controlled from one VDC output signal
- 10,000  $\Omega$  or 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

Model table

Part Number	Actuator power input					10 amps auxiliary switch <sup>a</sup>	Timing in seconds @ 72° F (22° C)			Required Linkage
	AC voltage $\pm$ 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 <sup>b</sup>
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.



MP-52xx Proportional

### Specifications

Inputs	
<b>Compatible with</b>	2 to 15 VDC from System 8000 controllers Operating Span: Approx. 3 VDC fixed. See F-26235-2 for valves. Impedance: 10,000 $\Omega$ or greater.
<b>Power input</b>	Refer to Model table.
<b>Connections</b>	Color-coded 4 ft. (1.2 m) leads.
Outputs	
<b>Electrical</b>	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.
<b>Mechanical</b>	Stroke, Valve: Approximately 9/16" (14.3 mm) over a nominal 6 VDC (fully retracted) to 9 VDC (fully extended).
Environment	
<b>Temperature limits</b>	Shipping & Storage, -40 to 140° F (-40 to 61° C) For valve actuators: Refer to Pg. 25, 2. VB-7000 Series Globe Valves and Sizing and Selection
<b>Humidity</b>	5 to 95% RH, non-condensing
<b>Location</b>	NEMA Type 1
<b>Dimensions</b>	6¾ x 3¼ Dia." (171 x 83 mm)
<b>Regulatory compliance</b>	RoHS and REACH

## MP-52xx Hydraulic Proportional SR Actuators

### Restrictions on the Maximum ambient temperature for valve actuator

Maximum ambient temperature (Check valve ratings)	Maximum ambient temperature of MP-541x or MPR-5x1x		Maximum ambient temperature of MA-521x or MP-521x	
	AV-600a or AV-7600b only for chilled water applications only	AV-600a or AV-7600b & AV-601	AV-600a or AV-7600b Only	AV-600a or AV-7600b & AV-601
366°F (180°C)	Do not use	88°F (31°C)	90°F (32°C)	90°F (32°C)
340°F (171°C)		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) <sup>c</sup>
181°F (83°C)		120°F (48°C)	140°F (60°C) <sup>c</sup>	
80°F (26°C)	140°F (60°C) <sup>c</sup>	140°F (60°C) <sup>c</sup>		

a - For detailed Linkage Installation instructions, refer to AV-600 Hydraulic Actuator Linkage Kit installation instructions, F-26279.

b - For detailed Linkage Installation instructions, refer to AV-7600 Hydraulic Actuator Linkage Kit installation instructions, F-26235.

c - Maximum allowable ambient temperature of the actuator.

### Optional accessories

#### Linkages

AV-601	Linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Linkage for VB-7000.

### Application

The AV-7600-1 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.

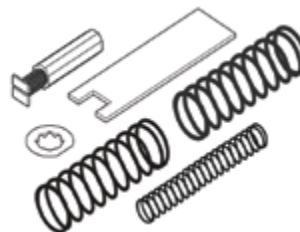
### Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies
- 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  
Linkage Kit



## MP-541x Hydraulic Proportional SR Actuators

### Application

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

### Features

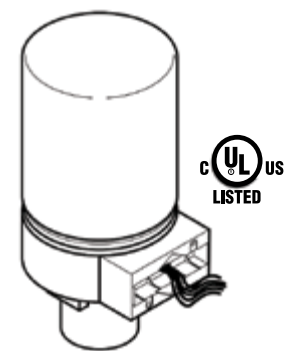
- Proportional control by variable VDC input signal
- Compatibility with 2 to 15 VDC System 8000 input signals
- Spring return
- Fixed 3 VDC operating span.
- Adjustable 2 to 12 VDC start point for paralleling or sequencing of actuators
- 10,000 Ω or greater input impedance
- 24 and 120 Vac models
-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

### Model table

Part number	Actuator power input				Positive positioner <sup>a</sup>	Timing in seconds @ 72° F (22° C)			Linkage	
	AC voltage +10% -15%	60 Hz		50 Hz		No Load Stroke		Retract on power loss		
		Watts	Amps	Watts		Amps	To Extend			To Retract
MP-5410	120	11.7	0.16	12.9	0.19	Yes	60	40	15	AV-600 AV-601b AV-7600-1
MP-5413	24	12.0	0.80	13.2	0.97					

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

b - May be required for steam or hot water.



MP-541x Series Positive Positioning

### Specifications

<b>Inputs</b>	Compatible with 2 to 15 VDC from System 8000 controllers
<b>Operating span</b>	Approx. 3 VDC fixed.
<b>Start point</b>	Adjustable 2 to 12 VDC. Factory set at 6 VDC. Impedance: 10,000 Ω or greater.
<b>Connections</b>	Color-coded 4 ft. (1.2 m) leads.
<b>Outputs</b>	
<b>Electrical</b>	Internal Power Supply: 20 VDC, 25 mA.
<b>Mechanical</b>	Stroke, Valve: Approximately 9/16" (14.3 mm) over a nominal 6 VDC (fully retracted) to 9 VDC (fully extended) input range.
<b>Environment</b>	
<b>Ambient temperature limits</b>	Operating: -20 to 140° F (-29 to 60° C) For valve actuators: Refer to Pg. 25, 2, VB-7000 Series Globe Valves and Sizing and Selection
<b>Humidity</b>	5 to 95% RH, non-condensing
<b>Location</b>	NEMA Type 1
<b>Dimensions</b>	6¾ x 3¼ Dia." (171 x 83 mm)
<b>Regulatory compliance</b>	RoHS and REACH

## MP-541x Hydraulic Proportional SR Actuators

### Restrictions on the maximum ambient temperature for Valve Actuator

Maximum ambient temperature (Check Valve Ratings)	Maximum ambient temperature of MP-541x or MPR-5x1x		Maximum ambient temperature of MA-521x or MP-521x	
	AV-600a or AV-7600b Only for Chilled Water Applications Only	AV-600a or AV-7600b & AV-601	AV-600a or AV-7600b Only	AV-600a or AV-7600b & AV-601
366°F (180°C)	Do not use	88°F (31°C)	90°F (32°C)	
340°F (171°C)		93°F (34°C)	100°F (38°C)	
281°F (138°C)		103°F (39°C)	115°F (46°C)	140°F (60°C) <sup>c</sup>
181°F (83°C)		120°F (48°C)	140°F (60°C) <sup>c</sup>	
80°F (26°C)	140°F (60°C) <sup>c</sup>			

a - For detailed Linkage Installation instructions, refer to AV-600 Hydraulic Actuator Linkage Kit installation instructions, F-26279.

b - For detailed Linkage Installation instructions, refer to AV-7600 Hydraulic Actuator Linkage Kit installation instructions, F-26235.

c - Maximum allowable ambient temperature of the actuator.

### Optional accessories

#### Linkages

AV-601	Linkage extension for hot water and steam applications; use with AV-7600.
AV-7600-1	Linkage for VB-7000.

### Application

The AV-7600-1 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.

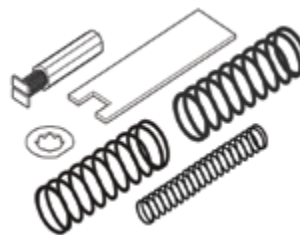
### Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies
- 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  
Linkage Kit



## MPR-561x 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 to 20 mA input signals.

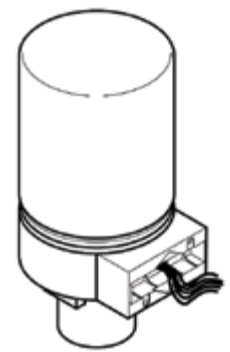
### Features

- 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

### 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 to 20 mA	60	30	AV-600 AV-601*
MPR-5613	24	12.0	0.80	13.2	0.97				

a - May be required for steam or hot water.



MPR-561x Series Proportional

### Specifications

Inputs	
<b>Control circuit</b>	MPR-561x Series: Two-wire.
<b>Input impedance</b>	82.5 Ω for 4 to 20 mA input.
<b>Power input</b>	Refer to Model table
<b>Connections</b>	Color-coded 4 ft. (1.2 m) leads.
Outputs	
<b>Electrical</b>	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.
<b>Mechanical</b>	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	
<b>Temperature limits</b>	Shipping and storage: -40 to 140° F (-40 to 60° C) Operating: -20 to 140° F (-29 to 60° C) Operating, valve: Refer to Pg. 25, 2. VB-7000 Series Globe Valves and Sizing and Selection
<b>Humidity</b>	5 to 95% RH, non-condensing
<b>Location</b>	NEMA Type 1
<b>Dimensions</b>	MP-5x1x: 6¼ x 3¼" (171 x 83 mm)
<b>Regulatory compliance</b>	RoHS and REACH



## MPR-561x Hydraulic Proportional SR Actuators

### Optional accessories

#### Linkages

<b>AV-601</b>	Linkage extension for hot water and steam applications; use with AV-7600.
<b>AV-7600-1</b>	Linkage for VB-7000.



### Application

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



### Application

The AV-7600-1 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.

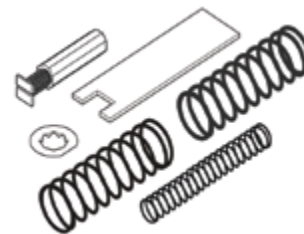
### Features

- Provides direct-couple interface between MA, MP and MPR-5xxx actuators and valve bodies
- 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  
Linkage Kit



## AV-601 Extension for MA, MP 5x1x-xxx, MPR-5x1x, 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 and Sequencing Valves, Flared
- 3-Way and Diverting Valves, Threaded

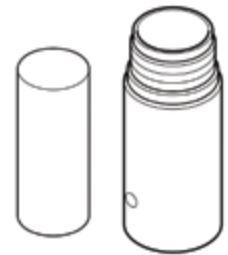
### Restrictions on the maximum ambient temperature for Valve Actuator

Maximum ambient temperature (check valve ratings)	Maximum ambient temperature of MP-541x or MPR-5x1x		Maximum ambient temperature of MA-521x or MP-521x	
	AV-600a or AV-7600b only for chilled water applications only	AV-600a or AV-7600b & AV-601	AV-600a or AV- 7600b Only	AV-600a or AV-7600b & AV-601
366°F (180°C)	Do not use	88°F (31°C)	90°F (32°C)	
340°F (171°C)		93°F (34°C)	100°F (38°C)	
281°F (138°C)		103°F (39°C)	115°F (46°C)	140°F (60°C) <sup>c</sup>
181°F (83°C)		120°F (48°C)	140°F (60°C) <sup>c</sup>	
80°F (26°C)		140°F (60°C) <sup>c</sup>		

a - For detailed Linkage Installation instructions, refer to AV-600 Hydraulic Actuator Linkage Kit installation instructions, F-26279.

b - For detailed Linkage Installation instructions, refer to AV-7600 Hydraulic Actuator Linkage Kit installation instructions, F-26235.

c - Maximum allowable ambient temperature of the actuator.



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

## MK-2690 Pneumatic Valve Actuator - Proportional

### Application

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

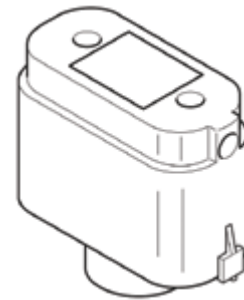
### Features

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

### Model table

Model number	Nominal spring range <sup>a</sup> (spring color Code)	
	psig	kPa
MK-2690	3 to 7 (Yellow)	21 to 48
	5 to 10 (Black)	34 to 69
	8 to 13 (Blue)	55 to 90

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



MK-2690 Proportional Pneumatic Valve Actuator

### Specifications

<b>Inputs</b>	Compatible with proportional pneumatic signal. Refer to Model table.
<b>Start point</b>	Non-adjustable.
<b>Air connections</b>	1/8" FNPT located on side of housing.
<b>Max. air pressure</b>	30 psig (207 kPa)
<b>Mechanical outputs</b>	
<b>Stroke</b>	5/8" available
<b>Environment</b>	
<b>Ambient temperature limits</b>	Shipping: -40 to 220° F (-40 to 104° C) Operating: -20 to 220° F (-29 to 104° C)
<b>Humidity</b>	5 to 95% RH, non-condensing
<b>Spring</b>	(see Optional accessories below)
<b>Dimensions</b>	3-9/16" H x 5" W x 2¼" D (90 x 127 x 57 mm)

### Optional accessories

<b>Spring</b>	Stainless steel spring retracts actuator shaft and raises valve stem on loss of air pressure. Springs provided in AV-400 or AV-7400 linkage.
<b>Linkages</b>	
<b>AK-42309-500</b>	Positive Positioner & linkage; use with MK-2690-0-0 to 1 or MK-2690-0-0-2 models only.
<b>AV-400</b>	Linkage (includes parts for VB-7000 and VB-9xxx valves and 3 to 7, 5 to 10, & 8 to 13 springs)
<b>AV-7400</b>	Linkage for VB-7000 valves only. (includes 3 to 7, 5 to 10, & 8 to 13 springs.)
<b>TOOLS (factory available)</b>	
<b>TOOL-095-1</b>	Pneumatic calibration tool kit.
<b>Maintenance parts</b>	
<b>PNV-144-43</b>	3 to 7 psig spring
<b>PNV-145-45</b>	5 to 10 psig spring
<b>PNV-145-48</b>	8 to 13 psig spring
<b>PNV-102-1</b>	Diaphragm

## AV-7400 Pneumatic Actuator Linkage Kit

### Application

The AV-7400 Linkage Kit is used to field install MK-2690 pneumatic actuators to a variety of ½” to 2” VB-7000 series valve bodies.

### Features

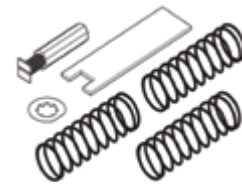
- Springs are provided for control-signal applications, including 3 to 7, 5 to 10 and 8 to 12 psig.
- Kit fits all VB-7000 series valve bodies.
- Blue spring used with AV-7600-1 supports hydraulic 4 to 20 mA and 0 to 10 VDC applications.

### Specifications

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

#### Spring specifications

Spring range psig (kPa)	Spring color
3 to 7 (21 to 48)	Yellow
5 to 10 (34 to 68)	Black
8 to 13 (55 to 89)	Blue



AV-7400  
Pneumatic Actuator  
Linkage Kit

## MK-46xx Pneumatic Actuator - Proportional

### Application

The MK-46xx Series and MK-4621-422 proportional pneumatic actuators, with 11 sq. in. (71 cm<sup>2</sup>) effective diaphragm area, are used to control ½" to 2" VB-7000 series valves.

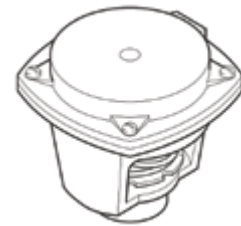
### Features

- 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" to 1¼").

### Model table

Model number	Nominal spring range <sup>a</sup>	
	psig	kPa
<b>MK-4601</b>	3 to 6	21 to 41
<b>MK-4611</b>	5 to 10	34 to 69
<b>MK-4621</b>	10 to 13	69 to 90
<b>MK-4621-422</b>	10 to 11.25	69 to 77
<b>MK-4641</b>	3 to 13	21 to 90

a - Nominal (no load) condition, spring ranges based on ½" (13 mm) maximum stroke.



MK-46xx  
Proportional Pneumatic Valve  
Actuator

### Specifications

<b>Construction</b>	Compatible with proportional pneumatic signal. Refer to Model table.
<b>Housing</b>	Die cast aluminum.
<b>Diaphragm</b>	Replaceable, beaded, molded, neoprene (Part number PNV-002).
<b>Stroke</b>	½" (12.7 mm) nominal.
<b>Spring</b>	Retracts actuator shaft and raises valve stem on loss of air pressure.
<b>Nominal spring range</b>	Refer to Model table.
<b>Starting point</b>	Field adjustable.
<b>MK-4601, MK-4621</b>	+½ psig (7 to 14 kPa).
<b>MK-4611, MK-4641</b>	±2 psig (14 kPa).
<b>Air connections</b>	1/8" FNPT.
<b>Max. air pressure</b>	30 psig (207 kPa).
<b>Environment</b>	
<b>Ambient temperature limits</b>	Shipping: -40 to 220° F (-40 to 104° C) Operating: -20 to 220° F (-29 to 104° C)
<b>Mounting</b>	In any upright position with actuator head above the center line of the valve body.
<b>Dimensions</b>	3-7/8 x 4¾ x 4¾" (99 x 121 x 121 mm)
<b>Maintenance parts</b>	See F-26033

### Optional accessories

<b>Linkage</b>	AV-401. See F-19072
<b>Positive Positioner &amp; linkage</b>	e; AK-42309-500 use with MK-46x1-0-2.
<b>Tools (factory available)</b>	TOOL-095-1 Pneumatic calibration tool kit.

## MK-66xx Pneumatic Actuator - Proportional

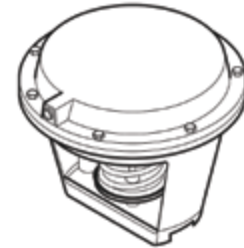
### Application

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

### Features

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

Model no.	Nominal spring range		Nominal stroke in. (mm)
	psig	kPa	
<b>MK-6601</b>	3 to 8	21 to 55	½ (13.7)
<b>MK-6611</b>	5 to 10	34 to 69	
<b>MK-6621</b>	8 to 13	55 to 90	



MK-66xx

Proportional Pneumatic Valve Actuator

Specifications	
<b>Construction</b>	
<b>Housing</b>	Die cast aluminum
<b>Diaphragm</b>	Replaceable beaded molded neoprene (Part number PNV-202)
<b>Stroke</b>	Refer to Model table.
<b>Spring</b>	Retracts actuator shaft and raises valve stem on loss of air pressure
<b>Nominal spring range</b>	Refer to Model table.
<b>Starting point</b>	Adjustable ±2 psig (±14 kPa)
<b>Maximum air pressure</b>	30 psig (207 kPa)
<b>Ambient temperature limits</b>	
<b>Shipping</b>	-40 to 220°F (-40 to 104°C)
<b>Operating</b>	-20 to 220°F (-29 to 104°C)
<b>Air connections</b>	1/8" FNPT
<b>Mounting</b>	Any upright position with actuator head above center line of the valve body
<b>Dimensions</b>	7¾" H x 10½" W x 10½" D (199 x 267 x 267 mm)
<b>Maintenance parts</b>	See F-26033
<b>Optional accessories</b>	
<b>Linkage</b>	AV-430 (See F-19072).

## AK-42309-500 Positive Positioning Relay

### Application

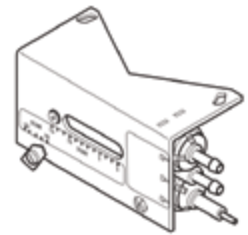
Positive Positioner Pneumatic Relay is used to accurately position an actuator stroke with respect to signal pressure from the controller. It can also be used to change the effective spring range of an actuator and increase the capacity of a controller.

### Features

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

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

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



AK-42309-500  
Positive Positioning Relay

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

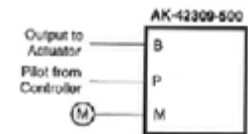


Figure 1 Piping Connections.

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



Visit:

<http://goo.gl/LJCLEb>

## Ordering VB-8/9000 Valves

Specify two part number fields (2 and 6 below) to determine the valve part number.

<p><b>1) Control Signal</b></p> <p>V <span style="border: 1px solid black; padding: 2px;">B</span></p>	<p><b>2) Trim and Valve Configuration</b></p> <p>— <span style="border: 1px solid black; padding: 2px;"> </span><span style="border: 1px solid black; padding: 2px;"> </span><span style="border: 1px solid black; padding: 2px;"> </span></p>	<p><b>3) Pipe End Connections</b></p> <p><span style="border: 1px solid black; padding: 2px;">3</span></p> <p>Specify Option 3 (Flanged) for all valves.</p>	<p><b>4) Actuator or Linkage</b></p> <p>— <span style="border: 1px solid black; padding: 2px;">0</span> —</p>	<p><b>5) Pattern Code</b></p> <p><span style="border: 1px solid black; padding: 2px;">5</span> —</p> <p>Specify Option 5 (Flanged) for all valves.</p>	<p><b>6) Port Code Cv Value</b></p> <p><span style="border: 1px solid black; padding: 2px;"> </span><span style="border: 1px solid black; padding: 2px;"> </span></p> <p>For water, steam, glycol and similar non flammable, non toxic fluids, choose based on the Capacity Sizing section of this catalog. Below 2½", go to Pg. 25, 2. VB-7000 Series Globe Valves and Sizing and Selection.</p>
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Refer to the guide below.

## Ordering VB-8000, VB-9000 Valves

<p>V <span style="border: 1px solid black; padding: 2px;">B</span></p> <p>B = Valve Body</p>	<p>— <span style="border: 1px solid black; padding: 2px;"> </span><span style="border: 1px solid black; padding: 2px;"> </span><span style="border: 1px solid black; padding: 2px;"> </span></p> <p>Trim and Configuration</p> <p>821 = 2-Way, Stem Up Open, Brass Trim EPDM Seat</p> <p>822 = 2-Way, Stem Up Closed, Brass Trim EPDM Seat</p> <p>830 = 3-Way, Mixing or Diverting, Brass Trim (Bottom port is "Common")</p> <p>931 = 3-Way, Mixing, Brass Trim, Metal-to-Metal (One end port is "Common")</p>	<p><span style="border: 1px solid black; padding: 2px;">3</span></p> <p>Pipe Connection End Fitting</p> <p>3 = Flanged</p>	<p>— <span style="border: 1px solid black; padding: 2px;">0</span> —</p> <p>Actuator or Linkage Code</p> <p>0 = No actuator, valve body (VB) only.</p>	<p>— <span style="border: 1px solid black; padding: 2px;">5</span> —</p> <p>Connection</p> <p>5 = Flanged</p>	<p>— <span style="border: 1px solid black; padding: 2px;"> </span><span style="border: 1px solid black; padding: 2px;"> </span></p> <p>Port Code</p> <p>2½" to 6" (Cv 56 to 500)</p> <p>12 = 2½"</p> <p>13 = 3"</p> <p>14 = 4"</p> <p>15 = 5"</p> <p>16 = 6"</p>
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NOTE: Threaded bodies are not available in size 2½" and larger.



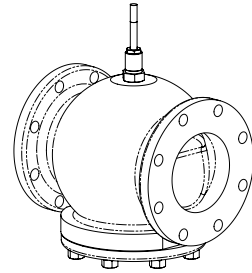
## VB-8000 2½" to 6" 2 and 3-Way Valves

### Schneider Electric VB-8213, VB-8223, & VB-8303 Valve Bodies

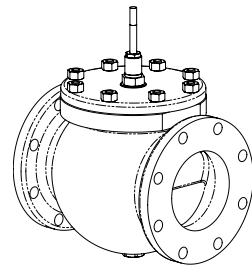
Ports		2-Way Flanged		3-Way Flanged	
Application		Chilled or hot water, steam <sup>i</sup>		Chilled or hot water <sup>i</sup>	
Size		2½" to 6"			
Valve body part number		VB-8213-0-5-P	VB-8223-0-5-P	VB-8303-0-5-P	
Valve body action		2-way stem open	2-way stem up closed	3-way/diverting <sup>a</sup>	
Material	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) <sup>b</sup>		20°F to 281°F (-7°C to 138°C)			
Close-off pressure, psi (kPa)		125 psi (856 kPa) <sup>c</sup>		35 psi (241 kPa) <sup>c</sup>	
P code	Valve size, In.	Cv (kvs)		Cv (kvs) mixing <sup>d</sup>	Cv (kvs) diverting <sup>e</sup>
12	2½	56 (48)	56 (48)	80 (69)	95 (82) <sup>f</sup> 115 (99) <sup>g</sup>
13	3	85 (74)	85 (74)	110 (95)	120 (104) <sup>h</sup>
14	4	145 (125)	145 (125)	190 (164)	190 (164) <sup>h</sup>
15	5	240 (208)	240 (208)	290 (251)	290 (251) <sup>h</sup>
16	6	370 (320)	370 (320)	500 (433)	500 (433) <sup>h</sup>

- 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 port 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%

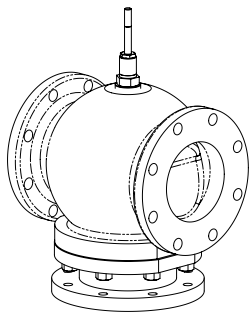
2-Way and 3-Way Valves  
2-Way Stem Up Open or Stem Up Closed  
3-Way/Diverting  
ASA 125 Flanged Cast Iron Body



VB-8213

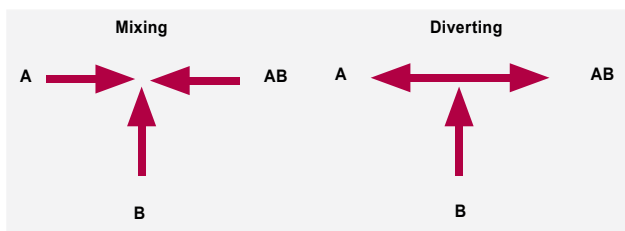


VB-8223



VB-8303

### VB-8000 3-Way Flow Patterns



## VB-9313 2½” to 6” 3-Way Valves

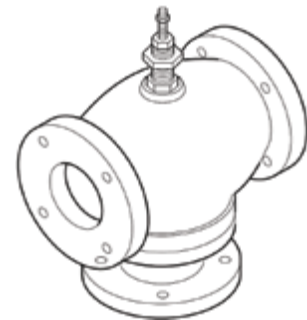
### Application

VB-9313 Series 3-Way 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 linkage that may be factory or field assembled.

### Features

- Valve sizes 2½” to 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		
<b>Application</b>		Chilled or hot water °		
<b>Flow characteristics</b>		Mixing		
<b>Sizes</b>		2½” to 6”		
<b>Type of end fitting</b>		125 lb. Flanged		
<b>Valve materials</b>	<b>Body</b>	Cast Iron		
	<b>Seat</b>	Bronze		
	<b>Stem</b>	Stainless steel		
	<b>Plug</b>	Brass		
	<b>Packing</b>	Spring loaded TFE & EPDM		
	<b>Disc</b>	None		
<b>ANSI pressure class, psig</b>		125 (up to 200 psig below 150°F)		
<b>Allowable control media temperature, °F (°C)</b>		40°F to 300°F (4°C to 149°C)		
<b>Allowable differential pressure, water, psi (kPa) <sup>a</sup></b>		35 psi (241 kPa) max. for normal life		
<b>Valve size, In.</b>	<b>Cv<sup>b</sup> Rating</b>	<b>kvs<sup>b</sup> Rating</b>	<b>Stroke</b>	<b>Complete valve body part number</b>
2½	74	64	7/8" (22 mm)	VB-9313-0-5-12
3	101	87	7/8" (22 mm)	VB-9313-0-5-13
4	170	147	7/8" (22 mm)	VB-9313-0-5-14
5	290	251	1¼" (45 mm)	VB-9313-0-5-15
6	390	337	1¼" (45 mm)	VB-9313-0-5-16



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

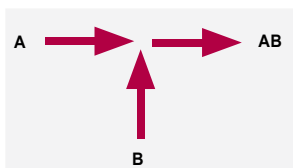
a - Maximum recommended differential pressure in open position. Do not exceed the recommended differential pressure (pressure drop) or integrity of parts may be affected

Exceeding maximum recommended differential pressure voids the product warranty.

b -  $kvs = m^3/h (\Delta P = 100 \text{ kPa})$      $kvs = Cv / 1.156$      $Cv = gpm / \sqrt{\Delta P}$  (in psi).

c - Glycol up to 50%

### VB-93xx 3-Way Flow Pattern



## 3-Way Valve sizing for water

### Sizing for water

#### Two-position

Two-position control valves are normally selected by "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:

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

Where:

Cv = Coefficient of flow

Cv 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.

#### Constant flow applications

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

#### Water capacity graph instructions

To select the appropriate valve Cv from the graph:

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

#### Additional Water Valve Sizing Information

For more information, download these documents from our website.

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

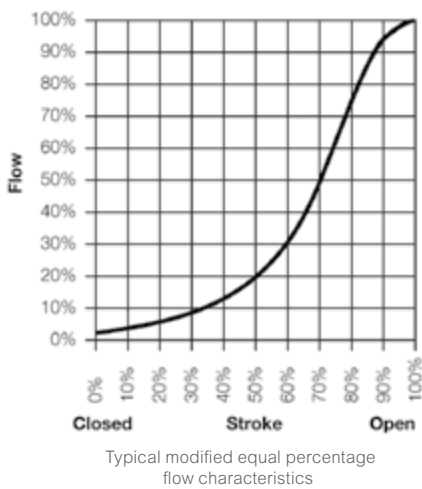
## VB-8xx3 Valve body characteristics

### 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

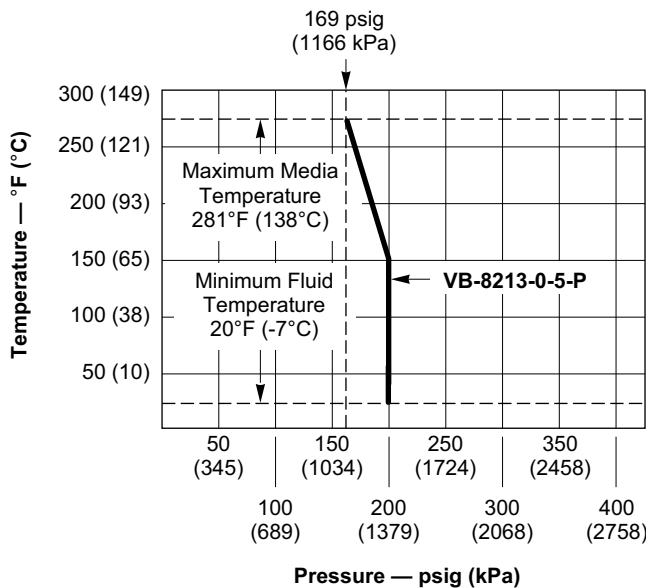
### 2-way valves:

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.



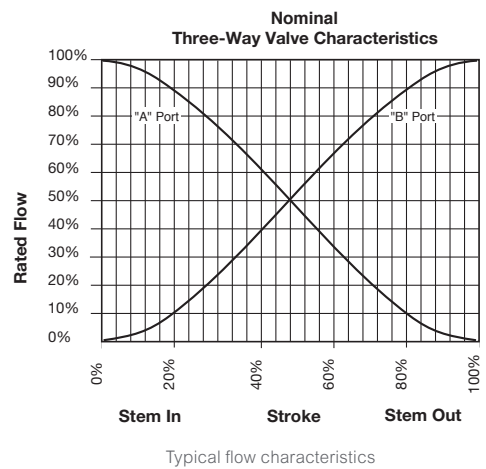
### Temperature/pressure ratings

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



### 3-way valves:

3-way 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.

### 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).

## VB-82x3 water flow coefficient and capacity

### 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 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 by "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 conventional heating system 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

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:

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

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)

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

## VB-82x3 steam capacity and vapor pressures

### 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 as follows:

For low pressure (15 psig or less), use  $\Delta P$  of 80% of gauge inlet pressure.

For steam pressures greater than 15 psig, use  $\Delta P$  of 42% of absolute (gauge plus 14.7) inlet pressure.

When the Cv required is between two valve sizes, select the larger size. Do not size steam valves using a pressure drop greater than 42% of the absolute inlet pressure.

### Steam table

Steam capacity in pounds per hour for VB-82x3 Series

Valve body part number	Cv rating	Differential pressure (DP in psi) <sup>a</sup>															
		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
<b>VB-82x3-0-5-12</b>	56	305	826	520	1331	818	1942	1093	2448	1359	2860	1620	3271	1879	3683	2136	4094
<b>VB-82x3-0-5-13</b>	85	463	1253	790	2021	1241	2947	1658	3716	2062	4341	2459	4965	2852	5590	3242	6214
<b>VB-82x3-0-5-14</b>	145	790	2138	1348	3447	2118	5027	2829	6339	3518	7405	4195	8470	4865	9536	5531	10601
<b>VB-82x3-0-5-15</b>	240	1308	3539	2231	5706	3505	8322	4683	10493	5823	12257	6943	14021	8053	15784	9156	17548
<b>VB-82x3-0-5-16</b>	370	2016	5456	3439	8796	5404	12830	7219	16177	8977	18896	10704	21615	12415	24334	14115	27053

<sup>a</sup> - 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

$$Cv = \frac{Q \times K}{3\sqrt{\Delta P \times P2}} \quad Q = \frac{3Cv\sqrt{\Delta P \times P2}}{K}$$

Where:

Cv = Coefficient of flow

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

$\Delta P$  = Differential pressure (pressure drop), measured in psi

P2 = Outlet pressure, measured in psia (absolute pressure). P2 = Inlet pressure + 14.7 –  $\Delta P$

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

## VB-82x3 steam capacity and vapor pressures

### 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.

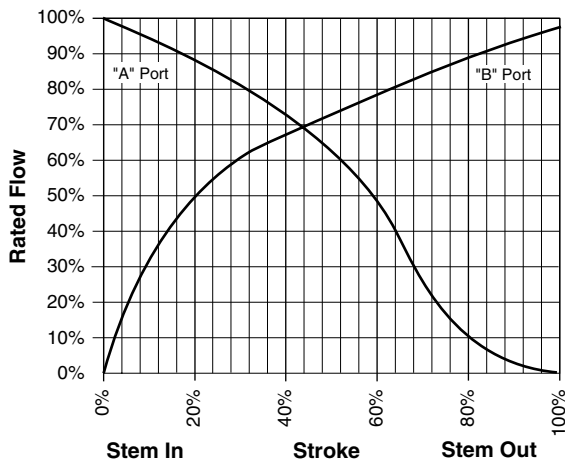
### Vapor pressure of water table

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

## VB-9313 Valve body characteristics

### Flow characteristics

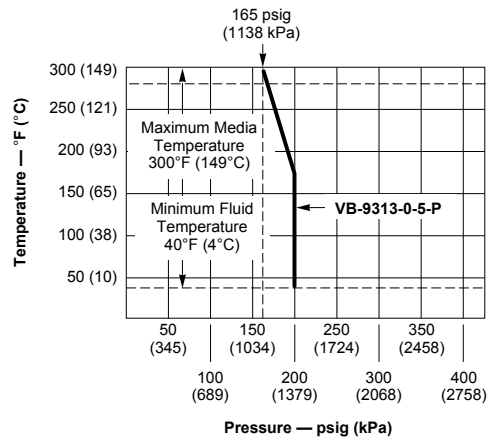
3-way valves are designed so that the flow from either of the inlet ports to the outlet is approximately linear, which means the total flow from the outlet is almost constant over the stroke of the valve stem. Typical flow characteristics of VB-9313 series valve bodies are shown below.



Typical flow characteristics

### Temperature/pressure ratings

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



Temperature and Pressure Ratings for VB-9313 Series Valve Bodies

### Rangeability

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

### Water

#### Two-position

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

#### Proportional to bypass flow

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

#### Conventional heating system pressure drops

Design temperature load drop °F (°C)	Recommended pressure drop* (% of available pressure)	Multiplier on load drop
60 (33) or more	50%	1 x load drop
40 (22)	66%	2 x load drop
20 (11)	75%	3 x load drop

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

Secondary circuits with small booster pumps: 13 50% of available pressure difference (equal to the drop through load, or 50% of booster pump head).



## 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

### Cv equation

Where:

Cv = Coefficient of flow

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

ΔP = Differential pressure in psi (pressure drop)

$$Cv = \frac{GPM}{\sqrt{\Delta P}}$$

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

$$GPM = Cv \sqrt{\Delta P}$$

### Cavitation limitations on valve pressure drop

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

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

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

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

Where:

P<sub>m</sub> = Maximum allowable pressure drop

P<sub>1</sub> = Absolute inlet pressure (psia)

P<sub>v</sub> = 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.

## VB-8xx3/9313 Close-Off pressure capability

Vapor pressure of water table

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

Seat leakage classes

### ANSI/FCI 70-2 leakage class

#### Class II

Maximum seat leakage

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.

## Overview VB-8/9000 Series Actuator Assemblies

### Vx-8xx3 Series Balanced Globe 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" to 6" 2-Way or 3-Way valve body with ASA flanged end connections.

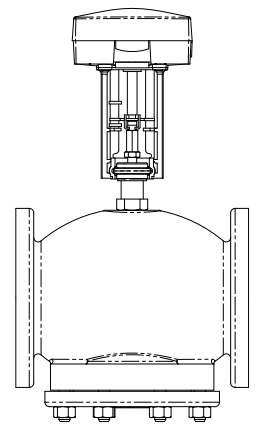
### VB-8xx3 Series Valve Bodies

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.

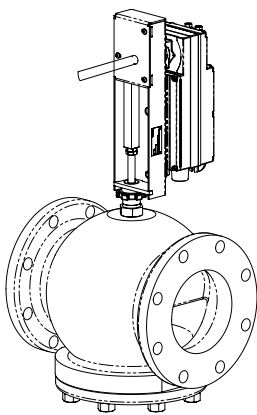
### Features

- 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" to 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 valves offer many of the same features as the VB-8xx3 vales and a conventional mixing valve flow pattern.

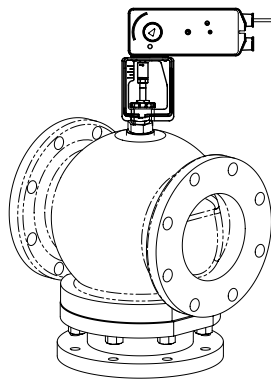
2-Way and 3-Way Valves  
2½" to 6" Flanged  
2-Way Stem Up Open  
2-Way Stem Up Closed  
3-Way/Diverting  
Electric/Electronic/Pneumatic  
Globe Valve Assemblies



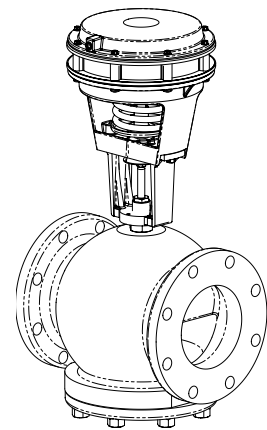
VB-8213 with M1500A Actuator



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

## VB-8000, VB-9000 Assembly selection procedure

### Globe Valve Assembly selection procedure

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

#### 1. Control signal type, valve body configuration and end connection

Refer to Pg. 111, Ordering VB-8000, VB-9000 Valve Assemblies 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:

- Refer to Sizing and Selection to calculate the required Cv.
- Select the nearest available Cv value and corresponding valve body port code.

#### 3. Actuator and linkages

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.

Note: Linkages shown in Specification tables are supplied with the actuator. When shown in Optional Accessories the linkage must be ordered separately.

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

## Specify four part number fields

(1, 2, 4, and 6 below) to determine the Valve Actuator Assembly part number.

<b>1) Control Signal</b>	<b>2) Trim and Valve Configuration</b>	<b>3) Pipe End Connections</b>	<b>4) Actuator or Linkage</b>	<b>5) Pattern Code</b>	<b>6) Port Code Cv Value</b>
V <input type="text"/> <input type="text"/> - <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> 3 -	<input type="text"/> <input type="text"/> <input type="text"/>	- <input type="text"/> 5 -	<input type="text"/> <input type="text"/>
Refer to the guide below.		Flanged for all valves.	Refer to the following pages for Spring & Non-Spring Return Electric and Pneumatic Spring Return Actuator codes, based on required close-off pressure.	Specify Option 5 (Flanged) for all valves.	For water, steam, glycol and similar non flammable, non toxic fluids, choose based on capacity sizing in this chapter. Below 2½", go to Pg. 25, 2. VB-7000 Series Globe Valves and Sizing and Selection .

## Ordering VB-8000, VB-9000 Valve Assemblies

V   -    **3** -    - **5** -

<p>A = Two-position F = Floating S = Proportional K = Pneumatic K4 = Positive Positioner for pneumatic actuators</p>	<p>Trim and Configuration 821 = 2-Way, Stem Up Open, Brass Trim EPDM Seat 822 = 2-Way, Stem Up Closed, Brass Trim EPDM Seat 830 = 3-Way, Mixing or Diverting, Brass Trim (Bottom port is "Common") 931 = 3-Way, Mixing, Brass Trim, Metal-to-Metal (One end port is "Common")</p>	<p>Pipe Connection End Fitting 3 = Flanged</p>	<p>Actuator code xxx = Replace with Actuator code.</p>	<p>Connection 5 = Flanged</p>	<p>Port Code 2½" to 6" (Cv 56 to 500) 12 = 2½" 13 = 3" 14 = 4" 15 = 5" 16 = 6"</p>
--	---	--	--	-----------------------------------	--

## 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	
Linkage	AV-607-1 <sup>a</sup>		AV-609-1 <sup>e</sup>		AV-607-1 <sup>d</sup>		AV-609-1 <sup>e</sup>		Included with actuator	
No act	Single	Dual	Single	Dual	Single	Dual	Single	Dual	Single	
<b>Pipe size</b>	VB-82x3 <sup>a</sup>									
2 1/2"	125/35				125/35				125/35	
3"										
4"										
5"										
6"			125/22	125/35			125/25	125/35		
<b>Pipe size</b>	VB-8303 <sup>a</sup>									
2 1/2"	35/35				35/35				35/35	
3"										
4"										
5"	32/28							35/35		
6"	35/35		15/11			16/12		35/31		
<b>Pipe size</b>	VB-9313 <sup>b,f</sup>									
2 1/2"	33	70			40	84				
3"	22	48			27	57				
4"	12	27			15	33				
5"			9				10			
6"			6				7			
Non-Spring Return Electric					Pneumatic Spring Return @15psi air (with 5 to 10 psi spring)					
Actuator	Mx41-6153		Mx41-6343		M800A	M1500A	MK-6811	MK-8811	MK-6911	MK-8911
Linkage	AV-607-1d		AV-609-1e		AV-822	AV-822	AV-497c	AV-496	AV-497	AV-496
No act	Single	Dual	Single	Dual	Single					
<b>Pipe size</b>	VB-82x3 <sup>a</sup>									
2 1/2"					125/35		125/35			
3"										
4"										
5"										
6"			125/25	125/35					125/35	
<b>Pipe size</b>	VB-8303 <sup>a</sup>									
2 1/2"					35/35		35/35			
3"										
4"										
5"										
6"							35/35			
<b>Pipe size</b>	VB-9313 <sup>b,f</sup>									
2 1/2"	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*



U-Bolt Mount

More information on VB-8303: Scan the QR code or visit the link below.



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

More information on VB-8213: Scan the QR code or visit the link below.



Visit: <http://goo.gl/VEAV7e>

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" to 5" VB-8000 valves or 2 1/2" to 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" to 6" VB-9313 valves), the AV-609-1 linkage can be used with the Mx41-634x actuator on 2 1/2" to 5" VB-8000 valves or 2 1/2" to 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)

## VB-82x3 2-Way Globe Valves with NSR Actuators

### Actuator combinations and operating pressure differentials

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 Non-Spring Return Actuators

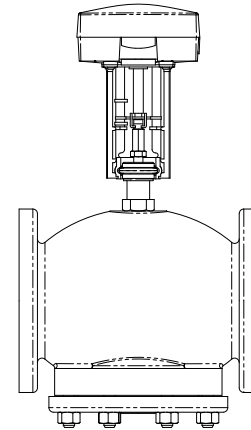
<b>Non-Spring Return (NSR) 2-Way Globe Valve Assemblies</b>	M1500A		Mx41-634x				
	<b>Actuator output rating (minimum)</b>						
	337 lbf (1500 N)		300 lb-in (34 N-m)				
	<b>Actuator model (Actuator code)</b>						
	Floating/ Proportional M1500A (686)		Floating MF41-6343  Proportional MS41-6340 (512) MS41-6343				
	<b>Linkage Kit part number</b>						
AV-822 (2½" to 6")		AV-609-1 (6")					
<b>Close-off pressure (psi)</b>							
125							
<b>Valve Assembly part number<sup>a</sup></b>	<b>P code</b>	<b>Valve size in.</b>	<b>Cv<sup>b</sup></b>	<b>kvs<sup>b</sup></b>	<b>Maximum allowable operating differential<sup>c</sup></b>		
					<b>M1500A</b>	<b>Single Actuator</b>	<b>Dual Actuator<sup>d</sup></b>
<b>Vx-8213-xxx-5-P Vx-8223-xxx-5-P</b>	12	2½	56	48	35 (240)	-	-
	13	3	85	74			
	14	4	145	125			
	15	5	240	208			
	16	6	370	320			

a - See Pg. 111, VB-8000, VB-9000 Assembly Selection Procedure for the relevant part series to determine a specific part no.

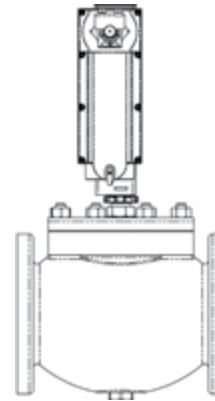
b -  $C_v = \frac{gpm}{\Delta P}$  (where  $\Delta P$  is measured in psi)     $kvs = Cv / 1.156$      $K_{vs} = \frac{m^3/h}{\Delta P}$  (where  $\Delta P$  is measured in bar; 1 bar = 100 kPa).

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



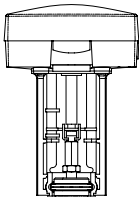
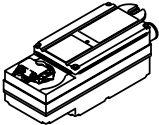
VB-8223 with Mx41-634x Actuator

## VB-8303 3-Way Globe Valves with NSR Actuators

### 3-Way Globe Valve Assemblies

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 Non-Spring Return Actuators

<b>Non-Spring Return (NSR) 3-Way Globe Valve Assemblies</b>	M1500A		Mx41-634x						
									
	<b>Actuator output rating (minimum)</b>								
	337 lb <sup>f</sup> (1500 N)		300 lb-in (34 N-m)						
	<b>Actuator model (Actuator code)</b>								
	<b>Floating/ Proportional</b> M1500A (686)		<b>Floating</b> MF41-6343 (516)  <b>Proportional</b> MS41-6340 (512) MS41-6343 (516)						
<b>Linkage kit part number</b>									
AV-822 (2½" to 6")		AV-609-1 (6")							
<b>Close-off pressure (psi)</b> 35									
<b>Valve assembly part number<sup>a</sup></b>	<b>P code</b>	<b>Valve size in.</b>	<b>Cv<sup>b</sup></b>	<b>kvs<sup>b</sup></b>	<b>Maximum allowable operating differential pressure<sup>c</sup> psi (kPa)(mixing/diverting)</b>				
					M1500A	Single Actuator	Dual Actuator <sup>d</sup>		
<b>Vx-8303-xxx-5-P</b>	12	2½	80 <sup>e</sup>	69 <sup>e</sup>	35 (240)	-			
			95 <sup>f</sup>	82 <sup>f</sup>					
			115 <sup>g</sup>	99 <sup>g</sup>					
	13	3	110 <sup>e</sup>	95 <sup>e</sup>					
			120 <sup>f</sup>	104 <sup>f</sup>					
			120 <sup>g</sup>	104 <sup>g</sup>					
	14	4	190 <sup>h</sup>	164 <sup>h</sup>					
	15	5	290 <sup>h</sup>	251 <sup>h</sup>					
	16	6	500 <sup>h</sup>	433 <sup>h</sup>				32 (219) 28 (192)	35 (240)

a - See Pg. 111, VB-8000, VB-9000 Assembly Selection Procedure for the relevant part series to determine a specific part number.

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

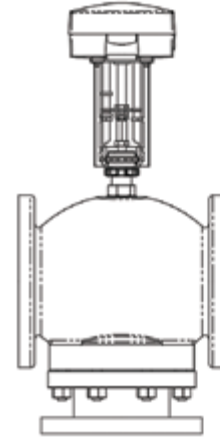
d - Dual actuators are not available as a factory assembly.

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

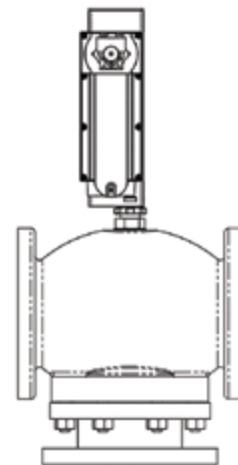
f - Diverting configuration, flow AB to A port.

g - Diverting configuration, flow AB to B port.

h - All flow configurations, mixing or Diverting.

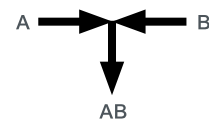


Vx-8303 with M1500A Actuator

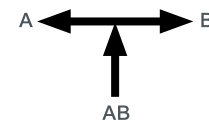


Vx-8303 with Mx41-634x Actuator

VB-8000 3-Way Flow Patterns



VB-8303 2½...6" 3-Way Mixing Stem Up  
Flow is B Port to Common Bottom AB Port

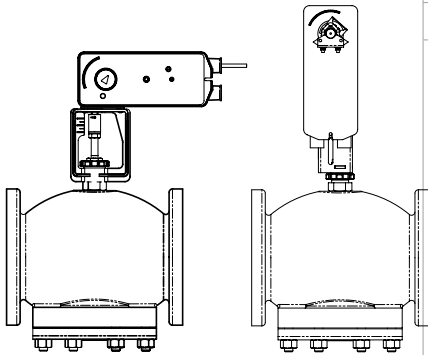


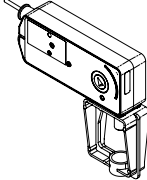
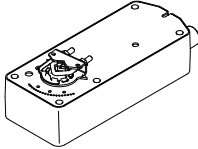
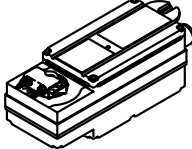
VB-8303 2½...6" 3-Way Diverting Stem Up  
Flow is Common Bottom AB Port to B Port

## VB-82x3 2-Way Globe Valves with SR Actuators

### 2-Way Globe Valve Assemblies with Spring Return Actuators

Spring Return  
2-Way Globe Valve Assemblies



		Mx61-720x	Mx41-715x	Mx40-717x					
									
		<b>Actuator output rating (minimum)</b>							
		220 lbf (979 N)	133 lb-in (15 N-m)	150 lb-in (17 N-m)					
		<b>Actuator models (Actuator codes)</b>							
		<b>Two-position</b> MA61-7200 MA61-7203 (596)  <b>Floating</b> MF61-7203 (596)  <b>Proportional</b> MS61-7203 (596) MS61-7203-040 MS61-7203-050	<b>Two-position</b> MA41-7150 MA41-7151 MA41-7153 (556) MA41-7150-502 MA41-7151-502 MA41-7153-502  <b>Floating</b> MF41-7153 (556) MF41-7153-502  <b>Proportional</b> MS41-7153 (556) MS41-7153-502	<b>Two-position</b> MA40-7170 MA40-7173 (576)  <b>Floating</b> MF40-7173 (576)  <b>Proportional</b> MS40-7170 MS40-7171 MS40-7173 (576)					
		<b>Linkage kit part number</b>							
		None (Part of Actuator)	AV-607-1 (2½" to 5") AV-609-1 (6")	AV-607-1 (2½" to 5") AV-609-1 (6")					
		Close-off pressure (psi) 125							
		<b>Maximum allowable operating differential pressure, psi (kPa)</b>							
Valve assembly part number <sup>a</sup>	P code	Valve size in.	Cv <sup>b</sup>	kvs <sup>b</sup>	Mx61-720x	Single Actuator	Dual Actuator <sup>d</sup>	Single Actuator	Dual Actuator <sup>d</sup>
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. 111, VB-8000, VB-9000 Assembly Selection Procedure for the relevant part series to determine a specific part number.

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

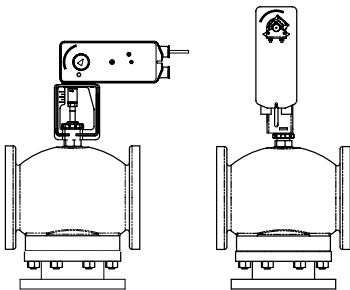
## VB-8303 3-Way Globe Valves with SR Actuators

### 3-Way Globe Valve Assemblies

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 Spring Return Actuators

#### Spring Return (SR) 3-Way Globe Valve Assemblies



Mx61-720x	Mx41-715x	Mx40-717x
<b>Actuator output rating (minimum)</b>		
220 lbf (979 N)	133 lb-in (15 N-m)	150 lb-in (17 N-m)
<b>Actuator models (Actuator codes)</b>		
<b>Two-position</b> MA61-7200 MA61-7203 (596)  <b>Floating</b> MF61-7203 (596)  <b>Proportional</b> MS61-7203 (596) MS61-7203-040 MS61-7203-050	<b>Two-position</b> MA41-7150 MA41-7151 MA41-7153 (556) MA41-7150-502 MA41-7151-502 MA41-7153-502  <b>Floating</b> MF41-7153 (556) MF41-7153-502  <b>Proportional</b> MS41-7153 (556) MS41-7153-502	<b>Two-position</b> MA40-7170 MA40-7173 (576)  <b>Floating</b> MF40-7173 (576)  <b>Proportional</b> MS40-7170 MS40-7171 MS40-7173 (576)
<b>Linkage kit part number</b>		
None (Part of Actuator)	AV-607-1 (2½" to 5") AV-609-1 (6")	AV-607-1 (2½" to 5") AV-609-1 (6")

Close-off pressure (psi)					35									
Valve assembly part number <sup>a</sup>	P code	Valve size in.	Cv <sup>b</sup>	kvs <sup>b</sup>	Maximum allowable operating differential pressure, psi (kPa) (mixing/diverting)									
					Mx61-720x	Single Actuator	Dual Actuator <sup>d</sup>	Single Actuator	Dual Actuator <sup>d</sup>					
Vx-8303-5xx-5-P	12	2½	80e	69e	35 (240) / 35 (240)	35 (240) / 35 (240)	-	35 (240) / 35 (240)	-					
			95f	82f										
			115g	99g										
	13	3	110e	95e										
			120f	104f										
			120g	104g										
	14	4	190h	164h										
	15	5	290h	251h										
	16	6	500h	433h						-	15 (103) / 11 (75)	-	16 (110) / 12 (82)	35 (240) / 31 (214)

a-See Pg. 111, VB-8000, VB-9000 Assembly Selection Procedure for the relevant part series to determine a specific part number.

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



VB-8303 2½"...6" 3-Way Mixing Stem Up Flow is B Port to Common Bottom AB Port  
 VB-8303 2½"...6" 3-Way Diverting Stem Up Flow is Common Bottom AB Port to B Port



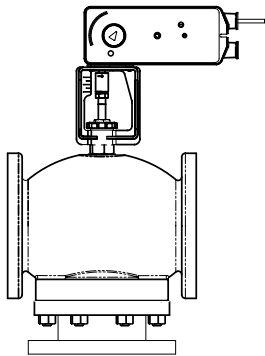
## Vx-9313 3-Way Globe Valves with Linear SR Actuators

### 3-Way Linked Globe Valve Assemblies with Linear Series Actuators

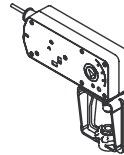
Choose a valve assembly with a maximum operating differential pressure capability sufficient for the application. Consult close-off pressure ratings. Not all actuator and valve body combinations are offered as factory assemblies.

#### 3-Way Globe Valve Assemblies with Linear Spring Return Actuators

#### 3-Way Linked Globe Valve Assemblies<sup>a</sup>



Mx61-720x



#### Actuator force rating

220 lbf (979 N)

#### Actuator model (Actuator code)

#### Two-position

MA61-7200  
MA61-7201  
MA61-7203 (596)

#### Floating

MF61-7203 (596)

#### Proportional

MS61-7203 (596)  
MS61-7203-040  
MS61-7203-050

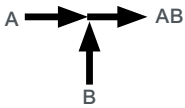
Valve assembly part number <sup>b</sup>	P code	Valve size in. (mm)	Cv <sup>c</sup>	kvs <sup>c</sup>	Actuator Close-off pressure (psi) <sup>ad</sup>
Vx-9313-xxx-5-P	12	2½ (65)	74.0	64	33
	13	3 (80)	101.0	87	22
Vx-9313-xxx-5-P	14	4 (N/A)	145.0	125	12

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. 111, VB-8000, VB-9000 Assembly Selection Procedure for the relevant part series.

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

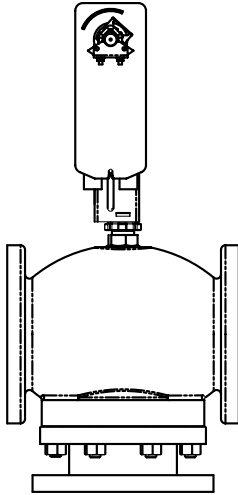


VB-9313 2½...6" 3-Way Mixing Stem Up  
Flow is B Port to Common AB Port

## Vx-9313 3-Way Globe Values with Linked SR Actuators

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

Spring Return  
3-Way Linked Globe Valve Assemblies



Mx41-707x	Mx41-715x	Mx40-717x
<b>Actuator Torque Rating (minimum)</b>		
60 lb-in (7 N-m)	133 lb-in (15 N-m)	150 lb-in (17 N-m)
<b>Actuator Model (Actuator Code)</b>		
Two-Position MA41-707x (544)	Two-Position MA41-7150 MA41-7151 MA41-7153 (556) MA41-7150-502 MA41-7151-502 MA41-7153-502	Two-Position MA40-717x
Floating MF41-7073	Floating MF41-7153 (556) MF41-7153-502	Floating MF40-7173
Proportional MS41-7073	Proportional MS41-7153 (556) MS41-7153-502	Proportional MS40-717x (576)
<b>Linkage Kit Part Number</b>		
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 <sup>b</sup>	P Code	Valve Size in. (mm)	Cv <sup>c</sup>	kv <sub>s</sub> <sup>c</sup>	Actuator Close-off Pressure (psig) <sup>d</sup>					
					Single Actuator	Dual Actuator <sup>e</sup>	Single Actuator	Dual Actuator <sup>e</sup>	Single Actuator	Dual Actuator <sup>e</sup>
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

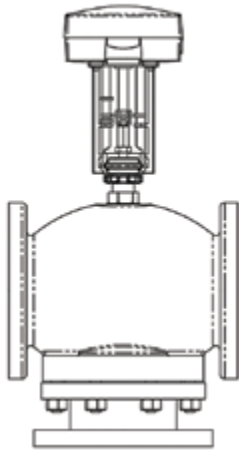
- a - For piping information refer to the separately available Wiring, Dimensions and Reference document F-28125 from the Exchange Download Center.
- b - To determine a specific part number, see *Pg. <?>, VB-8000, VB-9000 Assembly Selection Procedure* for the relevant part series.
- c -  $kvs = m^3/h (\Delta P = 100 \text{ kPa})$      $kvs = Cv / 1.156$      $Cv = kvs \times 1.156$
- 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.



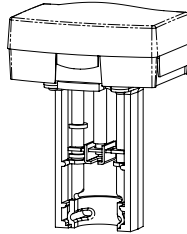
## Vx-9313 3-Way Globe Values with Linked SR Actuators

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

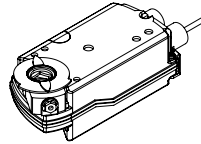
Non-Spring Return  
3-Way Linked Globe Valve Assemblies



M800A / M1500A



Mx41-6153



Mx41-6343



**Actuator Torque Rating (minimum)**

180 lbf  
(800 N)

337 lbf  
(1500 N)

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")

**Actuator Close-off Pressure psia<sup>d</sup>**

Valve Assembly Part Number <sup>b</sup>	P Code	Valve Size in.	Cvc	kv <sub>s</sub> <sup>c</sup>	Actuator Close-off Pressure psia <sup>d</sup>					
					AV-822	AV-822	Single Actuator	Dual Actuator <sup>e</sup>	Single Actuator	Dual Actuator <sup>e</sup>
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.

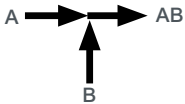
b - To determine a specific part number, see Pg. <?>, VB-8000, VB-9000 Assembly Selection Procedure for the relevant part series.

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.



VB-9313 2½...6" 3-Way Mixing Stem Up  
Flow is B Port to Common AB Port

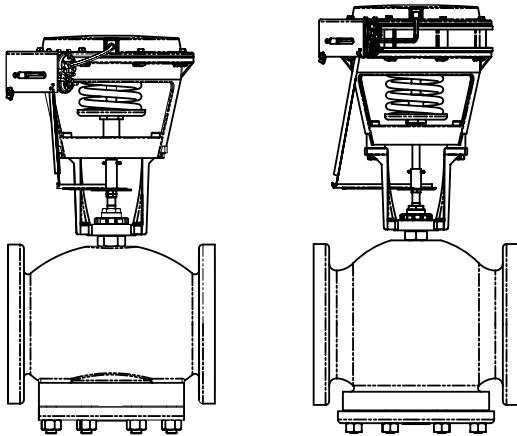
## VB-82x3 2-Way Globe Valves with Pneumatic SR Actuators

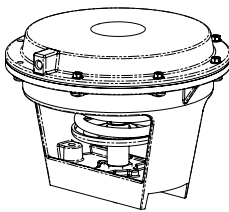
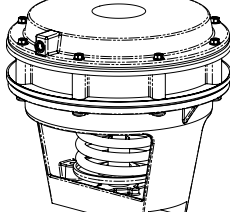
### 2-Way Valves

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 <sup>b</sup>	MK-6911 <sup>b</sup>
	
<b>Actuator models (Actuator codes)</b>	
MK-6811 (602)	MK-6911 (652)
<b>Linkage kit part number</b>	
AV-497	AV-497
<b>Spring range, psig (kPa)</b>	
5 to 10 (34 to 69) <sup>a</sup>	5 to 10 (34 to 69) <sup>a</sup>

Close-off pressure (psi)					125	
Valve assembly part number <sup>b</sup>	P Code	Valve size in.	Cv <sup>c</sup>	kvs <sup>c</sup>	Maximum allowable operating differential pressured, psi (kPa)	
VK-8213-602-5-12 VK-8223-602-5-12 VK4-8213-602-5-12 VK4-8223-602-5-12	12	2½	56	48	35 (240)	-
VK-8213-602-5-13 VK-8223-602-5-13 VK4-8213-602-5-13 VK4-8223-602-5-13	13	3	85	74		
VK-8213-602-5-14 VK-8223-602-5-14 VK4-8213-602-5-14 VK4-8223-602-5-14	14	4	145	125		
VK-8213-602-5-15 VK-8223-602-5-15 VK4-8213-602-5-15 VK4-8223-602-5-15	15	5	240	208		
VK4-8213-652-5-16 VK4-8223-652-5-16	16	6	370	320	-	35 (240)

a - Spring range field adjustable with Positive Positioner.

b - AK-42309-500 Positive Positioner optional for 2½" to 5" valve, required for 6" valve. Supplied as standard on VK4 factory valve assemblies. See Pg. 111, VB-8000, VB-9000 Assembly Selection Procedure for the relevant part series to determine a specific part number.

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



VB-8303 2½...6" 3-Way Mixing Stem Up Flow is B Port to Common Bottom AB Port  
VB-8303 2½...6" 3-Way Diverting Stem Up Flow is Common Bottom AB Port to B Port

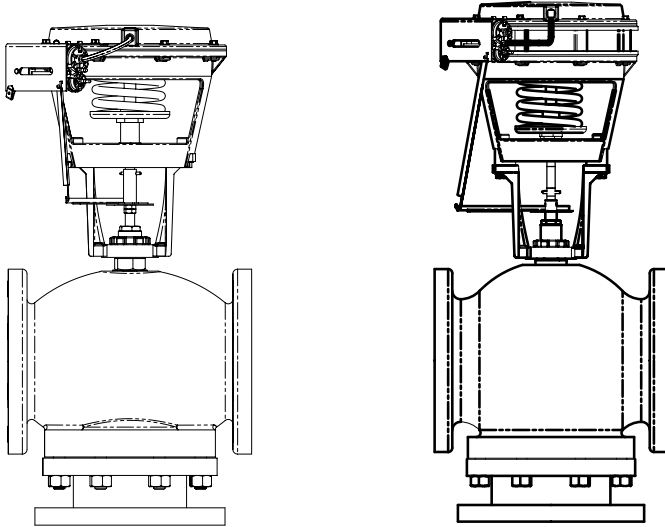
## VB-8303 3-Way Globe Valves with Pneumatic SR Actuators

### 3-Way Valves

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.

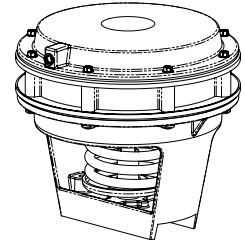
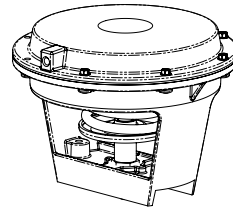
#### 3-Way Globe Valve Assemblies with Pneumatic Spring Return Actuators

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



MK-6811<sup>o</sup>

MK-6911<sup>o</sup>



Actuator models (Actuator codes)

MK-6811 (602)

MK-6911 (652)

Linkage kit part number

AV-497

AV-497

Spring range, psig (kPa)

5 to 10 (34 to 69)<sup>a</sup>

5 to 10 (34 to 69)<sup>a</sup>

Close-off pressure (psi)

35

Valve assembly part number <sup>b</sup>	P code	Valve size in.	Cv <sup>c</sup>	kvs <sup>c</sup>	Maximum allowable operating differential pressured, psi (kPa) (mixing/diverting)
VK-8303-602-5-12	12	2½	80 <sup>e</sup>	69 <sup>e</sup>	
			95 <sup>f</sup>	82 <sup>f</sup>	
			115 <sup>g</sup>	99 <sup>g</sup>	
VK-8303-602-5-13	13	3	110 <sup>e</sup>	95 <sup>e</sup>	
			120 <sup>f</sup>	104 <sup>f</sup>	
			120 <sup>g</sup>	104 <sup>g</sup>	
VK-8303-602-5-14	14	4	190 <sup>h</sup>	164 <sup>h</sup>	-
VK-8303-602-5-15 VK4-8303-602-5-15	15	5	290 <sup>h</sup>	251 <sup>h</sup>	
VK4-8303-652-5-16	16	6	500 <sup>h</sup>	433 <sup>h</sup>	

a - Spring range field adjustable with Positive Positioner.

b - AK-42309-500 Positive Positioner optional for 2½" to 5" valve, required for 6" valve. Supplied as standard on VK4 factory valve assemblies. See "Pg. 111, VB-8000, VB-9000 Assembly Selection Procedure" for the relevant part series to determine a specific part number.

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

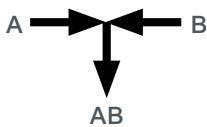
d - Maximum allowable differential across the valve in any open position. Less than 20 psi recommended for quieter service. Consult close-off pressure ratings.

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

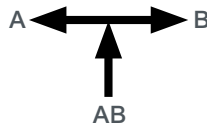
f - Diverting configuration, flow AB to A port.

g - Diverting configuration, flow AB to B port.

h - All flow configurations, mixing or Diverting.

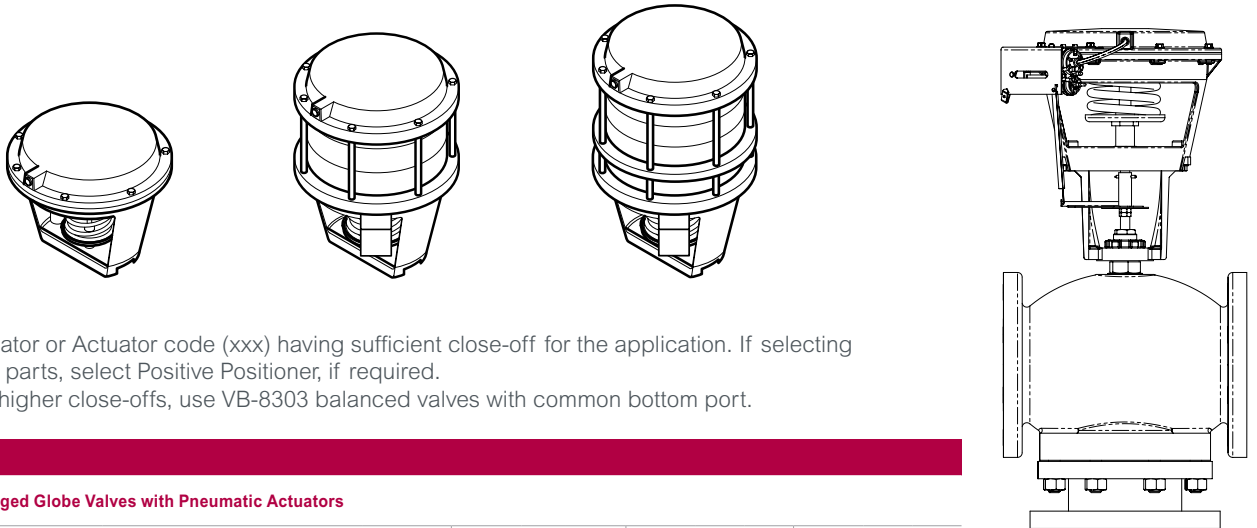


VB-8303 2½...6" 3-Way Mixing Stem Up Flow is B Port to Common Bottom AB Port



VB-8303 2½...6" 3-Way Diverting Stem Up Flow is Common Bottom AB Port to B Port

## VB-9313 3-Way Globe Valves with Pneumatic SR Actuators



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.

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

### 2½" to 6" Flanged Globe Valves with Pneumatic Actuators

<b>Actuator</b>	MK-6811	MK-8811	MK-8911
<b>Effective area (stroke)</b>	50 Sq. In. (1 " Stroke)	100 Sq. In. (1 " Stroke)	100 Sq. In. (2" Stroke)
<b>Positive Positioner</b>	AK-42309-500		
<b>Factory assembly with Positive Positioner</b>	Yes	Yes	Yes
<b>Actuator code (xxx)</b>	602 <sup>f</sup>	802 <sup>e</sup>	812 <sup>e</sup>
<b>Spring range (psig)</b>	5 to 10	5 to 10	5 to 10

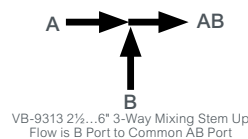
### Actuator close-off pressure rating (psi)<sup>ab</sup>

<b>Supply air pressure (psig)</b>	15/20	15	20	15/20	15	20	15/20	15	20			
<b>Stem position<sup>c</sup></b>	SU	SD	SD	SU	SD	SD	SU	SD	SD			
<b>Valve Assembly</b>	<b>Valve Body</b>	<b>P code</b>	<b>Size in.</b>									
<b>VK4-9313-xx2-5-Pd</b>	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	
<b>VK4-9313-812-5-Pd</b>	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.

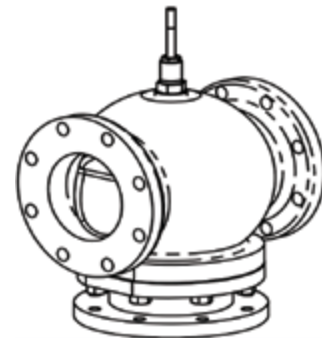
### Optional Input signal Interface to Pneumatic Actuator

Input signal Type	Interface Module Required
Two-position, SPST (Electric)	AL-1xx
Two-position, SPDT Snap Acting (Electric)	AL-1xx



## VB-9313 3-Way Valves with M900Axx SR Actuators

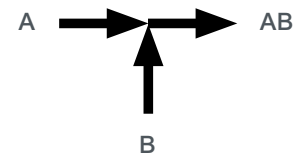
Schneider Electric VB-9313 Valve Bodies		
Application	Chilled or Hot Water	
Size	2½"...4"	
Valve Body Part Number	VB-9313-0-5-P	
Linkage Kit Part Number	AV-822	
Material	Flow Characteristic	Nominally Linear
	Body	Cast Iron
	Seat	Bronze
	Stem	Stainless Steel
	Plug	Brass
	Packing	Spring Loaded TFE/EPDM
	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) <sup>a</sup>		35 psi (241 kPa) Max.
<b>P Code</b>	Valve Size, In.	C <sub>v</sub> (K <sub>vs</sub> ) Rating <sup>b</sup>
12	2½	74 (64)
13	3	101 (87)
14	4	170 (147)



VB-9313

### 3-Way Valves

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



VB-9313 3-Way Mixing Flow Pattern

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  $\Delta P$  is measured in bar; 1 bar = 100 kPa).

### Schneider Electric SpaceLogic Actuator Model Table

Model	Actuator Code	Force	Power	Running Watts	Transformer Size	Floating Control <sup>a,b</sup>	Proportional Control <sup>b</sup>	Feed-back <sup>a</sup>	(2) SPDT Aux Switches <sup>e</sup>	Linkage <sup>c</sup>	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 <sup>d</sup>	-										Extend
M900ARW	660										Return
M900ARW-S2 <sup>d</sup>	-										Return
M900AEW-S2 <sup>d</sup>	-										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 SpaceLogicL Valve Actuators

Fluid Temperature in Valve Body	Maximum Allowable Ambient Temperature <sup>a</sup>
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).

## VB-9313 3-Way Valves with M900Axx SR Actuators

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 <sup>a</sup>	
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

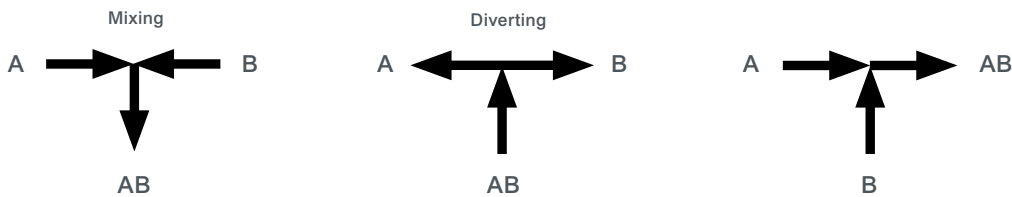
a - Requires AV-822 Linkage Order Separately.

Factory Valve and Actuator Assemblies				
VB-9313 Series Valve Assembly Part Numbers <sup>a</sup>	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.

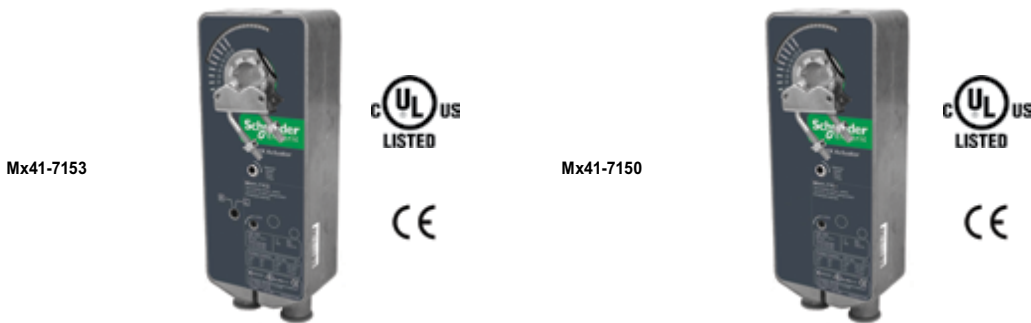
VB-9313 3-Way  
Mixing Flow Patterns



## Mx41-715x 133 lb-in SR SmartX Actuators

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

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



### Specifications

<b>Connection</b>	3 ft. (0.9 m) Appliance cable	
<b>Housing</b>	Aluminum die-cast	
<b>Enclosure rating</b>	NEMA 2 with conduit connector down	
<b>Dimensions</b>	10½ x 4 x 3½ (267 x 110 x 89 mm)	
<b>Linkage</b>	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)	
<b>Position indicator</b>	Visual indicator	
<b>Override</b>	Manual	
<b>Motor type</b>	Brushless	
<b>Rotation</b>	0 to 90°	
<b>Control signal</b>	MA41-7153: 2-position SPST MF41-7153: Floating MS41-7153: 2 to 10 VDC The 2 to 10 VDC Control signal is factory set for direct action. It can be changed in the field to reverse action.	MA41-7150: 2-position SPST
<b>Voltage</b>	24 Vac ± 20%, 22-30 VDC	120 Vac ± 10%
<b>VA@60 HZ</b>	9.7	10.0
<b>Feedback</b>	MA41 and MF41: None MS41: 2 to 10 VDC	None
<b>Auxiliary switch</b>	None	
<b>Timing (seconds)</b>	Powered <190 Spring return <30	
<b>Installation instructions</b>	F-26642	
	Note: Single mount actuators may be factory assembled, dual mount are field assembled.	Flanged Valve Close-off. 2-Way ratings are better than ANSI IV (0.01% leakage) with EPDM seating. 3-Way ratings are better than ANSI III (0.1% leakage) with metal seating.

## VB-9313 3-Way Valves with M900Axx SR Actuators

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 <sup>a</sup>	
VB-9313-0-5-P	3 Way	12	67 (58)	2 1/2"	29	35
		13	91 (79)	3"	19	35
		14	170 (147)	4"	10	35

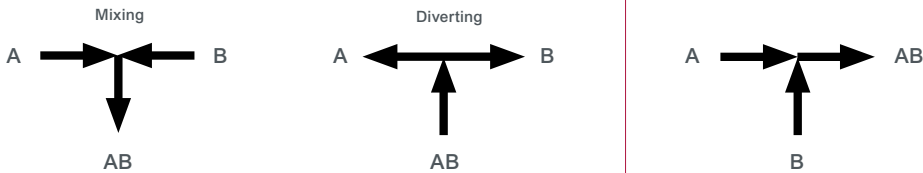
a - Requires AV-822 Linkage Order Separately.

Factory Valve and Actuator Assemblies				
VB-9313 Series Valve Assembly Part Numbers <sup>a</sup>	P Code	Size	Valve Action Stem UP	M900AR (650) or M900ARW (660) Action on Power Loss
VU-9313-6x0-5-P (Mixing):	12	2 1/2"	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

## Mx40-717x 150 lb-in SR SmartX Actuators

**Mx40-7173 Series  
SmartX Actuator  
(Code 576)  
24 Vac  
(Linkage not shown)**

**Mx40-7170 Series  
SmartX Actuator  
120 Vac  
(Linkage not shown)**



### Specifications

<b>Connection</b>	3 ft. (0.9 m) Appliance cable	
<b>Housing</b>	Aluminum die-cast	
<b>Enclosure rating</b>	NEMA 1, NEMA 4 with customer supplied water tight connector	
<b>Dimensions</b>	10-7/8 x 4 x 4 (276 x 100 x 100 mm)	
<b>Linkage</b>	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)	
<b>Position indicator</b>	Visual indicator	
<b>Override</b>	None	
<b>Motor type</b>	Brushless	
<b>Rotation</b>	0 to 90° CW	
<b>Control signal</b>	MA41-7173: 2-position SPST MF41-7173: Floating MS41-7173: 2 to 10 VDC/4 to 20 mA	MA40-7170: 2-position SPST MS40-7170: 2 to 10 VDC/4 to 20 mA
<b>Voltage</b>	24 Vac ± 20%, 22-30 VDC	120 Vac ± 10%
<b>VA@60 HZ</b>	MA40-7173: 7.4 (AC) MF40-7173: 8.1 (AC) MS40-7173: 7.8 (AC)	MA40-7170: 8.4 MS40-7170: 8.5
<b>Watts @ 60 Hz</b>	MA40-7173: 5.3 (AC) MF40-7173: 5.8 (AC) MS40-7173: 5.5 (AC)	MA40-7170: 6.2 MS40-7170: 6.4
<b>Feedback</b>	2 to 10 VDC	2 to 10 VDC (MS only)
<b>Auxiliary switch</b>	None	
<b>Timing (seconds)</b>	Powered 147 Spring return 65	Powered 162 Spring return 82
<b>Installation instructions</b>	MA40-7173: F-26742 MF40-7173: F-26749 MS40-7173: F-26748	MA40-7170: F-26742 MS40-7170: F-26748
	Note: Single mount actuators may be factory assembled, dual mount are field assembled.	Flanged Valve Close-off. 2-Way ratings are better than ANSI IV (0.01% leakage) with EPDM seating. 3-Way ratings are better than ANSI III (0.1% leakage) with metal seating. Note: Single mount actuators may be factory assembled, dual mount are field assembled.

## Mx61-720x 220 lbf SR SmartX Actuators

More information:  
Scan the QR code or visit the  
link below.



Visit:

<http://goo.gl/dJri2c>

**Mx61-7203 Series  
SmartX Actuator  
24 Vac**

**MA61-7200 Series  
SmartX Actuator  
120 Vac**

**Mx61-7203**



**MA61-7200**



### Specifications

<b>Connection</b>	MS61-7203: 3 ft. (0.9 m) Plenum cable MS61-7203-040/050: 3 ft. (0.9 m) appliance wire	
<b>Housing</b>	Aluminum die-cast	
<b>Enclosure rating</b>	NEMA 2	
<b>Dimensions</b>	9-9/16 x 10-5/8 x 2-9/16 (243 x 270 x 65 mm)	
<b>Linkage</b>	(included)	
<b>Position indicator</b>	Visual indicator	
<b>Override</b>	Manual	
<b>Motor type</b>	Brushless	
<b>Rotation</b>	0 to 90° CW	
<b>Control signal</b>	MA61-7203: 2-position SPST MF61-7203: Floating MS61-7203: 2 to 10 VDC MS61-7203-040: 2 to 10 VDC MS61-7203-050: 0 to 10 VDC The 2 to 10 VDC Control signal is factory set for direction action. It can be changed in the field to reverse action.	2-position SPST
<b>Voltage</b>	24 Vac ± 20%, 22-30 VDC	120 Vac ± 10%
<b>VA@60 HZ</b>	9.7	10.0
<b>Watts @ 60 Hz</b>	7.7	8.4
<b>Feedback</b>	MA61 and MF61: None MS61: 2 to 10 VDC only. MS61-7203-040 has no feedback.	None
<b>Auxiliary switch</b>	None	
<b>Timing (seconds)</b>	Powered <190 Spring return <40	
<b>Installation instructions</b>	F-27120	

## Mx61-634x 300 lb-in NSR SmartX Actuators

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

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

**Mx41-6343**



**MS41-6340**



**Specifications**

<b>Connection</b>	24-inch (61 cm ) Color-coded wires	3 ft. (91 cm ) Color-coded wires
<b>Housing</b>	Aluminum die-cast	
<b>Enclosure rating</b>	NEMA 4 with customer supplied water tight connector or plug	
<b>Dimensions</b>	10-7/8 x 4 x 4 (276 x 100 x 100 mm)	
<b>Linkage</b>	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.	
<b>Position indicator</b>	Visual indicator	
<b>Override</b>	Manual	
<b>Rotation</b>	0 to 90° CW	
<b>Control signal</b>	MF41-6343: Floating MS41-6343: 2 to 10 VDC	MS41-6340: 2 to 10 VDC
<b>Voltage</b>	24 Vac ± 20%	120 Vac ± 10%
<b>VA@60 HZ</b>	MF41-6343: 7.1 MS41-6343: 8	4.7
<b>Watts @ 60 Hz</b>	MF41-6343: 3.8 MS41-6343: 8	8.4
<b>Feedback</b>	None	2 to 10 VDC
<b>Auxiliary switch</b>	None	
<b>Timing (seconds)</b>	<145	148
<b>Installation instructions</b>	F-26744 F-26745	F-26745

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

## Mx41-6153 133 lb-in NSR SmartX Actuators

Mx41-6153 Series  
SmartX Actuator  
(Code 512)  
24 Vac

Mx41-6153



### Specifications

<b>Torque</b>	133 lb-in. (15 N-m).
<b>Connections</b>	3 ft. (0.9 m) long, 18 AWG leads
<b>Rotation</b>	CW / CCW
<b>Shaft size</b>	1/4 to 3/4-in. (6.4 to 19 mm) dia., 1/4 to 1/2-in. (6.4 to 13 mm) sq.
<b>Enclosure rating</b>	NEMA Type 1, IP54 according to EN 60 529.
<b>Dimensions</b>	8-3/8 H x 3 1/4 W x 2-2/3 D" (210 x 80 x 70 mm)
<b>Linkage</b>	AV-607-1 (2 1/2" to 4" VB-9313 valves)
<b>Position indication</b>	Adjustable pointer
<b>Override</b>	Manual
<b>Overload protection</b>	Throughout rotation.
<b>Angle of rotation</b>	90° nominal (field adjustable to limit travel on either end of stroke).
<b>Built-in auxiliary switches</b>	Dual SPDT Auxiliary switches available on MS41-6153-502 only.
<b>Operating temperature limits</b>	-25 to 130°F (-32 to 55°C).
<b>Wiring diagrams</b>	MF41-6153, MS41-6153
<b>Regulatory compliance</b>	c-UL-us LISTED per UL 873 and CAN C22.2 No.24-93. CE compliant to directives LVD, EMC, and RoHS2.
<b>Installation instructions</b>	F-27215

### Specifications - electrical and timing

Part number	Actuator inputs			Outputs		Approximate Timing in seconds	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary switch		
MF41-6153	Floating	24 Vac + 20% - 15%	3.0	None	No	<125 (60 Hz)	2.2 (1)
MS41-6153	0 to 10 VDC			0 to 10 VDC	2		
MS41-6153-502							

## M800A, M1500A 180/337 lbf NSR SpaceLogic Actuators

**M800A & M1500A Actuators**  
24 Vac - 20-29 VDC



### VB-8000/VB-9313 Actuator Application

Valve Size	M800A* (180 lbf)	M1500A (337 lbf) Size
2½"	•	•
3"	•	•
4"	•	•
5"		•
6"		•

### Specifications

<b>Stroke (M800, M1500)</b>	U-Bolt style: >3/8" to 2" (9-52mm)
<b>Stroke Timing</b>	Floating: 60 or 300 sec selectable, Proportional: 15 sec @½" stroke
<b>Linkage</b>	AV-822
<b>Feedback AO</b>	2 to 10 VDC
<b>Power supply type</b>	Half wave
<b>Motor type</b>	Brushless DC
<b>Enclosure</b>	NEMA 2 (IP 54, vertical mount only) with both conduit connectors used. NEMA 1 IP40 with one connector used.
<b>Sound power level</b>	Maximum 32 dba
<b>Ambient temperature storage</b>	-13 °F to 149 °F (-25 to 65 °C) ambient
<b>Ambient temperature operational</b>	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
<b>Minimum operating temperature</b>	14 ° to 150 ° F (-10 ° to 50 ° C)
<b>Ambient humidity</b>	15 to 95 % RH non-condensing
<b>Housing material</b>	Die-cast aluminum
<b>Cover material</b>	UL94 plenum rated plastic
<b>Regulatory compliance</b>	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 and control

Model	M800A	M800A-S2	M1500A	M1500A-S2
<b>AC power</b>	24 Vac +- 10% 50-60 Hz			
<b>DC power</b>	20 - 29 VDC 20 W		20 - 29 VDC 30 W	
<b>Running VA</b>	15		24	
<b>Transformer size VA</b>	50			
<b>Floating control</b>	Yes			
<b>Proportional control</b>	0 to 10 VDC, 2 to 10 VDC or 4 to 20mA with 500 ohm resistor			
<b>Feedback</b>	2 to 10 VDC			
<b>Force</b>	180 lbf (800 N)		337 lbf (1500 N)	
<b>2-SPDT aux switch</b>	No	24 Vac 4a res	No	24 Vac 4a res

## SpaceLogic M900A Series Spring Return Actuators

### Product Description

The M900A series is a linear electro-mechanical actuator with “fail-safe” spring return operation for the control of two-way and three-way globe valves in:

- Hot water and steam systems
- Heating and cooling systems
- Air handling systems

M900A series utilize brushless DC motors and a high resolution control board to provide a very precise fluid control in globe valves. The actuator’s input signal range and optional auxiliary switches of the actuator are adjusted automatically to the stroke of the valve.

The actuator automatically provides a consistent running time regardless of the valve stroke.

On power loss, the mechanical spring return mechanism drives the motor in turn, generating power to the board to control the spring return braking speed, avoiding mechanical stress and system water hammer. All actuators can be configured for either a 3-wire floating signal or various modulating control signals including sequencing.



### Specifications

M900ARx	Stem up (retract)
M900AEx	Stem down (extend)
Voltage Supply	24 Vac $\pm$ 10% 50-60Hz
Power Consumption	
Running	30 VA (21 W)
Rest	7 W
Running Time	
Modulating	20 sec.
Floating	60/300 sec. (selectable)
Spring Return	18 sec.
Transformer Sizing	50 VA
Stroke	
Range	0.35 in...1.2 in (9...30 mm)
Factory Set	.0.8 in (20 mm)
Force, nominal	202 Lbf (900N)
Duty Cycle	20%/60 minutes (full load, high amb.) 80%/60 minutes (half load, room temp.)
Analogue input	
Voltage	0...10 Vdc (factory)
Selectable Range Vdc	2...10, 0...5, 2...6, 5...10, 6...10 4...20 Ma, with a 500 ohm resistor (included)
Position Feedback	2...10 Vdc or 0...5 Vdc (0...100%) 2 mA
Load	

Electrical Terminals	18 gauge
Environmental	
Storage	-13...149 °F (-25...65 °C)
Ambient Humidity Range	max. 95% non-condensing
Min. Ambient Temp.	14 °F (-10 °C)
Operating Max. Temp.	
122 °F (50 °C)	Chilled water applications
113 °F (45 °C)	at 281 °F (138°C) Fluid temp.
107 °F (42 °C)	at 300 °F (149 °C) Fluid temp.
100 °F (38 °C)	at 340 °F (171°C) Fluid temp.
90°F (32 °C)	at 366 °F (186 °C) Fluid temp.
Enclosure Rating	
M900ARW, M900AEW	NEMA 4 (IP65)
M900AR, M900AE	NEMA 2 (IP54)
Sound Power Level	43 dBa
Materials	Aluminum
Conduit Connection	North American 1/2 in conduit connectors, two on the side, two on the bottom
S2 Auxillary Switch Relays (optional)	SPDT, 24Vac 4A resistive (contacts made at 5% and 95% of end stroke)



## SpaceLogic M900A Series Spring Return Actuators

Weight	
Short Yoke	6.9 lb (3.1 kg)
Tall Yoke	7.1 lb (3.2 kg)
Agency Listings	UL873, cULus, RCM, CE
Environmental	RoHS, REACH

### Accessories

Part No.	Description	Required
AV-821	VB-7xxx series globe valve linkage kit	To mount the Tall U-Bolt M900A to VB-7xxx, order separately. F-27701
AV-822	VB-8xxx and VB-9313 Series 2-1/2 to 4" globe valve linkage kit	To mount the Tall U-Bolt M900A to VB-8xxx and VB-9313, order separately. F-27702
880 0104 000	S2 auxiliary end point switches	Optional Switches can be added to the standard models in the field

### Available Products

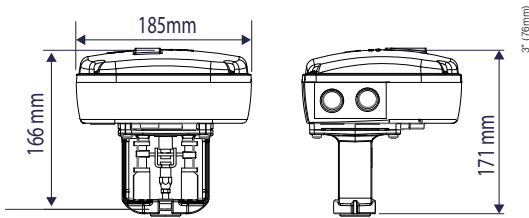
Part Number	Spring Return	Tall U-Bolt Style <sup>1</sup>	Short Screw Mount Style <sup>2</sup>	NEMA 4 Enclosure Rating	Auxiliary Switches
M900AR	Retract	X			0
M900AE	Extend	X			0
M900AR-VB	Retract		X		0
M900ARW	Retract	X		X	0
M900ARW-VB	Retract		X	X	0
M900ARW-S2	Retract	X		X	2-SPDT
M900AEW-S2	Extend	X		X	2-SPDT

<sup>1</sup> - VB-7xxx (1/2" to 2") and required AV-821, VB-8xxx (2-1/2" to 4") and required AV-822, and VB-9xxx (2-1/2" to 3") and required AV-822.\*

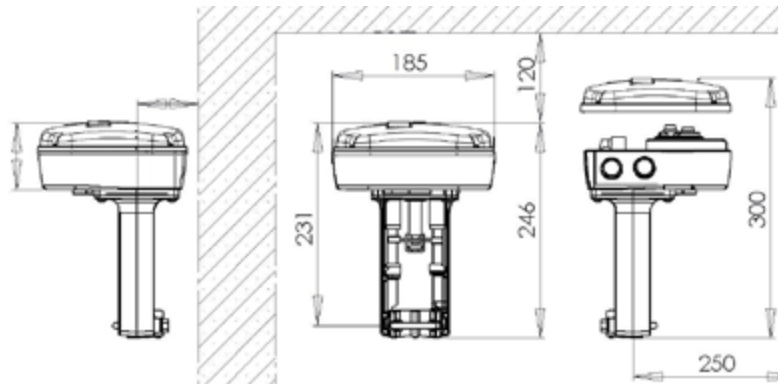
<sup>2</sup> - For Direct VB-7xxx Mounting (No Linkage Required)

\* Sold separately.

### Dimensions



Dimensions for M900AR-VB and M900ARW-VB.



Dimensions for M900AR, M900AE, M900ARW, M900ARW-S2 and M900AEW-S2

## MK-6811/6911 SR Pneumatic Actuators

### MK-6811, MK-6911 Actuator Specifications

#### Inputs

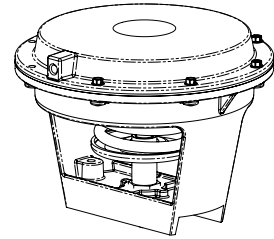
<b>Control signal</b>	5 to 10 psig (34 to 69 kPa). Positive Positioner start point adjustable 1 to 12 psi (7 to 83 kPa). Positive Positioner span adjustable 2 to 13 psi (14 to 89 kPa)
<b>Supply pressure</b>	15 to 20 psig (103 to 137 kPa) nominal 30 psig (205 kPa) maximum
<b>Air connections</b>	1/8 in FNPT
<b>Effective area</b>	50 sq. in. (323 cm <sup>2</sup> )

#### Outputs

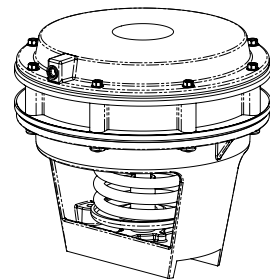
<b>MK-6811</b>	1" (25 mm) Nominal stroke
<b>MK-6911</b>	1¾" (45 mm) Nominal stroke

#### Environment

<b>Temperature limits</b>	Shipping / storage: -40 to 220°F (-40 to 104°C) ambient. Operating: -20°F to 220°F (-29°C to 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).
<b>Positive Positioner</b>	AK-42309-500 recommended for 5" valve, required for 6" valve, order separately. Supplied as standard on VK4 factory valve assemblies.



MK-6811



MK-6911

**More information:**  
Scan the QR code or visit the link below.



Visit:  
<http://goo.gl/6OaOs6>

## MK-88/8911 SR Pneumatic Actuators

### Application

MK-8800 series actuators are used to control 2½" to 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

<b>Effective Area</b>	100 sq. in. (645 cm <sup>2</sup> )
<b>Construction</b>	Housing: Die cast aluminum. Diaphragms: Replaceable beaded molded neoprene.
<b>Stroke</b>	See table below.
<b>Spring</b>	Retracts actuator shaft and raises valve stem on loss of air pressure.
<b>Nominal range</b>	See table below.
<b>Starting point</b>	Adjustable ± 1 psi (7 kPa). Maximum air pressure: 30 psig (207 kPa).
<b>Ambient temperature limits</b>	Shipping: -40 to 220 °F (-40 to 104 °C). Operating: -20 to 220 °F (-29 to 104 °C).
<b>Air connection</b>	1/8" FNPT
<b>Valve stroke position indication</b>	1/8" (3 mm) increments
<b>Mounting</b>	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.
<b>Dimensions</b>	See table below.

### Optional accessories

<b>Linkage</b>	AV-496
<b>AK-52309-500</b>	Positive Positioner with linkage
<b>Tool-95</b>	Pneumatic calibration tool kit

### Specifications

Part number	Nominal spring range <sup>a</sup>		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	12¾ high x 10½ wide x 10½ deep	324 high x 267 wide x 267 deep	VB-9313 5 & 6"

a - Nominal (no load) spring ranges are based on maximum 1" (25.4 mm) or 2" (50.8 mm) stroke.



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

## Pneumatic Positive Positioning Relay for VB-7/8/9xxx

### Positive Positioning Relay

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

### Features

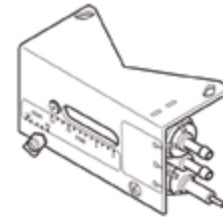
For accurate positioning of valve and Damper Actuators, this positioner utilizes a pilot-operated, relay-type position-sensing mechanism, much more sensitive to actuator position changes than some competitive “force-balance” positioners.

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

Note: This model cannot be used with M556, M572, M573, M574, and MK-12000 Series actuators. Use N800-0555 positioner with M556, M573, and M574.

### Specifications

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



More information:  
Scan the QR code or visit the link below.



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

## Rack & Pinion Linkages AV-607/609-1

### 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" to 6" VB-9313 and 2½" to 6" VB-8xx3 globe valves.

### Features

- Allows mounting of single or dual actuators Schneider Electric SmartX actuators
  - AV-607-1 is compatible with Schneider Electric (Siebe, Barber-Colman, INVENSYS) 2½" to 5" VB-8xx3, 2½" to 4" VB-9313 and discontinued 2" to 4" VB-9xxx valves and Schneider Electric SmartX actuators<sup>2</sup>
  - AV-609-1 is compatible with Schneider Electric (Siebe, Barber-Colman, INVENSYS) 6" VB-8xx3, 5" to 6" VB-9313 and 5" and 6" VB-92xx valves and Schneider Electric SmartX actuators 2
  - 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.

### Linkage Kits and Actuator/Linkage Assemblies

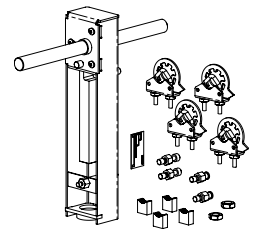
Application	Actuator	Linkage Kita
2½" to 5" 2-Way and 3-Way	MK-6811 <sup>b</sup>	AV-497 (VB-8000 only) AV-495 (VB-9313 up to 4" only)
6" 2-Way and 3-Way	MK-6911 <sup>b</sup>	AV-497 (VB-8000 only)
2½" to 4" 3-Way	MK-8811	AV-496 (VB-9313 only)
5" to 6" 3-Way	MK-8911	AV-496 (VB-9313 only)
2½" to 5" 2-Way and 3-Way (1" Nominal stroke)	MA41-7150,51,53, MA40-7170,71,73, MF41-6343a, MF41-7153, MF40-7173, MS41-6340a,MS41-6343a, MS41-7153, MS40-7170,71,73	AV-607-1 <sup>c</sup>
6" 2-Way and 3-Way (1½" Nominal stroke)		AV-609-1 <sup>d</sup>
2½" to 6" 2-Way and 3-Way (1" Nominal stroke)	M1500A	AV-822

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

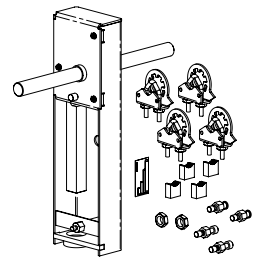
b - AK-42309-500 (order separately) optional for 2½" to 5" valve, required for 6" valve. VK4 valve assemblies include Positive Positioner.

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

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



AV-607-1



AV-609-1

# Pressure Independent Balancing and Control Valves and Actuators

## Description and features

The SpaceLogic PIBCV range is a comprehensive selection of automatic balancing and control valves that provide flow limitation, with full control authority over hydronic regulation.

Automatic balancing within PIBCV valves provide stable flow regulation regardless of pressure fluctuations in the system and all valves have an adjustable flow limitation set point. The control valve portion of the PIBCV further regulates the water/ glycol flow from close-off up to the maximum flow limit setting.

Typical applications are temperature control of chillers, air- handling units, heat exchanges and terminal units such as fan coils, induction units and radiant panels.

### Features

- Reduced Energy Consumption
  - Pressure independence ensures no overflow of water/ glycol through the valve. Limiting water/ glycol flow to the design load of the coil has a significant effect on energy efficiency since systems operate for the majority of the time on a partial load.
  - The overflow of water/glycol causes a degradation in heat transfer at the heat exchanger.
  - Uncontrolled overflow of water/glycol beyond the design flow of the heat exchanger is an extremely wasteful and inefficient use of heat.
  - The correct and maximum design flow ensures a high differential in supply and return temperatures to provide high operational efficiency of the chiller or boiler.
- Improved Comfort
  - The SpaceLogic PIBCV valves are not affected by other valves in the system that may be opening and closing throughout the day or other piping system disturbances providing more constant, comfortable, room temperatures.
- Reduced Pumping Costs
  - A reduction in overflows through the network reduces pumping costs. A smaller pump head and equipment is required compared to traditional configurations.
- Reduced Installation Costs
  - Only one valve needs to be installed rather than two or three since the SpaceLogic PIBCV covers the pressure balancing, flow limitation and control modulation.
- Easy and Quick Commissioning
  - SpaceLogic PIBCV setup time is significantly reduced with a simple and accurate flow setting procedure without the need for flow charts, calculations or measuring equipment.
- Improved Reliability
  - Improved mechanical equipment reliability from reduced actuator movements.



actuators are  

## Summary and applications

### Summary

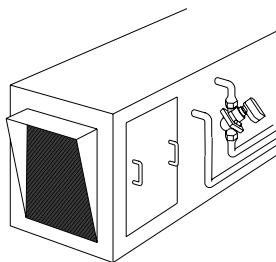
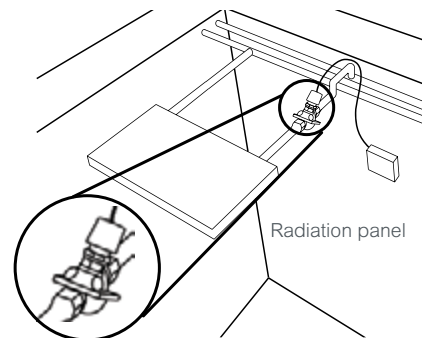
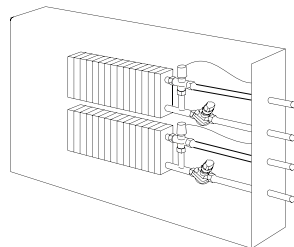
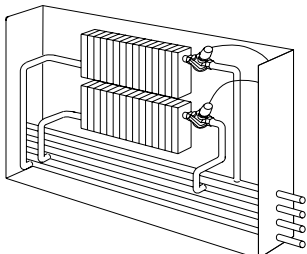
SpaceLogic PIBCV valves and Actuators can be used with actuators for pressure independent balancing and control applications or without actuators for automatic flow limiting balance applications. PIBCVs immediately react to all changes in system pressures, providing stable valve control independent from 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.

SpaceLogic 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.

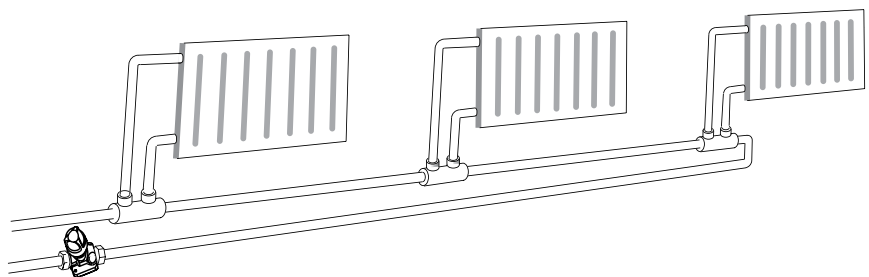
### Applications

**Variable flow systems:** A SpaceLogic 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 SpaceLogic PIBCV can be used. In a constant flow system with FCUs or in a one pipe heating system, SpaceLogic PIBCVs can be installed as an automatic balancing valve in every riser. SpaceLogic 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 SpaceLogic PIBCVs. This includes systems with (floor) heating/cooling, concrete core activation or radiation panels.



Air handling unit (AHU)



## Theory and implementation

### Theory

The SpaceLogic 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

SpaceLogic PIBCV actuators can be used to change the flow response from linear to logarithmic (equal percentage). This makes the SpaceLogic 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

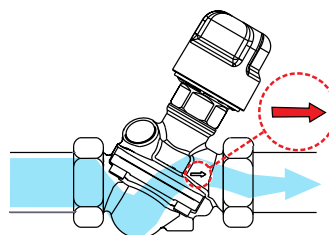
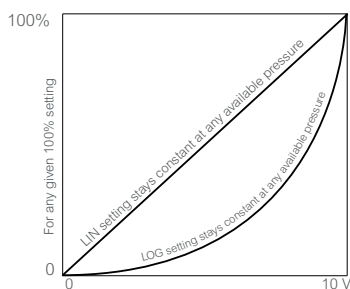
- No Cv or authority calculations needed. Flow is the only parameter to be considered when designing.
- Compact design, essential when only limited space is available such as in fan-coil units.
- Easy commissioning and troubleshooting. No specialized staff or measuring equipment needed.
- Trouble-free segmentation of the building project. SpaceLogic PIBCVs will automatically control the flow, even when sections of the installation are unfinished. There is no requirement to re-adjust the SpaceLogic PIBCV flow setting after finalization of the building project.

### Flow Direction

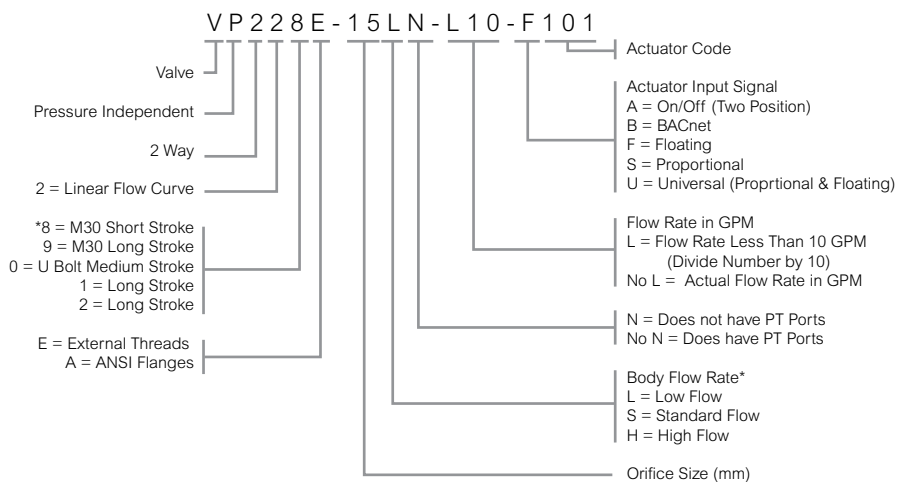
A SpaceLogic PIBCV valve is mono-directional, meaning the valve operates when the arrow on the valve body is aligned with the flow direction. When this rule is ignored, the valve acts as a variable orifice that causes water/glycol hammer at sudden closing when available pressure has increased, or the 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



## Methods of selection

### SpaceLogic PIBCV selection options

There are three methods for selecting SpaceLogic 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 **Pg. 197, Table 1. Valve Assemblies ½ to 1¼" With Female NPT End Connectors, Without PT Ports**.

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 to 1¼" Valve Body Actuators" on page 263 and for the valve body in Pg. 202, Table 12. Specification Threaded Version, ½ to 2"**.

#### 2. Custom method: valve body and actuator field assembly

Select the individual parts then set the flow rate and field assemble a valve assembly.

**Pg. 202, Table 12. Specification Threaded Version, ½ to 2"** shows the valve body specifications and **Pg. 209, Table 23. ½ to 2" Valve Flow Ranges ( $Q_{min}$  to  $Q_{nom}$ )**, and **Pg. 210, Table 24. 2½" to 10" Flanged Valve Flow Ranges ( $Q_{min}$  to  $Q_{nom}$ )**, 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 **Pg. 205, Table 17. Selection: ½" to 2" Valve Body Tail Pieces**, 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 Pg. 205, Table 17. Selection: ½" to 2" Valve Body Tail Pieces**, 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 to 1¼" Valve Body Actuators" on page 263 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 **Pg. 196, PIBCV Flow Setting**.

#### 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.

**Pg. 202, Table 12. Specification Threaded Version, ½ to 2"** shows the valve body specifications and **Pg. 205, Table 17. Selection: ½" to 2" Valve Body Tail Pieces** and **Pg. 210, Table 24. 2½" to 10" Flanged Valve Flow Ranges ( $Q_{min}$  to  $Q_{nom}$ )** 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 Pg. 205, Table 17. Selection: ½" to 2" Valve Body Tail Pieces**, 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 Pg. 201, Table 11.** Application: Operation of PIBCV Valve Body Without Actuator (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

### 1/2...1 1/4" 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:

- ❶ Remove the black protective cover or the mounted actuator.
- ❷ Raise the green pointer.
- ❸ Turn (clock wise to decrease) to the new presetting.
- ❹ 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.

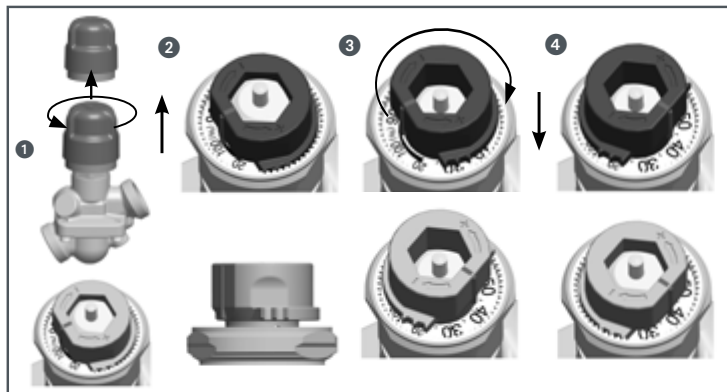
Example: VP229E-15HN

With this 1/2" valve the nom flow = 5 gal/min = 100% presetting.

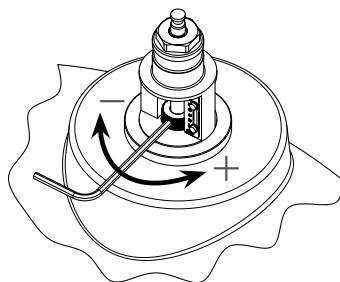
To set a flow of 4 gal/min you have to set:  $4/5 = 80\%$ .

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

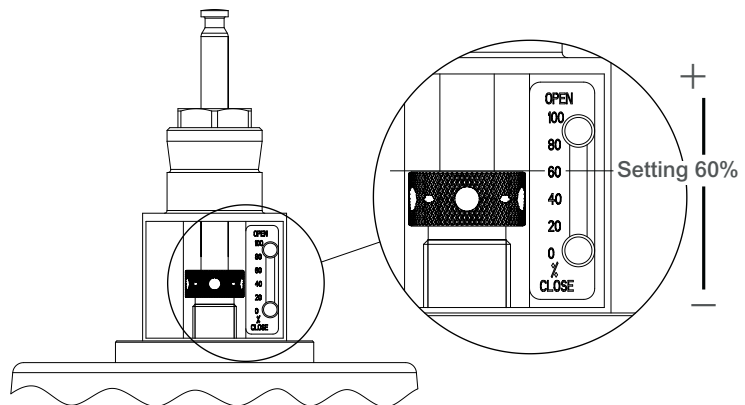
To set a PIBCV valve to a  $Q_{high}$  setting above 100%, turn the green pointer counter clock wise from 100%. The  $Q_{high}$  setting is the scale setting plus 90%. For example, to set the VP229E-15HN to a flow rate of 5.5 gal/min, set  $5.5/5.0 = 110\%$  setting. Obtain the 110% setting by turning the green pointer counter clock wise from 100% to 20% (20% and 90% = 110%). As shown on page 267,  $Q_{high}$  settings above 100% slightly increase the valve's required minimum differential pressure.



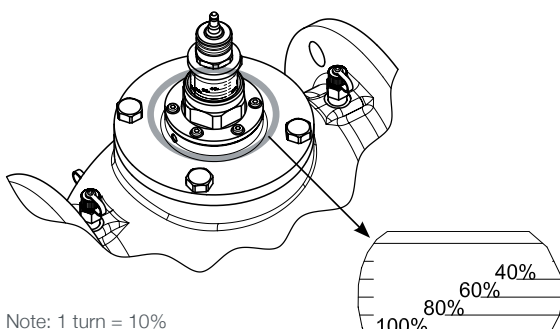
### PIBCV Flow Setting 5" ...10"



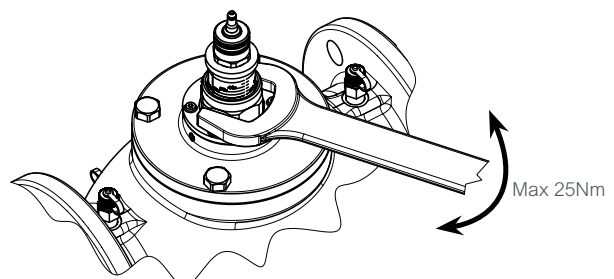
Note:  
1 turn = 5%



### PIBCV Flow Setting 1 1/2" ...4"



Note: 1 turn = 10%

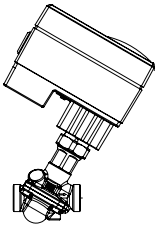


Max 25Nm

## PIBCV Assemblies: 1/2" to 1 1/4" Female NPT, without PT Ports

### Valve Assembly and Suitable Actuators

Table 1. Valve Assemblies 1/2" to 1 1/4" with Female NPT End Connectors, without PT Ports

Flow rate (GPM) <sup>a</sup>	Valve size (inch)	24 Vac Two-position with Auxiliary switch (MP131-24T)	24 Vac Three Wire Floating with Auxiliary switch (MP131-24F)	24 Vac Proportional with Position Output Signal (MP131-24MP)	24 Vac Proportional/Floating with Position Output Signal Spring Return Open (MP300-SRU)	24 Vac Proportional/Floating with Position Output Spring Return Closed (MP300-SRD)
						
0.5	1/2	VP228E-10LN-L05-A101	VP228E-10LN-L05-F101	VP228E-10LN-L05-S101	VP228E-10LN-L05-U201	VP228E-10LN-L05-U301
1.0	1/2	VP228E-15LN-L10-A101	VP228E-15LN-L10-F101	VP228E-15LN-L10-S101	VP228E-15LN-L10-U201	VP228E-15LN-L10-U301
1.5	1/2	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	1 1/4	VP229E-32SN-013-A101	VP229E-32SN-013-F101	VP229E-32SN-013-S101	VP229E-32SN-013-U201	VP229E-32SN-013-U301
14	1 1/4	VP229E-32SN-014-A101	VP229E-32SN-014-F101	VP229E-32SN-014-S101	VP229E-32SN-014-U201	VP229E-32SN-014-U301
15	1 1/4	VP229E-32HN-015-A101	VP229E-32HN-015-F101	VP229E-32HN-015-S101	VP229E-32HN-015-U201	VP229E-32HN-015-U301
16	1 1/4	VP229E-32HN-016-A101	VP229E-32HN-016-F101	VP229E-32HN-016-S101	VP229E-32HN-016-U201	VP229E-32HN-016-U301
17	1 1/4	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 to 2" on page 202 and page 209.

PIBCV Assemblies: 1/2" to 1 1/4" Female NPT, with PT Ports

Table 2. Valve Assemblies 1/2 to 1 1/4" with Female NPT End Connectors, with PT Ports

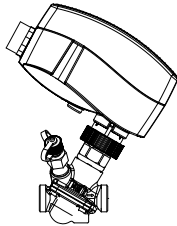
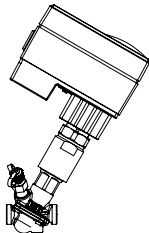
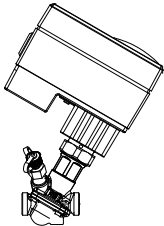
Flow Rate (GPM)	Valve size (inch)	24 Vac Two-position with Auxiliary switch (MP131-24T)	24 Vac Three Wire Floating with Auxiliary switch (MP131-24F)	24 Vac Proportional with Position Output Signal (MP131-24MP)	24 Vac Proportional/Floating Spring Return Open (MP300-SRU)	24 Vac Proportional/Floating Spring 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	1 1/4	VP229E-32S-014-A101	VP229E-32S-014-F101	VP229E-32S-014-S101	VP229E-32S-014-U201	VP229E-32S-014-U301


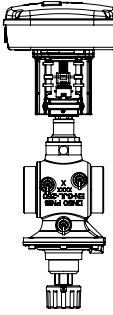
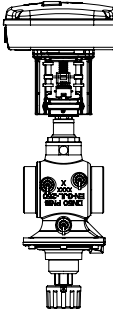
Table 3. Specification 1/2 to 1 1/4" Valve Body Actuators

1/2" to 1 1/4" Valve Body Actuator Part Number (Actuator code)	MP131-24T (A101)	MP131-24F (F101)	MP131-24MP (S101)	MP300-SRU (U201)	MP300-SRD (U301)
<b>Input signal</b>	Two-position, 3 wire with selectable input jumper signal action selection	Three wire floating	Proportional, 0 to 10 VDC, 2 to 10 VDC, 4 to 20 mA, sequencing with selectable input signal action, DIP switch selectable	Proportional, 0 to 10 VDC, 2 to 10 VDC, 4 to 20 mA, sequencing with selectable input signal action and Floating, DIP switch selectable	
<b>Electrical connection</b>	Screw terminal with conduit connector				
<b>Position feedback output signal</b>	-	-	0 to 10 VDC	0 to 10 VDC, 2 to 10 VDC	
<b>Spring return</b>	-	-	-	Open valve	Close valve
<b>Auxiliary switch</b>	Yes	Yes	-	-	-
<b>Other features</b>	-	-	Weekly anti blocking selection, auto calibration, LED indication	Valve stroke length selection, LED indication	
<b>Linear/equal% valve flow curve selection</b>	-	-	Yes	Yes	
<b>Actuator speed s/mm 60 Hz (50 Hz)</b>	20 (24)			11.7 (14)	
<b>Power consumption</b>	1 VA		1.5 VA	9 VA	
<b>Actuator weight (lb.)</b>	.9			2.0	1.3
<b>Operating temperature limits °F (°C)</b>	32 to 131 (0 to 55)				
<b>Regulatory compliance</b>	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]				
<b>Specification data sheet</b>	F-27961			F-27962	
<b>Installation data sheet</b>	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

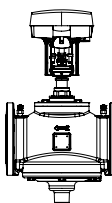
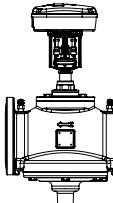
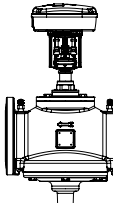
PIBCV Assemblies 1½” to 4”

Table 4. Valve Assemblies 1½”, 2” with Female NPT End Connectors, with PT Ports

Flow rate (GPM) <sup>a</sup>	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

Table 5. Valve Assemblies 2½” to 4” with ANSI Standard B16.1 Flanges, with PT Ports

Flow rate (GPM) <sup>a</sup>	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
110 (min. 44)	2½	VP220A-65H-110-U131	VP220A-65H-110-U231	VP220A-65H-110-U331
165 (min. 66)	4	VP220A-100S-165-U131	VP220A-100S-165-U231	VP220A-100S-165-U331
176 (min. 70)	3	VP220A-80H-176-U131	VP220A-80H-176-U231	VP220A-80H-176-U331
260 (min. 104)	4	VP220A-100H-260-U131	VP220A-100H-260-U231	VP220A-100H-260-U331

a. Factory set

PIBCV Assemblies: 1½” to 6” with PT Ports and Flanges

Table 6. Specification 1½” to 4” Valve Body Actuators

<b>1½” to 4” Valve Body Actuator part number (Actuator code)</b>	MP500C (U131)	MP500C-SRU (U231)	MP500C-SRD (U331)
<b>Input signal</b>	Proportional, 0 to 10 VDC, 2 to 10 VDC, 4 to 20 mA, sequencing with selectable input signal action and Floating, DIP switch selectable		
<b>Electrical connection</b>	Screw terminal with conduit connector		
<b>Position feedback output signal</b>	2 to 10 VDC	2 to 10 VDC, 0 to 5 VDC	
<b>Spring return</b>	–	Open Valve	Close Valve
<b>Auxiliary switch</b>	Optional Module		
<b>Other features</b>	Auto calibration, field selectable floating input signal travel time, powered manual override	Auto calibration, field selectable floating input signal travel time	
<b>Linear/equal% valve flow curve selectionFlow rate (GPM)</b>	Yes	Yes	
<b>Actuator speed full stroke 60 Hz (50 Hz)</b>	Proportional 15 (15) Floating 60 or 300 (60 or 300)	Proportional 15 (15) Floating 60 or 300 (60 or 300) Spring Return 13 (13)	
<b>Power consumption</b>	Running 15 VA, Transformer Sizing 50 VA	Running 30 VA, Transformer Sizing 50 VA	
<b>Operating temperature limits °F (°C)</b>	14 to 122 (-10 to 50)		
<b>Actuator weight (lb.)</b>	4.0	6.0	
<b>Regulatory compliance</b>	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.		
<b>Specification data sheet</b>	F-27944	F-27945	
<b>Installation data sheet</b>	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

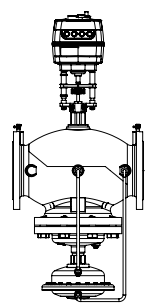
Flow rate (GPM) a	Valve size (inch)	24 Vac Proportional with Position Output Signal (MP2000-NSR)	24 Vac Proportional/Floating with Position Output Signal Spring Return Open (MP2000-SRU)	24 Vac Proportional/Floating with Position Output Spring Return Closed (MP2000-SRD)
				
<b>395 (min. 158)</b>	5	VP220A-125S-395-U161	VP220A-125S-395-U261	VP220A-125S-395-U361
<b>485 (min. 194)</b>	5	VP220A-125H-485-U161	VP220A-125H-485-U261	VP220A-125H-485-U361
<b>640 (min. 256)</b>	6	VP220A-150S-640-U161	VP220A-150S-640-U261	VP220A-150S-640-U361
<b>830 (min. 332)</b>	6	VP220A-150H-830-U161	VP220A-150H-830-U261	VP220A-150H-830-U361

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

<b>5” and 6” Valve Body Actuator part number (Actuator code)</b>	MP2000-NSR (U161)	MP2000-SRU (U261)	MP2000-SRD (U361)
<b>Input signal</b>	Proportional, 0 to 10 VDC, 2 to 10 VDC, 0 to 20 mA, 4 to 20 mA, with selectable Input signal action and Floating, DIP switch selectable		
<b>Electrical connection</b>	Screw terminal with conduit connector		
<b>Position feedback output signal</b>	0 to 10 VDC, 2 to 10 VDC, 0 to 20 mA, 4 to 20 mA a		
<b>Spring return</b>	–	Open Valve	Close Valve
<b>Auxiliary switch</b>	Yes		
<b>Other features</b>	Auto calibration, 3-color LED indication, powered manual override, configurable position output signals, selectable speed, adjustable equal percentage flow curve		
<b>Linear/equal% valve flow curve selectionFlow rate (GPM)</b>	Yes		
<b>Actuator speed s/mm 60 Hz (50 Hz)</b>	3 or 6 (3 or 6)	4 or 6 (4 or 6)	
<b>Power consumption</b>	15.0 VA		
<b>Operating temperature limits °F (°C)</b>	32 to 131 (0 to 55)		
<b>Actuator wWeight (lb.)</b>	13.8	18.96	
<b>Regulatory compliance</b>	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]		
<b>Specification data sheet</b>	F-27976	F-27969	
<b>Installation data sheet</b>	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.

## PIBCV Assemblies: 8” and 10” with PT Ports and Flanges

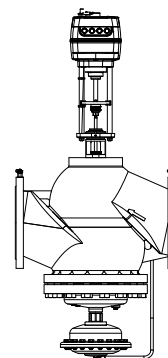


Table 9. Valve Assembly 8” and 10” With PT Ports

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.

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 to 10 VDC, 2 to 10 VDC, 0 to 20 mA, 4 to 20 mA, with selectable input signal action and Floating, DIP switch selectable
Electrical connection	Screw terminal with conduit connector
Position feedback output signal	0 to 10 VDC, 2 to 10 VDC, 0 to 20 mA, 4 to 20 mA a
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 to 131 (0 to 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” to 1-1/4”	VP228E-xxxxxxx, VP229E-xxxxxxx	Use black cap provided with VP228E-xxxxxxx or VP229E-xxxxxxx valve body	Install valve in the supply water pipe for best shut off 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 shut off valve tighten bottom knob (max. Close off pressure is 232 psi).
2-1/2” to 4”	VP220A-xxxxx		Install valve in either the supply or return water pipe. To shut off valve tighten bottom insert with a 8 mm allen wrench (max. Close off pressure is 232 psi).
5” to 6”	VP221A-xxxxxx	9114071000 (not included with valve body)	No shut off knob, set the valve to a 0% flow setting to shut off flow.
8” to 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.



## PIBCV Specifications: Threaded 1/2" to 2"

**Technical data**

**Table 12. Specification Threaded Version, 1/2" to 2"**

Valve size		1/2"				3/4"		1"		1 1/4"		1 1/2"	2"
<b>Valve assembly part number without PT Ports 1)</b>		VP228E-10LN-	VP228E-15LN-	VP228E-15SN-	VP229E-15HN-	VP228E-20SN-	VP229E-20HN-	VP229E-25SN-	VP229E-25HN-	VP229E-32SN-	VP229E-32HN-	-	-
<b>Valve assembly part number with PT Ports 1)</b>		VP228E-10L-	VP228E-15L-	VP228E-15S-	-	VP228E-20S-	-	VP229E-25S-	-	VP229E-32S-	-	VP220E-40S-	VP220E-50S-
<b>Flow range</b>	$Q_{min}$	.13	.24	.4	1	.8	1.5	1.5	2.4	2.82	3.5	13.2	22
	$Q_{nom}$ (100%) <sup>2)</sup>	.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
<b>Setting range 3)</b>		20-120%				20-110%	20-120%	20-110%					40-100%
<b>Diff. pressure 4), 5)</b>	$\Delta p_{Q_{nom}}$ ( $\Delta p_{Q_{high}}$ )	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]	
	<b>Stroke <math>Q_{nom}</math></b>	0.09 (2.25)			.157 (4)	0.09 (2.25)	.157 (4)	.177 (4.5)					.39 (10)
<b>Connection</b>	<b>ext. thread (ISO 228/1)</b>	G 1/2 A G 3/4 A			G 1 A		G 1 1/4 A		G 1 1/2 A		G 2 A	G 2 1/2 A	
	<b>actuators</b>	MP131-24T, MP131-24F, MP131-24MP, MP300-SRU, MP300-SRD										MP500C, MP500C-SRU/SRD	
<b>Body pressure rating</b>	<b>psi</b>	EN 12516-2:2004, 250 psi, PN 16											
<b>Leakage acc. to standard IEC 60534</b>		Class 4, max. 0.01% of $Q_{nom}$						max. 0.05% of $Q_{nom}$					
<b>Max. close off differential pressure across the valve</b>		232 psi (16 bar)											
<b>Control range</b>		Acc. to standard IEC 60534 control range is high as flow characteristic is linear (1:1000)											
<b>Control valve's characteristic</b>		Stem up open, Linear (can be converted by actuator to equal percentage)											
<b>For shut off function</b>		Acc. to ISO 5208 class A - no visible leakage											
<b>Flow medium</b>		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.											
<b>Medium temperature</b>	<b>°F (°C)</b>	(water/glycol) 15 to 250 (-10 - +120)											
<b>Materials in the water/glycol</b>													
<b>Valve bodies</b>	Dezincification Resistant Brass (CuZn36Pb2As - CW 602N) per EN 12420											Grey iron EN-GJL-250 (GG 25) per EN 1561	
<b>Cone (Pc)</b>	Stainless Steel, W.Nr. 1.4305											Wrought copper CuZn40Pb3-CW 614N, Stainless Steel, W.Nr. 1.4305	
<b>Seat (Pc)</b>	EPDM											Stainless Steel, W.Nr. 1.4305	
<b>Seat (Cv)</b>	Dezincification Resistant Brass (CuZn36Pb2As - CW 602N)											Stainless Steel, W.Nr. 1.4305	
<b>Membranes and O-rings</b>	EPDM												
<b>Springs</b>	Stainless Steel, W.Nr. 1.4568, W.Nr. 1.4310												
<b>Cone (Cv)</b>	Wrought copper, CuZn40Pb3 - CW 614N												
<b>Screw</b>	Stainless Steel (A2)												
<b>Flat gasket</b>	NBR												
<b>Sealing agent (only for valves with PT Ports)</b>	Dimethacrylate Ester												
<b>Materials out of the water/glycol</b>													
<b>Plastic parts</b>	PA											POM	
<b>Insert parts and outer screws</b>	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 Pg. 204, Table 15. Assembly Valve Body Configurations 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)  $\Delta p = (P1-P3)_{min-max}$
- 5) 87 psi  $\Delta p$  is possible if consideration has been made to the flow velocity, cavitation and noise. For application usage please speak with Product Support  
Pc - Pressure controller  
Cv - Control valve



## PIBCV Specifications: 2½" to 10" Flange Version

Table 13. Specification Flange Version, 2½" to 4"

Valve size			2½"		3"		4"	
Part Number			VP220A-65S	VP220A-65H	VP220A-80S	VP220A-80H	VP220A-100S	VP220A-100H
Flow range	Q <sub>min</sub>	gal/min	34	44	48	70	66	104
	Q <sub>nom</sub> (100%) 1)		85	110	120	176	165	260
Setting range 2)		%	40-100%					
Diff. pressure 3), 4)	ΔpQ <sub>nom</sub>	psi [kPa]	4.35-58 [30-400]	8.7-58 (60-400)	4.35-58 (30-400)	8.7-58 (60-400)	4.35-58 (30-400)	8.7-58 (60-400)
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 <sub>nom</sub>					
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 to 250 (-10 - +120)					
Stroke Q <sub>nom</sub>		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" to 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 <sub>min</sub>	gal / min	158	194	256	332	352	475	528	652
	Q <sub>nom</sub> (100%) 1)		395	485	640	830	880	1188	1320	1630
Setting range 2)		%	40-110%							
Diff. pressure 3)	ΔpQ <sub>nom</sub>	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 <sub>nom</sub>							
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 to 250 (-10 - +120)							
Stroke (Q <sub>nom</sub> )		in. (mm)	1.18 (30)							
<b>Materials in the water/glycol</b>										
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<sub>nom</sub> (100%) or lower depending on flow rate ordered.

2) Regardless of the setting, the valve can modulate below 1% of set flow.

3) Δp = (P1-P3) min-max

4) 87 psi Δp is possible if consideration has been made to the flow velocity, cavitation and noise. for application usage please speak with Product Support

Pc - Pressure controller

Cv - Control valve

## PIBCV Assembly Valve Body configurations

Table 15. Assembly Valve Body Configurations

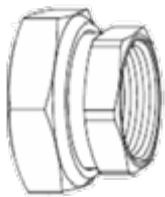
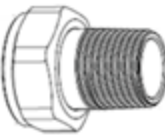
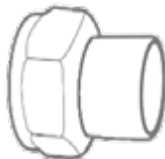
Pipe size (in.)	Valve Assembly part number series	Complete Valve Body part number	Valve type	Female NPT End Connectors (included with all 1/2" through 2" Valve Actuator Assemblies)	PT ports	Installation data sheet	
1/2	VP228E-10LN-	VP228E-10BQLNT	Threaded	911 2108 010		F-27937	
1/2	VP228E-10L-	VP228E-10BQL	Threaded	911 2108 010	Yes		
1/2	VP228E-15LN-	VP228E-15BQLNT	Threaded	911 2108 015			
1/2	VP228E-15L-	VP228E-15BQL	Threaded	911 2108 015	Yes		
1/2	VP228E-15SN-	VP228E-15BQSNT	Threaded	911 2108 015			
1/2	VP228E-15S-	VP228E-15BQS	Threaded	911 2108 015	Yes		
1/2	VP229E-15HN-	VP229E-15BQHNT	Threaded	911 2108 015			
3/4	VP228E-20SN-	VP228E-20BQSNT	Threaded	911 2108 020			
3/4	VP228E-20S-	VP228E-20BQS	Threaded	911 2108 020	Yes		
3/4	VP229E-20HN-	VP229E-20BQHNT	Threaded	911 2108 020			
1	VP229E-25SN-	VP229E-25BQSNT	Threaded	911 2108 025			
1	VP229E-25S-	VP229E-25BQS	Threaded	911 2108 025	Yes		
1	VP229E-25HN-	VP229E-25BQHNT	Threaded	911 2108 025			
1-1/4	VP229E-32SN-	VP229E-32BQSNT	Threaded	911 2108 032			
1-1/4	VP229E-32S-	VP229E-32BQS	Threaded	911 2108 032	Yes		
1-1/4	VP229E-32HN-	VP229E-32BQHNT	Threaded	911 2108 032			
1-1/2	VP220E-40S-	VP220E-40CQS	Threaded	911 2108 040	Yes		F-27934
2	VP220E-50S-	VP220E-50CQS	Threaded	911 2108 050	Yes		
2-1/2	VP220A-65S-	VP220A-65CQS	Flanged		Yes		
2-1/2	VP220A-65H	VP220A-65CQH	Flanged		Yes		
3	VP220A-80S-	VP220A-80CQS	Flanged		Yes		
3	VP220A-80H	VP220A-80CQH	Flanged		Yes		
4	VP220A-100S-	VP220A-100CQS	Flanged		Yes		
4	VP220A-100H	VP220A-100CQH	Flanged		Yes		
5	VP220A-125S-	VP221A-125CQS	Flanged		Yes		
5	VP220A-125H-	VP221A-125CQH	Flanged		Yes		
6	VP220A-150S-	VP221A-150CQS	Flanged		Yes	F-27939	
6	VP220A-150H-	VP221A-150CQH	Flanged		Yes		
8	VP222A-200S-	VP222A-200CQS	Flanged		Yes		
8	VP222A-200H-	VP222A-200CQH	Flanged		Yes		
10	VP222A-250S-	VP222A-250CQS	Flanged		Yes		
10	VP222A-250H-	VP222A-250CQH	Flanged		Yes		

PIBCV Valve Actuator codes and 1/2" to 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	1/2" to 1/4"	●		
MP131-24F	F101				
MP131-24MP	S101				
MP300-SRU	U201			●	
MP300-SRD	U301				●
MP500C	U131	1 1/2" to 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: 1/2" to 2" Valve Body Tail Pieces

	Part number	Pipe size	(A) Approximate length inches (mm)	Approximate nut size inches (mm)	(B) Approximate Valve Body thread engagement inches (mm)	Comments	Image
Female NPT Two Female NPT Connectors, Two Gaskets	911 2108 010	1/2"	1.1 (28)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	911 2108 015	1/2"	1.1 (28)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	911 2108 020	3/4"	1.26 (32)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	911 2108 025	1"	1.5 (38)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	911 2108 032	1-1/4"	1.65 (42)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	
	911 2108 040	1-1/2"	1.85 (47)	2.52 (63.9)	0.55 (14)	For 1-1/2" valve body	
	911 2108 050	2"	1.93 (49)	3.24 (82.2)	0.69 (17.5)	For 2" valve body	
Male NPT Two Male NPT Connectors, Two Nuts, Two Gaskets	911 2110 010	3/8"	1.24 (31.5)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	911 2110 015	1/2"	1.32 (33.5)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	911 2110 020	3/4"	1.5 (38)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	911 2110 025	1"	1.73 (44)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	911 2110 032	1-1/4"	1.85 (47)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	
	911 2110 040	1-1/2"	2.28 (58)	2.52 (63.9)	0.55 (14)	For 1-1/2" valve body	
	911 2110 050	2"	2.81 (71.5)	3.24 (82.2)	0.69 (17.5)	For 2" valve body	
Female Sweat Two Female Sweat Ends, Two Nuts, Two Gaskets	911 2109 010	3/8" Tubing (with 1/2" OD)	1.06 (27)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	911 2109 015	1/2" Tubing (with 5/8" OD)	1.32 (33.5)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	911 2109 020	3/4" Tubing (with 7/8" OD)	1.5 (38)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	911 2109 025	1" Tubing (with 1-1/8" OD)	1.73 (44)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	911 2109 032	1-1/4" Tubing (with 1-3/8" OD)	1.85 (47)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	
	911 2109 040	1-1/2" Tubing (with 1-5/8" OD)	2.36 (60)	2.52 (63.9)	0.55 (14)	For 1-1/2" valve body	
	911 2109 050	2" Tubing (with 2-1/8" OD)	2.81 (71.5)	3.24 (82.2)	0.69 (17.5)	For 2" valve body	

## PIBCV Dimensions: Threaded 1/2" to 2"

### Dimensions

#### Threaded Valves 1/2 to 1 1/4" (inches)

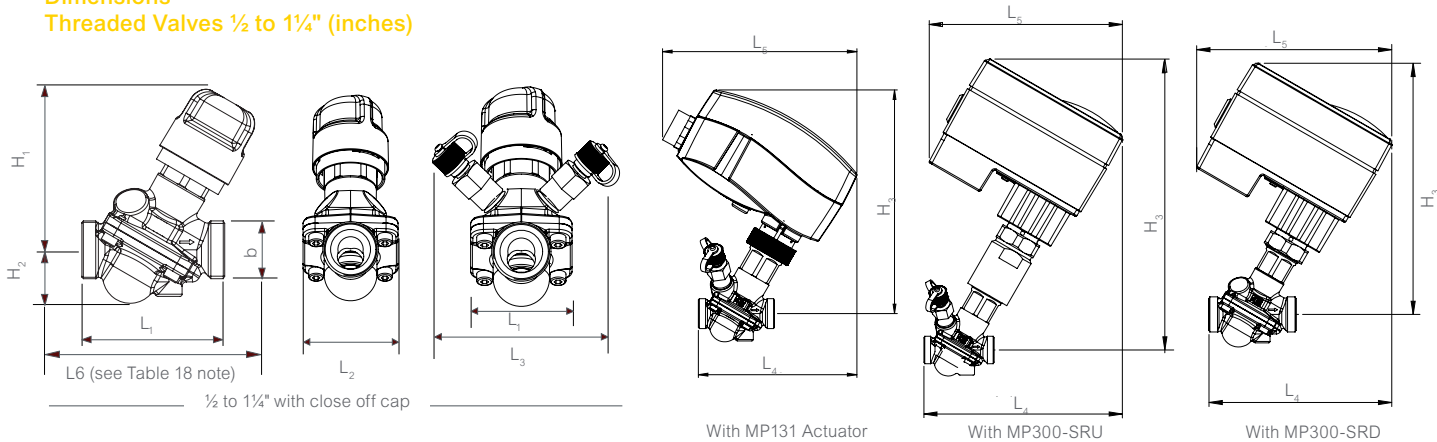


Table 18. Threaded Valves 1/2 to 1 1/4" (inches)

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 1/2	.83
1/2"	2.5	1.7		4.64	5.39	6.14			3	1	5.7	7.4	G 3/4	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 1/4	3.2
1 1/4"	5.1	3.5		6.26	7	7.8			3.9	2.3	6.58	8.27	G 1 1/2	4.8

NOTE: Valve Body Tail Piece Dimensions: See Columns A and B on page 205.  
For assemblies with Female NPT: L6= (2x Column A - 2x Column B) +L1

#### Threaded Valves 1 1/2" and 2" (inches)

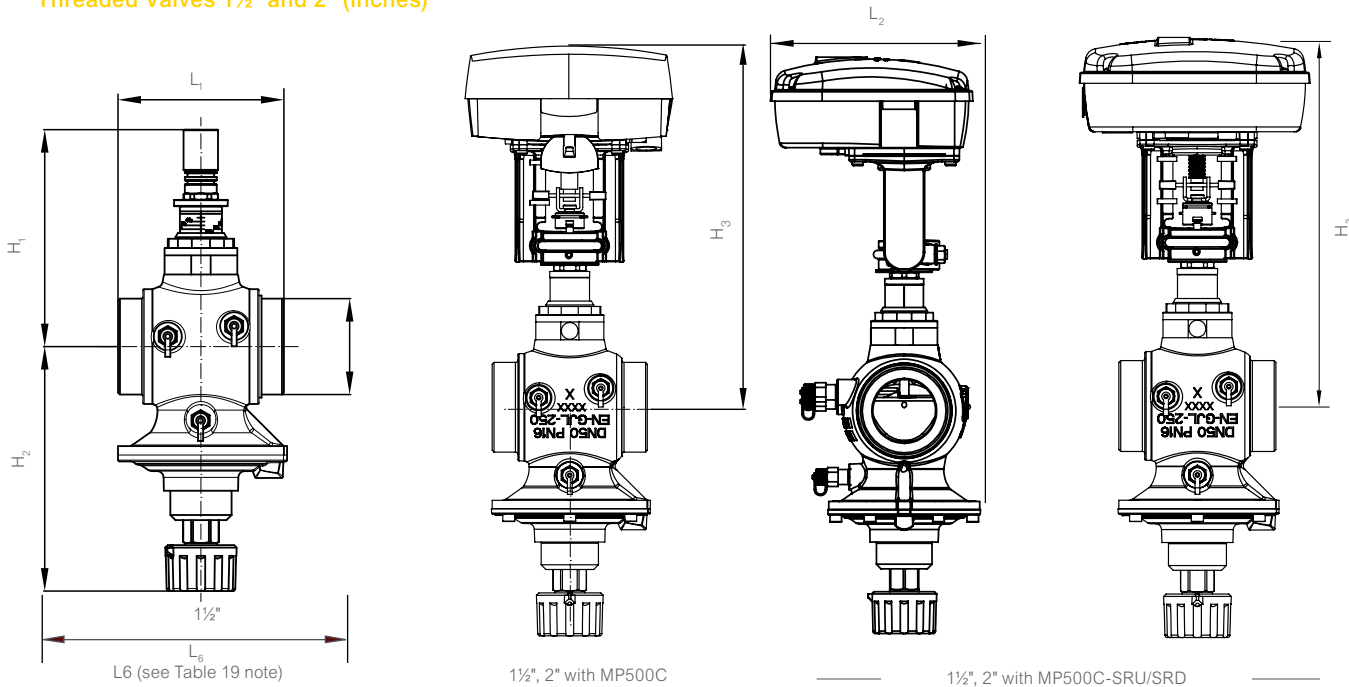


Table 19. Threaded Valves 1 1/2" and 2" (inches)

Type	L1	L2	H1	H2	H3	b ISO 228/1	Valve Body Weight lb
1 1/2"	4.33	7.19	6.7	6.85	11	G 2	15.8
2"	5.11					G 2 1/2	18.0

PIBCV Dimensions: 2½” to 6” Flanged Valves

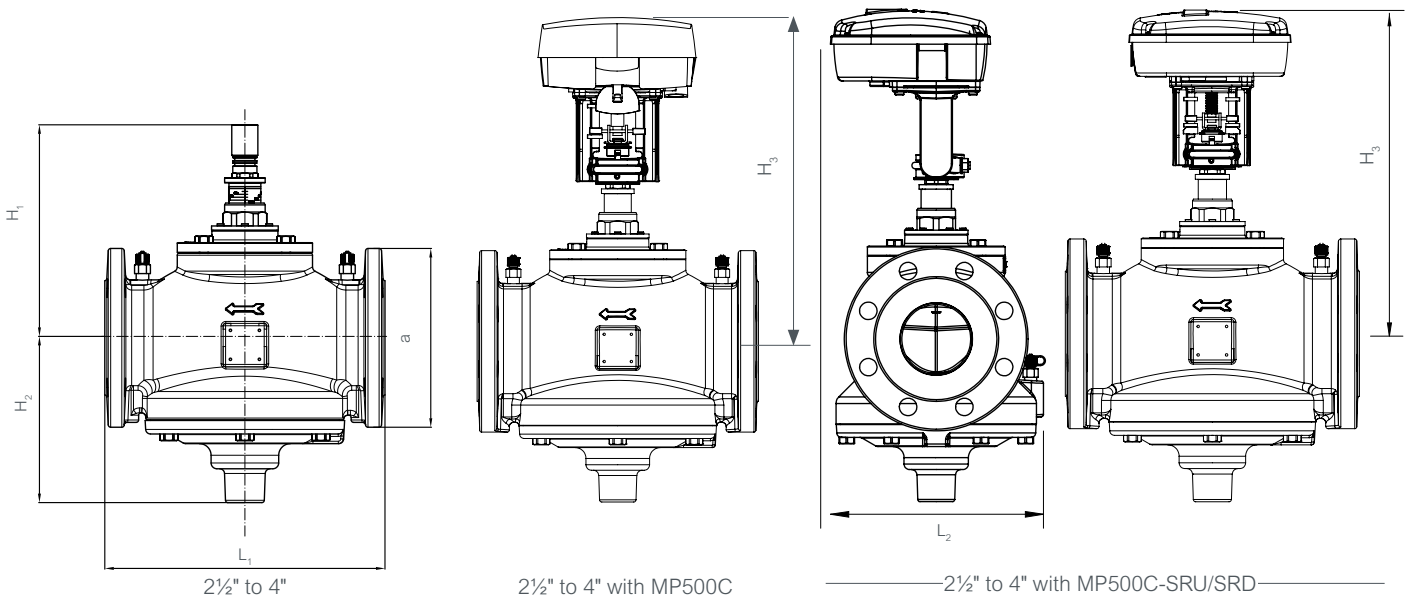


Table 20. Flanged Valves 2½” to 4” (inches)

Type	L1	L2	H1	H2	H3	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”

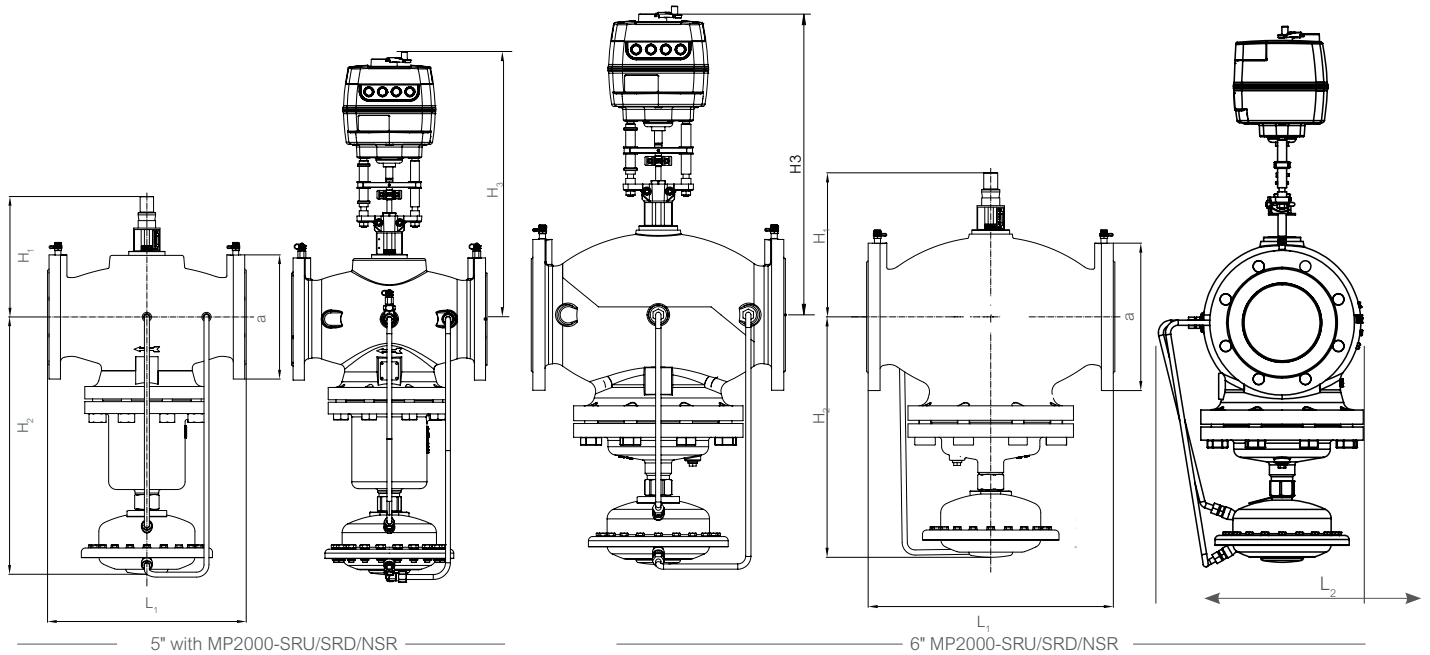


Table 21. Flanged Valves 5” and 6” (inches)

Type	L1	L2	H1	H2	H3 MP2000-SRU/SRD/NSR	a (EN 1092-2)	Valve Body Weight (lb.)	No. of Flange Bolt Holes
5”	15.7	14.45	10.7	21.1	20.94	9.84	188	8
6”	18.9	15.88	12.1	19.6	22.36	11.22	304	8

## PIBCV Dimensions: 8" and 10" Flanged and Adapters

### Flanged Valves 8" and 10"

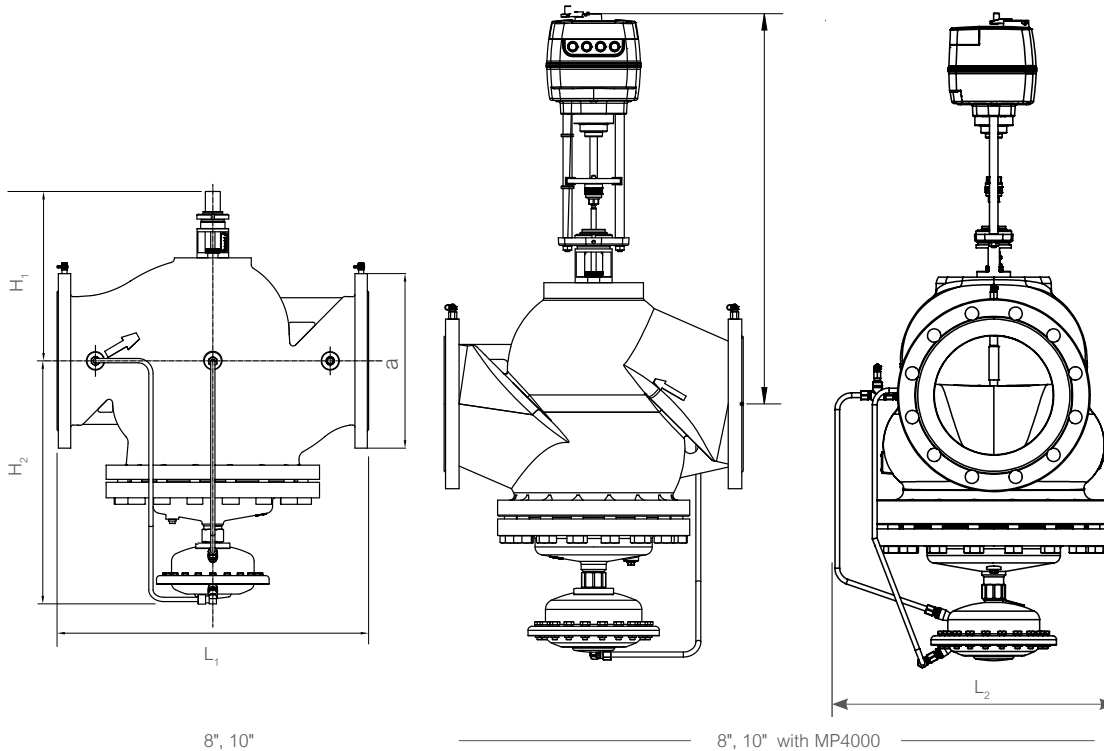
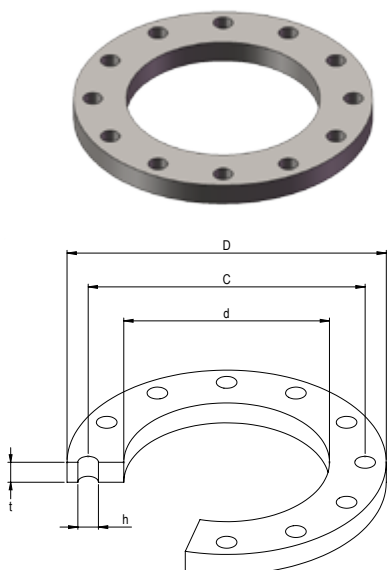


Table 22a. Flanged Valves 8" and 10" (inches)

Type	L1	L2	H1	H2	H3 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		
<b>Size</b>	8" (200 mm)	10" (250mm)
<b>Part number</b>	D2576-16-200	D2576-16-250
<b>Bolt hole diameter</b>	.87" (22 mm)	1.02" (25.9 mm)
<b>Bolt circle</b>	11.61" (294.89 mm)	13.98" (355.09 mm)
<b>Pressure</b>	PN16	
<b>d</b>	8.63" (219.1 mm)	10.75" (273mm)
<b>D</b>	13.39" (340 mm)	15.94" (405mm)
<b>C</b>	11.61" (295 mm)	13.98" (355mm)
<b>Number of bolts</b>	12	
<b>h</b>	0.87" (22 mm)	1.02" (26mm)
<b>t</b>	1.024" (26 mm)	1.14" (29mm)
<b>Weight</b>	24.03 lbs (10.9 kg)	39.68 lbs (18.0 kg)
<b>Material</b>	Carbon Steel	Carbon Steel
<b>IMPA/ISSA code</b>	734554 735564	734555 735565

PIBCV Valve Flow Ranges: 1/2" to 2"

Table 23. 1/2 to 2" Valve Flow Ranges (Q<sub>min</sub> to Q<sub>nom</sub>)

Flow rate (GPM)	1/2"			3/4"		1"		1 1/4"		1 1/2"	2"	
Without PT Ports	VP228E-10BQLNT	VP228E-15BQLNT	VP228E-15BQSNT	VP229E-15BQHNT	VP228E-20BQSNT	VP229E-20BQHNT	VP229E-25BQSNT	VP229E-25BQHNT	VP229E-32BQSNT	VP229E-32BQHNT	-	-
With PT Ports	VP228E-10BQL	VP228E-15BQL	VP228E-15BQS	-	VP228E-20BQS	-	VP229E-25BQS	-	VP229E-32BQS	-	VP220E-40CQS	VP220E-50CQS
0.5	1	1	1									
1.0		1	1	1	1							
1.5			1	1	1	1	1					
2.0			1	1	1	1	1					
2.5				1	1	1	1	1				
3.0				1	1	1	1	1	1			
3.5				1	1	1	1	1	1	1		
4.0				1	1	1	1	1	1	1		
4.5				1	(1)	1	1	1	1	1		
5.0				1		1	1	1	1	1		
5.5				(1)		1	1	1	1	1		
6.0						1	1	1	1	1		
6.5						1	1	1	1	1		
7.0						1	1	1	1	1		
7.5						1	1	1	1	1		
8.0						(1)	(1)	1	1	1		
8.5								1	1	1		
9.0								1	1	1		
9.5								1	1	1		
10								1	1	1		
11								1	1	1		
12								1	1	1		
13								(1)	1	1	1	
14									1	1	1	
15									(1)	1	1	
16										1	1	
17										1	1	
18										(1)	1	
19										(1)	1	
20											1	
21											1	
22											1	1
23											1	1
24											1	1
25											1	1
26											1	1
27											1	1
28											1	1
29											1	1
30											1	1
31											1	1
32											1	1
33											1	1
34												1
35												1
36												1
37												1
38												1
39												1
40												1
44												1
48												1
52												1
55												1

(Q<sub>high</sub> setting)  
All flanged valves come standard with PT ports

## PIBCV Valve Flow Ranges: 2½ to 10” Flanged

Table 24. 2½” to 10” Flanged Valve Flow Ranges (Q<sub>min</sub> to Q<sub>nom</sub>)

Size Flow rate (GPM)	2-1/2"		3"		4"		5"		6"		8"		10"	
	VP220A-65CQS	VP220A-65CQH	VP220A-80CQS	VP220A-80CQH	VP220A-100CQS	VP220A-100CQH	VP221A-125CQS	VP221A-125CQH	VP221A-150CQS	VP221A-150CQH	VP222A-200CQS	VP222A-200CQH	VP222A-250CQS	VP222A-250CQH
35	34													
40	1													
45	1	44												
50	1	1	48											
55	1	1	1											
60	1	1	1											
65	1	1	1											
70	1	1	1	70	66									
75	1	1	1	1	1									
80	1	1	1	1	1									
85	85	1	1	1	1									
90		1	1	1	1									
95		1	1	1	1									
100		110	1	1	1	104								
120			120	1	1	1								
140				1	1	1								
160				176	165	1	158							
180						1	1							
200						1	1	194						
250						260	1	1						
300							1	1	256					
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	880	1	1	1
850												1	1	1
900												1	1	1
950												1	1	1
1000												1	1	1
1100												1188	1	1
1200													1320	1
1300														1
1400														1
1500														1
1600														1630
1700														

All flanged valves come standard with the PT ports

### Specification Submittal Text

SpaceLogic PIBCV has the following specifications:

- NPS 2 and Smaller: PN 16, stainless steel components.
- NPS 2-1/2 through 10: Class 125 cast iron body per ASME B16.1-2010, Material class B per ASTM A 126-04 (2014), stainless steel components.
- Accuracy NPS ¾ and Smaller: The control valves shall accurately control the flow from 0 to 100% rated flow with a differential pressure range of 2.32 to 58 psi for low and standard flow units, 5 to 58 psi for high flow units within 5% of set flow value.
- Accuracy NPS 1 through 1-1/4: The control valves shall accurately control the flow from 0 to 100% rated flow with a differential pressure range of 2.9 to 58 psi for standard flow units, 5 to 58 psi for high flow units within 5% of set flow value.
- Accuracy NPS 1-1/2 through 4: The control valves shall accurately control the flow from 0 to 100% rated flow with a differential pressure range of 4.35 to 58 psi for standard flow units, 8.7 to 58 psi for high flow units within 5% of set flow rate.
- Accuracy NPS 5 through 10: The control valves shall accurately control the flow from 0 to 100% rated flow with a differential pressure range of 5.8 to 58 psi for standard flow units, 8.7 to 58 psi for high flow units within 5% of set flow value.
- Flow Characteristics: Linear Control, selectable to equal percentage at the proportional valve actuator.
- Field adjustable flow by means of a percentage of rated valve flow.
- Position feedback output signal integrated into all proportional actuators.
- 100% authority with modulating below 1% regardless of flow settings.
- No cartridges requiring replacement or maintenance.
- Close off ratings shall be 232 psi for all valve sizes.
- Valve control range 1:1000.



## MP131-24T, 24F, 24MP Floating and Proportional Actuators

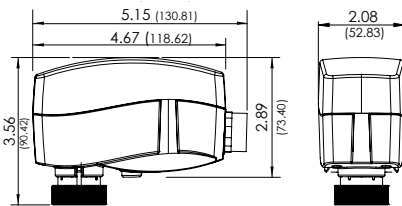
MP131 actuators are used together with automatically balanced combination valve type SmartX PIBCV for 1/2" to 1-1/4". Typical applications are temperature control and permanent automatic balancing on terminal units (fan-coils, chilled ceilings, air-handling units).

### 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



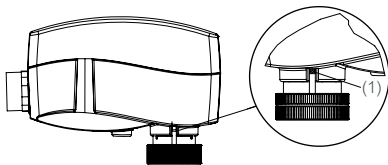
### Dimensions (mm)



### 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).



### Specifications

<b>Power supply</b>	24 Vac/Vdc (+10--15%)
<b>Power consumption</b>	1.0 VA
<b>MP131-24F/T</b>	1.5 VA, standby 0.4 W
<b>MP131-24MP</b>	
<b>Frequency</b>	50/60 Hz
<b>Control Input MP131-24MP</b>	MP131-24MP 0-10 (2-10) V Ri = 200 Ω
<b>Control input Y</b>	0-20 (4-20) mA Ri = 500 Ω
<b>Control output U</b>	0-10 V Ro (min) = 38 kΩ
<b>Feedback Control input Y</b>	0-20 (4-20) mA Ri = 500 Ω
<b>Control output X</b>	0-10 V Ro (min) = 38 kΩ
<b>Close off force</b>	130 N
<b>Stroke</b>	5mm
<b>Speed</b>	50 hz: 24 s/mm 60 hz: 20 s/mm
<b>Relative humidity</b>	max. 95%
<b>Max. medium temperature</b>	248 °F (120 °C)
<b>Ambient temperature</b>	32-131 °F (0-55 °C)
<b>Storage and transport temperature</b>	-40-158 °F (-40-70 °C)
<b>Protection class</b>	IP 42
<b>Weight</b>	.66 lbs (0.3 kg)
<b>Sound power level</b>	Max. 35 dB(A)
<b>Standards/Directives</b>	
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.

## MP300-SRU/SRD Multi-Signal Actuators

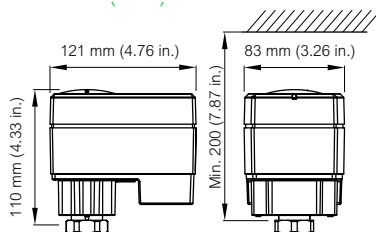
MP300-SRU/SRD actuators with Floating and Proportional control are low voltage motoric actuators for the SmartX PIBCV DN10-32 (½”–1¼”) Valves. These actuators have a spring return safety function that provides for an open or close valve in the event of power loss. The Spring return safety function should not be used for two position control

### Features

- The advanced design incorporates load related 'switch-off' to ensure that actuators and valves are not exposed to overload.
- The advanced design incorporates a diagnostic LED, operational data capture and self stroking feature.
- Low weight and robust.
- Spring Return operation in the event of power failure.

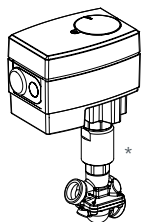


### Dimensions (mm)

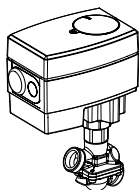


### Actuator Valve Combinations

MP300-SRU for a normally open valve. MP300-SRD for a normally closed valve.



MP300-SRU +  
VP228E, VP229E



MP300-SRD +  
VP228E, VP229E

### Specifications

<b>Power supply</b>	24 Vac/Vdc (+10--15%)
<b>Power consumption</b>	9 VA
<b>Frequency</b>	50/60 Hz
<b>Control input Y</b>	0-10 (2-10) V; 0-20 (4-20) mA
<b>Control output U</b>	0-10 (2-10) V
<b>Closing force</b>	300 N
<b>Max. stroke</b>	5.5mm
<b>Speed</b>	11.75 (60 hz) s/mm 14 (50 hz) s/mm
<b>Max. medium temperature</b>	248 °F (120 °C)
<b>Ambient temperature</b>	0-55 °C
<b>Storage and transport temperature</b>	-40-158 °F (-40-70°C)
<b>Grade of enclosure</b>	IP 54
<b>Weight</b>	0.8 kg
<b>Sound power level**</b>	40 dB (A) <small>** Consideration should be given to the noise of mechanical spring return actuators in hotel guest rooms or other applications requiring silent operation.</small>
<b>EMC Standards/Directives</b>	2014/30/EU EN 61000-6-2 & EN 61000-6-3 2014/35/EU EN 60730-1 & EN 60730-2-14
<b>LVD Standards/Directives</b>	2011/65/EU & RoHS2 Amendment 2015/863/EU
<b>RoHS2 Directives</b>	
<b>UL CSA</b>	c-UL-us LISTED using UL 60730-1 & -2 -14 and CSA/CAN E60730-1A & -2 -14

Part number	SR Direction	Linkage (incl. with actuator)
MP300-SRU	Up - Normally Open	Adapter*
MP300-SRD	Down - Normally Closed	Spacer

\* Total height of the assembly increases with the use of the Adapter model.

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

MP500C are linear electro-mechanical actuators for use with VP220x SmartX PIBCV valves, DN40–100, controlled by either an increase/decrease floating signal or by a range of modulating control signals in the range 0–10V. SRU/SRD models have a spring return feature. The U-Bolt connection allows quick and easy direct mounting onto the SmartX PIBCV VP220 valves.

### Features

- Brushless DC motor.
- High resolution control board allows precise fluid control.
- Working range and end point switches adjusted automatically to the stroke of the valve.
- When driven electrically, firmware calibrates a consistent running time regardless of the valve stroke.
- During power loss SRU/SRD spring return drives the motor, generating power to the board, controlling braking speed which avoids mechanical stress and system water hammer.
- Actuators can be configured for either 3 point increase/ decrease signal or various modulating control signals including sequencing.
- Stroke Indicators on the yoke provide clear visual indication of the valve opening/stroke status.



MP500C-SRU/SRD



MP500C

### Specifications

MP500C	Non-Spring Return
MP500C-SRU (-W)	Stem up (retract)
MP500C-SRD (-W)	Stem down (extend)
Voltage supply	24 Vac ±20% 50-60Hz 24 Vdc ±20%
Transformer Sizing	50 VA
Power consumption	
Running	30 VA (21 W)
Rest	7 W
MP500C	average 15 VA
Running Time	
Modulating	15 sec.
Increase/decrease (selectable)	60/300 sec.
Spring return	13 sec.
Stroke	2...35 mm
Force, nominal	500 N
Duty cycle	
Full load, high amb. temp.	20%/60 minutes
Half load, room temp.	80%/60 min.
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, Y1, Y2	
Voltage across open input	24 Vac
Current through closed input	5 mA
Pulse time	min. 20 ms
Output, U	
Position Feedback	2...10 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)
Sound power level NSR	32 dBa
SR	43 dBa

Enclosure rating	
MP500C, MP500C-SRU, MP500C-SRD	IP54 (NEMA 2)
MP500C-SRU-W, MP500C-SRD-W	IP65 (NEMA 4)
Standards/Directives	
ElectroMagnetic Compatability [EMC]	2014/30/EU
Low voltage directive [LVD]	2014/35/EU
Restriction of Hazardous Substances [RoHS2]	2011/65/EC
Heat	IEC 60068-2-2
Humidity	IEC 60068-2-3
Cold	IEC 60068-2-1
Vibration	IEC 60068-2-6
Weight	3.2 Kg
Materials of Construction; Housing and Cover	Aluminum
Max cable core diameter	2.5 mm <sup>2</sup>
Wiring Entry: Conduit connection	4 x M20 capped holes
Cable gland	1 x 6..12 mm O/D, IP68
Direct connection to Smart X PIBCV valves VP220	DN40...100
S2 Auxillary Switch Relay (optional accessory)	SPDT, 24 Vac (contacts made at 5% and 95% of end stroke)
	4A AC1

### Part Numbers & Accessories

Part Number	Spring Return Direction	On Power Failure	Rating
MP500C	Non-Spring Return Actuator		NEMA 2
MP500C-SRU	Spring return stem up	Valve Open	
MP500C-SRD	Spring return stem down	Valve Closed	
MP500C-SRU-W	Spring return stem up	Valve Open	NEMA 4
MP500C-SRD-W	Spring return stem down	Valve Closed	
880 0104 000	S2 aux end point switches		

## MP2000-SRU/SRD/NSR Multi-Signal Actuators

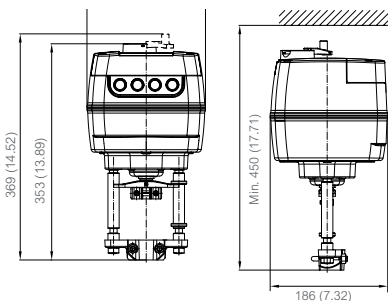
MP2000 SRU/SRD/NSR Actuators with spring return safety function and non-spring return are for fine regulation of large control valves under the demand of the HVAC controller. MP2000 SR can be controlled by either a modulating or a 3-point control signal and is used specifically with the VP221x SmartX PIBCV valves.

### 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)



### Dimensions



### Specifications

<b>Nominal voltage</b>	24 Vac/Vdc, 50 Hz/60 Hz
<b>Power consumption</b>	15 VA (24V)
<b>Control input signal</b>	Modulating or 3-point floating
<b>Power supply frequency</b>	50/60 Hz
<b>Control input Y</b>	0–10 (2-10) V Ri = 40 Ω 0–20 (4-20) mA Ri = 500 Ω
<b>Control output U</b>	0–10 Vdc (2–10 Vdc) Ri = 10k Ω 0–20 mA (4–20 ma) Ri = 510 Ω
<b>Force</b>	2000 N (450 lbf)
<b>Stroke</b>	50mm (2")
<b>Speed</b>	4 s/mm or 6 s/mm
<b>Max. medium temperature</b>	200 °C (392°F)
<b>Ambient temperature</b>	0–55 °C (32–131°F)
<b>Storage and transport temperature</b>	-40–70 °C (-40–158°F); Storing for three days
<b>Humidity</b>	5–95%
<b>Protection class</b>	III safety extra-low voltage
<b>Grade of enclosure</b>	IP54, NEMA 2
<b>Weight</b>	8.6 kg (18.96 lbs); 6.36 kg NSR (13.8 lbs)
<b>Safety function</b>	Yes
<b>Safety function runtime 50mm stroke</b>	120 S
<b>Manual operation</b>	Electrical and mechanical
<b>Power failure response</b>	
<b>MP2000-SRD Safety function</b>	stem extends down
<b>MP2000-SRU Safety function</b>	stem retracts up
<b>Standards/Directives</b>	
Heat	IEC 60068-2-2
Humidity	IEC 60068-2-3
Cold	IEC 60068-2-1
Vibration	IEC 60068-2-6
<b>Regulatory compliance</b>	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 number	Spring return direction
<b>MP2000-SRD</b>	Stem down, extends (valve closed)
<b>MP2000-SRU</b>	Stem up, retracts (valve open)
<b>MP2000-NSR</b>	Non-spring return

## MP2000-SRU/SRD/NSR Multi-Signal Actuators

### 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 function runtime 50mm stroke

120 s

### Manual operation

Electrical and

Mechanical

Power failure response

MP2000-SRD Safety function:

MP2000-SRU Safety function:

stem extends down

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

Humidity

Cold

Vibration

IEC 60068-2-2

IEC 60068-2-3

IEC 60068-2-1

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)

## MP4000 Multi-Signal Actuator for VP222x SmartX PIBCV, DN200...250 (8...10")

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.

### 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 position 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)



### Specifications

<b>Power supply</b>	24 Vac/Vdc (+10– -15%)
<b>Power consumption</b>	15 VA (24V)
<b>Frequency</b>	50/60 Hz
<b>Control input Y</b>	0–10 (2-10) V Ri = 100 Ω 0–20 (4-20) mA Ri = 500 Ω
<b>Control output U</b>	0–10 Vdc (2–10 Vdc) Ri = 2k Ω 0–20 mA (4–20 ma) Ri = 500 Ω
<b>Close off force</b>	4000 N (899.23)
<b>Max. stroke</b>	80mm
<b>Speed</b>	3 s/mm or 6 s/mm
<b>Max. medium temperature</b>	200 °C (392°F)
<b>Ambient temperature</b>	0–55 °C (32–131°F)
<b>Storage and transport temperature</b>	-40–70 °C (-40–158°F) Storing for three days
<b>Humidity</b>	5–95%
<b>Protection class</b>	II
<b>Grade of enclosure</b>	IP54, NEMA 2
<b>Electrical connection</b>	Conduit
<b>Weight</b>	7.5 (16.53 lbs)
<b>Manual operation</b>	Electrical and mechanical
<b>Power failure response</b>	Steam remains in last position
<b>Standards</b>	
Heat	IEC 60068-2-2
Humidity	IEC 60068-2-3
Cold	IEC 60068-2-1
Vibration	IEC 60068-2-6
<b>Regulatory standards</b>	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.

## SP90 Multi-Function Actuator High Accuracy Multi-Function Field Bus Actuators

### Product Description

Schneider Electric's SpaceLogic SP90 is a high accuracy multi-function field bus actuator, specifically designed for use in combination with DN10...32 (3/8"...1¼") SmartX PIBCV valves.

The high positional accuracy, together with the linear flow characteristic of the SmartX PIBCV valve, allow the SpaceLogic SP90 to be used as a flow indicator. When the SP90 is connected to temperature sensors across a coil, heat consumption will also be calculated.

Set up of the actuator and valve parameters are all made via fieldbus. The remote flow adjustment saves considerable time during mechanical installation/flow balancing with no need to adjust the flow setting dial on the valve.

### Features

- All Remote design flow settings made from the BMS
- Pluggable cables with Daisy chain connectivity allowing for super quick installation and reduction of mis-wiring
- LED status indication
- Auto MAC addressing
- Alarm reporting
- Spare 0...10 V and 2xPt1000 input
- Additional 0...10 V output



### Specifications

Power supply range	24 V ac/dc, ± 25%, 50 / 60 Hz
Power consumption	Running: 3.9 VA Standby: 0.9 W
Protection class	III safety extra-low voltage
Electrical connection	Pre-molded plug connector
Control signals	BACnet MS/TP, Modbus 0...10 Vdc, 4...20 mA
Actuator speed selections (sec/mm)	3, 6, 12, 24, Constant Time
Stroke	7 mm
Force	90 N
Positional accuracy	± 0.05 mm
Accuracy, Calculated Energy Usage	+/- 10%
Working Ambient temp.	-10°...50 °C (14...122 °F)
Max. medium temp.	120 °C (248 °F)
Storage temp. range	-40...70 °C (-40...158 °F)
Sound Power Level	Max. 30 dB(A)
Enclosure rating	IP54 (IP40 upside-down)
Weight	0.4 kg (0.88 lb)
<b>BACnet Data</b>	
BACnet device profile	BACnet Application Specific Controller (B-ASC)
BACnet protocol	BACnet Master Slave / Token Passing (MS/TP)
BACnet baud rates supported	Auto baud rate detection / 9600 bps / 19200 bps / 38400 bps / 56700 bps / 76800 bps / 115200bps

### Modbus RTU Data

Supported baud rates	Auto baud rate detection / 9600 bps / 19200 bps / 38400 bps / 56700 bps / 76800 bps / 115200bps
Supported transmission modes	Parity: None (1-8-N-2) / Odd (1-8-O-1) / Even (1-8-E-1) / None (1-8-N-1) Data format: Parity (Start bit - Data bits - Parity - Stop bits)

### Part Numbers

Part No.	Description
SP90-24BMM	Fieldbus PIBCV Actuator

### Cable Accessories

Type	Length (m)	Connections	Part Number
Digital	1.5	bus / power	9114401500P
	10.0	bus / power	9114410000P
Daisy chain	0.5	actuator / actuator	9114500500P
	1.5		9114501500P
	5.0		9114505000P
	10.0		9114510000P
Analogue + I/O Energy	1.5	actuator / free wires	9114601500P
		PT1000 surface mount temp sensors	9114701500P
		PT1000 Immersed temp sensors	9114801500P

Note: Cables are not included with actuator and must be ordered separately

## SP90 Multi-Function Actuator

### Dimensions

Threaded Valves 1/2 to 1 1/4" (inches)

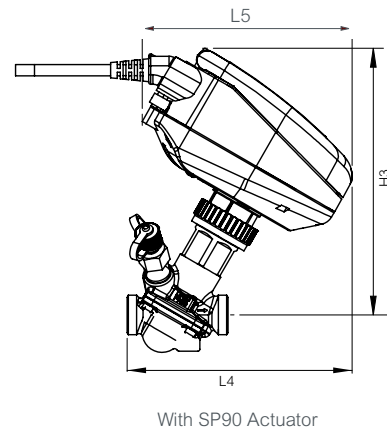
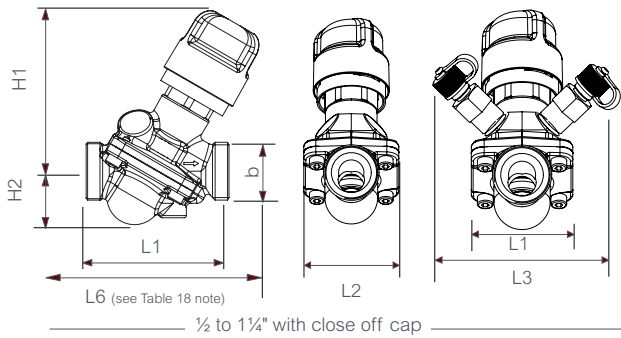


Table 8. Threaded Valves 1/2 to 1 1/4" (inches)

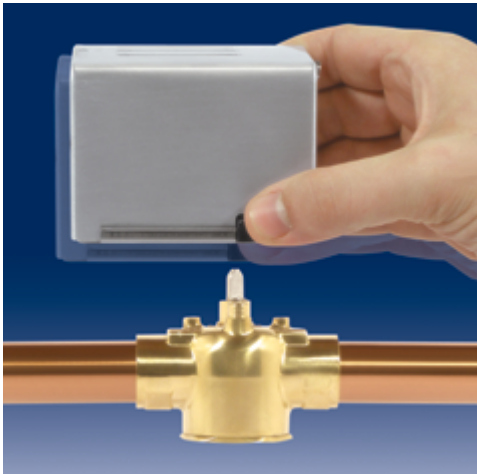
Type	L1	L2	L3 (PLUGS)	L4	L5	H1	H2	H3	b ISO 228/1	Valve Body Weight (lb.)
				SP90	SP90			SP90		
1/2" VP228E- 10Lx	2	1.41	3.11	4.65	4.33	2.9	.78	5.6	G 1/2	.83
1/2"	2.5	1.7		4.92		3	1	5.7	G 3/4	1
3/4"	3.2	2.2		5.24		3	1.2	5.8	G 1	1.43
1"	4	2.7		5.83		3.5	1.5	6.14	G 1 1/4	3.2
1 1/4"	5.1	3.5		6.54		3.9	2.3	6.58	G 1 1/2	4.8

NOTE: Valve Body Tail Piece Dimensions: See Columns A and B in Table 17 Pg. 206, PIBCValve Actuator Codes and 1/2"...2" Tail Pieces  
For assemblies with Female NPT: L6= (2x Column A - 2x Column B) +L1



# Zone Valves

## PopTop™



Erie's motorized hydronic valves, the PopTop™, provide convenient, reliable and easy installation for a variety of heating and cooling applications. Installation is a snap with easy, one-handed removal or engagement of the actuator to the valve body. Push the button and lift. It's that simple.

### Features

- One-handed engagement or removal of the motorized actuator to the valve body.
- Valve actuator can be easily attached after the valve body has been installed into the system.
- Mounts quickly and easily without the need of linkages or calibration.
- Available in 2-way and 3-way port configurations, 1/2" (15mm) through 1-1/4" (32mm) sweat or 1/2" (15mm) to 1" (25mm) threaded connections, 1.0 to 8.0 Cv range.
- Available factory coupled, or as individual bodies and actuators.
- Direct replacement for all existing PopTop™ applications.
- Rugged 400 PSIG rated brass forged body design for long life.
- UL listed actuator.

## Erie Family of Products



### PopTop™ Zone Valves

- 1/2", 3/4", 1" and 1-1/4" Sweat, NPT and Inverted Flare Union.
- Two-position (on/off), 2-way and 3-way.
- General close-off or High close-off.
- Low voltage or line voltage.



### PopTop™ Modulating Valves

- 1/2", 3/4", and 1-1/4" Sweat, NPT.
- Three-wire (on/off), 2-way and 3-way.
- 0-10, 0-5, 5-10 Vdc or 4-20 mA proportional inputs.
- Spring return or non-spring return.
- Time out feature available.

## PopTop™ Two Position Valves & Actuators



### General Close-Off

For your residential and commercial applications, Erie's General Close-Off valves and actuators offer precision control for 2-position (on/off) spring return temperature control. The General Close-Off may be used in a wide range of applications such as radiant baseboard and fan coil for easy installation and maintenance.



### High Close-Off "HCO"

For high-rise and commercial applications, where higher close-off is required, our High Close-Off valves and actuators offer precise temperature control. Our two-position (on/off) "HCO" actuator may be interchanged with General Close-Off actuators. This may be used in applications such as fan coil and VAV reheat.

### Features

- Direct replacement for all existing two-position, motorized PopTop applications.
- Sized to fit most baseboard applications.\*
- Rugged Brass forged 400 psig rated valve body.
- Up to 60 PSI (75 PSI for HCO valves and actuators) pressure differential close-off.
- Spring return operation, normally closed or normally open.
- Voltages 24 to 277 VAC.
- End switch option on general temperature models.
- Terminal block option on general temperature models (24V).
- Chilled, hot water, and low pressure/low temperature steam applications.
- Cv 1.0 to 8.0.
- Hysteresis synchronous motor design for long life.
- Meets or exceeds ANSI IV standard for close-off.
- UL Listed actuator.

\* General Close-Off Valves & Actuators only.

[schneider-electric.com/ecostruxure-building](http://schneider-electric.com/ecostruxure-building)

Life Is On

**Schneider**  
Electric

## Modulating Zone Valve Assembly ordering

Specify three part number fields for the Valve and three for Actuator Assembly part number



### Ordering Modulating Zone Valve Assemblies

**V M 2** | | | | | **3 A 00** | ①

**Body Type**  
M = Modulating

**Configuration**  
2 = 2-Way

**Valve size**  
2 = 1/2"  
3 = 3/4"  
4 = 1"  
5 = 1 1/4"

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

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

Cv Size (Kvs)			
	2-way / 3-way	Size	Connection Type
1 =	1.0 (0.8)	1/2"	1, 2
2 =	2.0 (1.7)	3/4"	
3 =	4.0 (3.5)	1/2"	1
		3/4"	
7 =	7.5 (6.5)	1"	1, 2
		3/4"	
	8.0 (7.0)	1 1/4"	1

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

**Electrical Leads**  
00 = No leads

**Voltage**  
A = 24 Vac only 50/60 Hz

**Temperature Ratings**  
3 = General Temperature

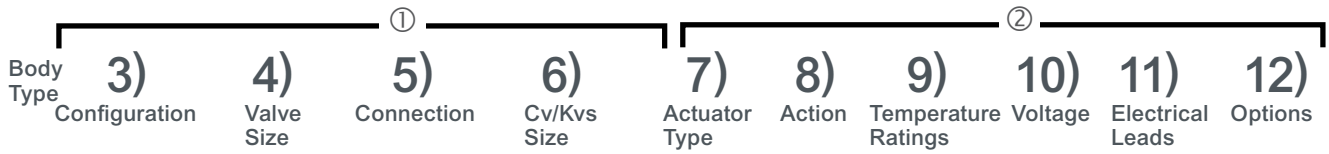
**Action**  
1 = Spring Return Normally closed, 2-way or 3-way  
2 = Spring Return Normally opened, 2-way only  
3 = Non-Spring Return

#### Available Actuators ②

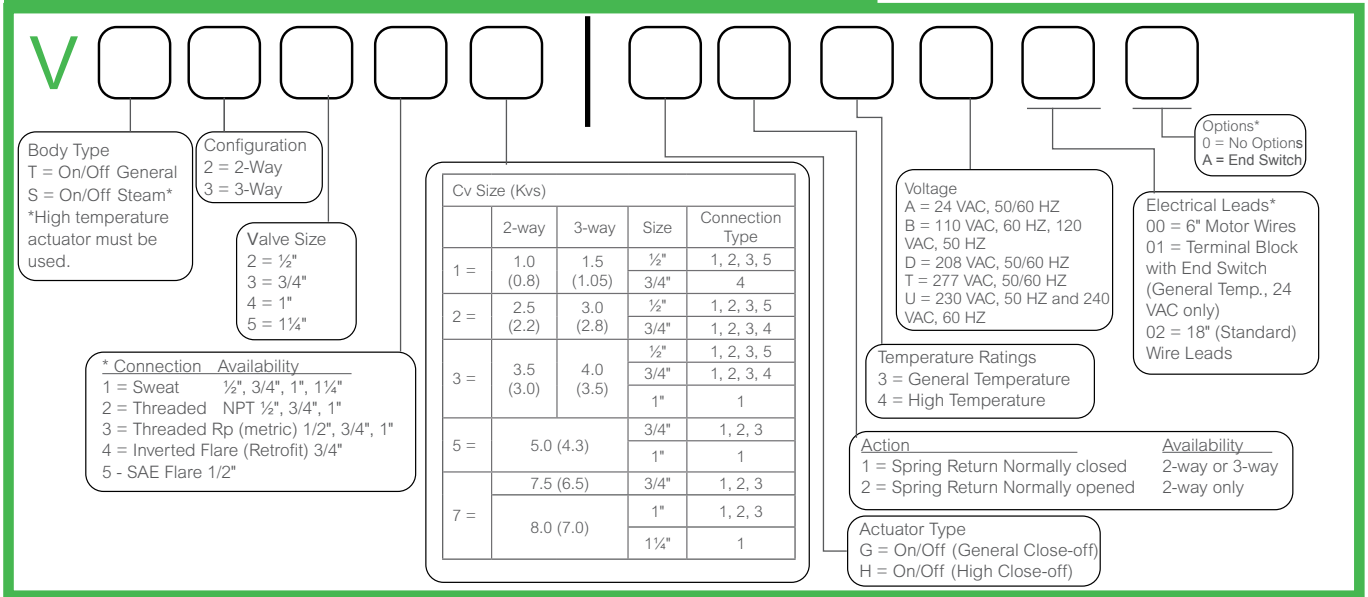
Part number	Action	Actuator type	Option
AT13A00T	Spring Return	Three Wire Floating	With Time-Out
AT23A00T	Spring Return	Three Wire Floating	With Time-Out
AT33A000	Non-Spring Return	Three Wire Floating	None
AT33A00T	Non-Spring Return	Three Wire Floating	With Time-Out
AP13A000	Spring Return	Proportional	None
AP23A000	Spring Return	Proportional	None
AP33A000	Non-Spring Return	Proportional	None

- ① This feature is standard for floating spring return actuators and must be included in the part number.
- ② If the actuator doesn't have a time-out feature then the controller needs to have a time-out feature.
- ③ When ordering only a valve body make selections for the 3 configurable fields shown to derive a 6-digit number.
- ④ When ordering only an actuator, prefix with the letter A then make selections for the 3 configurable fields shown, to derive a 6-digit number (the 5th position is a double zero).

Specify Five Part Number Fields for the Valve and Six for a 2-Position Zone Valve Assembly Part Number



Ordering 2-Position Zone Valve Assemblies



Body & Actuator Combination Requirements

Temperature Configurations	
Body Configuration	Actuator Spring Return Mode
V T X X X	A X X 3 X X X X
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 must be S or T

- ① When ordering only a valve body make selections for the five configurable fields shown to derive a 6-digit number.
- ② When ordering only an actuator, prefix with the letter A then make selections for the six configurable fields shown, to derive a 6-digit number.

\* Notes:

- Inverted Flare fittings must be ordered separately. See actuator accessories for fitting part numbers.
- End switch is not available for 277 Vac models if actuator temperature rating is high temperature (4).
- Actuators with Terminal blocks required end switch and the end switches is 24 Vac @ 101 mA min. -5A max.
- End switch is 24-240 Vac @ 101 mA min. to 5 A max. and 9-30 Vdc @ 100 mA max. for actuators rated 240V or less. End switch is 277 Vac @ 101 mA min. to 5A max. for actuators rated 277 V.

# Erie VM PopTop Series Modulating Valves Floating “T” & Proportional “P”

## Standard and Spring Return Modulating Valves

### Product Description

The Erie™ Modulating PopTop™ Series valve actuator assemblies are designed for closed hydronic heating and cooling systems. The Modulating PopTop is used to control fluid flow in fan coil units, VAV reheat, unit ventilators, AHUs and radiant applications.

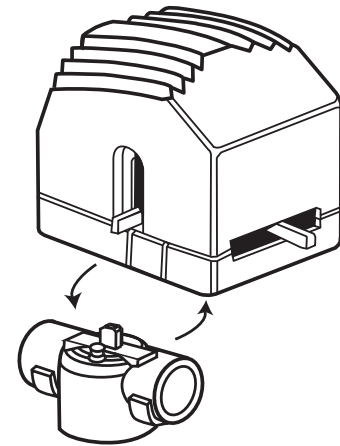
The Modulating PopTop Proportional (P) type is compatible with any 0 to 10 Vdc or 4 to 20 mA signal with jumper selectable operating range and action resulting in precise positioning. The floating (T) type is compatible with any 24 Vac three-wire signal when three minute time-out logic resides in the valve actuator or system controller.

The Modulating PopTop valve assemblies allow the actuator to be snapped onto, or off from, the valve body. The actuator can be mounted after the valve body has been installed into the system without the need for linkages or calibration.

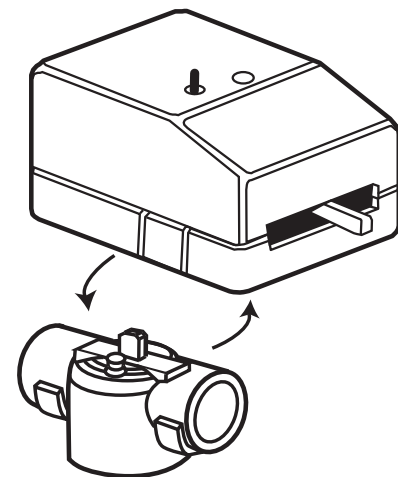
Available in standard (non-spring return) and spring return modulating actuators. The two-way spring return modulating actuators are provided in either normally open or normally closed operation. The three-way valves are available in normally closed operation only. Valve body reversal provides normally open flow for three-way valve bodies.

### Features

- Magnetic clutch to maximize the life of the motor and gear train
- Manual operating lever/position indicator facilitates field setup
- Easy to use lever 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 return will return actuator to normal position when the power is lost for more than two minutes.



Spring Return



Non-Spring Return

## Erie VM PopTop Series Modulating Valves Floating “T” & Proportional “P”

### Specifications

Timing:		Environment	
Mechanical Action		Ambient Temperature Limits	
T series	Direct acting	Shipping & Storage	-40 to 158°F (-40 to 70°C)
P series	Direct acting (valve opens port B with increase in signal.) Field selectable reverse acting	Operating	35 to 125°F (2 to 52°C)
Manual Override	Allows manual positioning	Fluid	32 to 200° F (0 to 93° C) (not steam rated)
Operating Pressure Limits	400 psi (2758 kPa) static pressure.	Humidity	5 to 95% RH, non-condensing.
Material		Seat Leakage	ANSI class IV (0.01%)
Actuator	High temperature plastic	Shipping Weight	1.9 lbs (860 g), actuator and valve body
Valve		Location:	NEMA Type 1
Body	Forged brass	Agency Listings (Actuator Only)	
Stem	nickel-plated/chrome-plated brass	North America	c-UL-us LISTED per UL 60730-1 & -2-14 and CSA/CAN E60730-1 & -2-14. FCC Part15 ClassB and ICES-003 ClassB compliant.
Seat	brass	Plenum	Rated per UL 2043 testing. LVD 2014/35/EU and EMC 2014/30/EU directives, per EN 60730-1 & -2-14. EN 6100-6-2 immunity & EN 61000-6-3 emissions complaint.
Plug/paddle	high temperature thermoplastic/rubber	European Union	
Flow Characteristic	1.0 to 4.0 Cv: equal percentage. 7.0/8.0 Cv: linear	Australia/New Zealand	This product meets requirements to bear the RCM mark.

### Inputs

Floating Actuator			Control Circuit, Max.		Total Actuator, Max.	
Series	Action	Vac	mA	VA	Powerup Inrush VA	Running VA
AT13A00T	Spring Return	24 Vac +25%/-15% 50/60 Hz	24	0.6	10	1.9
AT23A00T			24	0.6		1.9
AT33A000	Non- Spring Return		-	-	1.0	1.0
AT33A00T			-	-	1.2	1.2

a - Transformer must be sized for Powerup Inrush

Proportional Actuator			Control Circuit, Max.		Total Actuator, Max.	
Series	Action	VAC	Range	Rin	Powerup Inrush VA	Running VA
AP13A000	Spring Return	24 Vac +25%/-15% 50/60 Hz	0-10 VDC or 0-5 VDC or 5-10 VDC or 4-20 mA	>200K >200K >200K 300	10	1.7
AP23A000						
AP33A000	Non-Spring Return				1.7	

a - Transformer must be sized for Powerup Inrush  
b - Factory supplied. Actual range is 1-9 Vdc.

## Erie VM PopTop Series Modulating Valves Floating “T” & Proportional “P”

### Outputs

Series	Mode	Action	Nominal Stroke Time		Total Run Time	
			60 Hz	50 Hz	60 Hz	50 Hz
AT13A00T	Floating	Spring Return	2 min. 30 sec.	3 min.	3 min.	3 min. 36 sec.
AT23A00T						
AT33A000		Non-Spring Return			no delay	
AT33A00T					3 min. ± 30 sec.	na
AP13A000	Modulating	Spring Return	2 min. 45 sec.	3 min. 18 sec.	2 min. 45 sec.	3 min. 18 sec.
AP23A000						
AP33A000		Non-Spring Return				

Table 1. Flow Coefficients & Maximum Close-Off Differential Pressure.

Valve Size in.	Connection Type	Flow Coefficient Cv (kv)	Maximum Close-Off DP, PSI (kPa)		
			Non-Spring Operating Mode (Driven Close)	Spring Return Operating Mode (Driven Closed)	Spring Return Power Failure Mode* (Spring Close) PSID
1/2	NPT, SW, SAE, Rp	1.0 (0.9)	50 (344)	50 (344)	50 (344)
1/2	NPT, SW, SAE, Rp	2.0 (1.8)	50 (344)	50 (344)	20 (138)
3/4	NPT, SW, Rp				
1/2	NPT, SW, SAE, Rp	4.0 (3.5)	35 (241)	35 (241)	20 (138)
3/4	NPT, SW, SAE, Rp				
1	SW				
3/4	NPT, SW, Rp	7.5 (6.5)	35 (241)	35 (241)	15 (103)
1	SW, Rp	8.0 (6.9)	35 (241)	35 (241)	15 (103)
1-1/4	SW				

\*If valve is driven closed before a power failure, the "operating mode" close-off pressures apply.

Valve Body Legend

NPT — Threaded

SW — Sweat

SAE — Society Automotive Engineers.

Rp—"Metric" Threaded

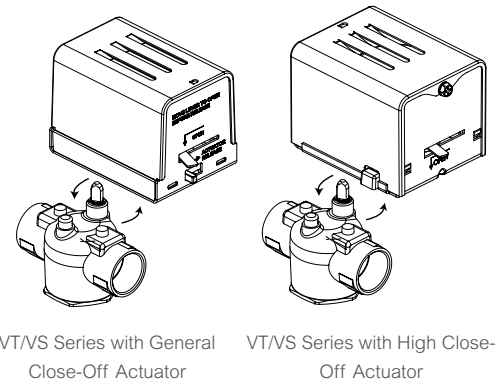
## Erie VM PopTop Series Valve Bodies and Actuators

### Product Description

Erie™ PopTop™ Series valve bodies and actuators provide easy installation for a variety of heating and cooling applications. The valve's actuator can be installed after the valve body has been installed onto the fan coil, baseboard or air handler. VS Series valves are available for low pressure steam applications. PopTop 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. PopTop 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. Actuators are designed for cycling applications (not constantly powered).

### Features

- Direct replacement for all existing two-position PopTop applications
- Hysteresis synchronous motor for long life
- Spring return operation provides a fail-safe
- Valve body rated for 400 psi static pressure
- Available in a variety of voltages
- Actuator mounts directly onto valve body without need for linkages or calibration
- Manual override lever (normally closed only)
- Actuator can be replaced without any tools, or removal of valve from system
- VS Series available for low pressure steam



### Specifications

Service	Hot and chilled water models, up to 50% glycol. Steam models up to 15 psi (both valve body and valve actuator must be rated for high temperature)
System Static Pressure Limits	400 psi (2758 kPa)
Fluid/Ambient Temperature Limits	See Table 1
Close-off	See Table 2
Seat Leakage	ANSI class IV (0.01%) with pressure at inlet (B-port/A-port, if 3-way)
Body	Forged brass
Stem	Nickel-plated
Seat	Brass
Paddle (VT series) (VS series)	Buna N Highly saturated nitrile
Actuator Voltage	24 Vac @ 50/60 Hz, 110 Vac @ 50 Hz, 120 Vac @ 60 Hz, 230 Vac @ 50 Hz, 240 Vac @ 60 Hz, 208 Vac @ 50/60 Hz, 277 Vac @ 50/60 Hz
Power Requirements	6.5 watts, 7.5 Va

Agency Listings	UL873	Underwriters laboratories (File #E9429 Category Temperature Indicating and Regulating Equipment).
	CUL	UL Listed for use in Canada by Underwriters Laboratory. Canadian Standards C22.2 No. 24. EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
European Community	Australia	This product meets requirements to bear the RSM Mark according to the terms specified by the Communications Authority under the Radio Communications Act of 1992.
Shipping Weight (Actuator/Valve Assembly)		2.25 lbs (1020 g).

**Table 1: Valve Body and Actuator Models**

Model	Temperature Range
<b>VTxxxx</b>	32×...200°F (fluid) @ 104 °F (Ambient) (0...93°C @ 40°C)
<b>VSxxxx</b>	32×...250°F (fluid) @ 169 °F (Ambient) (0...121°C @ 76°C), and/or 15 PSI (103 kPa) Steam <sup>a</sup>
<b>Axx3xxx</b>	32×...200°F (fluid) @ 104 °F (Ambient) (0...93°C @ 40°C)
<b>Axx4xxx</b>	32×...250°F (fluid) @ 169 °F (Ambient) (0...121°C @ 76°C), and/or 15 PSI (103 kPa) Steam <sup>a</sup>

<sup>a</sup> For steam applications both valve body and valve actuator must be rated for high temperature. Example: VS2213G14A020 = Assembly. VS2213 = Valve body. AG14A020 = Actuator.

## Erie VM PopTop Series Valve Bodies and Actuators

### Accessories for Inverted Flare Connection Valves

3/4" inverted flare bodies accept the following adapters to copper pipe:

436-214-1	Union nut & elbow assembly, female for 1/2" (5/8" O.D.) copper, 15/16" long
436-220	Union nut & coupling assembly, female for 1/2" (5/8" O.D.) copper, 1-1/16" long
436-252	Union nut & coupling assembly, female for 3/4" (7/8" O.D.) copper, 1-27/32" long
436-229-3	Union nut & nipple assembly, male for 1/2" (5/8" O.D.) copper, 3" long
436-214-4	Union nut & elbow assembly, male for 1/2" (5/8" O.D.) copper, 1-15/16" long
436-256	Union nut & coupling assembly, female for 1" (1-1/8" O.D.) copper, 1-3/8" long

**Table 2: Flow Coefficients and Maximum Close-Off Pressure Differentials**

Valve Size	Connection Type	2-way Cv (kv)	3-way Cv (kv)	(G) Close-Off ΔP PSI (kPa)	(H) PSI Close-Off ΔP (kPa)
1/2"	NPT, SW, Rp, SAE	1.0 (0.9)	1.5 (30)	60 (414)	75 (517)
3/4"	IFL				
1/2"	NPT, SW, Rp, SAE	2.5 (2.2)	3.0 (2.6)	40 (276)	50 (344)
3/4"	NPT, SW, IFL, Rp				
1/2"	NPT, SW, SAE, Rp	3.5 (3.0)	4.0 (3.4)	25 (172)	30 (208)
3/4"	NPT, SW, IFL, Rp				
1"	SW	5.0 (4.3)	5.0 (4.3)	20 (137)	25 (172)
3/4"	NPT, SW, Rp				
1"	SW	7.5 (6.5)	7.5 (6.5)	17 (117)	20 (137)
3/4"	NPT, SW, Rp				
1"	NPT, SW, Rp	8.0 (6.9)	8.0 (6.9)	17 (117)	20 (137)
1-1/4"	SW				

NPT - Threaded (female)

SW - Sweat

IFL - Inverted Flare

SAE - Society of Automotive Engineers Flare (male)

Rp - "Metric" Threaded (female)

G - General close off acuator

H - High close off actuator

**Table 3: Water Valve Sizing\***

ΔP	1.0 Cv	1.5 Cv	2.5 Cv	3.0 Cv	3.5 Cv	4.0 Cv	5.0 Cv	7.5 Cv	8.0 Cv
1 PSI	1.0	1.5	2.5	3.0	3.5	4.0	5.0	7.5	8.0
2 PSI	1.4	2.1	3.5	4.2	4.9	5.7	7.1	10.6	11.3
3 PSI	1.7	2.6	4.3	5.2	6.1	6.9	8.7	13.0	13.9
4 PSI	2.0	3.0	5.0	6.0	7.0	8.0	10.0	15.0	16.0
5 PSI	2.2	3.4	5.6	6.7	7.8	8.9	11.2	16.8	17.9

\* Water capacity in gallons per minute (GPM)



## Erie™ PopTop, 2/3-Way VM SR/NSR Assembly Flow Patterns

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

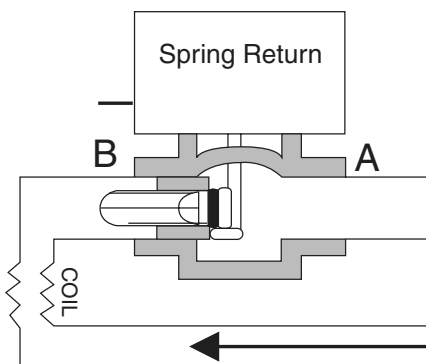
#### Piping

- 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.

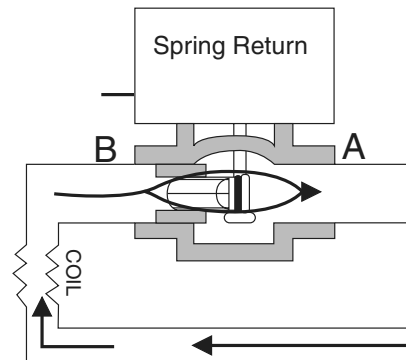
**CAUTION:** Do not use VM series valves in "open" systems. Excess make-up water may cause damage to the valve.

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

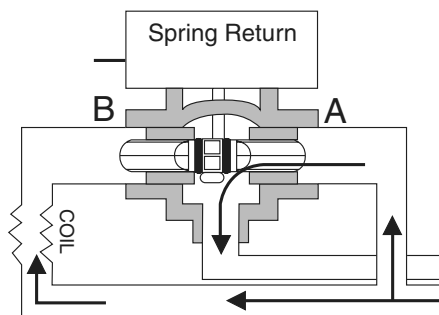
Note: Normally open actuators are not to be used on three-way valves to achieve normally open configurations. Use a normally closed actuator and pipe as shown in Figure-2.



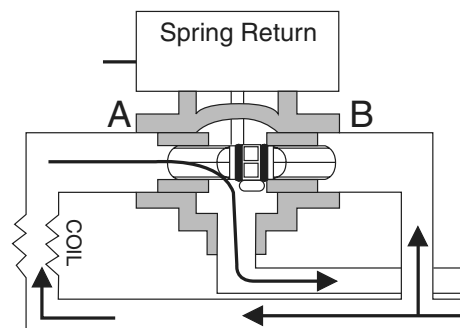
**Figure 1 Two-Way Valve Normally Closed.**



**Figure 2 Two-Way Valve Normally Open.**



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

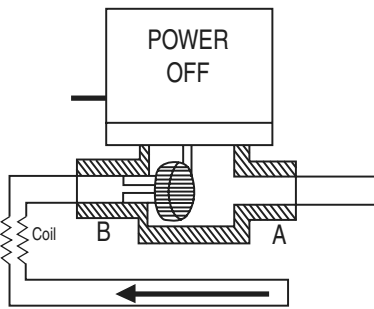


**Figure 4 Three-Way Valve  
A Port Piped to Coil Outlet  
Normally Open**

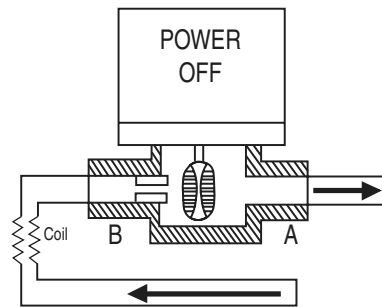
## Erie™ PopTop, 2/3-Way VT/VS Two Position SR Assembly Flow Patterns

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

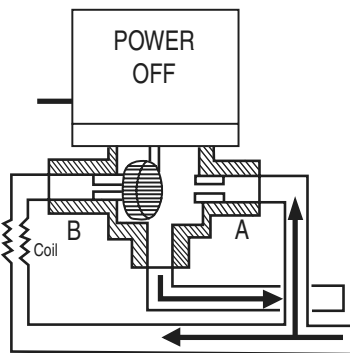
The VT/VS series are two-position spring return valves. When powered, the actuator moves to the desired position, tensing the spring return system. When power is removed the actuator returns to the normal position. The VT/VS series two-position spring return valves can be purchased with an optional built-in auxiliary SPDT end switch for interfacing or signaling; for example, zone pump burner control.



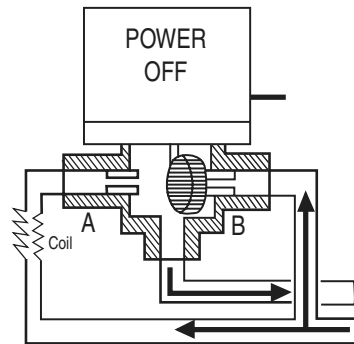
**Figure 5 Two-Way Valve with Normally Closed Actuator.**



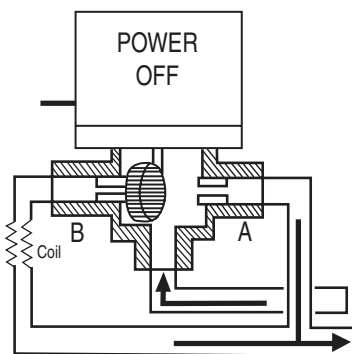
**Figure 6 Two-Way Valve with Normally Open Actuator.**



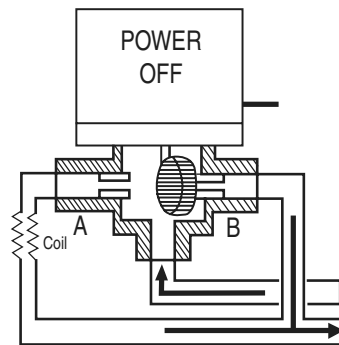
**Figure 7 Three-Way Valve in Mixing Configuration Normally Closed to the Coil.**



**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.**

## Section 230900 – INSTRUMENTATION AND CONTROL FOR HVAC

### 2.15 ACTUATORS

#### A. Electronic Direct Couple Damper (and Valve) Actuators

##### [Schneider Electric SmartX Actuators]

1. Manufactured, brand labeled or distributed by Schneider Electric
2. Direct-coupled typenon-hydraulic designed for minimum 100,000 full-stroke cycles at rated torque.
3. Direct-coupled damper actuators must have a five-year warranty.
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 133lb.-in. are -25°F-130°F (-32°C-55°C). The 30, 35, 60, 150 and 300lb. -in. are -25°F-140°F (-30°C-60°C). The 270lb. -in. are -22 °F-122°F (-30 °C-50 °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 0-10Vdc, 2-10Vdc or 4-20mA 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 270lb.-in. of torque or more should be able to be tandem mount or "gang" mount.
15. Agency Listings: ISO9001, cULus, CE and CSA

#### B. 1/2"-3/4" Ball Valve Electronic Actuators

##### [Schneider Electric VBB/VBS ballvalves 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 24Vac/Vdc, 101mA to 5mA maximum on selected two-position models.
5. Controller Signal Two-position, Floating or Proportional (0-5 Vdc, 0-10 Vdc, 5-10 Vdc, or 4-20mA dc). The design allows for changing selections via DIP switches without removal of cover.
6. Manual operating lever and position indicator must be present and are 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. (45cm) 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: ISO9001, cULus, and CE.
13. Schneider Electric shall warrant all components for a period of 5 years from the date of production.

#### C. 2-way (1/2"-3") and 3-way (1/2"-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: Non-Spring Return (NSR) actuators with 44 and 88 lb.-in. of torque must be -25 to 130°F (-32 to 55 °C). All other actuators are -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: ISO9001, 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 CloseOff models.
3. Actuator Voltage Models are 24Vac @ 50/60Hz, 110Vac @ 50Hz and 120Vac @ 60Hz, 230Vac @ 50Hz, 240Vac @ 60Hz, 208Vac @ 50/60Hz., 277Vac@50/60Hz.
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. 277Vac.
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/ handwheel, 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 (handwheel) 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 (NorthAmerica) UL, CSA and CE.

### F. 2"–4" 2-way and 3-way Butterfly Valve Spring Return (SR) Electronic Valve Actuators

#### [Schneider Electric SmartXMx41-7153 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 or4–20 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 SPD Tauxiliary 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 (NorthAmerica) UL, CSA and CE

### G. 2"–6" 2-way and 3-way Butterfly Valve Non-Spring Return (NSR) Electronic Valve Actuators

#### [Schneider Electric SmartXNR-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 0–10Vdc or 4–20mA 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 24Vac models.
5. Actuators shall have two SPDT auxiliary switch 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 2–10 Vdc or 4–20 mA.
7. Actuator operating temperature shall be -22–140°F (-12–60°C)
8. Actuators are to have a 5-year warranty.
9. Actuator agency listings (NorthAmerica) UL, CSA andCE
10. Actuator agency listings (North America) UL, CSA and CE

### H. ½"–2" Bronze Body, Linear Electronic Valve Actuators with 67 or 78lbs. 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, autocalibration 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 director reverse acting.
7. Actuator must have autocalibration 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 2–10Vdc 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 UL2043

### I. ½"–2" Bronze Body, Linear Electronic Valve Actuators with 105lbs. of force Globe Valve Actuators

#### [Schneider Electric SmartXMx51-7103 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 0–10Vdc, 2–10Vdc, 4–20mAdc, 0–3 Vdc, or 6–9 Vdc. Control function direct/reverse action is switch selectable on most models.
4. Actuator force is to be 105lb. (467 newton) with ½" (13 mm) nominal linear stroke
5. Power requirements 24 Vac, 120Vac or 230Vac depending on model.
6. Actuator housings rated for up to NEMA2/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. UL873: 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 SmartXMx51-720x 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 6–9Vdc. 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” (25mm) 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 NEMA2/IP54
11. Actuator must have manual override to allow positioning of valve and preload
12. Actuator is to mount directly to valves without separate linkage.
13. Actuator is to have a 5-year warranty.
14. Actuator agency Listings (NorthAmerica)
  - a. UL873: 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.

### K. ½”–2” Bronze Body, SpringReturn (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 150lb.-in of force depending on model.
3. Actuator housings rated for up to NEMA 2/IP54 with a 150lb.-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 (NorthAmerica)
  - a. UL-873 Underwriters Laboratories
  - b. Canadian Standards C22- 2No.24-83, CUL

### 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 VentaVB-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 4–20mA 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) 157lb. 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 (NorthAmerica) UL873, cULus, RCM, CE

### **M. 2½”–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 4–20mA 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 37 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 (NorthAmerica) UL873, cULus, RCM, CE

### **N. 2½”–6” Cast Iron Flanged Globe Valve Actuators 220lbs. force.**

1. 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 6–9Vdc. Control function direct/reverse action is jumper selectable.
2. Actuator is to be spring return.
3. Actuator will have 220 lb. force (979 newton) with ½” (13mm) or 1” (25 mm) nominal linear stroke.
4. Feedback on proportional model with 2–10 Vdc (max. 0.5 mA) output signal or to operate up to four like additional slave actuators.
5. Actuator must automatically set input span to match valve travel.
6. Actuator Operating temperature 0–140°F (-18–60°C) up to a maximum valve fluid temperature of 300 °F (149 °C).
7. Actuator is to have a 24 Vac power supply on two-position and Proportional models and 120 Vac on two-position models.
8. Actuator housings rated for up to NEMA2/IP54.
9. Actuator must have manual override to allow positioning of valve and preload.
10. Actuator is to mount directly to valves without separate linkage.
11. Actuator agency Listings: UL873, CUL: UL.

### **O. 2½”–6” Cast Iron Flanged Globe Valve Actuators with Linkage SR.**

1. Actuators with 60, 133, or 150lb.-in of force depending on model.
2. Actuator housings rated for up to NEMA 2/ IP54 with a 150lb.-in. rated a NEMA 4.
3. Actuators are to be spring return.
4. Actuators are to have two-position, Floating and Proportional models.
5. Actuators must have overload protection throughout rotation.
6. Actuator have an optional built-in auxiliary switch to provide for interfacing or signaling on selected models.
7. Actuator agency listings:UL-873, C22-2 No.24-83,CUL.

### **P. 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 air 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 100sq. ineffective 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.



### Q. 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 8sq.in. 11, 20 and 40 sq.in.(dualmounted) 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 20sq. 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, brandl abeled 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, if3-way).
4. Valves are to be: Body 300 psi rated forged brass, Stem-nickel plated, Seat-brass, Paddle-BunaNor highly saturated nitrile.
5. Valves are to be2-way or 3-way with connections options of NPT (threaded female), Sweat (SW),Inverted flare (IFL), Societ yAutomotive 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 “HighClose-off” models.
7. Valve line sizes are ¾”, ½”, ¾”, 1”, and 1¼” depending on model.
8. Valve CVs are to from 1 to 8 depending on model.
9. Actuators are to be UL listed

### B. Bronze½”–2”GlobeControlValves

#### [SchneiderElectricVentaVB-7000valves]

1. Control Valves: Factory fabricated, with body material, and pressure class based on maximum pressure and temperature rating of piping systemwith 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.Valvesshallhave allowable media temperature of20°F –281°F to assure reliabilitywith 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 dualtemperature 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 openvalve 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 temperatures team applications with gradual opening for light loads.
- e. Sizing:
  - a. Two Position Water: Line size or size using a differential pressure of 1 psi.
  - b. Modulating Water: 5PSI or twice the load pressure drop.
  - c. Pressure drop across steam valve at a maximum flow of 80 percent of inlet pressure up to 15psig and 42% of absolute (gage pressure +14.7) inlet pressure above 15 psig inlet.
  - d. 100 psi saturated steam maximum inlet pressure for heavy duty bronze body globe valves ½"–2".
  - e. 150 psi saturated steam maximum inlet pressure for high temperature bronze body globe valves ½"–2".
  - f. 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) NPS2" 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:
    - a. 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.
    - b. 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 (0.0005ml 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) NPS2 "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: 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:
    - a. Modulating Water: Minimum 5 psi or at least equal to the load pressure drop.
- 9. Required Certifications:
  - a. Pressure Equipment Directive (PED97/23/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 with standing the full operating temperature ranges, including daily and seasonal fluctuations of water, 60% glycol and steam fluids.
6. Characteristics
  - a. Rangeability: Twoway, 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: 5PSI 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 (PED97/23/EC), RoHS (Restriction of Hazardous Substances) and REACH (Regulation, Evaluation, Authorization, and Restriction of Chemicals)

### D. Steam Control Valves

1. ½"–2" Steam Service Designed Globe Valves
  - a. Body material, and pressure class based on maximum pressure and temperature rating of piping system with a body rating of not less than 400 psig at 150 °F, 321 psig at 281 °F per ANSI B16.15.
  - b. High temperature 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.
  - c. Two-way fluid system globe valves shall have the following characteristics:
    - a. Rangeability: Greater than 100:1 for all valves with flow coefficients of 0.4 and higher to provide stable control under light load conditions.
    - b. Maximum Allowable Seat Leakage: Standard and heavy duty valves must be designed to meet ANSI Class V (0.0005 ml per minute per "of orifice diameter per psi differential) up to 35 psi close off differential pressure and ANSI Class IV seat leakage (maximum 0.01% of full open valve capacity) above 35 psi with appropriate actuator. High temperature valves must meet ANSI Class III seat leakage (maximum 0.1% of full open valve capacity).
    - c. The valve must be able to operate with a full-open operating differential of no less than 87 psi.
    - d. Flow Characteristics: Modified equal percentage characteristics for standard duty water applications and modified linear for heavy duty and high temperature steam applications with gradual opening for light loads.

- e. Sizing:
    - a. 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.
    - b. 100 psi saturated steam maximum inlet pressure for heavy duty bronze body globe valves ½"...2".
    - c. 150 psi saturated steam maximum inlet pressure for high temperature bronze body globe valves ½"...2".
    - d. 35 psi saturated steam maximum inlet pressure for standard duty bronze body globe valves ½"...2".
  - f. Certifications for All Models: Pressure Equipment Directive (PED 97/23/EC), RoHS (Restriction of Hazardous Substances) and REACH (Regulation, Evaluation, Authorization, and Restriction of Chemicals)
2. 2½"...6" Steam Service Designed Globe Valves
- a. Bodies: Shall be American Factory fabricated with ASTM A 126 Class B cast iron body material with the pressure class within the maximum pressure and temperature rating of the piping system. (125 body rating with not less than 200 psig at 150 °F, decreasing to 169 psig at 281F per ANSA B16.1)
  - b. Serviceability: 2-Way valve operators, stem and plug assemblies and spring-loaded PTFE/EPDM valve stem packing cartridges must be removable for future replacement to restore the valves back to their original condition.
  - c. Construction: Material grades must meet the fluid temperature and pressure requirement temperatures of 20 °F ...281 °F to assure reliability throughout all application temperature ranges.
  - d. Packings: Shall be cartridges suitable for replacement as units withstanding the full operating temperature ranges, including daily and seasonal fluctuations of water, 60% glycol and steam fluids.
  - e. 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. Flow curves: 2-Way modified equal percentage characteristic.
    - d. Sizing
      - a. 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.
      - b. Certifications for All Models: Pressure Equipment Directive (PED 97/23/EC), RoHS (Restriction of Hazardous Substances) and REACH (Regulation, Evaluation, Authorization, and Restriction of Chemicals)

### E. 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 blow out 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 (4137Pa)
10. The manufacturer shall warrant all components for a period of 2 years from the date of production.

### F. 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 40–130psi 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® EPDMO-ring seals.

- 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.
- Fluid (water) temperature are a minimum 20°F (-7°C) and a maximum of 250°F (121 °C).
- Valves will have a two year warranty.

### G. Pressure Independent Balancing Control Valves ½"–10"

#### [Schneider Electric SmartXPIBCV]

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.

- Manufactured, brand labeled or distributed by Schneider Electric.
- NPS 2 and Smaller: PN16, stainless steel components.
- NPS 2½ through 10: Class 125 cast iron body per ASME B16.1-2010, Material class B per ASTM A126-04 (2014), stainless steel components.
- 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% offset flow value.
- 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.
- 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 for standard flow units, 8.7 psi to 58 psi for high flow units within 5% of set flow value.
- 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% offset flow value.
- Flow Characteristics: Linear Control, selectable to equal percentage at the proportional valve actuator.
- Field adjustable flow by means of a percentage of rated valve flow.
- Position feedback output signal integrated into all proportional actuators.
- 100% authority with modulating below 1% regardless of flow settings.
- No cartridges requiring replace or maintenance.
- Close off ratings shall be 232 psi for all valve sizes.

### H. Butterfly Valves

- Manufactured, brand labeled or distributed by Schneider Electric.
- Valve body are to be polyester coated iron ASTM A 126 lug mating with ANSI class 125/150 flanges.
- Disc Type: Ductile iron nylon 11 coated.
- Valve Stem:
  - 2–8" 416 stainless steel double D stem.
  - 10–12" 316 stainless steel double D stem.
  - 14" and larger: stainless steel round shaft woodruff key slot.
- Valve Seat:
  - EPDM tongue and groove seat and molded O-ring flange seat
- Flow Characteristics: Modified equal percentage.
- Close-Off Pressure Rating: Bubble-tight shutoff (no leakage).
- Valve Fluid Temperature Rating: -40–250°F (-40–121°C)
- Valve will have two (2) inch extended neck (because of heat).
- Valve must accept pneumatic or electric/electronic actuators
- Valves must have a minimum of a two (2) year warranty.

### I. High Performance Butterfly Valves

- Manufactured, brand labeled or distributed by Schneider Electric.
- Valve body are to be carbon steel with ANSI class 150 flanges
- Disc Type: 316 stainless steel
  - Valve Stem: 17-4PH stainless steel
  - One-piece design
  - Blowout proof design
- Valve Seat:
  - Resilient energizer totally encapsulated by the PTFE seat
  - Seat assembly locked in the body recess by full-faced seat retainer
  - Self adjusting for temperature changes and wear
- Flow Characteristics: Modified equal percentage
- Close-Off Pressure Rating: Bubble-tight shut off (no leakage) at rated maximum differential pressure
- Valve Fluid Temperature Rating:
  - 40–500°F (-40–250°C)
  - On/Off steam application max. 150 psi pressure
  - Proportional steam application max. 50 psi pressure
- Valve will have extended neck (because of heat)
- Valve must accept pneumatic or electric/electronic actuators
- Valve must have a minimum two (2) year warranty

Life Is On

**Schneider**  
Electric

**Schneider Electric Americas**

Boston ONE Campus  
800 Federal Street  
Andover, MA 01810-1067  
Tel: +1-978-794-0800

**Schneider Electric EMEA**

Mobilvägen 10  
SE-223 62, Lund, Sweden  
Tel: +46 (40) 38 68 50

**Schneider Electric Hong Kong Ltd**

11/F, Kerry Centre,  
683 King's Rd,  
Quarry Bay, Hong Kong  
Tel:+853 2875 1738

[www.schneider-electric.com](http://www.schneider-electric.com)