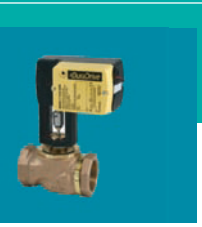
Third Edition

TAC Valves and Electric Actuators

Recommended Products for New Construction and Renovations



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t.a.c® by Schneider Electric

General Information

TAC

TAC is a Schneider Electric Company with a long tradition of global leadership in building controls technology. We offer the most extensive line of controls and components available to today's market, including: valve bodies, valve assemblies, actuation devices and sensors, as well as interfaces, and building automation systems that link these products and other building systems together.

TAC Catalogs for More Information

Consult the TAC Electric/Electronic Products catalog, F-27382, for complete information on all electric and electronic controllers, actuators, and accessories.

Consult the TAC Pneumatic Products catalog, F-27383, for complete information on all pneumatic controllers, actuators, and accessories.

Visit Us on the Web

Be sure and visit www.tac.com. Click on "Brands", then "Field Devices". You'll find electronic versions of all our catalogs, a complete list of field offices, training information, and links to more information about TAC and Schneider Electric.

Additional Products Available from TAC

Actuators

The actuators shown in this selection guide represent only a portion of TAC broad family of actuators. In addition to the TAC DuraDrive actuators shown in this selection guide, we also offer:

- Pneumatic Actuators — a full line pneumatic actuators ranging from 3 in^2 to 100 in^2 for a wide range of damper and VB-7000 valve applications.
- Hydraulic actuators — accepting 2-position, floating, and proportional input control signals for both damper and VB-7000 valve applications.
- Electric Gear Train Actuators — ranging from 16 lb.-in. to 1300 lb.-in torque, accepting 2-position, floating, and proportional input control signals, used for damper and valve applications.

Valves

In addition to the valves shown in this selection guide, TAC also offers:

- Two-way and three-way valves with flared, union sweat, and metric threaded (Rp) end connections.
- Two-way valves for steam applications up to 150 psig (1034 kPa).
- Other zone and ball valves are available.

Pneumatic and Electric Controls

TAC offers a large family of pneumatic and electric/electronic controls to provide all the components needed for the installation and maintenance of complete control systems.

- Pneumatic thermostats, humidistats, and transmitters for day/night, heating/cooling, and summer/winter applications requiring control of space temperature and humidity, air flow, air and fluid pressure and temperature.
- Pneumatic control components - - receiver-controllers, relays, gauges, TAC Pneumodular® controls panels, and accessories to complete your pneumatic control system.
- Electric and electronic thermostats, humidistats, pressure controllers for control of space temperature and humidity, air flow, air and fluid pressure and temperature.
- TAC System 8000 family of controllers and sensors.
- TAC Erie Boiler Boss® controls for all your boiler control applications and the complete range of TAC Erie zone valves.

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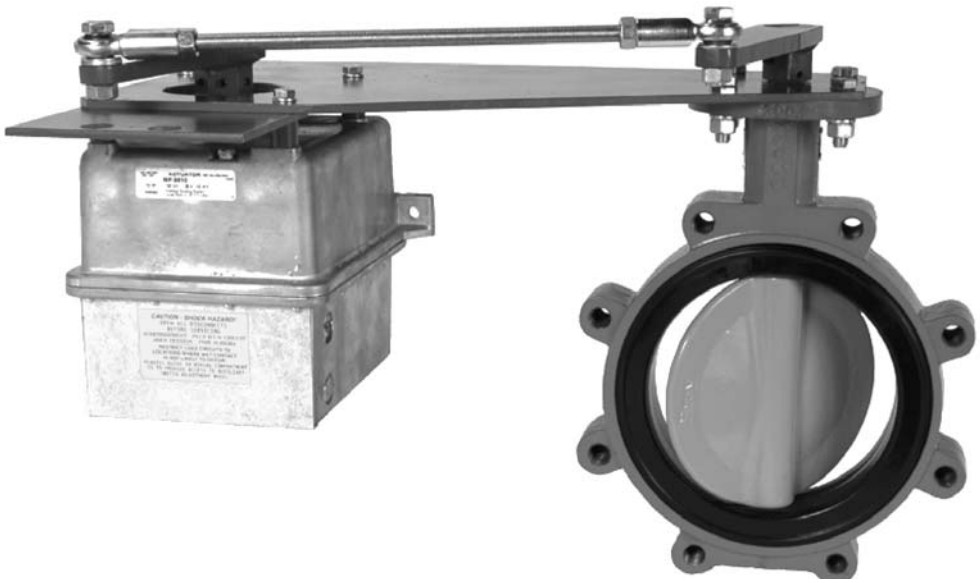
NEW from TAC

VB-6200 and VB-6300 Series Rubber Lined Butterfly Valves

- 2 to 18" two-way and 2 to 16" three-way.
- Peroxide cured EPDM seats provide long term consistent close-offs and actuator torque requirements.
- Bidirectional flow.
- Bubble tight ANSI VI close-off.
- Hot and chilled water up to 60% glycol.
- -40 to 250˚F service.
- Ductile Iron Nylon 11 coated disc.
- Mixing or diverting service for all three-way valves.
- Wide selection of TAC DuraDrive and other quality actuation options.



VBB and VBS Series Ball Valves
TAC DuraDrive

- Chilled and hot water applications
- 600 psig Static pressure rating
- Blowout resistant stem
- ANSI IV (0.01% leakage of rated Cv)
- Forged brass body ASTM B283
- VBB features brass trim
- VBS features stainless steel trim

Easy Installation

- Actuators are designed to be installed in seconds.
- No tools required.
- Compact low profile assembly allows installation in tight areas.

Actuator Product Range
Spring Return

Mx4D-x033-100 Series TAC DuraDrive™ 30 in-lb (3.4 Nm)	Mx40-7043 Series TAC DuraDrive® 35 in-lb (4 Nm)	Mx41-7073 Series TAC DuraDrive® 60 in-lb (7 Nm)	Mx41-7153 Series TAC DuraDrive® 133 in-lb (15 Nm)	Mx40-7170 Series TAC DuraDrive® 150 in-lb (17 Nm)	Mx40-7173 Series TAC DuraDrive® 150 in-lb (17 Nm)
 page 20	 page 12	 page 13	 page 14	 page 15	 page 15
Two-Position MA4D-7033-100 MA4D-8033-100	**Two-Position** MA40-7043 MA40-7043-501	**Two-Position** MA41-7073 MA41-7073-502	**Two-Position** MA41-7153 MA41-7153-502	**Two-Position** MA40-7170	**Two-Position** MA40-7173
Floating Point MF4D-7033-100 MF4D-8033-100	**Floating Point** MF40-7043 MF40-7043-501	**Floating Point** MF41-7073 MF41-7073-502	**Floating Point** MF41-7153 MF41-7153-502	**Proportional** MS40-7170	**Floating Point** MF40-7173
Proportional MS4D-7033-100 MS4D-7033-150 MS4D-7033-160 MS4D-8033-100 MS4D-8033-150 MS4D-8033-160	**Proportional** MS40-7043 MS40-7043-501	**Proportional** MS41-7073 MS41-7073-502	**Proportional** MS41-7153 MS41-7153-502		**Proportional** MS40-7173
24 Vac ± 20%	24 Vac ± 20%	24 Vac ± 20%	24 Vac ± 20%	120 Vac ± 20%	24 Vac ± 20%

MS4D-60x3-100 Series TAC DuraDrive™ 35 or 70 in-lb (4 or 8 Nm)	MF4E-60x30-100 Series TAC DuraDrive™ 35 or 70 in-lb (4 or 8 Nm)	Mx41-6043 Series TAC DuraDrive® 35 in-lb (4 Nm)	Mx41-6083 Series TAC DuraDrive® 70 in-lb (8 Nm)	Mx41-6153 Series TAC DuraDrive® 133 in-lb (15 Nm)	Mx41-634x Series TAC DuraDrive® 300 in-lb (34 Nm)
 page 21	 page 22	 page 16	 page 17	 page 18	 page 19
Proportional MS4D-6043-100 MS4D-6043-120 MS4D-6043-130 MS4D-6043-150 MS4D-6043-160 MS4D-6083-100 MS4D-6083-120 MS4D-6083-130 MS4D-6083-150 MS4D-6083-160	**Floating** MF4E-60430-100 MF4E-60830-100	**Floating** MF41-6043 MF41-6043-510 MF41-6043-502 **Proportional** MS41-6043 MS41-6043-520 MS41-6043-522 MS41-6043-502	**Floating** MF41-6083 MF41-6083-510 MF41-6083-502 **Proportional** MS41-6083 MS41-6083-520 MS41-6083-522 MS41-6083-502	**Floating** MF41-6153 **Proportional** MS41-6153 MS41-6153-502	**Floating** MF41-6343 **Proportional** MS41-6343 MS-41-6340
24 Vac ± 20%	24 Vac + 20% - 15%	24 Vac + 20% - 15%	24 Vac + 20% - 15%	24 Vac + 20% - 15%	24 Vac ± 20%

Valve Product Range

Globe Valves VA Series Two Position VF Series Three-Wire Floating VS Series Proportional	**TAC DuraDrive Ball Valves** VA Series Two Position VF Series Three-Wire Floating VS Series Proportional VBB Brass Trim VBS Stainless Steel Trim	**TAC Erie™ Zone Valves** VM Series Modulating VT and VS Series Two Position	**TAC Butterfly Valves** VA Series Two Position VF Series Three-Wire Floating VS Series Proportional
 **page 29**	 **page 87**	 **page 121**	 **page 151**
Two and Three-Way Valves 7000 Valves: 1/2 to 2 in. 8000 Valves: 2-1/2 to 6 in. (shown) Two-Way Valve Close Off Ratings ANSI IV (0.01% Leakage) Stainless Steel Stems Available as Stem Up Open or Closed **Typical Applications Include:** • Reheat on VAV boxes • Fan coil units • Hot and chilled water coils • Unit ventilators • Central systems	**Two and Three-Way Valves** Two-Way: 1/2 to 3 in. Three-Way: 1/2 to 2 in. Valve Close Off Ratings Two-Way: ANSI IV (0.01% of Cv) Three-Way: ANSI IV (0.01% of Cv) Piped coil-side outlet to A port Forged Brass Body Brass Stems Nickel/Chromium-Plated Brass Ball VBB valves feature a chrome plated brass ball and nickel plated brass stem. VBS valves feature a stainless steel ball and stem. **Typical Applications Include:** • Reheat on VAV boxes • Fan coil units • Hot and chilled water coils • Air handling • Unit ventilators	**Two and Three-Way Valves** 1/2 to 1-1/4 in. Two-Position Valve Close Off Ratings ANSI IV (0.01%) with pressure at inlet (B-port/A-port if 3-way) Modulating ANSI IV (0.01%) **Typical Applications Include:** • Fan coil fluid flow • VAV reheat • Ventilators • Radiant applications • Easy replacement of actuators • VS series available for low pressure steam	**Two and Three-Way Valves** Two-Way: 2 to 18 in. Three-Way: 2 to 16 in. Valve Close Off Ratings: ANSI VI Bubble Tight Polyester-coated cast iron body, rubber lined, ASTM A126 Class B lug Stainless Steel Double ”D” stem Seat is EPDM tongue and groove with molded O-ring flange seal, peroxide cured. **Typical Applications Include:** • Cooling towers • Central system shutoff and bypass piping control • Thermal storage • Chiller and boiler control

Damper Actuators and Accessories

Features

- Wide range of models.
- Spring return and non-spring return models.
- 30 to 300 lb-in of torque.
- Two-position, floating, or proportional control.
- NEMA 2 or 4.

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All specifications are nominal and may change as design improvements are introduced. TAC shall not be liable for damages resulting from misapplication or misuse of its products.

Actuator Product Range
Spring Return

	Output Torque lb-in		Type of Control					Feed Back		Power				Power Input			Running Time (Sec.)		Auxiliary Switch	Spring Return Rotation	Page Number
	Min	Max Stall	Two- Position	Floating	Proportional			2-10 Vdc	0-10 Vdc	24 Vac ± 20%, 20-30 Vdc	24 Vac ± 20%, 22-30 Vdc	24 Vac ± 20 %	120 Vac ± 10 %	VA	Running	Holding	Powered	Spring Return			
					0-10 Vdc	2-10 Vdc[a]	4-20 mA								W	W					
MA4D-7033-100	30		●							●				5.1			<56	<23		CCW	20
MA4D-8033-100			●							●										CW	
MF4D-7033-100				●				●		●				6.8	4.2	1.9	85	21		CCW	
MF4D-8033-100				●				●		●										CW	
MS4D-7033-100						●		●			●			6.1	3.4	1.4				CCW	
MS4D-7033-150					●			●			●										
MS4D-7033-160							●	●			●										
MS4D-8033-100						●		●			●									CW	
MS4D-8033-150					●			●			●										
MS4D-8033-160							●	●			●										
MA40-7043	35	150	●								●			4.4	2.9	0.8	<50	<28		CW/ CCW	12
MA40-7043-501			●								●								1		
MF40-7043		120		●							●			5.9	4.4	2.9	<130	<25			
MF40-7043-501				●							●								1		
MS40-7043						●		●			●			5.6	4.2	2.4					
MS40-7043-501						●		●			●								1		
MA41-7073	60	250	●								●			4.8	3.2	0.8	<80	<40			13
MA41-7073-502			●								●								2		
MF41-7073		160		●							●			6.2	4.8	2.8	<195	<30			
MF41-7073-502				●							●								2		
MS41-7073		25				●	●		●		●			5.8	4.6	2.3					
MS41-7073-502						●	●		●		●								2		
MA41-7153	133	350	●								●			9.7	7.5	2.8	<190	<30			14
MA41-7153-502			●								●								2		
MF41-7153		300		●							●				7.7	3.2					
MF41-7153-502				●							●								2		
MS41-7153						●		●			●				7.4	2.9					
MS41-7153-502						●		●			●								2		
MA40-7170	150	450	●										●	11.4	7.2	9.4	<145	<145			15
MS40-7170						●	●						●	11.1	7.1						
MA40-7173			●									●		9.6	5.4	4.1					
MF40-7173				●								●		10	5.5						
MS40-7173						●	●					●		9.4	7.1						

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

	Output Torque lb-in		Type of Control				Feed Back			Power				Power Input			Running Time (Sec.)	Auxiliary Switch		Page Number
	Min	Max Stall	Floating	Proportional			2-10 Vdc	0-10 Vdc	0-1000 ohm <10 mA	24 Vac ± 20% or 20-30 Vdc	24 Vac + 20% -15 %	24 Vac ± 20 %	120 Vac ± 10 %	VA	Running	Holding	Powered	SPDT, 6A, Resistive, 24 Vac	24 Vac 4A Resistive	
				0-10 Vdc	2-10 Vdc[a]	4-20 mA									W	W				
MF41-6043	35		●								●			2.3			90			16
MF41-6043-510			●						●		●									
MF41-6043-502			●								●								2	
MS41-6043				●		●		●			●			3.3			90			
MS41-6043-520				●		●		●			●									
MS41-6043-522				●		●		●			●								2	
MS41-6043-502				●		●		●			●									
MF4D-6043-100	35		●				●			●				4.4	2.7	1.7	85			21
MS4D-6043-100					●		●			●				4.2	2.2	1.2				
MS4D-6043-150				●			●			●										
MS4D-6043-160						●	●			●										
MF4E-60430-100			●		●						●			2.0	2		90			22
MF4E-60830-100	70		●	●							●									
MF4D-6083-100			●				●			●				5.9	3.6	1.6	85			21
MS4D-6083-100					●		●			●				5.2	2.7	1.4				
MS4D-6083-150				●			●			●										
MS4D-6083-160						●	●			●										
MF41-6083	70		●								●			2.3			125			17
MF41-6083-510			●						●		●									
MF41-6083-502			●								●								2	
MS41-6083				●		●		●			●			3.3						
MS41-6083-520				●		●		●			●									
MS41-6083-522				●		●		●			●								2	
MS41-6083-502				●		●		●			●								2	
MF41-6153	133		●								●			3	3					18
MS41-6153				●		●		●			●			5	4	4				
MS41-6153-502				●		●		●			●					1		2		
MF41-6343	300	600	●									●		7.1	3.8	3.6	<145			19
MS41-6343					●							●		8	10					
MS41-6340					●								●							

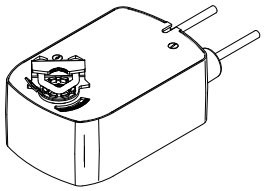
[a] Proportional models with a 2-10 Vdc control signal will accept a 4-20 mA signal with the use of a 500 ohm resistor.

Mx40-7043 Series

Spring Return Actuator

35 in-lb (4 Nm) minimum torque

TAC DuraDrive™



Torque:	35 lb-in (4 Nm) minimum.
Connections:	3 ft. (0.9 m) cable, 1/2-in. conduit connectors.
Rotation:	CW or CCW spring return using reverse mounting.
Control Action:	Direct/reverse signal selection MS40 only.
Shaft Size:	5/8-in. (15.9 mm) diameter, 1/2-in. (13 mm) square.
Housing:	NEMA 2 (IEC IP54) with conduit connector in the down position.
Dimensions:	6-51/64 H x 4 W x 3-1/2 D in. (68 x 100 x 89 mm)
Overload Protection:	Throughout rotation.
Angle of Rotation:	95° nominal (adjustable 40 to 95°).
Position Indication:	Visual indicator.
Built-in Auxiliary Switches:	1 - SPDT 6A on MA40-7043-501, MF40-7043-501, MS40-7043-501.
Override:	No manual override.
General Instructions:	MA40-7043: Refer to F-26642. MF40-7043: Refer to F-26644. MS40-7043: Refer to F-26645.
Wiring Diagrams:	MA40-7043: Refer to Figure 11 on page 176. MF40-7043: Refer to Figures 21, 23 and 24 on pages 179 to 181. MS40-7043: Refer to Figures 40 to 42 on pages 188 to 189.
Agency Listing:	UL-873. EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No. 24-93. Australia C-Tick.

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

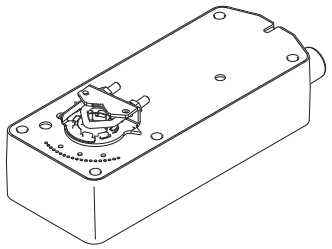
[a] With the addition of a 500 ohm resistor.

See Accessories section for compatible accessories.

Mx41-7073 Series

Spring Return Actuator

60 in-lb (7 Nm) minimum torque



Torque:	60 lb-in (7 Nm) minimum.
Connections:	3 ft. (0.9 m) cable, 1/2-in. conduit connectors.
Rotation:	CW or CCW spring return using reverse mounting.
Control Action:	Direct/reverse signal selection MS41 only.
Shaft Size:	3/4-in. (19 mm) diameter, 1/2-in. (13 mm) square.
Housing:	NEMA1, NEMA 2 (IEC IP54) with conduit connector in the down position.
Dimensions:	10-1/2 H x 4 W x 3-1/2 D in. (287 x 100 x 89 mm)
Overload Protection:	Throughout rotation.
Angle of Rotation:	93° nominal.
Position Indication:	Pointer and scale.
Built-in Auxiliary Switches:	Two SPDT 7A on MA41-7073-502, MF41-7073-502, MS41-7073-502 only.
Override:	Manual.
Motor Type:	All brushless DC except MA41-7073 -brush.
General Instructions:	MA41-7073: Refer to F-26642. MF41-7073: Refer to F-26644. MS41-7073: Refer to F-26645.
Wiring Diagrams:	MA41-7073: Refer to Figure 12 on page 176. MF41-7073: Refer to Figures 21 to 24 on pages 179 to 181. MS41-7073: Refer to Figure 55 to 57 on pages 194 to 195.
Agency Listing:	UL-873. EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No. 24-93. Australia C-Tick.

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

[a] With the addition of a 500 ohm resistor.

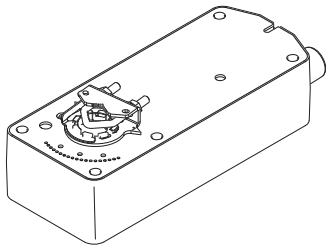
See Accessories section for compatible accessories.

Mx41-7153 Series

Spring Return Actuator

133 in-lb (15 Nm) minimum torque

TAC DuraDrive™



Torque:	133 lb-in (15 Nm) minimum.
Connections:	3 ft. (0.9 m) Appliance cable, 1/2-in. conduit connectors.
Rotation:	CW or CCW spring return using reverse mounting.
Control Action:	Direct/reverse signal selection MS41 only.
Shaft Size:	Up to 3/4-in. (19 mm) round, 1/2-in. (13 mm) square standard. Accessories enable larger sizes up to 1.05-in. (26.7 mm) round.
Housing:	Die cast rated NEMA 2/IP54 with conduit connector in the down position.
Dimensions:	10-1/2 X 4 x 3-1/2 in. (287 x 100 x 89 mm)
Overload Protection:	Throughout rotation.
Angle of Rotation:	95° nominal.
Position Indication:	Position indicator.
Built-in Auxiliary Switches:	2 x SPDT. One at + 5°, one adjustable 25 to 85°.
Override:	Manual.
Motor Type:	Brushless motor.
General Instructions:	Refer to F-26642.
Wiring Diagrams:	MA41-7153: Refer to Figure 12 on page 176. MF41-7153: Refer to Figures 21 to 23 on page 179 to 180. MS41-7153: Refer to Figures 55 to 57 on pages 194 to 195.
Agency Listing:	UL-873 EMC Directive (89/336/EEC), Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No 24-93. Australia C-Tick.

Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds		Weight
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	Spring Return	lbs (kg)
MA41-7153	2-Position	24 Vac ± 20% 22-30 Vdc	9.7	None	No	<190	<30	7.5 (3.4)
MA41-7153-502					Two			
MF41-7153	Floating				No			
MF41-7153-502					Two			
MS41-7153	2-10 Vdc[a]			2-10 Vdc	No			
MS41-7153-502					Two			

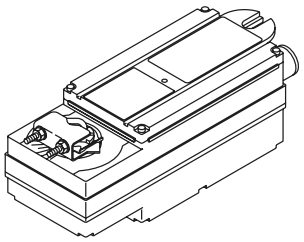
[a] 4-20 mA with 500 ohms.

See Accessories section for compatible accessories.

Mx40-717x Series

Spring Return Actuator

150 in-lb (17 Nm) minimum torque



Torque:	150 lb-in (17 Nm) minimum.
Connections:	2 ft. (61 cm) Appliance cable, 1/2-in. conduit connectors.
Rotation:	CW or CCW spring return using reverse mounting.
Shaft Size:	Standard: 3/8 to 1/2-in. (10 to 13 mm) round or square. Optional: 1.05-in. (26.1 mm) diameter, 5/8-in. (15.9 mm) square.
Housing:	NEMA 1, NEMA 4 (IEC IP56) with customer supplied water tight connector.
Dimensions:	10-7/8 H x 4 W x 4 D in. (276 x 100 x 100 mm)
Overload Protection:	Throughout rotation.
Angle of Rotation:	93° nominal.
Position Indication:	Visual indicator.
Built-in Auxiliary Switches:	None.
Override:	None.
Motor Type:	Brushless DC.
General Instructions:	MA40-717x: Refer to F-26742. MF40-7173: Refer to F-26749. MS40- 717x: Refer to F-26748.
Wiring Diagrams:	MA40-717x: Refer to Figure 10 on page 175. MF40-7173: Refer to Figures 17 to 18 on page 178. MS40-717x: Refer to Figures 45 to 48 on pages 190 to 192.
Agency Listing:	UL-873. EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No. 24-93. Austrailia C-Tick.

Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds		Weight
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	Spring Return	lbs (kg)
MA40-7170	2-Position	120 Vac ± 10%	11.4	None	No	<145		10.5 (4.8)
MA40-7173		24 Vac ± 20%	9.6					
MF40-7173	Floating		10.0					
MS40-7170[a]	2-10 Vdc 4-20 mAdc[b]	120 Vac ± 10%	11.1					
MS40-7173	2-10 Vdc	24 Vac ± 20%	9.4					

[a] The CE Directive is not applicable to this model.

[b] With the addition of a 500 ohm resistor.

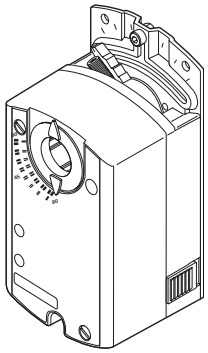
See Accessories section for compatible accessories.

Mx41-6043 Series

Non-Spring Return Actuator

35 in-lb (4 Nm) minimum torque

TAC DuraDrive™



Torque:	35 lb-in (4 Nm) minimum.
Connections:	3 ft. (0.9 m) long, 18 AWG leads, plenum-rated.
Rotation:	90° CW or CCW field selectable.
Shaft Size:	3/8 to 5/8-in. (10 to 15.9 mm) diameter, 1/4 to 1/2-in. (6.4 to 13 mm) square, 9/16-in. (14.3 mm) hex.
Housing:	NEMA 2, IP54 to EN60529 with conduit in the down position.
Dimensions:	5-7/16 H x 2-3/4 W x 2-3/8 D in. (140 x 70 x 60 mm)
Overload Protection:	Throughout the rotation.
Angle of Rotation:	90° nominal (field adjustable to limit travel on either end of stroke).
Position Indication:	Adjustable pointer.
Built-in Auxiliary Switches:	Two SPDT on MF41-6043-502, MS41-6043-522, MS41-6043-502 only.
Override:	Manual.
General Instructions:	MF41-6043: Refer to F-27213. MS41-6043: Refer to F-27214.
Wiring Diagrams:	MF41-6043: Refer to Figure 19 on page 178. MS41-6043: Refer to Figures 49 to 50 on page 192.
Agency Listing:	UL-873. EMC Directive (89/336/EEC). Emissions (EN50081-1). Immunity (EN50082-2). UL tested for Canadian Standards C22.2 No. 24-93.

Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds	Weight
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	lbs (kg)
MF41-6043	Floating	24 Vac +20%-15%	2.3	None	No	<90	1.06 (0.5)
MF41-6043-510				0 to 1000 K	No		
MF41-6043-502				None	Two		
MS41-6043	0-10 Vdc		3.3	0-10 Vdc	No		
MS41-6043-520	0-10 Vdc adjustable				No		
MS41-6043-522					Two		
MS41-6043-502	0-10 Vdc				Two		

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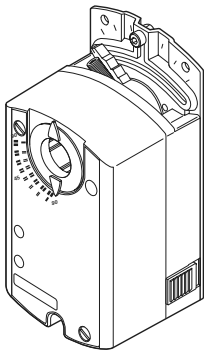
See Accessories section for compatible accessories.



Torque: 70 lb-in (8 Nm) minimum.

Connections: 3 ft. (0.9 m) long, 18 AWG leads, plenum-rated.

Rotation: 90° CW/CCW field selectable.

Shaft Size: 3/8 to 5/8-in. (10 to 15.9 mm) diameter, 1/4 to 1/2-in. (6.4 to 13 mm) square, 9/16-in. (14.3 mm) hex.

Housing: NEMA 2, IP54 to EN60529 with conduit in the down position.

Dimensions: 5-7/16 H x 2-3/4 W x 2-3/8 D in. (140 x 70 x 60 mm)

Overload Protection: Throughout the rotation.

Angle of Rotation: 90° nominal (field adjustable to limit travel on either end of stroke).

Position Indication: Adjustable pointer.

Built-in Auxiliary Switches: Two SPDT on MF41-6083-502, MS41-6083-522, MS41-6083-502 only.

Override: Manual.

General Instructions: MF41-6083: Refer to F-27213.
MS41-6083: Refer to F-27214.

Wiring Diagrams: MF41-6083: Refer to Figure 19 on page 178.
MS41-6083: Refer to Figures 49 to 50 on page 192.

Agency Listing: UL-873.
EMC Directive (89/336/EEC). Emissions (EN50081-1). Immunity (EN50082-2).
UL tested for Canadian Standards C22.2 No. 24-93.

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

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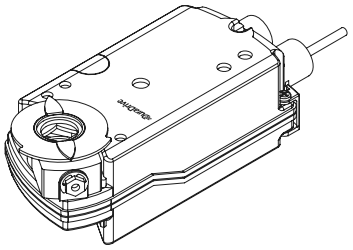
See Accessories section for compatible accessories.

Mx41-6153 Series

Non-Spring Return Actuator

133 in-lb (15 Nm) minimum torque

TAC DuraDrive™



Torque:	133 lb-in. (15 Nm).
Connections:	3 ft. (0.9 m) long, 18 AWG leads
Rotation:	CW/CCW through reverse mounting.
Shaft Size:	1/4 to 3/4-in. (6.4 to 19 mm) dia., 1/4 to 1/2-in. (6.4 to 13 mm) sq.
Housing:	NEMA Type 1, IP54 according to EN 60 529.
Dimensions:	8-3/8 H x 3-1/4 W x 2-2/3 D in. (210 x 80 x 70 mm)
Overload Protection:	Throughout rotation.
Angle of Rotation:	90° nominal (field adjustable to limit travel on either end of stroke).
Position Indication:	Adjustable pointer.
Built-in Auxiliary Switches:	Dual SPDT auxiliary switches available on MS41-6153-502 only.
Override:	Manual.
General Instructions:	Refer to F-27215.
Wiring Diagrams:	MF41-6153: Refer to Figure 20 on page 179. MS41-6153: Refer to Figures 51 to 52 on page 193.
Agency Listing:	UL-873. EMC Directive (89/336/EEC). Emissions (EN50081-1). Immunity (EN61000-6-2). UL tested for Canadian Standards C22.2 No. 24-93.

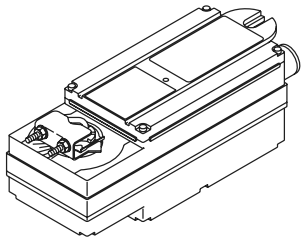
Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds	Weight
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	lbs (kg)
MF41-6153	Floating	24 Vac + 20% - 15%	3.0	None	No	<125 (60 Hz)	2.2 (1)
MS41-6153	0 to 10 Vdc			0 to 10 Vdc			
MS41-6153-502					2		

See Accessories section for compatible accessories.

Mx41-634x Series

Non-Spring Return Actuator

300 in-lb (34 Nm) minimum torque



Torque:	300 lb-in (34 Nm) minimum.
Connections:	2 ft. (61 cm) Appliance cable, 1/2-in. conduit connectors.
Rotation:	CW or CCW available through reverse mounting.
Shaft Size:	3/8 to 1/2-in. (10 to 13 mm) round or square shafts standard.
Housing:	NEMA 1, NEMA 4 (IEC IP56) with customer-supplied water tight connector or plug.
Dimensions:	10-7/8 H x 4 W x 4 D in. (276 x 100 x 100 mm)
Overload Protection:	Throughout rotation.
Angle of Rotation:	93° nominal.
Position Indication:	Position indicator.
Override:	Manual.
Motor Type:	Brushless motor.
General Instructions:	MF41-6343: Refer to F-26744. MS41-6343: Refer to F-26745.
Wiring Diagrams:	MF41-6343: Refer to Figure 17 on page 178. MS41-6343: Refer to Figures 53 to 54 on pages 193 to 194.
Agency Listing:	UL-873. EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). UL tested for Canadian Standards C22.2 No. 24-93. Australia C-Tick.

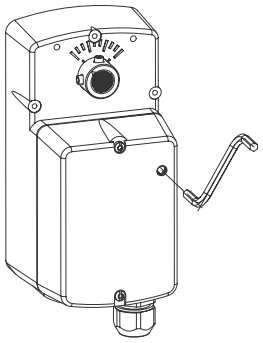
Part Number	Actuator Inputs			Outputs		Approximate Timing in Seconds	Weight
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	lbs (kg)
MF41-6343	Floating	24 Vac ± 20%	7.1	None	No	<145	10.5 (4.8)
MS41-6340	2-10 Vdc 4-20 mAdc[a]	120 Vac ± 10%	8.0				
MS41-6343		24 Vac ± 20%					

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

See Accessories section for compatible accessories.

Mx4D-x033-100 Series
Spring Return Actuator

TAC DuraDrive™



Torque:	30 lb-in (3.4 Nm) minimum.
Connections:	10 ft. (3 m) plenum cable, 1/2-in. conduit connectors.
Rotation:	CW or CCW spring return models.
Shaft Size:	Up to 1/2 in. (13 mm)
Housing:	NEMA 1, NEMA 2, UL Type 2 (IEC IP54).
Dimensions:	7-7/8 H x 3-1/2 W x 3-1/2 D in. (200 x 89 x 89 mm)
Overload Protection:	Throughout stroke.
Angle of Rotation:	93° nominal.
Position Indication:	Position scale.
Built-in Auxiliary Switches:	None.
Override:	Manual.
General Instructions:	Refer to F-27170.
Wiring Diagrams:	MA4D-x033: Refer to Figure 13 on page 176. MF4D-x033: Refer to Figures 25 to 28 on pages 181 to 183. MS4D-x033: Refer to Figures 58 to 59 on page 196.
Agency Listing:	UL-873. EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC). This product fits in installation Category (Overvoltage Category) II per EN 61010-1. UL tested for Canadian Standards C22.2 No. 24-93. Australia C-Tick.

Part Number	SR Rotation[a]	Actuator Inputs			Outputs		Approximate Timing in Seconds		Weight
		Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch	Powered	Spring Return	lbs (kg)
MA4D-7033-100	CCW	2-Position	24 Vac ± 20% 20-30 Vdc	5.1	None	No	<56	<23	4.2 (2)
MA4D-8033-100	CW								
MF4D-7033-100	CCW	Floating		6.8	2-10 Vdc		<85	<21	
MF4D-8033-100	CW								
MS4D-7033-100	CCW	2-10 Vdc[b]	24 Vac ± 20% 22-30 Vdc	6.1					
MS4D-7033-150		0-10 Vdc							
MS4D-7033-160		4-20 mAdc							
MS4D-8033-100	CW	2-10 Vdc[b]							
MS4D-8033-150		0-10 Vdc							
MS4D-8033-160		4-20 mAdc							

[a] As viewed from cover side.

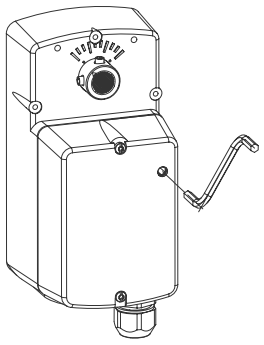
[b] 4 to 20 mA with the addition of a 500 ohm resistor (AM-708).

See Accessories section for compatible accessories.

MS4D-60x3-100 Series

Non-Spring Return Actuator

35 or 70 in-lb (4 or 8 Nm) minimum torque



Torque:	35 or 70 lb-in (4 or 8 Nm) minimum.
Connections:	10 ft. (3 m) plenum cable, 1/2 in. conduit.
Rotation:	CW or CCW field selectable.
Shaft Size:	Up to 1/2-in. (13 mm) diameter.
Housing:	NEMA 1, NEMA 2, UL Type 2 (IEC IP54).
Dimensions:	7-7/8 H x 3-1/2 W x 3-1/2 D in. (200 x 89 x 89 mm)
Overload Protection:	Throughout stroke.
Angle of Rotation:	93° nominal.
Position Indication:	Position scale.
Built-in Auxiliary Switches:	None.
Override:	Manual.
General Instructions:	Refer to F-27170.
Wiring Diagrams:	Refer to Figures 58 to 59 on page 196.
Agency Listing:	UL-873. UL tested for Canadian Standards C22.2 No. 24-93. EMC Directive (89/336/). Low Voltage Directive (72/23/EEC). This product fits in installation Category (Overvoltage Category) II per EN 61010-1. Australia C-Tick.

Part Number	Actuator Inputs			Outputs		Torque in-lb (Nm)	Approximate Timing in Seconds	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch		Powered	
MS4D-6043-100	2-10 Vdc[a]	24 Vac ± 20% 20-30 Vdc	4.2	2-10 Vdc	No	35 (4)	<85	4.2 (2)
MS4D-6043-150	0-10 Vdc							
MS4D-6043-160	4-20 mAdc							
MS4D-6083-100	2-10 Vdc[a]		5.2			70 (8)		
MS4D-6083-150	0-10 Vdc							
MS4D-6083-160	4-20 mAdc							

[a] 4 to 20 mA with the addition of a 500 ohm resistor (AM-708).

See Accessories section for compatible accessories.

MF4E-60x30-100 Series

Non-Spring Return Actuator

35 or 70 in-lb (4 or 8 Nm) minimum torque

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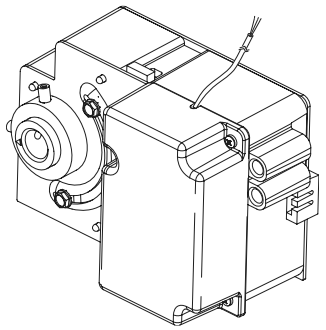

Torque:	35 or 70 lb-in (4 or 8 Nm) minimum.
Connections:	10 ft. (3 m) plenum cable.
Rotation:	CW or CCW field selectable.
Shaft Size:	Standard: Up to 1/2-in. (13 mm) round diameter.
Housing:	NEMA 1, (IEC IP30).
Dimensions:	4-5/32 H x 3-9/16 W x 2-3/4 D in. (110 x 90 x 70 mm)
Overload Protection:	Magnetic coupling.
Angle of Rotation:	95° nominal adjustable.
Position Indication:	Visual indicator.
Built-in Auxiliary Switches:	None.
Manual Override:	Yes.
General Instructions:	Refer to F-27373.
Wiring Diagrams:	Refer to Figures 29 to 31 on pages 183 to 184.
Agency Listing:	UL-873. UL tested for Canadian Standards C22.2 No. 24-93. European Community EN-61326. Australia C-Tick.

Part Number	Actuator Inputs			Outputs		Torque in-lb (Nm)	Approximate Timing in Seconds	Weight lbs (kg)
	Control	Voltage	VA @ 60 Hz	Feedback	Auxiliary Switch		Powered	
MF4E-60430-100	Floating	24 Vac + 20% - 15%	2.0	No	No	35 (4)	90	3.5 (1.6)
MF4E-60830-100						70 (8)		

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See Accessories section for compatible accessories.

The best source for Control Damper Torque requirements is to obtain the torque requirements from the damper manufacturer. If you cannot determine the damper manufacturer and/or model number, the following information may be used as a guideline in determining the appropriate actuator to use.

1. Calculate the area of the damper in square feet.
2. Determine the style of the damper: opposed blade or parallel blade.
3. Determine whether the damper is with or without edge and blade seals.
4. Determine the static pressure, air velocity, or design CFM.

Once you have this information, you may use the following table to assist in selecting the correct actuator on a new damper. Older dampers may have higher torque requirements

Static pressure for this table is 2.5 " WC.

Style	With Seals in. lbs. of torque/sq. ft.	Without Seals in. lbs. of torque/sq. ft.
Opposed Blade	6.3	3.2
Parallel Blade	8	4

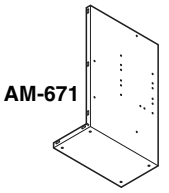
Other Factors To Consider

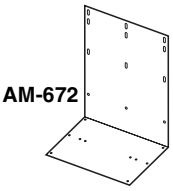
The above figures are an estimate. There are many damper manufacturers, varying designs, and torque requirements. This table is a good starting point that can be used as a general guideline. If the application is a replacement actuator, the torque output of the old actuator should be considered.

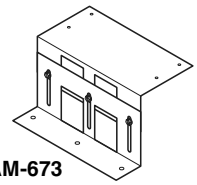
Over time, the damper's moving parts may have picked up dirt or corrosion and may no longer move as freely as when it was new. The static pressure, velocity, or cfm may be more or less than what is shown above. These factors may also affect the torque requirement of your application.

Accessories Chart

TAC DuraDrive™


AM-671


AM-672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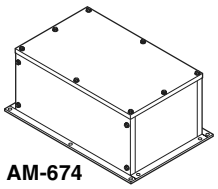
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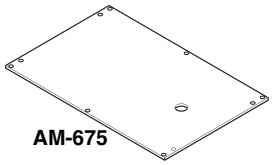
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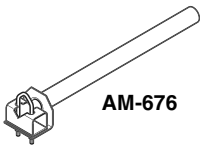
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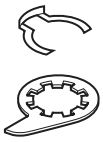
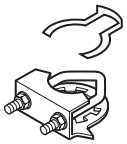
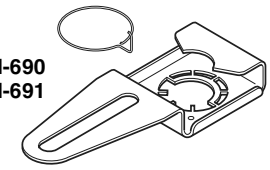
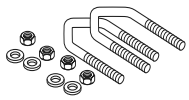
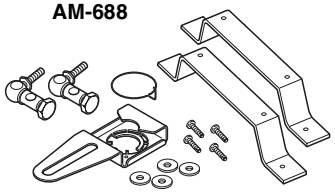

AM-686


AM-687
AM-688


AM-689


AM-690
AM-691


AM-692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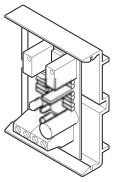
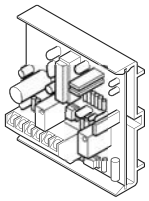
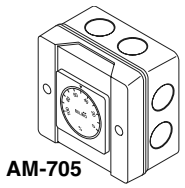

AM-703


AM-704

Part Numbers	Description	Spring Return Actuators									Non-Spring Return Actuators								General Instructions Document
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717X MF40-7173	MS40-7173	MS4D-x033	MF41-6043 MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	MS4D-60x3-1xx	
AM-671[abc]	Mounting Bracket	X	X	X	X	X	X												F-25096
AM-672[abc]		X	X	X	X	X	X												
AM-673[b]		X	X	X	X	X	X												
AM-674	Weather Shield & Base	X	X	X	X	X	X	X	X							X	X		F-25097
AM-675		X	X	X	X	X	X												
AM-676	Shaft Extension	X	X	X	X	X	X	X	X							X	X		F-25098
AM-686	Position Indicator			X	X	X	X												
AM-687[d]	V-clamp			X	X	X	X												
AM-688	Replacement Universal Clamp			X	X	X	X												
AM-689	Rotation Limiter			X	X	X	X												
AM-690	Crank Arm			X	X	X	X												
AM-691				X	X	X	X												
AM-692[e]	V-bolt			X	X	X	X												
AM-693[fg]	Crank Arm Kit			X	X	X	X												
AM-703	Span Adjustment		X		X		X		X				X		X		X	X	F-26895
AM-704	Modulation Interface		X		X		X		X				X		X		X	X	

[a] AM-693 crank arm kit required.
[b] Drill appropriate mounting holes where needed.
[c] The large "C"-shaped clamps included in AM-693 crank arm kit are required for mounting the actuator. Drill appropriate mounting holes where needed.
[d] For shafts to 1.05" (26.7 mm) diameter or 5/8" (15.9 mm) square.
[e] For shafts to 3/4" and 1.05" (19 to 26.7 mm) diameter (with AM-690 and AM-691, respectively).
[f] Use the self-tapping screws and flat washers provided in kit to mount actuator.
[g] AM-692 V-bolt kit required.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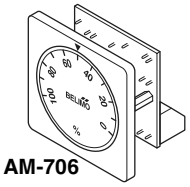
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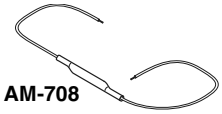
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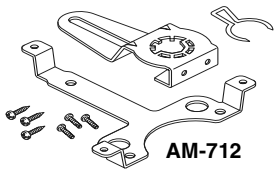
AM-710, AM-717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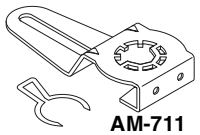
AM-709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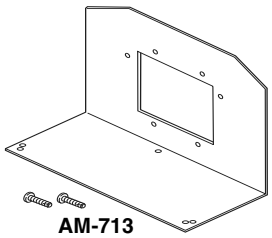
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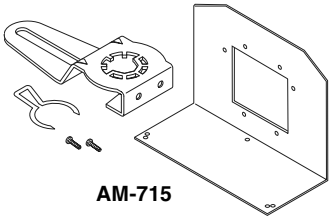
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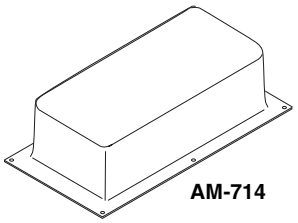
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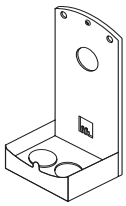
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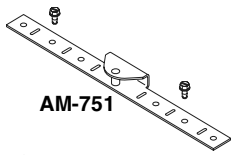
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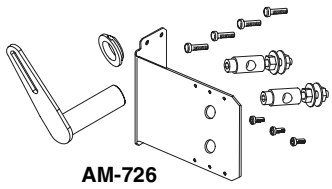
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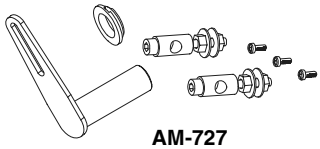
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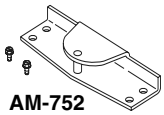
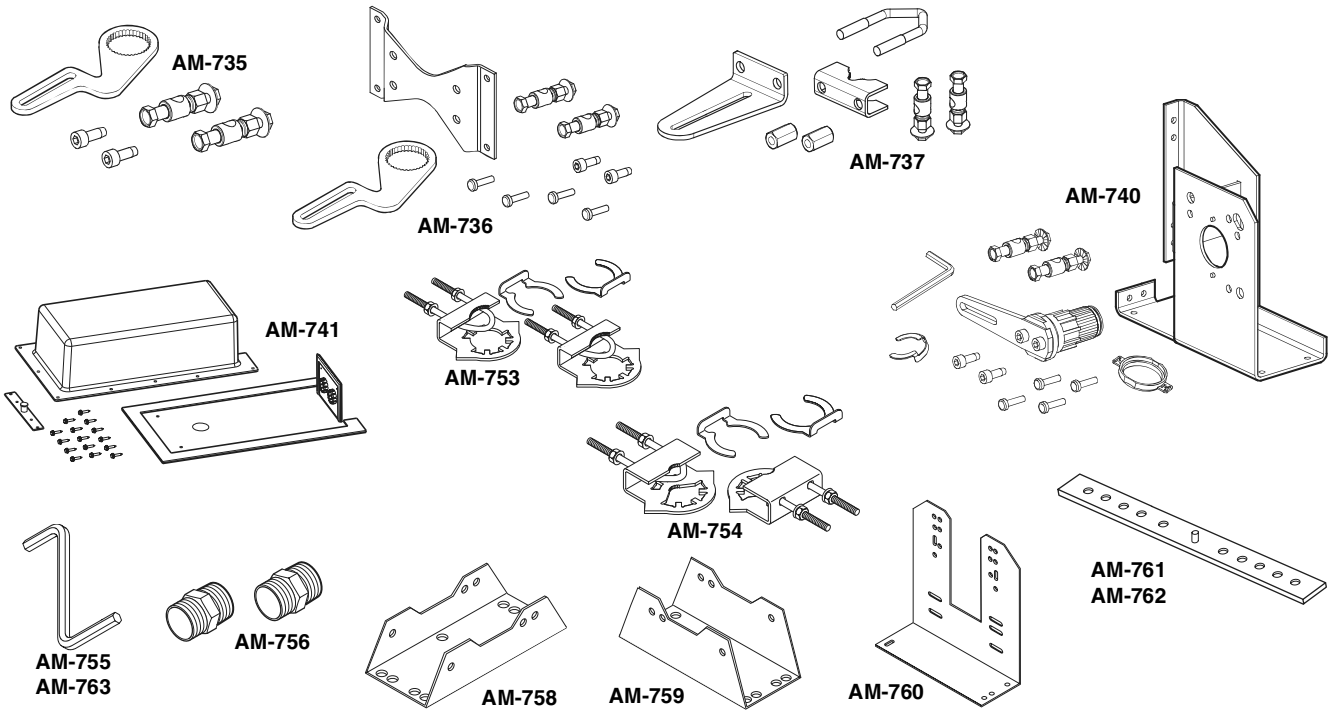

AM-752

Part Numbers	Description	Spring Return Actuators									Non-Spring Return Actuators									General Instructions Document
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717X MF40-7173	MS40-7173	MS4D-x033	MF41-6043	MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	MS4D-60x3-1xx	
AM-705	Positioner		X		X		X		X			X		X		X		X	X	F-26895
AM-706			X		X		X		X			X		X		X		X	X	
AM-708	500 Ω Resistor		X		X		X					X		X		X			X	
AM-709	Position Indicator & Stroke Limiter	X	X																	F-26896
AM-710[a]	V-clamp	X	X																	
AM-711	Crank Arm Adaptor Kit	X	X																	
AM-712		X	X																	
AM-713	Bracket	X	X																X	
AM-714	Weather Shield	X	X	X	X	X	X			X										F-25097
AM-715	Crank Arm Adaptor Kit	X	X																	F-26896
AM-717	Replacement Universal Clamp	X	X																	F-26896
AM-726	Crank Arm Adaptor										X	X	X	X						F-26802
AM-727											X	X	X	X						
AM-728[b]	Conduit Adaptor										X	X	X	X						
AM-751	Anti-rotation Bracket							X	X								X	X		F-26898
AM-752								X	X								X	X		

[a] For shafts up to 3/4" (19 mm) diameter round or up to 1/2" (13 mm) square.
[b] Cannot be used when creating a linked valve/actuator assembly.

Accessories Chart

TAC DuraDrive™



Part Numbers	Description	Spring Return Actuators									Non-Spring Return Actuators								General Instructions Document
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717X MF40-7173	MS40-7173	MS4D-x033	MF41-6043 MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	MS4D-60x3-1xx	
AM-735	Crank Arm Kit													X	X				F-27246
AM-736	Crank Arm Kit with Bracket													X	X				F-27247
AM-737	Universal Crank Arm[a]													X	X				F-27248
AM-740	Replacement Kit													X	X				F-27249
AM-741	Weather Shield										X	X	X	X	X				F-27250
AM-753[b]	Mounting Clamp							X	X							X	X		F-26898
AM-754[c]								X	X							X	X		
AM-755	Manual Override Crank															X	X		
AM-756	Metric Conduit Adaptor	X	X	X	X	X	X	X	X	X						X	X	X	F-26899
AM-758	Short "U" Mounting Bracket			X	X	X	X												F-25096
AM-759	Tall "U" Mounting Bracket			X	X	X	X												
AM-760	Slotted "L" Mounting Bracket			X	X	X	X												
AM-761	7-inch Anti-Rotation Bracket	X	X																F-26986
AM-762	9-inch Anti-Rotation Bracket	X	X	X	X	X	X	X	X							X	X		F-25098

[a] For Honeywell Floor Mount Mod Motor.
[b] For shafts 3/4" (19 mm) round and 5/8" (15. 9 mm) square.
[c] For shafts 3/8" to 1/2" (10 to 13 mm) round and square.

Part Numbers	Description	Spring Return Actuators									Non-Spring Return Actuators								General Instructions Document
		MA40-7043 MF40-7043	MS40-7043	MA41-7073 MF41-7073	MS41-7073	MA41-7153 MF41-7153	MS41-7153	MA40-717X MF40-7173	MS40-7173	MS4D-x033	MF41-6043 MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	MS41-6343	MS4D-60x3-1xx	
AM-771	Crank Arm and Adapter Kit									X								X	
AM-772	Bracket for Reverse Mounting									X								X	
AM-763	Manual Override Crank			X[a]	X[a]	X[a]	X[a]												F-25098

[a] Only used on Mx41-707x-xxx, Mx41-715x-xxx.

1/2" to 2" Bronze Globe Valves

TAC VA,VF, and VS-7000 series valve assemblies are complete actuator/valve assemblies that accept two-position, floating, and proportional electric/electronic control signals. These valves control water that is 20 to 281 °F (-7 to 138 °C) or steam to 281 °F (138 °C). The Vx-7000 series valves are used for two-position or proportional control applications. These valve assemblies consist of electric or electronic valve actuators either direct-coupled or linked to a 1/2 to 2 inch 2-way or 3-way valve body.

Features

- 250 psig (1723 kPa) pressure rating per ANSI Standards (816.14-1985) for screwed cast bronze bodies.
- Self-adjusting spring loaded TFE/EPDM packing.
- ANSI IV close off (0.01% leakage).
- Stainless steel stem.
- ISO 9001:2000 Certified Quality Management System.
- 1/2 to 2" threaded bronze globe valves.
- Outstanding performance with over 50 years as a leader in valve design.
- Made in the USA.
- Optional stainless steel trim 340 or 400 °F (171 or 204 °C) operating range.

Table of Contents

7000 Series Globe

V X - 7 X X 3 -

Control Signal Type
A = Two Position
B = Valve Body
F = Floating
S = Proportional

Configuration ⚠1
7213 = 2-Way, Stem Up Open Brass Plug EPDM Disc
7223 = 2-Way, Stem Up Closed Brass Plug EPDM Disc
7253 = 2-Way, Stem Up Open SS Plug Teflon Disc
7263 = 2-Way, Stem Up Closed SS Plug Teflon Disc
7273 = 2-Way, Stem Up Open High Temp SS Plug
7283 = 2-Way, Stem Up Closed High Temp SS Plug
7313 = 3-Way, Mixing Brass Plug
7323= 3-Way, Diverting Brass Plug

Connection
3 = Threaded NPT

⚠1 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	
		Valve Stem	Flow
Vx-7213-xxx-4-P Vx-7253-xxx-4-P Vx-7273-xxx-4-P	2-Way Stem Up Open	Up	Open
Vx-7223-xxx-4-P Vx-7263-xxx-4-P Vx-7283-xxx-4-P	2-Way Stem Up Closed	Up	Closed
Vx-7313-xxx-4-P	3-Way Mixing	Up	Flow B to AB
Vx-7323-xxx-4-P	3-Way Diverting	Up	Flow B to AB

Valve Assemblies

XXX - 4 - XX

Actuator Code

Pattern Code
4 = Straightway (Bronze)

Port Code

Actuator Code ⚠1				
Model	**Code**	**Normal Position**	**Voltage**	**Type**
Two-Position				
MA51-7100	**801**	SR Up	120 Vac	2-Position
MA51-7103-100[a]	**804**	SR Up	24 Vac	2-Position
MA51-7200	**592**	SR Up	120 Vac	2-Position
MA51-7203	**593**	SR Up	24 Vac	2-Position
Floating				
MF-22303	**255**	NSR	24 Vac	3-Wire Floating
MF-22353	**256**	NSR	24 Vac	3-Wire Floating
MF-23303	**265**	NSR	24 Vac	3-Wire Floating
MF-63103	**301**	NSR	24 Vac	3-Wire Floating
MF51-7103-100[a]	**804**	SR Up	24 Vac	3-Wire Floating
MF51-7203	**593**	SR Up	24 Vac	3-Wire Floating
Proportional				
MF-63123-411[b]	**422**	NSR	24 Vac	4 to 20 mA
MS-22353	**256**	NSR	24 Vac	2 to 10 Vdc
MS41-6043	**505**	NSR	24 Vac	0 to 10 Vdc
MS41-6343	**516**	NSR	24 VAc	4 to 20 mA
MS51-7103-100[a]	**804**	SR Up	24 Vac	2 to 10 Vdc
MS51-7203	**593**	SR Up	24 Vac	2 to 10 Vdc
MS41-6083	**506**	NSR	24 Vac	0 tp 10 Vac

SR = Spring Return
NSR = Non-Spring Return

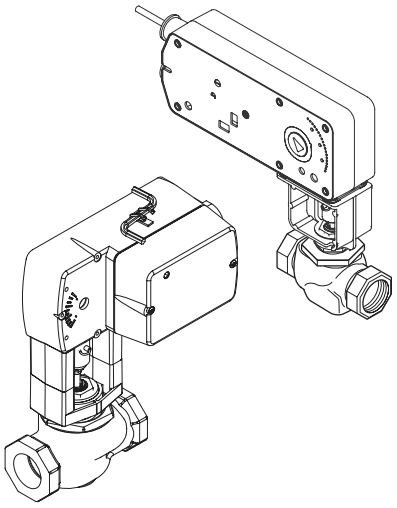
[a] Plenum cable wire.
[b] MF-63103 with MFC-420 card added.

Note: For detailed information on the VB-7000 series globe valves, refer to the following publications: F-26073, F-26704, F-26075, and F-26076.

	2-Way		3-Way		
			C_v		
Size	C_v	P Code	Mixing	Diverting	P Code
1/2"	0.4	1	—	—	
	1.3	2	2.2	2.2	2
	2.2	3	—	—	
	4.4	4	4.4	4.4	4
3/4"	5.5	5	—	—	
	7.5	6	7.5	7.5	6
1"	10.0	7	—	—	
	14.0	8	14.0	15.0	8
1-1/4"	20.0	9	20.0	20.0	9
1-1/2"	28.0	10	28.0	28.0	10
2"	40.0	11	41.0	40.0	11

	2-Way		3-Way		
			Kvs		
Size	Kvs	P Code	Mixing	Diverting	P Code
1/2"	0.34	1	—	—	
	1.12	2	1.12	1.12	2
	1.9	3	—	—	
	3.8	4	3.8	3.8	4
3/4"	4.7	5	—	—	
	6.5	6	6.5	6.5	6
1"	8.6	7	—	—	
	12	8	12	12	8
1-1/4"	17.3	9	17.3	17.3	9
1-1/2"	24.2	10	24.2	24.2	10
2"	34.6	11	34.6	34.6	11

7000 Series Bronze Globe Valves
Two-Way Normally Open



1/2 to 2 in. Screwed NPT
Two-Way Normally Open
Spring Return
Stem Up Open

Flow Type		Equal %.
Material	**Body**	Bronze.
	Seat	Bronze.
	Stem	Stainless steel.
	Plug	Brass.
	Packing	Spring loaded EPDM and TFE.
	Disc	Composition.
ANSI Pressure Class		250 psig (1723 kPa).
Max. Inlet Pressure Steam		35 psig (240 kPa).
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Differential Pressure psi (kPa)		
	Water	35 (241).
	Steam	20 (138).
Close-Off Rating		ANSI IV (0.01% leakage)

Two-Way Normally Open Assemblies

Size in.	Cv (K_{VS})	Close-Off Pressure psi (kPa)	Two Position	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma	Voltage Vac
1/2	0.4 (0.34)	250 (1723)	VA-7213-801-4-01	—	—	120
			VA-7213-804-4-01	VF-7213-804-4-01	VS-7213-804-4-01	24
	1.3 (1.1)		VA-7213-801-4-02	—	—	120
			VA-7213-804-4-02	VF-7213-804-4-02	VS-7213-804-4-02	24
	2.2 (1.9)		VA-7213-801-4-03	—	—	120
			VA-7213-804-4-03	VF-7213-804-4-03	VS-7213-804-4-03	24
	4.4 (3.8)		VA-7213-801-4-04	—	—	120
			VA-7213-804-4-04	VF-7213-804-4-04	VS-7213-804-4-04	24
3/4	5.5 (4.7)	200 (1379)	VA-7213-801-4-05	—	—	120
			VA-7213-804-4-05	VF-7213-804-4-05	VS-7213-804-4-05	24
	7.5 (6.5)		VA-7213-801-4-06	—	—	120
			VA-7213-804-4-06	VF-7213-804-4-06	VS-7213-804-4-06	24
1	10 (8.6)	150 (1034)	VA-7213-801-4-07	—	—	120
			VA-7213-804-4-07	VF-7213-804-4-07	VS-7213-804-4-07	24
	14 (12)		VA-7213-801-4-08	—	—	120
			VA-7213-804-4-08	VF-7213-804-4-08	VS-7213-804-4-08	24
1-1/4	20 (17.3)	90 (620.5)	VA-7213-801-4-09	—	—	120
			VA-7213-804-4-09	VF-7213-804-4-09	VS-7213-804-4-09	24
1-1/2	28 (21.2)	60 (413.6)	VA-7213-801-4-10	—	—	120
			VA-7213-804-4-10	VF-7213-804-4-10	VS-7213-804-4-10	24
2	40 (34.6)	32 (222.6)	VA-7213-801-4-11	—	—	120
			VA-7213-804-4-11	VF-7213-804-4-11	VS-7213-804-4-11	24
Higher Close Off						
1-1/4	20 (17.3)	150 (1034)	VA-7213-592-4-09			120
			VA-7213-593-4-09	VF-7213-593-4-09	VS-7213-593-4-09	24
1-1/2	28 (21.2)	100 (689.5)	VA-7213-592-4-10	—	—	120
			VA-7213-593-4-10	VF-7213-593-4-10	VS-7213-593-4-10	24
2	40 (34.6)	65 (448)	VA-7213-592-4-11	—	—	120
			VA-7213-593-4-11	VF-7213-593-4-11	VS-7213-593-4-11	24

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

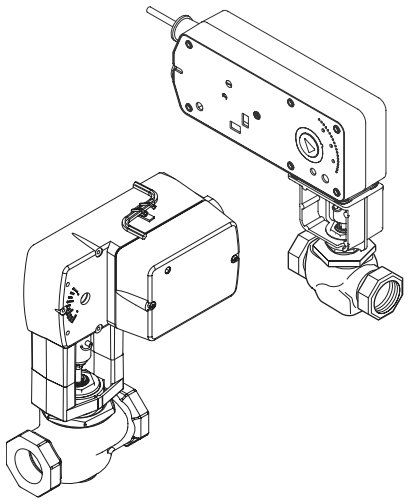
Vx-7213-xxx-4-xx

Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
592	VA	MA51-7200	120 Vac, 2-Position	177	14	211	82
593	VA	MA51-7203	24 Vac, 2-Position	177	14	211	82
593	VF	MF51-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	211	82
593	VS	MS51-7203	24 Vac, 2-10 Vdc Input[a]	198 to 199	63 to 66	211	82
801	VA	MA51-7100	120 Vac, 2-Position	177	14	210	80
804	VA	MA51-7103-100	24 Vac, 2-Position	177	14	210	80
804	VF	MF51-7103-100	24 Vac, 3-Wire Floating	185 to 186	32 to 35	210	80
804	VS	MS51-7103-100	24 Vac, 2-10 Vdc Input[a]	197	60 to 62	210	80

[a] Reversible control signal.

7000 Series Bronze Globe Valves
Two-Way Normally Closed



1/2 to 2 in. Screwed NPT
Two-Way Normally Closed
Spring Return
Stem Up Closed

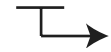
Flow Type		Equal %.
Material	**Body**	Bronze.
	Seat	Bronze.
	Stem	Stainless steel.
	Plug	Brass.
	Packing	Spring loaded EPDM and TFE.
	Disc	Composition.
ANSI Pressure Class		250 psig (1723 kPa).
Max. Inlet Pressure Steam		35 psig (240 kPa).
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Differential Pressure psi (kPa)		
	Water	35 (241).
	Steam	20 (138).
Close-Off Rating		ANSI IV (0.01% leakage).

Two-Way Normally Closed Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two Position	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma	Voltage Vac
1/2	0.4 (0.34)	250 (1723)	VA-7223-801-4-01	—	—	120
			VA-7223-804-4-01	VF-7223-804-4-01	VS-7223-804-4-01	24
	1.3 (1.1)		VA-7223-801-4-02	—	—	120
			VA-7223-804-4-02	VF-7223-804-4-02	VS-7223-804-4-02	24
	2.2 (1.9)		VA-7223-801-4-03	—	—	120
			VA-7223-804-4-03	VF-7223-804-4-03	VS-7223-804-4-03	24
	4.4 (3.8)		VA-7223-801-4-04	—	—	120
			VA-7223-804-4-04	VF-7223-804-4-04	VS-7223-804-4-04	24
3/4	5.5 (4.7)	200 (1379)	VA-7223-801-4-05	—	—	120
			VA-7223-804-4-05	VF-7223-804-4-05	VS-7223-804-4-05	24
	7.5 (6.5)		VA-7223-801-4-06	—	—	120
			VA-7223-804-4-06	VF-7223-804-4-06	VS-7223-804-4-06	24
1	10 (8.6)	90 (620.5)	VA-7223-801-4-07	—	—	120
			VA-7223-804-4-07	VF-7223-804-4-07	VS-7223-804-4-07	24
	14 (12)		VA-7223-801-4-08	—	—	120
			VA-7223-804-4-08	VF-7223-804-4-08	VS-7223-804-4-08	24
1-1/4	20 (17.3)	60 (413.5)	VA-7223-801-4-09	—	—	120
			VA-7223-804-4-09	VF-7223-804-4-09	VS-7223-804-4-09	24
1-1/2	28 (21.2)	35 (241)	VA-7223-801-4-10	—	—	120
			VA-7223-804-4-10	VF-7223-804-4-10	VS-7223-804-4-10	24
2	40 (34.6)	20 (138)	VA-7223-801-4-11	—	—	120
			VA-7223-804-4-11	VF-7223-804-4-11	VS-7223-804-4-11	24
Higher Close-Off						
1-1/4	20 (17.3)	150 (1034)	VA-7223-592-4-09			120
			VA-7223-593-4-09	VF-7223-593-4-09	VS-7223-593-4-09	24
1-1/2	28 (21.2)	100 (689.5)	VA-7223-592-4-10	—	—	120
			VA-7223-593-4-10	VF-7223-593-4-10	VS-7223-593-4-10	24
2	40 (34.6)	60 (413.6)	VA-7223-592-4-11	—	—	120
			VA-7223-593-4-11	VF-7223-593-4-11	VS-7223-593-4-11	24

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

Vx-7223-xxx-4-xx

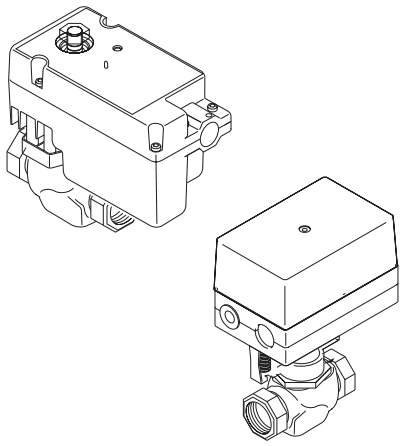


Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
592	VA	MA51-7200	120 Vac, 2-Position	177	14	211	82
593	VA	MA51-7203	24 Vac, 2-Position	177	14	211	82
593	VF	MF51-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	211	82
593	VS	MS51-7203	24 Vac, 2-10 Vdc Input[a]	198 to 199	63 to 66	211	82
801	VA	MA51-7100	120 Vac, 2-Position	177	14	210	80
804	VA	MA51-7103-100	24 Vac, 2-Position	177	14	210	80
804	VF	MF51-7103-100	24 Vac, 3-Wire Floating	185 to 186	32 to 35	210	80
804	VS	MS51-7103-100	24 Vac, 2-10 Vdc Input[a]	197	60 to 62	210	80

[a] Reversible control signal.

7000 Series Bronze Globe Valves
Two-Way Non-Spring Return



1/2 to 2 in. Screwed NPT

Two-Way Non-Spring Return Stem Up Open

Flow Type		Equal %.
Material	**Body**	Bronze.
	Seat	Bronze.
	Stem	Stainless steel.
	Plug	Brass.
	Packing	Spring loaded EPDM and TFE.
	Disc	Composition.
ANSI Pressure Class		250 psig (1723 kPa).
Max. Inlet Pressure Steam		35 psig (240 kPa).
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Differential Pressure (psig (kPa)		
	Water	35 (241).
	Steam	20 (138).
Close-Off Rating		ANSI IV (0.01% leakage).

Size in.	Cv (K_{VS})	Close-Off Pressure psi (kPa)	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma
1/2	0.4 (0.34)	130 (896)	VF-7213-255-4-01	VS-7213-256-4-01
		250 (1723)	VF-7213-265-4-01	—
	1.3 (1.1)	130 (896)	VF-7213-255-4-02	VS-7213-256-4-02
		250 (1723)	VF-7213-265-4-02	—
	2.2 (1.9)	130 (896)	VF-7213-255-4-03	VS-7213-256-4-03
		250 (1723)	VF-7213-265-4-03	—
	4.4 (3.8)	130 (896)	VF-7213-255-4-04	VS-7213-256-4-04
		250 (1723)	VF-7213-265-4-04	—
3/4	5.5 (4.7)	80 (551)	VF-7213-255-4-05	VS-7213-256-4-05
		170 (1172)	VF-7213-265-4-05	—
	7.5 (6.5)	80 (551)	VF-7213-255-4-06	VS-7213-256-4-06
		170 (1172)	VF-7213-265-4-06	—
1	10 (8.6)	40 (276)	VF-7213-255-4-07	VS-7213-256-4-07
		80 (551)	VF-7213-265-4-07	—
		100 (689)	—	VS-7213-505-4-07
	14 (12)	40 (276)	VF-7213-255-4-08	VS-7213-256-4-08
		80 (551)	VF-7213-265-4-08	—
		100 (689)	—	VS-7213-505-4-08
1-1/4	20 (17.3)	25 (172)	VF-7213-255-4-09	VS-7213-256-4-09
		50 (345)	VF-7213-265-4-09	—
		60 (144)	—	VS-7213-505-4-09
1-1/2	28 (21.2)	33 (227)	VF-7213-265-4-10	—
		40 (276)	—	VS-7213-505-4-10
2	40 (34.6)	20 (138)	—	VS-7213-505-4-11

[a] Factory proportional control signal is direct-acting. An increase in control signal will close a stem up open valve.

Size in.	Cv (K_{vs})	Close-Off Pressure psig (kPa)	Three Wire Floating 24 Vac	Proportional[a] Vdc or 4-20ma
Higher Close Off				
1-1/4	20 (17.3)	100 (689)	—	VS-7213-506-4-09
		150 (1034)	VF-7213-301-4-09	VS-7213-422-4-09
1-1/2	28 (21.2)	70 (483)	—	VS-7213-506-4-10
		100 (689)	VF-7213-301-4-10	VS-7213-422-4-10
2	40 (34.6)	40 (276)	—	VS-7213-506-4-11
		50 (345)	VF-7213-301-4-11	VS-7213-422-4-11
Highest Close Off				
2	40 (34.6)	80 (551)	VF-7213-508-4-11	VS-7213-508-4-11

[a] Factory proportional control signal is direct-acting. An increase in control signal will close a stem up open valve.

Vx-7213-xxx-4-xx

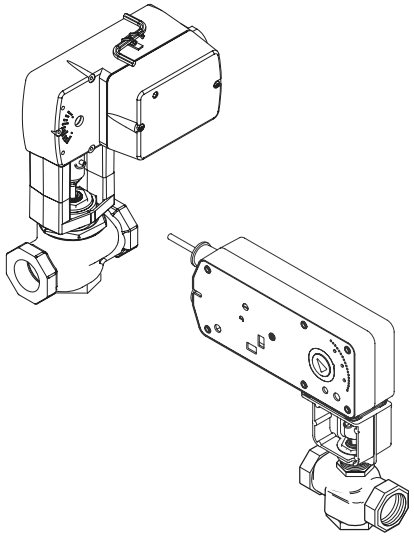
Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
255	VF	MF-22303	24 Vac, 3-Wire Floating	177	15	209	78
256	VS	MS-22353	24 Vac, 2-10 Vdc Control	187 to 188	38 to 39	209	78
265	VF	MF-23303	24 Vac, 3-Wire Floating [a]	177	15	209	78
301	VF	MF-63103	24 Vac, 3-Wire Floating	177	16	209	79
422	VS	MF-63123-411	24 Vac,4-20 mA Input[b]	186	36	209	79
505	VS	MS41-6043	24 Vac, 0-10 Vdc Control[b]	192	49 to 50	208	76
506	VS	MS41-6083	24 Vac 0-10 Vdc Input	192	49	208	76
508	VF	MF41-6153	24 Vac, 3-Wire Floating	179	20	212	84
508	VS	MS41-6153	24 Vac, 2-10 Vdc Input[b]	193	51 to 52	212	84

[a] Requires a control with time out.

[b] Reversible control signal.

7000 Series Bronze Globe Valves
Three-Way Mixing



1/2 to 2 in. Screwed NPT

Three-Way Mixing

Spring Return Stem Up Normally Closed A to AB

Flow Type		Mixing.
Material	**Body**	Bronze.
	Seat	Bronze.
	Stem	Stainless steel.
	Plug	Brass.
	Packing	Spring loaded EPDM and TFE.
ANSI Pressure Class		250 psig (1723 kPa).
Allowable Control Media Temperature		20 to 300 °F (-7 to 149 °C).
Allowable Differential Pressure for Water		35 psi (241 kPa).
Close-Off Rating		ANSI III (0.1% leakage).

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two Position	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma	Voltage Vac
1/2	2.2 (1.9)	250 (1723)	VA-7313-801-4-02	—	—	120
			VA-7313-804-4-02	VF-7313-804-4-02	VS-7313-804-4-02	24
	4.4 (3.8)		VA-7313-801-4-04	—	—	120
			VA-7313-804-4-04	VF-7313-804-4-04	VS-7313-804-4-04	24
3/4	7.5 (6.5)	200 (1379)	VA-7313-801-4-06	—	—	120
			VA-7313-804-4-06	VF-7313-804-4-06	VS-7313-804-4-06	24
1	14 (12)	90 (620.5)	VA-7313-801-4-08	—	—	120
			VA-7313-804-4-08	VF-7313-804-4-08	VS-7313-804-4-08	24
1-1/4	20 (17.3)	60 (413.6)	VA-7313-801-4-09	—	—	120
			VA-7313-804-4-09	VF-7313-804-4-09	VS-7313-804-4-09	24
1-1/2	28 (21.2)	35 (241)	VA-7313-801-4-10	—	—	120
			VA-7313-804-4-10	VF-7313-804-4-10	VS-7313-804-4-10	24
2	40 (34.6)	20 (138)	VA-7313-801-4-11	—	—	120
			VA-7313-804-4-11	VF-7313-804-4-11	VS-7313-804-4-11	24
Higher Close Off						
1-1/4	20 (17.3)	150 (1034)	VA-7313-592-4-09	—	—	120
			VA-7313-593-4-09	VF-7313-593-4-09	VS-7313-593-4-09	24
1-1/2	28 (21.2)	100 (689)	VA-7313-592-4-10	—	—	120
			VA-7313-593-4-10	VF-7313-593-4-10	VS-7313-593-4-10	24
2	40 (34.6)	65 (448)	VA-7313-592-4-11	—	—	120
			VA-7313-593-4-11	VF-7313-593-4-11	VS-7313-593-4-11	120

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

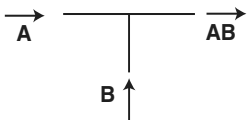
Vx-7313-xxx-4-xx

Actuator Code Table.

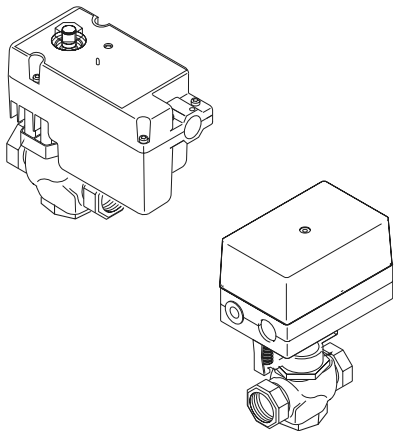
Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
592	VA	MA51-7200	120 Vac, 2-Position	177	14	211	83
593	VA	MA51-7203	24 Vac, 2-Position	177	14	211	83
593	VF	MF51-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	211	83
593	VS	MS51-7203	24 Vac, 2-10 Vdc Input[a]	198 to 199	63 to 66	211	83
801	VA	MA51-7100	120 Vac, 2-Position	177	14	210	81
804	VA	MA51-7103-100	24 Vac, 2-Position	177	14	210	81
804	VF	MF51-7103-100	24 Vac, 3-Wire Floating	185 to 186	32 to 35	210	81
804	VS	MS51-7103-100	24 Vac, 2-10 Vdc Input[a]	197	60 to 62	210	81

[a] Reversible control signal.

Flow Pattern



7000 Series Bronze Globe Valves
Three-Way Mixing



1/2 to 2 in. Screwed NPT

Three-Way Mixing

Non-Spring Return
Stem Up Closed A to AB

Flow Type		Mixing.
Material	**Body**	Bronze.
	Seat	Bronze.
	Stem	Stainless steel.
	Plug	Brass.
	Packing	Spring loaded EPDM and TFE.
ANSI Pressure Class		250 psig (1723 kPa).
Allowable Control Media Temperature		20 to 300 °F (-7 to 149 °C).
Allowable Differential Pressure for Water		35 psi (241 kPa).
Close-Off Rating		ANSI III (0.1% leakage).

Size in.	Cv (K_{VS})	Close-Off Pressure psi (kPa)	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma
1/2	2.2 (1.9)	130 (896)i	VF-7313-255-4-02	VS-7313-256-4-02
		250 (1723)	VF-7313-265-4-02	—
	4.4 (3.8)	130 (896)	VF-7313-255-4-04	VS-7313-256-4-04
		250 (1723)	VF-7313-265-4-04	—
3/4	7.5 (6.5)	80 (551)	VF-7313-255-4-06	VS-7313-256-4-06
		170 (1172)	VF-7313-265-4-06	—
1	14 (12)	40 (276)	VF-7313-255-4-08	VS-7313-256-4-08
		80 (551)	VF-7313-265-4-08	—
1-1/4	20 (17.3)	25 (172)	VF-7313-255-4-09	VS-7313-256-4-09
		50 (345)	VF-7313-265-4-09	—
1-1/2	28 (21.2)	33 (227)	VF-7313-265-4-10	—
2	40 (346)	20 (138)	VF-7313-505-4-11	—
Higher Close Offs				
1-1/4	20 (17.3)	120 (827)	—	VS-7313-506-4-09
		150 (1034)	VF-7313-301-4-09	VS-7313-422-4-09
1-1/2	28 (21.2)	75 (518)	—	VS-7313-506-4-10
		100 (689)	VF-7313-301-4-10	VS-7313-422-4-10
2	40 (34.6)	40 (276)	—	Vs-7313-506-4-11
		50 (345)	VF-7313-301-4-11	VS-7313-422-4-11
Highest Close Offs				
2	40 (34.6)	80 (551)	VF-7313-508-4-11	VS-7313-508-4-11

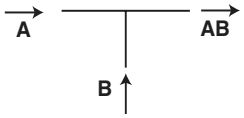
[a] Factory proportional control signal is direct-acting. An increase in control signal will open A and close B port.

Actuator Code Table.

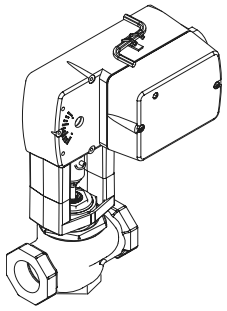
Vx-7313-xxx-4-xx

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
255	VF	MF-22303	24 Vac, 3-Wire Floating	177	15	213	86
265	VF	MF-23303	24 Vac, 3-Wire Floating	177	15	213	86
301	VF	MF-63103	24 Vac, 3-Wire Floating	177	16	213	87
422	VS	MF-63123-411	24 Vac, 4 to 20 mA Input	186	36	213	87
505	VF	MF41-6043	24 Vac, 3-Wire Floating	178	19	208	76
506	VS	MS41-6083	24 Vac, 0-10 Vdc Input	192	50	208	76
508	VF	MF41-6153	24 Vac, 3-Wire Floating	179	20	212	85
508	VS	MS41-6153	24 Vac, 2-10 Vdc Control	192	51 to 52	188	77
256	VS	MS-22353	24 Vac, 0-10 Vac Input	187 to 188	38 to 39	185	70

Flow Pattern



7000 Series Bronze Globe Valves
Three-Way Diverting



1/2 to 2 in. Screwed NPT

Three-Way Diverting

Spring Return Stem Up Normally Closed B to A

Flow Type		Diverting.
Material	**Body**	Bronze.
	Seat	Bronze.
	Stem	Stainless steel.
	Plug	Brass.
	Packing	Spring loaded EPDM and TFE.
ANSI Pressure Class		250 psig (1723 kPa).
Allowable Control Media Temperature		20 to 300 °F (-7 to 149 °C).
Allowable Differential Pressure for Water		35 psi (241 kPa).
Close-Off Rating		ANSI III (0.1% leakage).

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two Position	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma	Voltage Vac
1/2	4.4 (3.8)	250 (1723	VA-7323-801-4-04	—	—	120
			VA-7323-804-4-04	VF-7323-804-4-04	VS-7323-804-4-04	24
3/4	7.5 (6.5)		VA-7323-801-4-06	—	—	120
			VA-7323-804-4-06	VF-7323-804-4-06	VS-7323-804-4-06	24
1	14 (12)		VA-7323-801-4-08	—	—	120
			VA-7323-804-4-08	VF-7323-804-4-08	VS-7323-804-4-08	24
1-1/4	20 (17.3)		VA-7323-801-4-09	—	—	120
			VA-7323-804-4-09	VF-7323-804-4-09	VS-7323-804-4-09	24
1-1/2	28 (21.2)		VA-7323-801-4-10	—	—	120
			VA-7323-804-4-10	VF-7323-804-4-10	VS-7323-804-4-10	24
2	40 (34.6)		VA-7323-801-4-11	—	—	120
			VA-7323-804-4-11	VF-7323-804-4-11	VS-7323-804-4-11	24

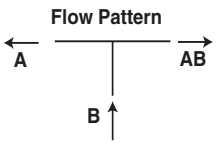
[a] Factory proportional control signal is direct-acting. An increase in control signal will open B to A port and close B to AB.

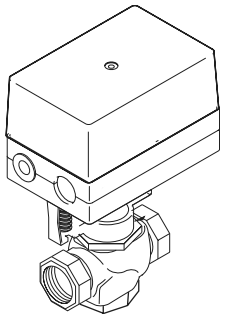
Actuator Code Table.

Vx-7323-xxx-4-xx

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
801	VA	MA51-7100	120 Vac, 2-Position	177	14	210	81
804	VA	MA51-7103-100	24 Vac, 2-Position	177	14	210	81
804	VF	MF51-7103-100	24 Vac, 3-Wire Floating	185 to 186	32 to 35	210	81
804	VS	MS51-7103-100	24 Vac, 2-10 Vdc Input[a]	197	60 to 62	210	81

[a] Reversible control signal.





1/2 to 2 in. Screwed NPT

Three-Way Diverting

Non-Spring Return
Stem Up Closed B to A

Flow Type		Diverting.
Material	**Body**	Bronze.
	Seat	Bronze.
	Stem	Stainless steel.
	Plug	Brass.
	Packing	Spring loaded EPDM and TFE.
ANSI Pressure Class		250 psig (1723 kPa).
Allowable Control Media Temperature		20 to 300 °F (-7 to 149 °C).
Allowable Differential Pressure for Water		35 psi (241 kPa).
Close-Off Rating		ANSI III (0.1% leakage).

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Three Wire Floating[a] 24 Vac	Proportional [b] 0-10 Vdc
1/2	4.4 (3.8)	250 (1723)	—	VS-7323-505-4-04
			VF-7323-265-4-04	VS-7323-422-4-04
3/4	7.5 (6.5)		—	VS-7323-505-4-06
			VF-7323-265-4-06	VS-7323-422-4-06
1	14 (12)		—	VS-7323-505-4-08
			VF-7323-265-4-08	VS-7323-422-4-08
1-1/4	20 (17.3)		—	VS-7323-505-4-09
			VF-7323-265-4-09	VS-7323-422-4-09
1-1/2	28 (21.2)		—	VS-7323-505-4-10
			VF-7323-265-4-10	VS-7323-422-4-10
2	40 (34.6)		—	VS-7323-505-4-11
			VF-7323-265-4-11	VS-7323-422-4-11

[a] Requires time out feature in controller.

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

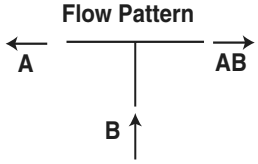
Actuator Code Table.

Vx-7323-xxx-4-xx

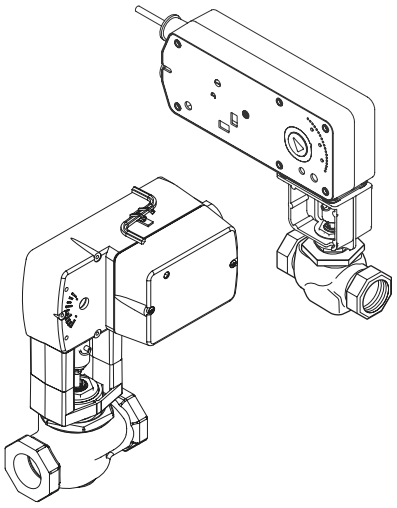
Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 58)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
265	VF	MF-23303	24 Vac, 3-Wire Floating	177	15	209	78
422	VS	MF-63123-411	24 Vac, 4-20 mA Input[a]	186	36	209	79
505	VS	MS41-6043	24 Vac, 0-10 Vac Input	192	49 to 50	208	77

[a] Reversible control signal.

Flow Pattern



7000 Series Bronze Globe Valves with Stainless Steel Trim
Two-Way Normally Open



1/2 to 2 in. Screwed NPT
Two-Way Normally Open
Spring Return
Stem Up Open

Flow Type		Modified linear.
Material	**Body**	Bronze.
	Seat	Stainless steel.
	Stem	Stainless steel.
	Plug	Stainless steel.
	Packing	Spring loaded EPDM and TFE.
	Disc	Teflon®.
ANSI Pressure Class		250 psig (1723 kPa).
Max. Inlet Pressure Steam		100 psig (690 kPa).
Allowable Control Media Temperature		20 to 340 °F (-7 to 171 °C).
Differential Pressure psi (kPa)		
	Water or Steam	35 (241).
Close-Off Rating		ANSI IV (0.01% leakage).

Two-Way Normally Open Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two Position	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma	Voltage Vac
1/2	0.4 (0.34)	250 (1723)	VA-7253-801-4-01	—	—	120
			VA-7253-804-4-01	VF-7253-804-4-01	VS-7253-804-4-01	24
	1.3 (1.1)		VA-7253-801-4-02	—	—	120
			VA-7253-804-4-02	VF-7253-804-4-02	VS-7253-804-4-02	24
	2.2 (1.9)		VA-7253-801-4-03	—	—	120
			VA-7253-804-4-03	VF-7253-804-4-03	VS-7253-804-4-03	24
	4.4 (3.8)		VA-7253-801-4-04	—	—	120
			VA-7253-804-4-04	VF-7253-804-4-04	VS-7253-804-4-04	24
3/4	5.5 (4.7)	200 (1379)	VA-7253-801-4-05	—	—	120
			VA-7253-804-4-05	VF-7253-804-4-05	VS-7253-804-4-05	24
	7.5 (6.5)		VA-7253-801-4-06	—	—	120
			VA-7253-804-4-06	VF-7253-804-4-06	VS-7253-804-4-06	24
1	10 (8.6)	150 (1034)	VA-7253-801-4-07	—	—	120
			VA-7253-804-4-07	VF-7253-804-4-07	VS-7253-804-4-07	24
	14 (12)		VA-7253-801-4-08	—	—	120
			VA-7253-804-4-08	VF-7253-804-4-08	VS-7253-804-4-08	24
1-1/4	20 (17.3)	90 (620.5)	VA-7253-801-4-09	—	—	120
			VA-7253-804-4-09	VF-7253-804-4-09	VS-7253-804-4-09	24
1-1/2	28 (21.2)	60 (413.6)	VA-7253-801-4-10	—	—	120
			VA-7253-804-4-10	VF-7253-804-4-10	VS-7253-804-4-10	24
2	40 (34.6)	32 (222.6)	VA-7253-801-4-11	—	—	120
			VA-7253-804-4-11	VF-7253-804-4-11	VS-7253-804-4-11	24
Higher Close Off						
1-1/4	20 (17.3)	150 (1034)	VA-7253-592-4-09			120
			VA-7253-593-4-09	VF-7253-593-4-09	VS-7253-593-4-09	24
1-1/2	28 (21.2)	100 (689.5)	VA-7253-592-4-10	—	—	120
			VA-7253-593-4-10	VF-7253-593-4-10	VS-7253-593-4-10	24
2	40 (34.6)	65 (448)	VA-7253-592-4-11	—	—	120
			VA-7253-593-4-11	VF-7253-593-4-11	VS-7253-593-4-11	24

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

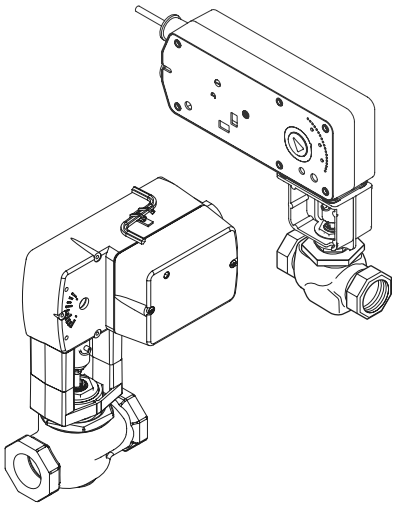
Vx-7253-xxx-4-xx

Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
592	VA	MA51-7200	120 Vac, 2-Position	177	14	211	82
593	VA	MA51-7203	24 Vac, 2-Position	177	14	211	82
593	VF	MF51-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	211	82
593	VS	MS51-7203	24 Vac, 2-10 Vdc Input[a]	198 to 199	63 to 66	211	82
801	VA	MA51-7100	120 Vac, 2-Position	177	14	210	80
804	VA	MA51-7103-100	24 Vac, 2-Position	177	14	210	80
804	VF	MF51-7103-100	24 Vac, 3-Wire Floating	185 to 186	32 to 35	210	80
804	VS	MS51-7103-100	24 Vac, 2-10 Vdc Input[a]	197	60 to 62	210	80

[a] Reversible control signal.

7000 Series Bronze Globe Valves with Stainless Steel Trim (Metal Seat)
Two-Way Normally Open



1/2 to 2 in. Screwed NPT
Two-Way Normally Open
Spring Return
Stem Up Open

Flow Type		Modified linear.
Material	**Body**	Bronze.
	Seat	Stainless steel, metal to metal.
	Stem	Stainless steel.
	Plug	Stainless steel.
	Packing	Spring loaded EPDM and TFE.
	Disc	None.
ANSI Pressure Class		250 psig (1723 kPa)
Max. Inlet Pressure Steam		150 psig (1034 kPa).
Allowable Control Media Temperature		20 to 400 °F (-7 to 205 °C).
Differential Pressure psi (kPa)		
	Water	35 (241).
	Steam	50 (345).
Close-Off Rating		ANSI III (0.1% leakage).

Two-Way Normally Open Assemblies

Size in.	Cv (K_{VS})	Close-Off Pressure psi (kPa)	Two Position	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma	Voltage Vac
1/2	0.4 (0.34)	250 (1723)	VA-7273-801-4-01	—	—	120
			VA-7273-804-4-01	VF-7273-804-4-01	VS-7273-804-4-01	24
	1.3 (1.1)		VA-7273-801-4-02	—	—	120
			VA-7273-804-4-02	VF-7273-804-4-02	VS-7273-804-4-02	24
	2.2 (1.9)		VA-7273-801-4-03	—	—	120
			VA-7273-804-4-03	VF-7273-804-4-03	VS-7273-804-4-03	24
	4.4 (3.8)		VA-7273-801-4-04	—	—	120
			VA-7273-804-4-04	VF-7273-804-4-04	VS-7273-804-4-04	24
3/4	5.5 (4.7)	200 (1379)	VA-7273-801-4-05	—	—	120
			VA-7273-804-4-05	VF-7273-804-4-05	VS-7273-804-4-05	24
	7.5 (6.5)		VA-7273-801-4-06	—	—	120
			VA-7273-804-4-06	VF-7273-804-4-06	VS-7273-804-4-06	24
1	10 (8.6)	150 (1034)	VA-7273-801-4-07	—	—	120
			VA-7273-804-4-07	VF-7273-804-4-07	VS-7273-804-4-07	24
	14 (12)		VA-7273-801-4-08	—	—	120
			VA-7273-804-4-08	VF-7273-804-4-08	VS-7273-804-4-08	24
1-1/4	20 (17.3)	90 (620.5)	VA-7273-801-4-09	—	—	120
			VA-7273-804-4-09	VF-7273-804-4-09	VS-7273-804-4-09	24
1-1/2	28 (21.2)	60 (413.6)	VA-7273-801-4-10	—	—	120
			VA-7273-804-4-10	VF-7273-804-4-10	VS-7273-804-4-10	24
2	40 (34.6)	32 (222.6)	VA-7273-801-4-11	—	—	120
			VA-7273-804-4-11	VF-7273-804-4-11	VS-7273-804-4-11	24
Higher Close Off						
1-1/4	20 (17.3)	150 (1034)	VA-7273-592-4-09			120
			VA-7273-593-4-09	VF-7273-593-4-09	VS-7273-593-4-09	24
1-1/2	28 (21.2)	100 (689.5)	VA-7273-592-4-10	—	—	120
			VA-7273-593-4-10	VF-7273-593-4-10	VS-7273-593-4-10	24
2	40 (34.6)	65 (448)	VA-7273-592-4-11	—	—	120
			VA-7273-593-4-11	VF-7273-593-4-11	VS-7273-593-4-11	24

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

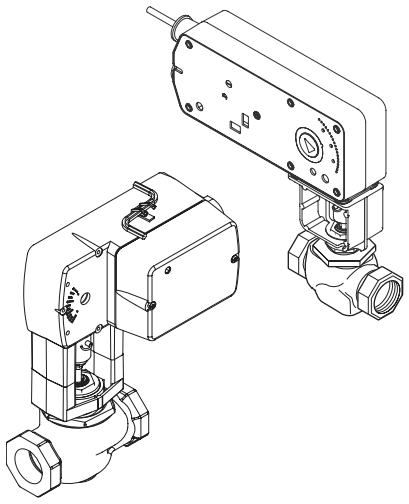
Vx-7273-xxx-4-xx

Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
592	VA	MA51-7200	120 Vac, 2-Position	177	14	211	82
593	VA	MA51-7203	24 Vac, 2-Position	177	14	211	82
593	VF	MF51-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	211	82
593	VS	MS51-7203	24 Vac, 2-10 Vdc Input[a]	198 to 199	63 to 66	211	82
801	VA	MA51-7100	120 Vac, 2-Position	177	14	210	80
804	VA	MA51-7103-100	24 Vac, 2-Position	177	14	210	80
804	VF	MF51-7103-100	24 Vac, 3-Wire Floating	185 to 186	32 to 35	210	80
804	VS	MS51-7103-100	24 Vac, 2-10 Vdc Input[a]	197	60 to 62	210	80

[a] Reversible control signal.

7000 Series Bronze Globe Valves with Stainless Steel Trim
Two-Way Normally Closed



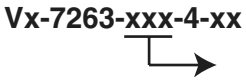
1/2 to 2 in. Screwed NPT
Two-Way Normally Closed
Spring Return
Stem Up Closed

Flow Type		Modified linear.
Material	**Body**	Bronze.
	Seat	Stainless steel.
	Stem	Stainless steel.
	Plug	Stainless steel.
	Packing	Spring loaded EPDM and TFE.
	Disc	Teflon.
ANSI Pressure Class		250 psig (1723 kPa).
Max. Inlet Pressure Steam		100 psig (690 kPa).
Allowable Control Media Temperature		20 to 340 °F (-7 to 171 °C).
Differential Pressure psi (kPa)		
	Water or Steam	35 (241).
Close-Off Rating		ANSI IV (0.01% leakage).

Two-Way Normally Closed Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two Position	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma	Voltage Vac
1/2	0.4 (0.34)	250 (1723)	VA-7263-801-4-01	—	—	120
			VA-7263-804-4-01	VF-7263-804-4-01	VS-7263-804-4-01	24
	1.3 (1.1)		VA-7263-801-4-02	—	—	120
			VA-7263-804-4-02	VF-7263-804-4-02	VS-7263-804-4-02	24
	2.2 (1.9)		VA-7263-801-4-03	—	—	120
			VA-7263-804-4-03	VF-7263-804-4-03	VS-7263-804-4-03	24
	4.4 (3.8)		VA-7263-801-4-04	—	—	120
			VA-7263-804-4-04	VF-7263-804-4-04	VS-7263-804-4-04	24
3/4	5.5 (4.7)	200 (1379)	VA-7263-801-4-05	—	—	120
			VA-7263-804-4-05	VF-7263-804-4-05	VS-7263-804-4-05	24
	7.5 (6.5)		VA-7263-801-4-06	—	—	120
			VA-7263-804-4-06	VF-7263-804-4-06	VS-7263-804-4-06	24
1	10 (8.6)	90 (620.5)	VA-7263-801-4-07	—	—	120
			VA-7263-804-4-07	VF-7263-804-4-07	VS-7263-804-4-07	24
	14 (12)		VA-7263-801-4-08	—	—	120
			VA-7263-804-4-08	VF-7263-804-4-08	VS-7263-804-4-08	24
1-1/4	20 (17.3)	60 (413.5)	VA-7263-801-4-09	—	—	120
			VA-7263-804-4-09	VF-7263-804-4-09	VS-7263-804-4-09	24
1-1/2	28 (21.2)	35 (241)	VA-7263-801-4-10	—	—	120
			VA-7263-804-4-10	VF-7263-804-4-10	VS-7263-804-4-10	24
2	40 (34.6)	20 (138)	VA-7263-801-4-11	—	—	120
			VA-7263-804-4-11	VF-7263-804-4-11	VS-7263-804-4-11	24
Higher Close-Off						
1-1/4	20 (17.3)	150 (1034)	VA-7263-592-4-09			120
			VA-7263-593-4-09	VF-7263-593-4-09	VS-7263-593-4-09	24
1-1/2	28 (21.2)	100 (689.5)	VA-7263-592-4-10	—	—	120
			VA-7263-593-4-10	VF-7263-593-4-10	VS-7263-593-4-10	24
2	40 (34.6)	65 (448)	VA-7263-592-4-11	—	—	120
			VA-7263-593-4-11	VF-7263-593-4-11	VS-7263-593-4-11	24

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

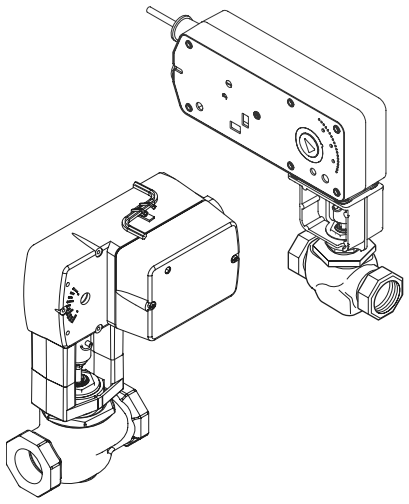


Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
592	VA	MA51-7200	120 Vac, 2-Position	177	14	211	82
593	VA	MA51-7203	24 Vac, 2-Position	177	14	211	82
593	VF	MF51-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	211	82
593	VS	MS51-7203	24 Vac, 2-10 Vdc Input[a]	198 to 199	63 to 66	211	82
801	VA	MA51-7100	120 Vac, 2-Position	177	14	210	80
804	VA	MA51-7103-100	24 Vac, 2-Position	177	14	210	80
804	VF	MF51-7103-100	24 Vac, 3-Wire Floating	185 to 186	32 to 35	210	80
804	VS	MS51-7103-100	24 Vac, 2-10 Vdc Input[a]	197	60 to 62	210	80

[a] Reversible control signal.

7000 Series Bronze Globe Valves with Stainless Steel Trim (Metal Seat)
Two-Way Normally Closed



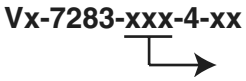
1/2 to 2 in. Screwed NPT
Two-Way Normally Closed
Spring Return
Stem Up Closed

Flow Type		Modified linear.
Material	**Body**	Bronze.
	Seat	Stainless steel, metal to metal.
	Stem	Stainless steel.
	Plug	Stainless steel.
	Packing	Spring loaded EPDM and TFE.
	Disc	None.
ANSI Pressure Class		250 psig (1723 kPa).
Max. Inlet Pressure Steam		150 psig (1034 kPa).
Allowable Control Media Temperature		20 to 400 °F (-7 to 205 °C).
Differential Pressure psi (kPa)		
	Water or Steam	35 (241). 50 (345).
Close-Off Rating		ANSI III (0.1% leakage).

Two-Way Normally Closed Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two Position	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma	Voltage Vac
1/2	0.4 (0.34)	250 (1723)	VA-7283-801-4-01	—	—	120
			VA-7283-804-4-01	VF-7283-804-4-01	VS-7283-804-4-01	24
	1.3 (1.1)		VA-7283-801-4-02	—	—	120
			VA-7283-804-4-02	VF-7283-804-4-02	VS-7283-804-4-02	24
	2.2 (1.9)		VA-7283-801-4-03	—	—	120
			VA-7283-804-4-03	VF-7283-804-4-03	VS-7283-804-4-03	24
	4.4 (3.8)		VA-7283-801-4-04	—	—	120
			VA-7283-804-4-04	VF-7283-804-4-04	VS-7283-804-4-04	24
3/4	5.5 (4.7)	200 (1379)	VA-7283-801-4-05	—	—	120
			VA-7283-804-4-05	VF-7283-804-4-05	VS-7283-804-4-05	24
	7.5 (6.5)		VA-7283-801-4-06	—	—	120
			VA-7283-804-4-06	VF-7283-804-4-06	VS-7283-804-4-06	24
1	10 (8.6)	90 (620.5)	VA-7283-801-4-07	—	—	120
			VA-7283-804-4-07	VF-7283-804-4-07	VS-7283-804-4-07	24
	14 (12)		VA-7283-801-4-08	—	—	120
			VA-7283-804-4-08	VF-7283-804-4-08	VS-7283-804-4-08	24
1-1/4	20 (17.3)	60 (413.5)	VA-7283-801-4-09	—	—	120
			VA-7283-804-4-09	VF-7283-804-4-09	VS-7283-804-4-09	24
1-1/2	28 (21.2)	35 (241)	VA-7283-801-4-10	—	—	120
			VA-7283-804-4-10	VF-7283-804-4-10	VS-7283-804-4-10	24
2	40 (34.6)	20 (138)	VA-7283-801-4-11	—	—	120
			VA-7283-804-4-11	VF-7283-804-4-11	VS-7283-804-4-11	24
Higher Close-Off						
1-1/4	20 (17.3)	150 (1034)	VA-7283-592-4-09			120
			VA-7283-593-4-09	VF-7283-593-4-09	VS-7283-593-4-09	24
1-1/2	28 (21.2)	100 (689.5)	VA-7283-592-4-10	—	—	120
			VA-7283-593-4-10	VF-7283-593-4-10	VS-7283-593-4-10	24
2	40 (34.6)	65 (448)	VA-7283-592-4-11	—	—	120
			VA-7283-593-4-11	VF-7283-593-4-11	VS-7283-593-4-11	24

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

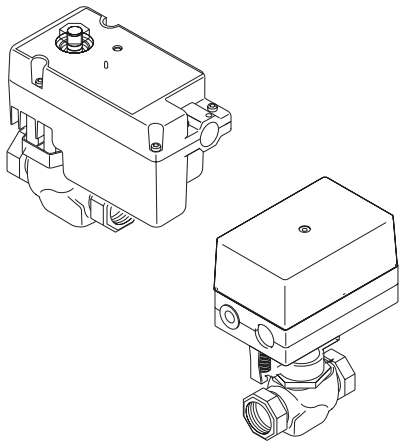


Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
592	VA	MA51-7200	120 Vac, 2-Position	177	14	211	82
593	VA	MA51-7203	24 Vac, 2-Position	177	14	211	82
593	VF	MF51-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	211	82
593	VS	MS51-7203	24 Vac, 2-10 Vdc Input[a]	198 to 199	63 to 66	211	82
801	VA	MA51-7100	120 Vac, 2-Position	177	14	210	80
804	VA	MA51-7103-100	24 Vac, 2-Position	177	14	210	80
804	VF	MF51-7103-100	24 Vac, 3-Wire Floating	185 to 186	32 to 35	210	80
804	VS	MS51-7103-100	24 Vac, 2-10 Vdc Input[a]	197	60 to 62	210	80

[a] Reversible control signal.

7000 Series Bronze Globe Valves with Stainless Steel Trim
Two-Way Non-Spring Return



1/2 to 2 in. Screwed NPT

Two-Way Non-Spring Return Stem Up Open

Flow Type		Modified linear.
Material	**Body**	Bronze.
	Seat	Stainless steel.
	Stem	Stainless steel.
	Plug	Stainless steel.
	Packing	Spring loaded EPDM and TFE.
	Disc	Teflon.
ANSI Pressure Class		250 psig (1723 kPa).
Max. Inlet Pressure Steam		100 psig (690 kPa).
Allowable Control Media Temperature		20 to 340 °F (-7 to 171 °C).
Differential Pressure (psig (kPa)		
	Water or Steam	35 (241).
Close-Off Rating		ANSI IV (0.01% leakage).

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Three Wire Floating 24 Vac	Proportional[a] 0-10, 2-10 Vdc or 4-20 ma
1/2	0.4 (0.34)	130 (896)	VF-7253-255-4-01	VS-7253-256-4-01
		250 (1723)	VF-7253-265-4-01	—
	1.3 (1.1)	130 (896)	VF-7253-255-4-02	VS-7253-256-4-02
		250 (1723)	VF-7253-265-4-02	—
	2.2 (1.9)	130 (896)	VF-7253-255-4-03	VS-7253-256-4-03
		250 (1723)	VF-7253-265-4-03	—
	4.4 (3.8)	130 (896)	VF-7253-255-4-04	VS-7253-256-4-04
		250 (1723)	VF-7253-265-4-04	—
3/4	5.5 (4.7)	80 (551)	VF-7253-255-4-05	VS-7253-256-4-05
		170 (1172)	VF-7253-265-4-05	—
	7.5 (6.5)	80 (551)	VF-7253-255-4-06	VS-7253-256-4-06
		170 (1172)	VF-7253-265-4-06	—
1	10 (8.6)	40 (276)	VF-7253-255-4-07	VS-7253-256-4-07
		80 (551)	VF-7253-265-4-07	—
		100 (689)	—	VS-7253-505-4-07
	14 (12)	40 (276)	VF-7253-255-4-08	VS-7253-256-4-08
		80 (551)	VF-7253-265-4-08	—
		100 (689)	—	VS-7253-505-4-08
1-1/4	20 (17.3)	25 (172)	VF-7253-255-4-09	VS-7253-256-4-09
		50 (345)	VF-7253-265-4-09	—
		60 (144)	—	VS-7253-505-4-09
1-1/2	28 (21.2)	33 (227)	VF-7253-265-4-10	—
		40 (276)	—	VS-7253-505-4-10
2	40 (34.6)	20 (138)	—	VS-7253-505-4-11

[a] Factory proportional control signal is direct-acting. An increase in control signal will close a stem up open valve.

Size in.	Cv (K_{vs})	Close-Off Pressure psig (kPa)	Three Wire Floating 24 Vac	Proportional[a] 0-10 Vdc or 4-20ma
Higher Close Off				
1-1/4	20 (17,3)	100 (689)	—	VS-7253-506-4-09
		150 (1034)	VF-7253-301-4-09	VS-7253-422-4-09
1-1/2	28 (21.2)	70 (482)	—	VS-7253-506-4-10
		100 (689)	VF-7253-301-4-10	VS-7253-422-4-10
		40 (276)	—	VS-7253-506-4-11
2	40 (34.6)	50 (345)	VF-7253-301-4-11	VS-7253-422-4-11
Highest Close Off				
2	40 (34.6)	80 (551)	VF-7253-508-4-11	VS-7253-508-4-11

[a] Factory proportional control signal is direct-acting. An increase in control signal will close a stem up open valve.

Vx-7253-xxx-4-xx

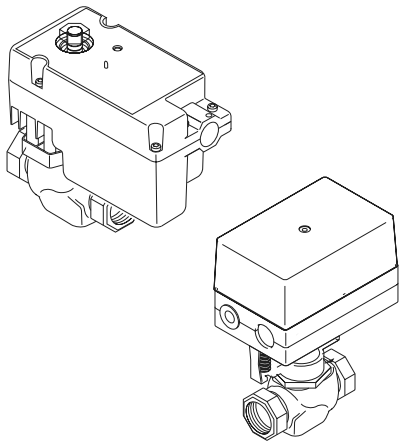
Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
255	VF	MF-22303	24 Vac, 3-Wire Floating	177	15	209	78
256	VS	MS-22353	24 Vac, 2-10 Vdc Control	187 to 188	38 to 39	209	78
265	VF	MF-23303	24 Vac, 3-Wire Floating [a]	177	15	209	78
301	VF	MF-63103	24 Vac, 3-Wire Floating	177	16	209	79
422	VS	MF-63123-411	24 Vac,4-20 mA Input[b]	186	36	209	79
505	VS	MS41-6043	24 Vac, 0-10 Vdc Control[b]	192	49 to 50	208	76
506	VS	MS41-6083	24 Vac, 0-10 Vdc Input	192	49 to 50	208	76
508	VF	MF41-6153	24 Vac, 3-Wire Floating	179	20	212	84
508	VS	MS41-6153	24 Vac, 2-10 Vdc Input[b]	193	51 to 52	212	84

[a] Requires a control with time out.

[b] Reversible control signal.

7000 Series Bronze Globe Valves with Stainless Steel Trim (Metal Seat)
Two-Way Non-Spring Return



1/2 to 2 in. Screwed NPT

Two-Way Non-Spring Return Stem Up Open

Flow Type		Modified linear.
Material	**Body**	Bronze.
	Seat	Stainless steel, metal to metal.
	Stem	Stainless steel.
	Plug	Stainless steel.
	Packing	Spring loaded EPDM and TFE.
	Disc	None.
ANSI Pressure Class		250 psig (1723 kPa).
Max. Inlet Pressure Steam		150 psig (1034 kPa).
Allowable Control Media Temperature		20 to 400 °F (-7 to 205 °C).
Differential Pressure (psig (kPa)		
	Water	35 (241).
	Steam	50 (345).
Close-Off Rating		ANSI III (0.1% leakage).

Size in.	Cv (K_{VS})	Close-Off Pressure psi (kPa)	Three Wire Floating 24 Vac	Proportional[a] 2-10 Vdc or 4-20 ma
1/2	0.4 (0.34)	130 (896)	VF-7273-255-4-01	VS-7273-256-4-01
		250 (1723)	VF-7273-265-4-01	—
	1.3 (1.1)	130 (896)	VF-7273-255-4-02	VS-7273-256-4-02
		250 (1723)	VF-7273-265-4-02	—
	2.2 (1.9)	130 (896)	VF-7273-255-4-03	VS-7273-256-4-03
		250 (1723)	VF-7273-265-4-03	—
	4.4 (3.8)	130 (896)	VF-7273-255-4-04	VS-7273-256-4-04
		250 (1723)	VF-7273-265-4-04	—
3/4	5.5 (4.7)	80 (551)	VF-7273-255-4-05	VS-7273-256-4-05
		170 (1172)	VF-7273-265-4-05	—
	7.5 (6.5)	80 (551)	VF-7273-255-4-06	VS-7273-256-4-06
		170 (1172)	VF-7273-265-4-06	—
1	10 (8.6)	40 (276)	VF-7273-255-4-07	VS-7273-256-4-07
		80 (551)	VF-7273-265-4-07	—
		100 (689)	—	VS-7273-505-4-07
	14 (12)	40 (276)	VF-7273-255-4-08	VS-7273-256-4-08
		80 (551)	VF-7273-265-4-08	—
		100 (689)	—	VS-7273-505-4-08
1-1/4	20 (17.3)	25 (172)	VF-7273-255-4-09	VS-7273-256-4-09
		50 (345)	VF-7273-265-4-09	—
		60 (144)	—	VS-7273-505-4-09
1-1/2	28 (21.2)	33 (227)	VF-7273-265-4-10	—
		40 (276)	—	VS-7273-505-4-10
2	40 (34.6)	20 (138)	—	VS-7273-505-4-11

[a] Factory proportional control signal is direct-acting. An increase in control signal will close a stem up open valve.

Size in.	Cv (K_{vs})	Close-Off Pressure psig (kPa)	Three Wire Floating 24 Vac	Proportional[a] Vdc or 4-20ma
Higher Close Off				
1-1/4	20 (17,3)	100 (689)	—	VS-7273-506-4-09
		150 (1034)	VF-7273-301-4-09	VS-7273-422-4-09
1-1/2	28 (21.2)	70 (483)	—	VS-7273-506-4-10
		100 (689)	VF-7273-301-4-10	VS-7273-422-4-10
2	40 (34.6)	40 (276)	—	VS-7273-506-4-11
		50 (345)	VF-7273-301-4-11	VS-7273-422-4-11
Highest Close Off				
2	40 (34.6)	80 (551)	VF-7273-508-4-11	VS-7273-508-4-11

[a] Factory proportional control signal is direct-acting. An increase in control signal will close a stem up open valve.

Vx-7273-xxx-4-xx

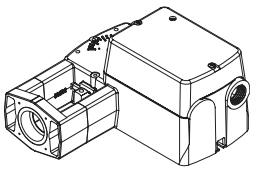
Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 56 thru 59)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
255	VF	MF-22303	24 Vac, 3-Wire Floating	177	15	209	78
256	VS	MS-22353	24 Vac, 2-10 Vdc Control	187 to 188	38 to 39	209	78
265	VF	MF-23303	24 Vac, 3-Wire Floating [a]	177	15	209	78
301	VF	MF-63103	24 Vac, 3-Wire Floating	177	16	209	79
422	VS	MF-63123-411	24 Vac,4-20 mA Input[b]	186	36	209	79
505	VS	MS41-6043	24 Vac, 0-10 Vdc Control[b]	192	49 to 50	208	76
506	VS	MS41-6083	24 Vac, 0-10 Vdc Input	192	49 to 50	208	76
508	VF	MF41-6153	24 Vac, 3-Wire Floating	179	20	212	84
508	VS	MS41-6153	24 Vac, 2-10 Vdc Input[b]	193	51 to 52	212	84

[a] Requires a control with time out.

[b] Reversible control signal.

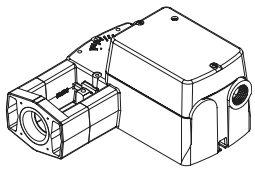
Mx51-7103 Series (804)
TAC DuraDrive®
24 Vac
105 lb (467 N)



Specifications

Connection:
3 ft. (0.9 m) Plenum cable
Housing:
Polymer, NEMA 2
Dimensions:
6-5/16 x 6-3/4 x 3-1/2
(160 x 170 x 90 mm)
Position Indicator:
Visual indicator
Override:
Manual
Control Signal:
MA51-7103-100: Two-position SPST
MF51-7103-100: Floating
MS51-7103-100: 2-10 Vdc
The control signal is factory set for direct action. It can be changed in the field for reverse action.
Voltage:
24 Vac ± 20%
20-30 Vdc
VA @ 60 Hz
MA51-7103-100: 5.3
MF51-7103-100: 6.9
MS51-7103-100: 6.6
Watts @ 60 Hz:
4.7
Auxiliary Switch:
None
Timing (seconds):
Powered <60
Spring return <15
Feedback
MF51 and MS51: 2-10 Vdc
General Instructions:
F-27169

MA51-7100 Series (801)
TAC DuraDrive®
120 Vac
105 lb (467 N)



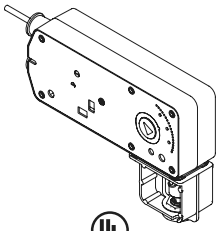
Specifications

Connection:
3 ft. (0.9 m) Plenum cable
Housing:
Polymer, NEMA 2
Dimensions:
6-5/16 x 6-3/4 x 3-1/2 (160 x 170 x 90 mm)
Position Indicator:
Visual indicator
Override:
Manual
Control Signal:
MA51-7103-100: Two-position SPST
Voltage:
120 Vac ± 10%
VA @ 60 Hz
7.9
Watts @ 60 Hz:
6.2
Auxiliary Switch:
None
Timing (seconds):
Powered approx. 44
Spring return approx. 19
Feedback
None
General Instructions:
F-27169

Mx51-7203 Series (593)

TAC DuraDrive®

24 Vac
220 lb (979 N)



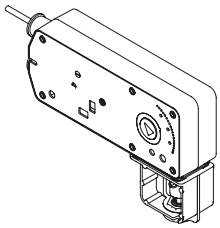
Specifications

Connection:
3 ft. (0.9 m) Plenum cable
Housing:
Aluminum diecast, NEMA 1
Dimensions:
7 x 10-5/8 x 2-9/16 (178 x 270 x 65 mm)
Position Indicator:
Visual indicator
Override:
Manual
Control Signal:
MA51-7203: Two-position SPST
MF51-7203: Floating
MS51-7203: 2-10 Vdc
The control signal is factory set for direct action. It can be changed in the field to reverse action.
Voltage:
24 Vac ± 20%
22-30 Vdc
VA @ 60 Hz
9.7
Watts @ 60 Hz:
MA51-7203: 7.5
MF51-7203: 7.1
MS51-7203: 7.5
Auxiliary Switch:
None
Timing (seconds):
Powered <100
Spring return <35
Feedback:
MA51 and MF51: None
MS51: 2-10 Vdc only
General Instructions:
F-27120

MA51-7200 Series (592)

TAC DuraDrive®

120 Vac
220 lb (979 N)

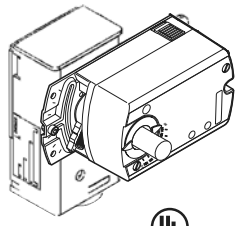


Specifications

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

7000 Series Globe Valve Actuator Product Range
Non-Spring Return

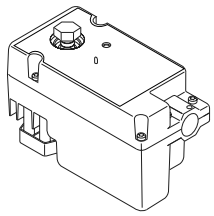
Mx41-60x3 Series (505) (506) TAC DuraDrive®
24 Vac
100 lb (445 N)



Specifications

Connection:
3 ft. (0.9 m) 18 AWG, plenum rated
Housing:
NEMA 2
Dimensions:
7-5/8 x 2-3/4 x 2-3/8 (194 x 70 x 60 mm)
Linkage:
AV-611 (included)
Position Indicator:
Visual indicator
Override:
Manual
Control Signal:
MF41-6043 (505): 3-Wire Floating
MS41-6043 (505): 0-10 Vdc
MS41-6083- (506): 0-10 Vdc
Voltage:
24 Vac + 20% - 15%
VA@60 HZ
MF41-6043: 2.3
MS41-6043: 3.3
MS41-6083: 3.3
Watts @ 60 Hz:
3.3
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
Mx41-6043: 90
Mx41-6083: 125
General Instructions:
F-27214

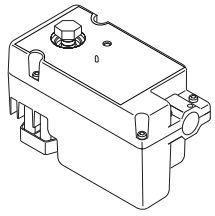
Mx-223x3 Series (256)(255)
24 Vac
45 lb (200 N)



Specifications

Connection:
4 ft. (1.2 m) Color-coded 18 AWG
Housing:
Aluminum diecast, NEMA 1
Dimensions:
3-5/16 x 3 x 5-9/16 (84 x 76 x 141 mm)
Override:
Manual
Control Signal:
MF-22303 (255): Floating
MS-22353 (256) : 4-10 Vdc
4-20 mA
Voltage:
24 Vac + 20% - 15%
VA@60 HZ
MF-22303 (255): 1.5
MF-22353 (256): 4
Feedback:
MS-22353. 2-10 Vdc
Auxiliary Switch:
None
Timing (seconds):
126 per 1/2"
General Instructions:
F-26264 (MF)
F-26263 (MS)

Mx-23303 Series (265)
24 Vac
80 lb (355 N)



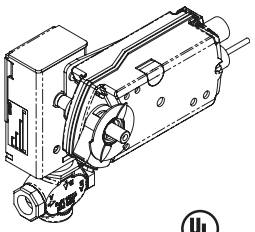
Specifications

Connection:
4 ft. (1.2 m) Color-coded 18 AWG
Housing:
Aluminum diecast, NEMA 1
Dimensions:
3-5-16 x 3 x 5-9/16 (84 x 76 x 141 mm)
Override:
Manual
Control Signal:
MF-23303: Floating
Voltage:
24 Vac + 20% - 15%
VA@60 HZ
1.5
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
126 per 1/2"
General Instructions:
F-26752

MX41-6153 Series (508)

TAC DuraDrive®

24 Vac
330 lb (1468 N)

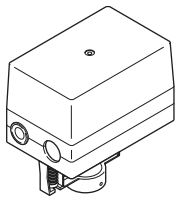


Specifications

Connection:
3 ft 18 AWG
Housing:
Aluminum diecast, NEMA 1
Dimensions:
7-5/8 x 3-1/4 x 2-2/3 (194 x 83 x 68 mm)
Linkage:
AV-611 (included)
Override:
Manual
Control Signal:
MF41-6153: Floating
MS41-6153: 0-10 Vdc
Voltage:
24 Vac +20% -15%
VA@60 HZ
MF41-6153: 3
MS41-6153: 5
Watts @ 60 Hz:
3
Feedback:
MF41-6153: None
MS41-6153: 0-10 Vdc
Auxiliary Switch:
None
Timing (seconds):
125
General Instructions:
F-27215

MF-63103 Series (301) MF-63123-411 Series (422)

24 Vac
210 lb (935 N)



Specifications

Connection:
Coded screw terminals
Housing:
Aluminum diecast, NEMA 1
Dimensions:
6 x 5-5/8 x 3-5/8 (152 x 143 x 92 mm)
Override:
Manual
Control Signal:
MF-63103 (301): Floating
MF-63123-411 (422): 4-20 mA
Voltage:
24 Vac +10% -15%
VA@60 HZ
6
Watts @ 60 Hz:
7
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
120
General Instructions:
F-24732

2-1/2" to 6" Cast Iron Globe Valves

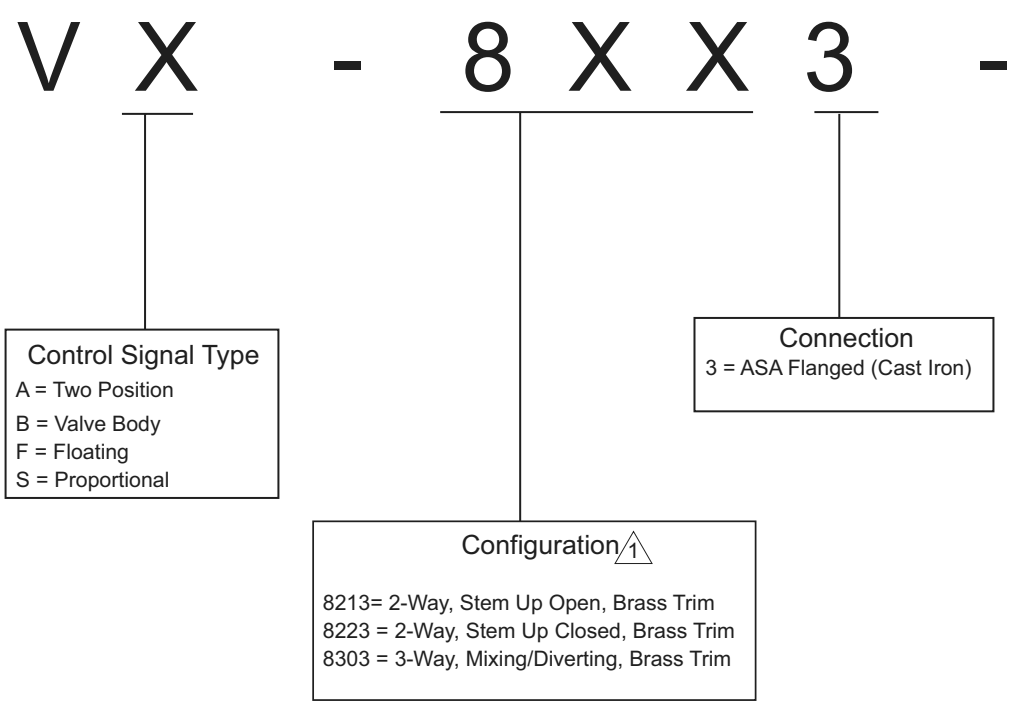
TAC VA,VF, and VS-8000 series valve assemblies are complete actuator/valve assemblies that accept two-position, floating, and proportional electric/electronic control signals. Great for the control of chilled water, hot water, or low pressure steam. These valve assemblies consist of electric or electronic valve actuators either direct-coupled or linked to a 2-1/2 to 6 inch 2-way or 3-way valve body with ASA flanged end connections.

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 2-1/2 to 6 in., ASA 125 flanged.
- 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.
- Expanded temperatures 20 to 281 °F (-6 to 138.3 °C).
- ISO 9001:2000 Certified Quality Management System.
- 2-1/2 to 6" balanced cast iron valves.
- High close-offs with small actuators.
- Designed and made in USA.

Table of Contents

8000 Series Globe



1 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	
		Valve Stem	Flow
Vx-8213-xxx-5-P	2-Way Stem Up Open	Up	Open
Vx-8223-xxx-5-P	2-Way Stem Up Closed	Up	Closed
Vx-8303-xxx-5-P	3-Way Mixing	Up	Flow B to AB
Vx-8303-xxx-5-P	3-Way Diverting	Up	Flow AB to B

Valve Assemblies

XXX - X - XX

Actuator Code

Pattern Code
5 = ASA Globe Flanged (Cast Iron)

Port Code

Actuator Code				
Model	**Code**	**Normal Position**	**Voltage**	**Type**
Two-Position				
MA40-7170	**572**	SR Up	120 Vac	2-Position
MA40-7173	**576**	SR Up	24 Vac	2-Position
MA41-7150	**552**	SR Up	120 Vac	2-Position
MA41-7153	**556**	SR Up	24 Vac	2-Position
MA61-7200	**595**	SR Up	120 Vac	2-Position
MA61-7203	**596**	SR Up	24 Vac	2-Position
Floating				
MF-63103	**301**	NSR	24 Vac	3-Wire Floating
MF41-6343	**516**	NSR	24 Vac	3-Wire Floating
MF41-7153	**556**	SR	24 Vac	3-Wire Floating
MF40-7173	**576**	SR	24 Vac	3-Wire Floating
MF61-7203	**596**	SR	24 Vac	3-Wire Floating
Proportional				
MF-63123-411[a]	**422**	NSR	24 Vac	4 to 20 mA
MS40-7170	**572**	SR	120 Vac	2 to 10 Vdc
MS41-6340	**512**	NSR	120 Vac	2 to 10 Vdc
MS41-7153	**556**	SR	24 Vac	2 to 10 Vdc
MS40-7173	**576**	SR	24 Vac	2 to 10 Vdc
MS61-7203	**596**	SR	24 Vac	2 to 10 Vdc

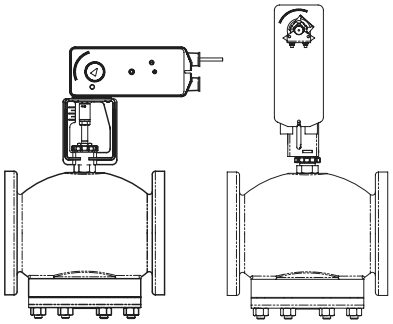
SR = Spring Return
NSR = Non-Spring Return

	2-Way		3-Way	
Size	C_V	P Code	Cv	P Code
2-1/2"	56.0	12	80[b]	12
	56.0	12	95[c]	12
	56.0	12	115[d]	12
3"	85.0	13	110[b]	13
	85.0	13	120[c]	13
	85.0	13	120[d]	13
4"	145.0	14	190[e]	14
5"	240.0	15	290[e]	15
6"	370.0	16	500[e]	16

	2-Way		3-Way	
Size	Kvs	P Code	Kvs	P Code
2-1/2"	48	12	69[b]	12
	48	12	82[c]	12
	48	12	99[d]	12
3"	74	13	95[b]	13
	74	13	104[c]	13
	74	13	104[d]	13
4"	125	14	164[e]	14
5"	208	15	251[e]	15
6"	320	16	433[e]	16

[a] MF-63103 with MFC-420 card added.
[b] Mixing configuration, flow from either A or B to AB.
[c] Diverting configuration, flow AB to A.
[d] Diverting configuration, flow AB to B.
[e] All flow configurations.

Note: For detailed information on the 8000 Series Globe Valves, refer to publication F-27199.



2-1/2 to 6 in. Flanged
Two-Way Spring Return
Stem Up Normally Open

Flow Type		Equal %.
Material	**Body**	Cast iron.
	Seat	Forged brass.
	Stem	Stainless steel.
	Plug	Forged brass.
	Packing	Spring loaded TFE/EPDM.
	Seat Ring	EPDM.
ANSI Pressure Class		125 psig (862 kPa).
Max. Inlet Pressure Steam		35 psig (240 kPa).
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Close-Off Pressure		125 psi (862 kPa).
Close-Off Rating		ANSI IV (0.01% leakage).

Two-Way Normally Open Assemblies.

Size in.	Cv (K_{vs})	Close-Off Pressure/ Max. Operating Differential Pressure[a] psi (kPa)	Stem Up	Two Position	Floating	Proportional[b]	Input Voltage Vac
2-1/2	56 (48)	125/35 (862/241)	Open	VA-8213-595-5-12	—	—	120
				VA-8213-596-5-12	VF-8213-596-5-12	VS-8213-596-5-12	24
3	85 (74)			VA-8213-595-5-13	—	—	120
				VA-8213-596-5-13	VF-8213-596-5-13	VS-8213-596-5-13	24
4	145 (125)			VA-8213-595-5-14	—	—	120
				VA-8213-596-5-14	VF-8213-596-5-14	VS-8213-596-5-14	24
5	240 (208)			VA-8213-595-5-15	—	—	120
				VA-8213-596-5-15	VF-8213-596-5-15	VS-8213-596-5-15	24
6	370 (320)	125/22 (862/152)		VA-8213-552-5-16	—	—	120
				VA-8213-556-5-16	VF-8213-556-5-16	VS-8213-556-5-16	24
		125/25 (862/172)		VA-8213-572-5-16	—	—	120
				VA-8213-576-5-16	VF-8213-576-5-16	VS-8213-576-5-16	24

[a] Close-off pressure is the maximum pressure differential across the valve in the closed position. Maximum operating differential pressure is the maximum differential across the valve in the open position. Do not exceed either value.

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

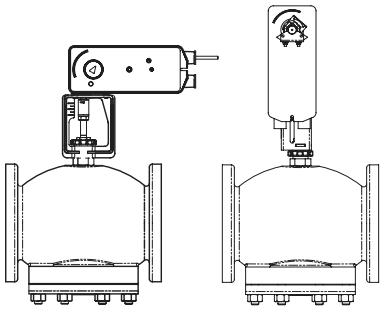
Vx-8213-xxx-5-1x

Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 73 thru 75)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
552	VA	MA41-7150	120 Vac, 2-Position	176	12	216	92
556	VA	MA41-7153	24 Vac, 2-Position	176	12	216	92
556	VF	MF41-7153	24 Vac, 3-Wire Floating	179 to 181	21 to 24	216	92
556	VS	MS41-7153	24 Vac, 2-10 Vdc Input[a]	180, 194 to 195	22, 55 to 57	216	92
572	VA	MA40-7170	120 Vac, 2-Position, NEMA 4[b]	175	10	214	88
576	VA	MA40-7173	24 VAc, 2-Position, NEMA 4[b]	175	10	214	88
576	VF	MF40-7173	24 Vac, 3-Wire, Floating, NEMA 4[b]	178	17 to 18	214	88
576	VS	MS40-7173	24 Vac, 2-10 Vdc Input, NEMA 4[b]	190 to 192	45 to 48	214	88
595	VA	MA61-7200	120 Vac, 2-Position	177	14	217	94
596	VA	MA61-7203	24 Vac, 2- Position	177	14	217	94
596	VF	MF61-7203	24 Vac, 3-Wire Floating	185	32 to 35	217	94
596	VS	MS61-7203	24, Vac, 2-10 Vdc Input[a]	197 to 199	61, 63 to 66	217	94

[a] Reversable control signal.

[b] NEMA 4 with customer supplied water tight connector.



2-1/2 to 6 in. Flanged

Two-Way Spring Return
Stem Up Normally Closed

Flow Type		Equal %.
Material	**Body**	Cast iron.
	Seat	Forged brass.
	Stem	Stainless steel.
	Plug	Forged brass.
	Packing	Spring loaded TFE/EPDM.
	Seat Ring	EPDM.
ANSI Pressure Class		125 psig (862 kPa).
Max. Inlet Pressure Steam		35 psig (240 kPa) .
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Close-Off Pressure		125 psi (862 kPa).
Close-Off Rating		ANSI IV (0.01% leakage).

Two-Way Normally Closed Assemblies.

Size in.	Cv (K_{vs})	Close-Off Pressure/ Max. Operating Differential Pressure[a] psi (kPa)	Stem Up	Two Position	Floating	Proportional[b]	Input Voltage Vac
2-1/2	56 (48)	125/35 (862/241)	Closed	VA-8223-595-5-12	—	—	120
				VA-8223-596-5-12	VF-8223-596-5-12	VS-8223-596-5-12	24
3	85 (74)			VA-8223-595-5-13	—	—	120
				VA-8223-596-5-13	VF-8223-596-5-13	VS-8223-596-5-13	24
4	145 (125)			VA-8223-595-5-14	—	—	120
				VA-8223-596-5-14	VF-8223-596-5-14	VS-8223-596-5-14	24
5	240 (208)			VA-8223-595-5-15	—	—	120
				VA-8223-596-5-15	VF-8223-596-5-15	VS-8223-596-5-15	24
6	370 (320)	125/22 (862/152)		VA-8223-552-5-16	—	—	120
				VA-8223-556-5-16	VF-8223-556-5-16	VS-8223-556-5-16	24
		125/25 (862/172)		VA-8223-572-5-16	—	VS-8223-572-5-16	120
				VA-8223-576-5-16	VF-8223-576-5-16	VS-8223-576-5-16	24

[a] Close-off pressure is the maximum pressure differential across the valve in the closed position. Maximum operating differential pressure is the maximum differential across the valve in the open position. Do not exceed either value.

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

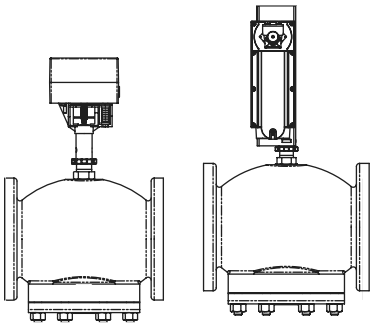
Vx-8223-xxx-5-1x

Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model (Reference pages 73 thru 75)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
552	VA	MA41-7150	120 Vac, 2-Position	176	12	216	92
556	VA	MA41-7153	24 Vac, 2-Position	176	12	216	92
556	VF	MF41-7153	24 Vac, 3-Wire Floating	179 to 181	21 to 24	216	92
556	VS	MS41-7153	24 Vac, 2-10 Vdc Input[a]	180, 194 to 195	22, 55 to 57	216	92
572	VA	MA40-7170	120 Vac, 2-Position, NEMA 4[b]	175	10	214	88
572	VS	MS40-7170	120 Vac, 2-10 Vdc Input, NEMA 4[b]	190	43 to 44	214	88
576	VA	MA40-7173	24 VAc, 2-Position, NEMA 4[b]	175	10	214	88
576	VF	MF40-7173	24 Vac, 3-Wire, Floating, NEMA 4[b]	178	17 to 18	214	88
576	VS	MS40-7173	24 Vac, 2-10 Vdc Input, NEMA 4[b]	190 to 192	45 to 48	217	94
595	VA	MA61-7200	120 Vac, 2-Position	177	14	217	94
596	VA	MA61-7203	24 Vac, 2- Position	177	14	217	94
596	VF	MF61-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	217	94
596	VS	MS61-7203	24, Vac, 2-10 Vdc Input[a]	197 to 199	61, 63 to 66	217	94

[a] Reversable control signal.

[b] NEMA 4 with customer supplied water tight connector.



2-1/2 to 6 in. Flanged
Two-Way Non-Spring Return
Stem Up Open

Flow Type		Equal %.
	Body	Cast iron.
	Seat	Forged brass.
	End Connections	ASA flanged.
Material	**Stem**	Stainless steel.
	Plug	Forged brass.
	Packing	Spring loaded TFE/EPDM.
	Seat Ring	EPDM.
ANSI Pressure Class		125 psig (862 kPa).
Max. Inlet Pressure Steam		35 psig (240 kPa).
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Close-Off Pressure		125 psi (862 kPa).
Close-Off Rating		ANSI IV (0.01% leakage).

Size in.	Cv (K_{vs})	Close-Off Pressure/ Max. Operating Differential Pressure[a] psi (kPa)	Stem Up	Floating	Proportional[b]
2-1/2	56 (48)	125/35 (862/241)	Open	VF-8213-301-5-12	VS-8213-422-5-12
3	85 (74)			VF-8213-301-5-13	VS-8213-422-5-13
4	145 (125)			VF-8213-301-5-14	VS-8213-422-5-14
5	240 (208)			VF-8213-301-5-15	VS-8213-422-5-15
6	370 (320)			VF-8213-516-5-16	VS-8213-516-5-16
				—	VS-8213-512-5-16

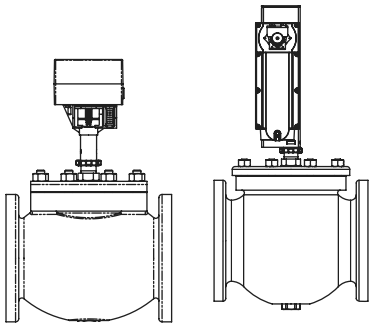
[a] Close-off pressure is the maximum pressure differential across the valve in the closed position. Maximum operating differential pressure is the maximum differential across the valve in the open position. Do not exceed either value.

[b] Factory proportional control signal is direct-acting. An increase in control signal will close a stem up open valve.

Actuator Code Table.

Vx-8213-xxx-5-1x

Actuator Codes	Model Prefix	Actuator Model (Reference pages 73 thru 75)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
301	VF	MF-63103	24 Vac 3-Wire Floating	177	16	218	96
422	VS	MF-63123-411	24 Vac 4 to 20 mA Input	186	36	218	96
512	VS	MS41-6340	120 Vac 2 to 10 Vdc Input	193 to 194	53 to 54	215	90
516	VF	MF41-6343	24 Vac 3-Wire Floating	178	17	215	90
516	VS	MS41-6343	24 Vac 4 to 20 mA input	193 to 194	53 to 54	215	90



2-1/2 to 6 in. Flanged

Two-Way Non-Spring Return Stem Up Closed

Flow Type		Equal %.
Material	**Body**	Cast iron.
	Seat	Forged brass.
	End Connections	ASA flanged.
	Stem	Stainless steel.
	Plug	Forged brass.
	Packing	Spring loaded TFE/EPDM.
	Seat Ring	EPDM.
ANSI Pressure Class		125 psig (862 kPa).
Max. Inlet Pressure Steam		35 psig (240 kPa).
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Close-Off Pressure		125 psi (862 kPa).
Close-Off Rating		ANSI IV (0.01% leakage).

Size in.	Cv (K_{vs})	Close-Off Pressure/ Max. Operating Differential Pressure[a] psi (kPa)	Stem Up	Floating	Proportional[b]
2-1/2	56 (48)	125/35 (862/241)	Closed	VF-8223-301-5-12	VS-8223-422-5-12
3	85 (74)			VF-8223-301-5-13	VS-8223-422-5-13
4	145 (125)			VF-8223-301-5-14	VS-8223-422-5-14
5	240 (208)			VF-8223-301-5-15	VS-8223-422-5-15
6	370 (320)			VF-8223-516-5-16	VS-8223-516-5-16
				—	VS-8223-512-5-16

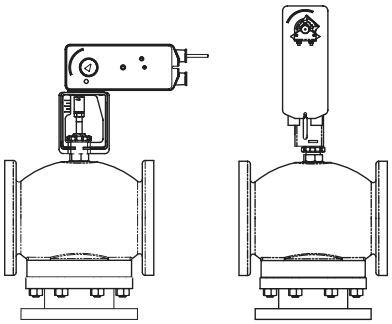
[a] Close-off pressure is the maximum pressure differential across the valve in the closed position. Maximum operating differential pressure is the maximum differential across the valve in the open position. Do not exceed either value.

[b] Factory proportional control signal is direct-acting. An increase in control signal will open a stem up closed valve.

Actuator Code Table.

Vx-8223-xxx-5-1x

Actuator Codes	Model Prefix	Actuator Model (Reference pages 73 thru 75)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
301	VF	MF-63103	24 Vac 3-Wire Floating	177	16	218	96
422	VS	MF-63123-411	24 Vac 4 to 20 mA Input	186	36	218	96
512	VS	MS41-6340	120 Vac 2 to 10 Vdc Input	193 to 194	53 to 54	215	90
516	VF	MF41-6343	24 Vac 3-Wire Floating	178	17	215	90
516	VS	MS41-6343	24 Vac 4 to 20 mA input	193 to 194	53 to 54	215	90



2-1/2 to 6 in. Flanged
Three-Way Spring Return
Stem Up
Mixing Closed A to AB
Diverting Closed AB to A

Flow Type		Equal %.
Material	**Body**	Cast iron.
	Seat	Forged brass.
	Stem	Stainless steel.
	Plug	Forged brass.
	Packing	Spring loaded TFE/EPDM.
	Seat Ring	EPDM.
ANSI Pressure Class		125 psig (862 kPa).
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Close-Off Pressure		125 psi (862 kPa).
Close-Off Rating		ANSI III (0.1% leakage).

Size in.	Cv (M) Mixing/ (D) Diverting (K_{vs})	Close-Off Pressure/ Max. Operating Differential Pressure[a] psi (kPa)	Stem Up	Two Position	Floating	Proportional[b]	Input Voltage Vac
2-1/2	80 (69) m	35/35 (241/241)	A Port Closed	VA-8303-595-5-12	—	—	120
				VA-8303-596-5-12	VF-8303-596-5-12	VS-8303-596-5-12	24
	95 (82) d/ A port			VA-8303-595-5-12	—	—	120
				VA-8303-596-5-12	VF-8303-596-5-12	VS-8303-596-5-12	24
	115 (99) d/ B port			VA-8303-595-5-12	—	—	120
				VA-8303-596-5-12	VF-8303-596-5-12	VS-8303-596-5-12	24
3	110 (95) m			VA-8303-595-5-13	—	—	120
				VA-8303-596-5-13	VF-8303-596-5-13	VS-8303-596-5-13	24
	120 (104) d			VA-8303-595-5-13	—	—	120
				VA-8303-596-5-13	VF-8303-596-5-13	VS-8303-596-5-13	24
4	190 (164) m or d			VA-8303-595-5-14	—	—	120
				VA-8303-596-5-14	VF-8303-596-5-14	VS-8303-596-5-14	24
5	290 (251) m or d			VA-8303-595-5-15	—	—	120
				VA-8303-596-5-15	VF-8303-596-5-15	VS-8303-596-5-15	24
6	500 (433) m or d	35/15 m 35/11 d (241/103 m) (241/75.8 d)		VA-8303-552-5-16	—	—	120
				VA-8303-556-5-16	VF-8303-556-5-16	VS-8303-556-5-16	24
		35/16 m 35/12 d (241/110 m) (241/82.7 d)		VA-8303-572-5-16	—	VS-8303-572-5-16	120
				VA-8303-576-5-16	VF-8303-576-5-16	VS-8303-576-5-16	24

[a] Close-off pressure is the maximum pressure differential across the valve in the closed position. Maximum operating differential pressure is the maximum differential across the valve in the open position. Do not exceed either value.

[b] Factory proportional control signal is direct-acting. An increase in control signal will open A and AB while closing B port.

Vx-8303-xxx-5-1x

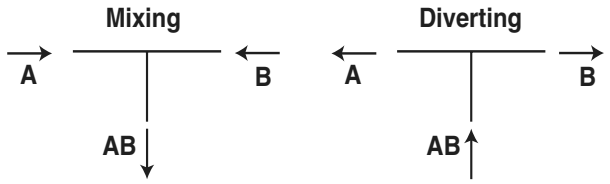
Actuator Code Table.

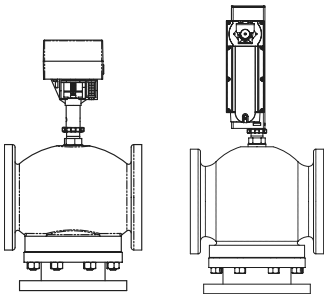
Actuator Codes	Model Prefix	Actuator Model (Reference pages 73 thru 75)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
552	VA	MA41-7150	120 Vac, 2-Position	176	12	216	93
556	VA	MA41-7153	24 Vac, 2-Position	176	12	216	93
556	VF	MF41-7153	24 Vac, 3-Wire Floating	179 to 181	21 to 24	216	93
556	VS	MS41-7153	24 Vac, 2-10 Vdc Input[a]	180, 194 to 195	22, 55 to 57	216	93
572	VA	MA40-7170	120 Vac, 2-Position, NEMA 4[b]	175	10	214	89
572	VS	MS40-7170	120 Vac, 2-10 Vdc Input, NEMA 4[b]	190	43 to 44	214	89
576	VA	MA40-7173	24 VAc, 2-Position, NEMA 4[b]	175	10	214	89
576	VF	MF40-7173	24 Vac, 3-Wire, Floating, NEMA 4[b]	178	17 to 18	214	89
576	VS	MS40-7173	24 Vac, 2-10 Vdc Input, NEMA 4[b]	190 to 192	45 to 48	214	89
595	VA	MA61-7200	120 Vac, 2-Position	177	14	217	94
596	VA	MA61-7203	24 Vac, 2- Position	177	14	217	94
596	VF	MF61-7203	24 Vac, 3-Wire Floating	185 to 186	32 to 35	217	94
596	VS	MS61-7203	24, Vac, 2-10 Vdc Input[a]	197 to 199	61, 63 to 66	217	94

[a] Reversable control signal.

[b] With customer supplied water tight connector.

Three-Way Flow Patterns





2-1/2 to 6 in. Flanged

Three-Way Non-Spring Return

Stem Up

Mixing Closed A to AB
Diverting Closed AB to A

Flow Type		Equal %.
Material	**Body**	Cast iron.
	Seat	Forged brass.
	Stem	Stainless steel.
	Plug	Forged brass.
	Packing	Spring loaded TFE/EPDM.
	Seat Ring	EPDM.
ANSI Pressure Class		125 psig (862 kPa).
Allowable Control Media Temperature		20 to 281 °F (-7 to 138 °C).
Close-Off Pressure		35 psi (241 kPa).
Close-Off Rating		ANSI III (0.1% leakage).

Size in.	Cv (M) Mixing/ (D) Diverting (K_{vs})	Close-Off Pressure/ Max. Operating Differential Pressure[a] psi (kPa)	Stem Up	Three-Wire Floating	Proportional[b] 2-10 Vdc Input	Input Voltage Vac
2-1/2	80 (69) m 95 (82) d/A port 115 (99) d/ B port	35/35 (241/241)	A Port Closed	VF-8303-301-5-12	VS-8303-422-5-12	24
3	110 (95) m 120 (104) d			VF-8303-301-5-13	VS-8303-422-5-13	
4	190 (164) m or d			VF-8303-301-5-14	VS-8303-422-5-14	
5	290 (251) m or d			VF-8303-301-5-15	VS-8303-422-5-15	
6	500 (433) m or d	32/28 (222/193)		VF-8303-516-5-16	VS-8303-516-5-16	24
				—	VS-8303-512-5-16	120

[a] Close-off pressure is the maximum pressure differential across the valve in the closed position. Maximum operating differential pressure is the maximum differential across the valve in the open position. Do not exceed either value.

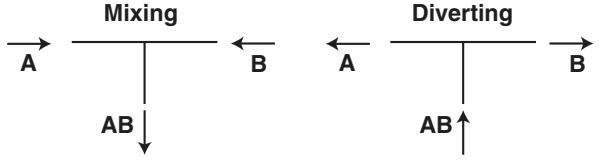
[b] Factory proportional control signal is direct-acting. An increase in control signal will open A and AB while closing B port.

Actuator Code Table.

Vx-8303-xxx-5-1x

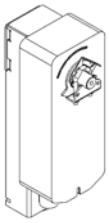
Actuator Codes	Model Prefix	Actuator Model (Reference pages 73 thru 75)	Description	Wiring Diagrams		Dimension Information	
				Page	Figure	Page	Figure
301	VF	MF-63103	24 Vac, 3-Wire, Floating	177	16	218	97
422	VS	MF-63123-411	24 Vac 4-20 mA Input	186	36	218	97
512	VS	MS41-6340	120 Vac 2-10 Vdc Input	193 to 194	53 to 54	215	91
516	VF	MF41-6343	24 Vac 3-Wire Floating	178	17	215	91
516	VS	MS41-6343	24 Vac 4-20 mA Input	193 to 194	53 to 54	215	91

Three-Way Flow Patterns



Mx41-7153 Series (556) TAC DuraDrive™

24 Vac
118 lb (525 N)

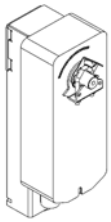


Specifications

Connection:
3 ft. (0.9 m) Appliance cable
Housing:
Aluminum diecast, NEMA 2 with conduit connector in the down position
Dimensions:
10-1/2 x 4 x 3-1/2 (267 x 110 x 89 mm)
Linkage:
AV-609 (included)
Position Indicator:
Visual indicator
Override:
Manual
Motor Type:
Brushless
Rotation:
With left side out 0 to 90° CW is standard from factory.
Control Signal:
MA41-7153: Two-position SPST
MF41-7153: Floating
MS41-7153: 2-10 Vdc
The control signal is factory set for direct action. It can be changed in the field to reverse action.
Voltage:
24 Vac ± 20%
22-30 Vdc
VA@60 HZ
9.7
Feedback:
MA41 and MF41: None
MS41: 2-10 Vdc
Auxiliary Switch:
None
Timing (seconds):
Powered <190
Spring return <30
General Instructions:
F-26642

MA41-7150 Series (552) TAC DuraDrive™

120Vac
118 lb (525 N)

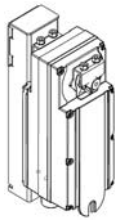


Specifications

Connection:
3 ft. (0.9 m) Appliance cable
Housing:
Aluminum diecast, NEMA 2 with conduit connector in the down position
Dimensions:
10-1/2 x 4 x 3-1/2 (267 x 100 x 89 mm)
Linkage:
AV-609 (included)
Position Indicator:
Visual indicator
Override:
Manual
Motor Type:
Brushless
Rotation:
With left side out 0 to 90° CW is standard from factory.
Control Signal:
MA41-7150: Two-position SPST
Voltage:
120 Vac ± 10%
VA@60 HZ
10.0
Watts @ 60 Hz:
8.4
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
Powered <190
Spring return <30
General Instructions:
F-26642

Mx40-7173 Series (576) TAC DuraDrive™

24 Vac
122 lb (543 N)

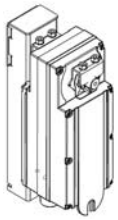


Specifications

Connection:
2 ft. (61 cm) Appliance cable
Housing:
Aluminum diecast NEMA 1, NEMA 4 with customer supplied water tight connector
Dimensions:
10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage:
AV-609 (included)
Position Indicator:
Visual indicator
Override:
None
Rotation:
With left side out 0 to 90° CW is standard from factory.
Control Signal:
MA41-7173: Two-position SPST
MF41-7173: Floating
MS41-7173: 2-10 Vdc/4-20 mA
Voltage:
24 Vac ± 20%
VA@60 HZ
MA40-7173: 9.6
MF40-7173: 10.0
MS40-7173: 9.4
Watts @ 60 Hz:
MA40-7173: 5.4
MF40-7173: 5.5
MS40-7173: 5.4
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
Powered <145
Spring return <145
General Instructions:
MA40-7173: F-26742
MF40-7173: F-26749
MS40-7173: F-26748

8000 Series Globe Valve Actuator Product Range
Spring Return

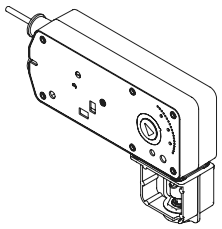
Mx40-7170 Series (572) TAC DuraDrive™
120 Vac
122 lb (543 N)



Specifications

Connection:
2 ft. (61 cm) Appliance cable
Housing:
Aluminum diecast NEMA 1, NEMA 4 with customer supplied liquid tight connector or plug
Dimensions:
10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage:
AV-609 (included)
Position Indicator:
Visual Indicator
Override:
None
Rotation:
With left side out 0 to 90° CW is standard from factory.
Control Signal:
MA40-7170: Two-position SPST
MS40-7170: 2-10 Vdc/4-20 mA
Voltage:
120 Vac ±10%
VA@60 HZ
MA40-7170: 11.4
MS40-7170: 11.4
Watts @ 60 Hz:
MA40-7170: 7.2
MS40-7170: 7.2
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
Powered <145
Spring return <145
General Instructions:
MA40-7170: F-26742
MS40-7170: F-26748

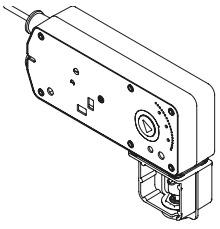
Mx61-7203 Series (596) TAC DuraDrive™
24 Vac
220 lb (979 N)



Specifications

Connection:
3 ft. (0.9 m) Plenum cable
Housing:
Diecast, NEMA 1
Dimensions:
9-9/16 x 10-5/8 x 2-9/16
(243 x 270 x 65 mm)
Position Indicator:
Visual indicator
Override:
Manual
Control Signal:
MA61-7203: Two-position SPST
MF61-7203: Floating
MS61-7203: 2-10 Vdc
The control signal is factory set for direct action. It can be changed in the field to reverse action.
Voltage:
24 Vac ± 20%
22-30 Vdc
VA@60 HZ
9.7
Watts @ 60 Hz:
7.7
Feedback:
MA61 and MF61: None
MS61: 2-10 Vdc only
Auxiliary Switch:
None
Timing (seconds):
Powered <190
Spring return <40
General Instructions:
F-27120

MA61-7200 Series (595) TAC DuraDrive™
120 Vac
220 lb (979 N)

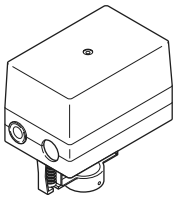


Specifications

Connection:
3 ft. (0.9 m) Plenum cable
Housing:
Diecast, NEMA 1
Dimensions:
9-9/16 x 10-5/8 x 2-9/16
(243 x 270 x 65 mm)
Position Indicator:
Visual indicator
Override:
Manual
Control Signal:
Two-position SPST
Voltage:
120 Vac ± 10%
VA@60 HZ
10.0
Watts @ 60 Hz:
8.4
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
Powered <190
Spring return <40
General Instructions:
F-27120

MF-63103 (301)
MF-63123-411 Series (422)

24 Vac
210 lb (935 N)

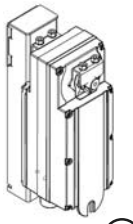


Specifications

Connection:
Coded screw terminals
Housing:
Aluminum diecast, NEMA 1
Dimensions:
6 x 5-5/8 x 3-5/8 (152 x 143 x 92 mm)
Override:
Manual
Control Signal:
MF-63103 (301): Floating
MF-63123-411 (422): 4-20 mA
Voltage:
24 Vac +10% -15%
VA@60 HZ
6
Watts @ 60 Hz:
7
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
120
General Instructions:
F-24732

Mx41-6343 Series
(516)
TAC DuraDrive™

24 Vac
444 lb (1975 N)

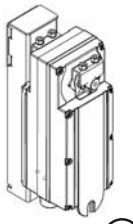


Specifications

Connection:
24-inch (61 cm) Color-coded wires
Housing:
Aluminum diecast, NEMA 4 with customer supplied water tight connector or plug
Dimensions:
10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage:
AV-609 (included)
Position Indicator:
Visual scale
Override:
Manual
Rotation:
With left side out 0 to 90° CW is standard from factory.
Control Signal:
MF41-6343: Floating
MS41-6343: 2-10 Vdc
Voltage:
24 Vac ± 20%
VA@60 HZ
MF41-6343: 7.1
MS41-6343: 8
Watts @ 60 Hz:
MF41-6343: 3.8
MS41-6343: 8
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
<145
General Instructions:
F-26744
F-26745

MS41-6340 Series
(512)
TAC DuraDrive™

120 Vac
444 lb (1975 N)



Specifications

Connection:
24-inch (61 cm) Color-coded wires
Housing:
Aluminum diecast, NEMA 4 with customer supplied water tight connector or plug
Dimensions:
10-7/8 x 4 x 4 (276 x 100 x 100 mm)
Linkage:
AV-609 (included)
Position Indicator:
Visual scale
Override:
Manual
Rotation:
With left side out 0 to 90° CW is standard from factory.
Control Signal:
MS41-6340: 2-10 Vdc
Voltage:
120 Vac ± 10%
VA@60 HZ
8
Watts @ 60 Hz:
10
Feedback:
None
Auxiliary Switch:
None
Timing (seconds):
<145
General Instructions:
F-26745

Flow Curves and Rangeability

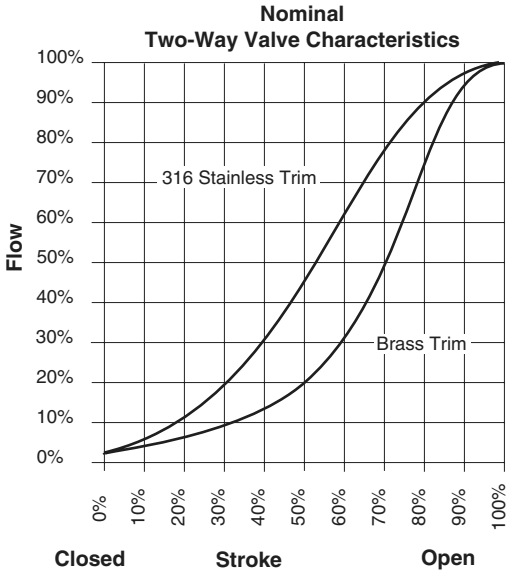
Flow Curves

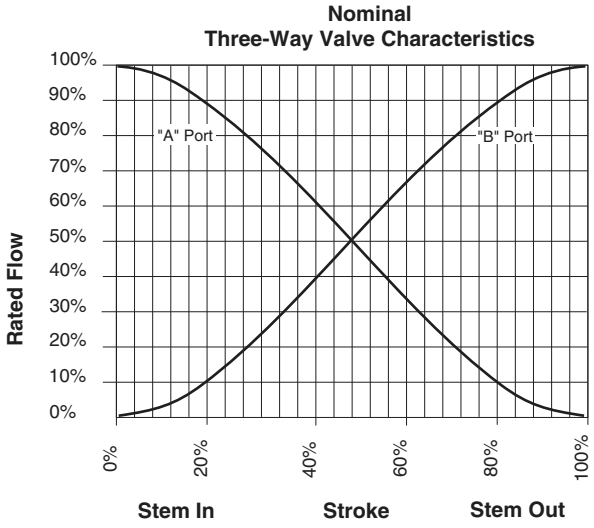
Flow curves shown below are representative of all sizes.

All valve plugs have lower gain when nearly closed to enhance control at low demand. Mixing and diverting valves are nominally linear. Separate curves shown for “A” or “B” ports are not directly additive. Total flow with both ports contributing is rated C_v.

Two-way valves with brass trim are nominally equal percentage in the composition disc types and normally used for water and low pressure steam.

Two-way valves with stainless trim are nominally linear in the TFE and metal-to-metal disc types, and normally used for higher temperature water and steam.





Rangeability

Rangeability is defined as the ratio of rated to minimum controllable flow.

For mixing and diverting valves, control begins as soon as plug displacement allows flow. Thus, Three-way valve rangeability normally exceeds 500:1 which is the reciprocal of 0.2% nominal leakage.

For Two-way valves, modulation occurs when plug displacement allows flow through the area between the plug and the port. The rangeability value is achieved by accurately machining the plug and port diameters for appropriate clearance. The following are nominal values.

TABLE 1. VB-7000 and VB-8000 Two-way Valve Rangeability.

Nominal Size		Port Code (P)	Nominal Ratio
Standard	Metric		
1/2”	15 mm	1	5:1
		2	15:1
		3	25:1
		4	40:1
3/4”	20 mm	5	50:1
		6	60:1
1”	25 mm	7	60:1
		8	75:1
1-1/4”	32 mm	9	75:1
1-1/2”	40 mm	10	75:1
2”	50 mm	11	75:1
2-1/2”	65 mm	12	100:1
3”	80 mm	13	100:1
4”	—	14	100:1
5”	—	15	100:1
6”	—	16	100:1

Close-off Ratings (Unless Otherwise Specified)

Nominal actuator close-off ratings are based on ANSI IV (0.01% leakage) with EPDM discs and PTFE discs in steam applications. Metal-to-metal trim such as brass three-way and high temperature stainless are designed for ANSI III (0.1% leakage). Seat leakage for reduced port versions of metal-to-metal seats may match the full port versions allowing up to 1% on the 0.4 C_v plugs.

Valve Packing Life

Valve packings are designed to provide many years of useful life before they must be replaced.

The actual life, under the standard specified conditions, will vary — depending on the frequency of valve cycle and the condition of the fluid controlled. The more frequently the valve is cycled and the more contaminated the fluid is with dirt and harsh chemicals, the shorter the life of the packing.

Water and Steam System Guidelines for Valves

All heating and cooling systems are susceptible to valve and system problems caused by improper water treatment and system storage procedures.

These guidelines are to help you avoid valve and water system problems resulting from improperly treated water or storage procedures in your cooling and hot water systems, and to obtain maximum life from your TAC valves.

Durability of valve stems and packings is dependent on maintaining non-damaging water conditions. Inadequate water treatment or filtration, not in accordance with chemical supplier/ASHRAE handbook recommendations, can result in corrosion, scale, and abrasive particle formation. Scale and particulates can result in stem and packing scratches; and can adversely affect packing life and other parts of the hydronic system.

To maintain non-damaging conditions, clean the system prior to start up. Use a nitrite or molybdate based treatment program. Use filtration equipment where needed. Properly store off-line systems and monitor water treatment results using corrosion test coupons.

Follow the advice of a water treatment professional. Consult **EN-205 Water and Steam System Guidelines, Engineering Information, F-26080**, for further details.

TABLE 1. Flow Conversion Factors.

U.S.	Metric	U.K.
Cv	Kvs	Cvs
US Gal/min	m3/hr	UK gal/min
1.0	0.865	0.833
1.156	1.0	0.962
1.201	1.039	1.0

TABLE 2. Pressure Conversion.

1.0 psi	=	6.894 kPa		
1.0 kPa	=	0.145 psi		
100 kPa	=	14.5 psi	=	1.0 Bar

Globe Valve Sizing Information for Water

GENERAL INFORMATION REQUIRED

1. Fluid controlled:
   - Chilled water, hot water, or steam.
2. Temperature limitations:
   - Fluid, maximum, and minimum.
   - Ambient for actuator.
3. Pressure:
   - Static.
   - Close-off — Fully closed.
   - Differential — Pressure drop across the valve in the fully open position.
4. End fitting:
   - Union end.
   - Globe screwed.
   - Flared.
   - Flanged.
   - Flangeless.
5. For return to a known position (i.e., normally open or normally closed): Specify 200 or 300 Series spring return actuator.
6. Dimensional data.
7. C_v (flow coefficient) requirement is calculated from flow rate and differential pressure. Refer to formulas and tables.

For additional sizing and selection background information, refer to:

- CA-28 Control Valve Sizing, F-13755.
- CA-27 Three-Way Valves, F-12348.
- CA-15 Control of High Temperature Water Systems, F-7638.
- CA-13 Fundamentals of Hot Water Pump Installation, F-7767.

RECOMMENDED PRESSURE DROPS FOR WATER

Refer to specific valve data in this catalog for maximum allowable pressure drops and close-off ratings.

A. Two-Position Valves

Two-position valves are normally selected “line size” to keep pressure drop at a minimum. If desirable to reduce valve below line size, then 10% of “available pressure” normally used to select valve.

B. Proportional Two-Way Valves

Usually selected to take a pressure drop equal to at least 50% of the “available pressure” (i.e., the pump pressure differential available between supply and return mains with design flow at the valve location). 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), but never less than 5 psi (34 kPa).

When design temperature drop is less than 60°F (33°C) for conventional systems, higher pressure drops across the valve are needed for good control results. Refer to the following table.

The calculated C_v usually falls between two valve sizes. If the pressure drop of the smaller is acceptable for the application, select the smaller valve for better control.

Conventional Heating Systems

Coil Temp. Drop °F (°C)	Recom. Valve Pressure Drop[a] (% of Available Pressure)	Valve Pressure Drop
60 (33) or more	50%	1 x load drop
40 (22)	66%	2 x load drop
20 (11)	75%	3 x load drop

[a] Recommended minimum pressure drop — 5 psi (34 kPa).

Secondary Circuits with Small Booster Pumps

50% of Available Pressure Difference (Equal to drop through load, or 50% of booster pump head)

C. Proportional Three-Way Valves

Recommended Pressure Drop — Bypass Application: 50% of “available pressure”, or equal to pressure drop through the load at full flow.

Three-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 two-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.

Three-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.

CAVITATION LIMITATIONS ON VALVE PRESSURE DROP

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

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

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

$Pm = 0.5 (P_1 - Pv)$

Pm = Maximum allowable pressure drop

P_1 = Absolute inlet pressure (psia)

Pv = Absolute vapor pressure (refer to Vapor Pressure of Water Table or Steam Table)

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

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

Pm = 0.5 [(18 + 14.7) - 11.53] = 10.6 psi

(Vapor pressure of 200°F water is 11.53 psi)

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.

C_v (FLOW COEFFICIENT) DETERMINATION

The Water Valve Sizing Table or Slide Rule (refer to the following page) is based on the following formula:

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

Where: C_v = Coefficient of flow

C_v is defined as the flow in GPM with ýP = 1 psi

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

ΔP = Differential pressure in psi (pressure drop)

Other forms of this formula are:

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

and

$$GPM = Cv\sqrt{\Delta P}$$

These formulas can be used to calculate one of the three quantities if the other two are known.

Flow coefficients (C_v's) for valve bodies are given on valve specification pages of this catalog.

Metric (SI) Units

Kvs is defined as the flow in m^3/h with ΔP = 100 kPa (1.0 Bar) with the valve completely open.

Flow is calculated using the following formula:

$$m^3/h = kvs\sqrt{\Delta P}$$

Where:

ΔP = Differential pressure (pressure drop) in Bar (1 Bar = 100 kPa)

m^3/h = Cubic metres/hour (15.6 °C)

Pressure drop is calculated using the following form of the above formula:

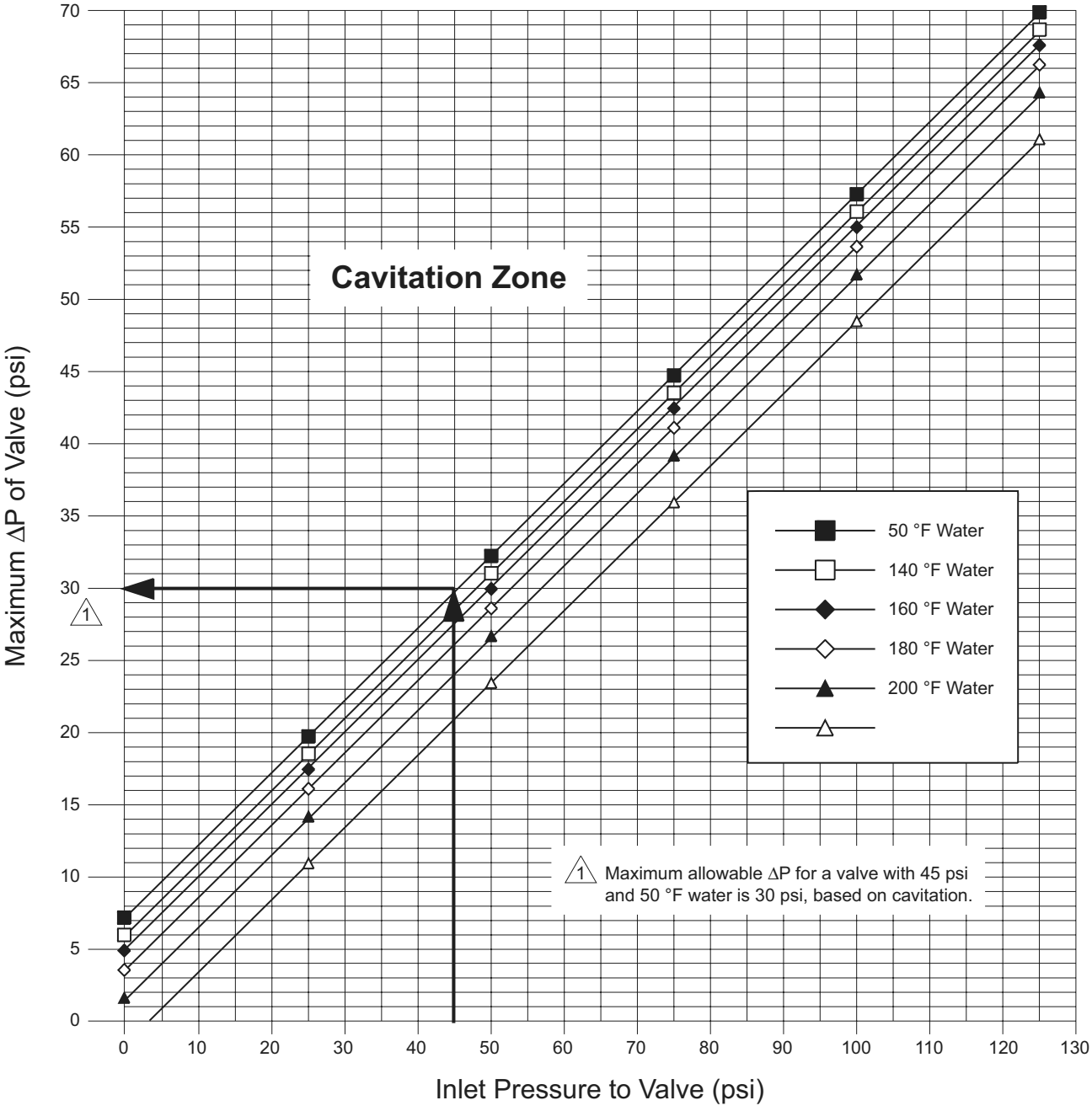
$$\Delta P = \left(\frac{m^3/h}{kvs}\right)^2$$

These formulas can be used to calculate one of the three quantities if the other two are known.

TABLE 1. Vapor Pressure of Water Table.

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

Globe Valve Sizing Information for Water



Maximum Allowable Differential Pressure (ΔP) for Water Valves.

WATER VALVE SIZING TABLES

WATER CAPACITY IN GALLONS PER MINUTE										
	Differential Pressure (psi) ΔP									
Cv	2	3	4	5	10	15	20	25	30	35
0.10	0.14	0.17	0.20	0.22	0.32	0.39	0.45	0.5	0.5	0.6
0.22	0.31	0.38	0.44	0.49	0.70	0.85	0.98	1.1	1.2	1.3
0.30	0.42	0.52	0.60	0.67	0.95	1.16	1.34	1.5	1.6	1.8
0.4	0.57	0.69	0.80	0.89	1.26	1.55	1.79	2.0	2.2	2.4
0.75	1.06	1.30	1.50	1.68	2.37	2.90	3.35	3.8	4.1	4.4
0.9	1.27	1.56	1.80	2.01	2.85	3.49	4.02	4.5	4.9	5.3
0.95	1.34	1.65	1.9	2.1	3.0	3.7	4.2	4.8	5.2	5.6
1.0	1.41	1.73	2.0	2.2	3.2	3.9	4.5	5.0	5.5	5.9
1.3	1.84	2.3	2.6	2.9	4.1	5.0	5.8	6.5	7.1	7.7
1.4	1.98	2.4	2.8	3.1	4.4	5.4	6.3	7.0	7.7	8.3
1.5	2.12	2.6	3.0	3.4	4.7	5.8	6.7	7.5	8.2	8.9
1.75	2.47	3.0	3.5	3.9	5.5	6.8	7.8	8.8	9.6	10.4
1.9	2.69	3.3	3.8	4.2	6.0	7.4	8.5	9.5	10.4	11.2
2.0	2.8	3.5	4.0	4.5	6.3	7.7	8.9	10	11	12
2.2	3.1	3.8	4.4	4.9	7.0	8.5	9.8	11	12	13
2.8	4.0	4.8	5.6	6.3	8.9	10.8	12.5	14	15	17
3.25	4.6	5.6	6.5	7.3	10.3	12.6	14.5	16	18	19
3.6	5.1	6.2	7.2	8.0	11	14	16	18	20	21
4.0	5.7	6.9	8.0	8.9	13	15	18	20	22	24
4.3	6.1	7.4	8.6	9.6	14	17	19	22	24	25
4.4	6.2	7.6	8.8	9.8	14	17	20	22	24	26
5.0	7.1	8.7	10	11	16	19	22	25	27	30
5.4	7.6	9.4	11	12	17	21	24	27	30	32
5.5	7.8	9.5	11	12	17	21	25	28	30	33
6.2	8.8	11	12	14	20	24	28	31	34	37
7.5	11	13	15	17	24	29	34	38	41	44
8.5	12	15	17	19	27	33	38	43	47	50
10	14	17	20	22	32	39	45	50	55	59
12	17	21	24	27	38	46	54	60	66	71
14	20	24	28	31	44	54	63	70	77	83
15	21	26	30	34	47	58	67	75	82	89
16	23	28	32	36	51	62	72	80	88	95
20	28	35	40	45	63	77	89	100	110	118
21	30	36	42	47	66	81	94	105	115	124
22	31	38	44	49	70	85	98	110	120	130
28	40	48	56	63	89	108	125	140	153	166
30	42	52	60	67	95	116	134	150	164	177
34	48	59	68	76	108	132	152	170	186	201
40	57	69	80	89	126	155	179	200	219	237
41	58	71	82	92	130	159	183	205	225	243
43	61	74	86	96	136	167	192	215	236	254
47	66	81	94	105	149	182	210	235	257	278
48	68	83	96	107	152	186	215	240	263	284
49	69	85	—	—	—	—	—	—	—	—
51	72	88	102	114	161	198	228	255	279	302
56	79	97	112	125	177	217	250	280	307	331

WATER CAPACITY IN GALLONS PER MINUTE										
	Differential Pressure (psi) ΔP									
Cv	2	3	4	5	10	15	20	25	30	35
63	89	109	126	141	199	244	282	315	345	373
65	92	113	130	145	206	252	291	325	356	385
67	95	116	134	150	212	259	300	335	367	396
68	96	118	136	152	215	263	304	340	372	402
78	110	135	—	—	—	—	—	—	—	—
84	119	145	168	188	266	325	376	420	460	497
95	120	147	170	190	269	329	380	425	466	503
91	129	158	182	203	288	352	407	455	498	538
100	141	173	200	224	316	387	447	500	548	592
101	143	175	202	226	319	391	452	505	553	598
108	153	187	216	241	342	418	483	540	592	639
132	187	—	—	—	—	—	—	—	—	—
133	188	—	—	—	—	—	—	—	—	—
145	205	251	290	324	459	562	648	725	794	858
170	240	294	340	380	538	658	760	850	931	1006
177	250	307	354	396	560	686	792	885	969	1047
235	332	407	470	525	743	910	1051	1175	1287	1390
250	354	433	500	559	791	968	1118	1250	1369	1479
257	363	—	—	—	—	—	—	—	—	—
270	382	—	—	—	—	—	—	—	—	—
290	410	502	580	648	917	1123	1297	1450	1588	1716
350	495	606	700	783	1107	1356	1565	1750	1917	2071
389	550	674	778	870	1230	1507	1740	1945	2131	2301
390	552	675	780	872	1233	1510	1744	1950	2136	2307
429	607	—	—	—	—	—	—	—	—	—
525	742	—	—	—	—	—	—	—	—	—
632	894	—	—	—	—	—	—	—	—	—
820	1160	—	—	—	—	—	—	—	—	—
1125	1591	—	—	—	—	—	—	—	—	—
1320	1867	—	—	—	—	—	—	—	—	—
1758	2486	—	—	—	—	—	—	—	—	—
1900	2687	—	—	—	—	—	—	—	—	—
2533	3582	—	—	—	—	—	—	—	—	—
2850	4031	—	—	—	—	—	—	—	—	—
3035	4292	—	—	—	—	—	—	—	—	—
4118	5824	—	—	—	—	—	—	—	—	—
5279	7466	—	—	—	—	—	—	—	—	—
6584	9311	—	—	—	—	—	—	—	—	—
9626	13613	—	—	—	—	—	—	—	—	—

Note: Consult valve body and assembly specifications for pressure, pressure drop, temperature, and other limitations. When using pipe reducers, use effective Cv and formula to calculate flow rather than nominal Cv shown in this table.

RECOMMENDED PRESSURE DROPS FOR STEAM

Refer to specific valve data in this catalog for maximum allowable drops and close-off ratings.

A. Two Position Zone Valves and Direct Radiator Valves

Use a minimum of 10% of inlet pressure (psig).

B. Proportional Control Valves

Low pressure (15 psig or less): ΔP of 80% of gauge inlet pressure.

When Cv required is between two valve sizes and closer to the smaller valve size, re-size for Cv using 42% of the absolute inlet pressure as pressure drop. Use the valve that is larger than the calculated Cv.

For steam pressures greater than 15 psig: 42% of the absolute inlet pressure.

When Cv required is between two valve sizes, select the larger size.

Note: Do not size steam valves on higher system pressures using a pressure drop greater than 42% of the absolute inlet pressure.

Cv (FLOW COEFFICIENT) DETERMINATION

The Steam Capacity Tables or Slide Rule (refer to this and the following two pages) is based on the following formula:

$$Cv = \frac{QK}{3\sqrt{\Delta P \times P_2}}$$

Where: Cv = Coefficient of flow

Q = Lbs per hour of steam

ΔP = Differential pressure in psi (pressure drop)

P_2 = Outlet pressure in psia (absolute)
psig + 14.7 = psia (absolute)

K = 1 + (0.0007 x °F super-heat)

Note: K normally is 1 (K = 1 for saturated steam).

Other forms of the formula are:

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

Note: K normally is 1.

$$\Delta P = \left(\frac{QK}{3\,Cv}\right)^2 \times \frac{1}{\Delta P_2}$$

Note: K normally is 1.

$$P_2 = \left(\frac{QK}{3\,Cv}\right)^2 \times \frac{1}{\Delta P}$$

Note: K normally is 1 (K = 1 for saturated steam).

These formulas can be used to calculate one of the quantities if the others are known.

Flow coefficients (Cv's) for specific valve bodies are given on specification pages of this catalog.

STEAM CAPACITY IN POUNDS PER HOUR

Note: Table is based on saturated steam.

Inlet Pressure psig ΔP	2#		5#		10#		15#		20#		25#		40#		50#		75#		100#	
Cv	**0.2**[a]	**1.6**[b]	**0.5**[a]	**4**[b]	**1**[a]	**8**[b]	**1.5**[a]	**12**[b]	**2**[a]	**14**[b]	**2.5**[a]	**16**[b]	**4**[a]	**23**[b]	**5**[a]	**27**[b]	**7.5**[a]	**37**[b]	**10**[a]	**48**[b]
0.10	0.5	1.5	0.9	2.4	1.5	3	2.0	4	2.4	5	2.9	6	4.3	8	5.2	10	7.4	13	9.7	17
0.22	1.2	3.2	2.0	5.2	3.2	8	4.3	10	5.3	11	6.4	13	9.4	18	11.4	21	16.4	29	21.4	37
0.30	1.6	4.4	2.8	7.1	4.4	10	5.9	13	7.3	15	8.7	18	12.8	24	15.5	29	22.3	40	29.1	51
0.4	2.2	5.9	3.7	9.5	5.8	14	7.8	17	9.7	20	11.6	23	17.1	32	20.7	38	29.8	53	38.8	68
0.75	4.1	11.1	7.0	17.8	11.0	26	14.6	33	18.2	38	21.7	44	32.0	61	38.9	72	55.9	99	72.8	127
0.9	4.9	13	8.4	21	13	31	18	39	22	46	26	53	38	73	47	86	67	119	87	153
0.95	5.2	14	8.8	23	14	33	19	42	23	49	27	55	41	77	49	91	71	126	92	161
1.0	5.4	15	9.3	24	15	35	20	44	24	51	29	58	43	81	52	96	74	132	97	170
1.3	7.1	19	12	31	19	45	25	57	32	66	38	76	56	105	67	124	97	172	126	221
1.4	7.6	21	13	33	20	49	27	61	34	71	41	82	60	113	73	134	104	185	136	238
1.5	8.2	22	14	36	22	52	29	66	36	77	43	88	64	122	78	144	112	199	146	255
1.75	9.5	26	16	42	26	61	34	77	42	89	51	102	75	142	91	167	130	232	170	297
1.9	10	28	18	45	28	66	37	83	46	97	55	111	81	154	98	182	142	252	184	323
2.0	11	29	19	48	29	69	39	87	49	102	58	117	85	162	104	191	149	265	194	339
2.2	12	32	20	52	32	76	43	96	53	112	64	129	94	178	114	211	164	291	214	373
2.5	14	37	23	59	37	87	49	109	61	128	72	146	107	203	130	239	186	331	243	424
2.8	15	41	26	67	41	97	55	122	68	143	81	164	120	227	145	268	209	371	272	475
3.25	18	48	30	77	47	113	63	142	79	166	94	190	139	263	168	311	242	431	315	552
3.5	19	52	33	83	51	121	68	153	85	179	101	204	150	284	181	335	261	464	340	594
3.6	20	53	33	86	53	125	70	157	87	184	104	210	154	292	187	345	268	477	349	611
4.0	22	59	37	95	58	139	78	175	97	204	116	234	171	324	207	383	298	530	388	679
4.3	23	63	40	102	63	149	84	188	104	220	124	251	184	348	223	412	320	570	417	730
4.4	24	65	41	105	64	153	86	192	107	225	127	257	188	356	228	421	328	583	427	747
5.0	27	74	46	119	73	173	98	219	121	255	145	292	214	405	259	479	372	662	485	849
5.4	29	80	50	128	79	187	105	236	131	276	156	315	231	437	280	517	402	715	524	917
5.5	30	81	51	131	80	191	107	240	133	281	159	321	235	446	285	526	410	729	534	934
6.2	34	91	58	147	91	215	121	271	150	317	179	362	265	502	321	593	462	821	602	1052
7.0	38	103	65	166	102	243	137	306	170	357	203	409	299	567	363	670	521	927	680	1188
7.5	41	111	70	178	110	260	146	328	182	383	217	438	320	608	389	718	559	994	728	1273
8.5	46	125	79	202	124	295	166	372	206	434	246	497	363	689	441	814	633	1126	825	1443

[a] For two-position control.

[b] Proportional control.

STEAM CAPACITY IN POUNDS PER HOUR

Note: Table is based on saturated steam.

Inlet Pressure psig ΔP	2#		5#		10#		15#		20#		25#		40#		50#		75#		100#	
Cv	**0.2**[a]	**1.6**[b]	**0.5**[a]	**4**[b]	**1**[a]	**8**[b]	**1.5**[a]	**12**[b]	**2**[a]	**14**[b]	**2.5**[a]	**16**[b]	**4**[a]	**23**[b]	**5**[a]	**27**[b]	**7.5**[a]	**37**[b]	**10**[a]	**48**[b]
10	54	147	93	238	146	347	195	437	243	511	289	584	427	810	518	957	745	1325	971	1697
12	65	177	112	285	175	416	234	525	291	613	347	701	513	972	622	1149	894	1590	1165	2037
14	76	206	130	333	204	485	273	612	340	715	405	818	598	1134	726	1340	1043	1855	1359	2376
15	82	221	139	357	219	520	293	656	364	766	434	876	641	1215	777	1436	1117	1987	1456	2546
16	87	236	149	380	234	555	312	700	388	817	463	935	684	1296	829	1531	1192	2120	1553	2716
20	109	295	186	475	292	694	390	874	485	1021	579	1168	854	1620	1037	1914	1490	2649	1941	3395
21	114	310	195	499	307	728	410	918	509	1072	608	1227	897	1701	1088	2010	1564	2782	2039	3565
22	120	324	204	523	321	763	429	962	534	1124	636	1285	940	1782	1140	2106	1639	2914	2136	3734
28	153	413	260	666	409	971	546	1224	679	1430	810	1636	1196	2268	1451	2680	2086	3709	2718	4753
30	163	442	279	713	438	1040	585	1312	728	1532	868	1753	1282	2430	1555	2871	2235	3974	2912	5092
34	185	501	316	808	497	1179	663	1487	825	1736	984	1986	1453	2754	1762	3254	2533	4504	3300	5771
40	218	590	372	951	584	1387	780	1749	970	2043	1157	2337	1709	3240	2073	3829	2980	5299	3883	6790
41	223	605	381	975	599	1422	800	1793	995	2094	1186	2395	1752	3321	2125	3924	3054	5431	3980	6960
43	234	634	400	1022	628	1491	839	1880	1043	2196	1244	2512	1837	3483	2229	4116	3203	5696	4174	7299
47	256	693	437	1117	686	1630	917	2055	1140	2400	1360	2746	2008	3807	2436	4499	3501	6226	4562	7978
48	262	708	446	1141	701	1664	937	2099	1165	2451	1389	2804	2051	3888	2488	4594	3575	6359	4659	8148
49	267	723	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
51	278	752	474	1212	745	1768	995	2230	1237	2605	1475	2979	2179	4131	2643	4881	3799	6756	4951	8657
56	305	826	521	1331	818	1942	1093	2448	1359	2860	1620	3271	2392	4536	2903	5360	4171	7418	5436	9506
63	343	929	586	1498	920	2185	1229	2754	1528	3217	1823	3680	2692	5103	3265	6030	4693	8346	6116	10694
65	354	958	604	1545	949	2254	1268	2842	1577	3320	1881	3797	2777	5265	3369	6221	4842	8611	6310	11034
67	365	988	623	1593	979	2323	1307	2929	1625	3422	1938	3914	2862	5427	3473	6413	4991	8876	6504	11373
68	371	1003	632	1617	993	2358	1327	2973	1650	3473	1967	3973	2905	5508	3225	6509	5065	9008	6601	11543
78	425	1150	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
84	458	1239	781	1997	1227	2913	1639	3673	2038	4290	2430	4907	3589	6804	4354	8040	6257	11128	8154	14259
85	463	1253	790	2021	1241	2947	1658	3716	2062	4341	2459	4966	3631	6885	4406	8136	6332	11260	8251	14429
91	496	1342	846	2163	1329	3155	1776	3979	2208	4647	2633	5316	3888	7372	4717	8710	6778	12055	8834	15447
100	545	1475	930	2377	1460	3468	1951	4372	2426	5107	2893	5842	4272	8101	5183	9571	7449	13247	9707	16975
101	550	1489	939	2401	1475	3502	1971	4416	2450	5158	2922	5900	4315	8182	5235	9667	7523	13380	9804	17145
108	589	1593	1004	2568	1577	3745	2107	4722	2620	5516	3125	6309	4614	8749	5598	10337	8045	14307	10484	18333
132	719	1949	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
133	725	1961	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

[a] For two-position control.

[b] For proportional control.

Inlet Pressure psig ΔP	2#		5#		10#		15#		20#		25#		40#		50#		75#		100#	
Cv	**0.2**[a]	**1.6**[b]	**0.5**[a]	**4**[b]	**1**[a]	**8**[b]	**1.5**[a]	**12**[b]	**2**[a]	**14**[b]	**2.5**[a]	**16**[b]	**4**[a]	**23**[b]	**5**[a]	**27**[b]	**7.5**[a]	**37**[b]	**10**[a]	**48**[b]
145	790	2138	1348	3447	2118	5028	2829	6340	3518	7405	4195	8471	6195	11746	7516	13878	10801	19209	14075	24613
170	926	2507	1580	4042	2483	5895	3317	7433	4128	8682	4918	9931	7263	13771	8811	16271	12663	22520	16502	28857
177	965	2610	1645	4208	2585	6138	3454	7739	4294	9039	5121	10340	7562	14338	9174	16941	13184	23448	17182	30045
235	1281	3465	2184	5587	3432	8149	4585	10275	5701	12002	6799	13729	10040	19036	12180	22493	17505	31131	22812	39819
250	1362	3686	2324	5943	3651	8669	4878	10930	6065	12768	7233	14605	10681	20251	12958	23928	18622	33118	24268	42437
257	1401	3790	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
270	1471	3981	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
290	1580	4276	2696	6894	4235	10056	5658	12679	7036	14810	8390	16942	12389	23492	15031	27757	21602	38417	28151	49227
350	1907	5161	3253	8321	5112	12136	6829	15303	8491	17875	10126	20447	14953	28352	18141	33500	26071	46366	33975	59412
389	2120	5736	3616	9248	5681	13489	7590	17008	9438	19866	11254	22725	16619	31511	20162	37233	28976	51532	37761	66032
390	2125	5751	3625	9272	5696	13523	7609	17052	9462	19918	11283	22783	16662	31592	20214	37328	29050	51664	37858	66202
429	2338	6326	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
525	2861	7742	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
632	3444	9319	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
820	4469	12092	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1125	6131	16589	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1320	7194	19465	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1758	9581	25923	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1900	10355	28017	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2533	13804	37351	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2850	15532	42026	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3035	16540	44754	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4118	22442	60723	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5279	28769	77843	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6584	35881	97087	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9626	52459	141944	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

[a] For two-position control.

[b] For proportional control.

TAC DuraDrive VBB/VBS Series Ball Valves

Features

- Fast easy installation
- ULTEM 2200® glass filled characterizing insert.
- Close-off pressure of 130 psi (896 kPa).
- Blowout resistant stem.
- Valve body made of forged brass ASTM B283.
- Ultra low-friction seals and O-rings.
- ANSI Class IV (0.01% of Cv) shutoff.
- Available in spring and non-spring return models.
- VBB valves feature brass trim.
- VBS valves feature stainless steel trim.

ULTEM 2200® is a trademark of the General Electric Company.

The VBB/VBS Series of ball valves have been designed with the installer in mind. All of the VBB/VBS actuator offerings in this section will work with any of the VBB or VBS ball valve bodies. Any of the actuators can be installed in SECONDS with no special tools. You will find that the assemblies have a compact profile that allows easier installation and servicing in tight areas.

Flow Characterization for Proportional and Floating Control

The VBB/VBS series ball valve assemblies provide an equal percentage flow, which is achieved with the use of a flow characterizing insert made from ULTEM 2200® (Figure-1). As shown in the graph in Figure-2, a ball valve equipped with the flow insert mirrors the flow characteristic of the coil, resulting in linear heat transfer.

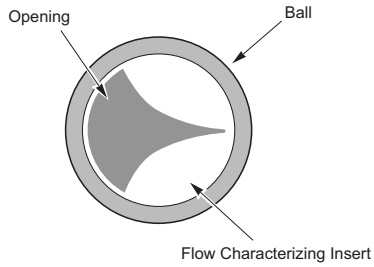


Figure 1 Flow Characterizing Insert.

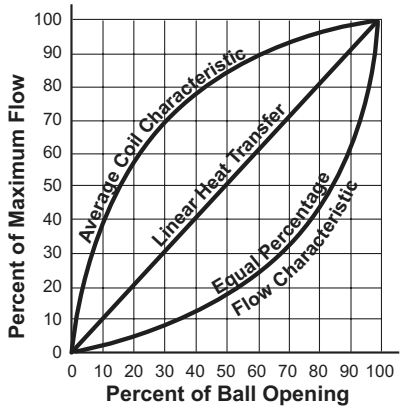


Figure 2 Equal Percentage Flow Control.

Table of Contents

VBB/VBS Ball

V B x 2 N x x

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

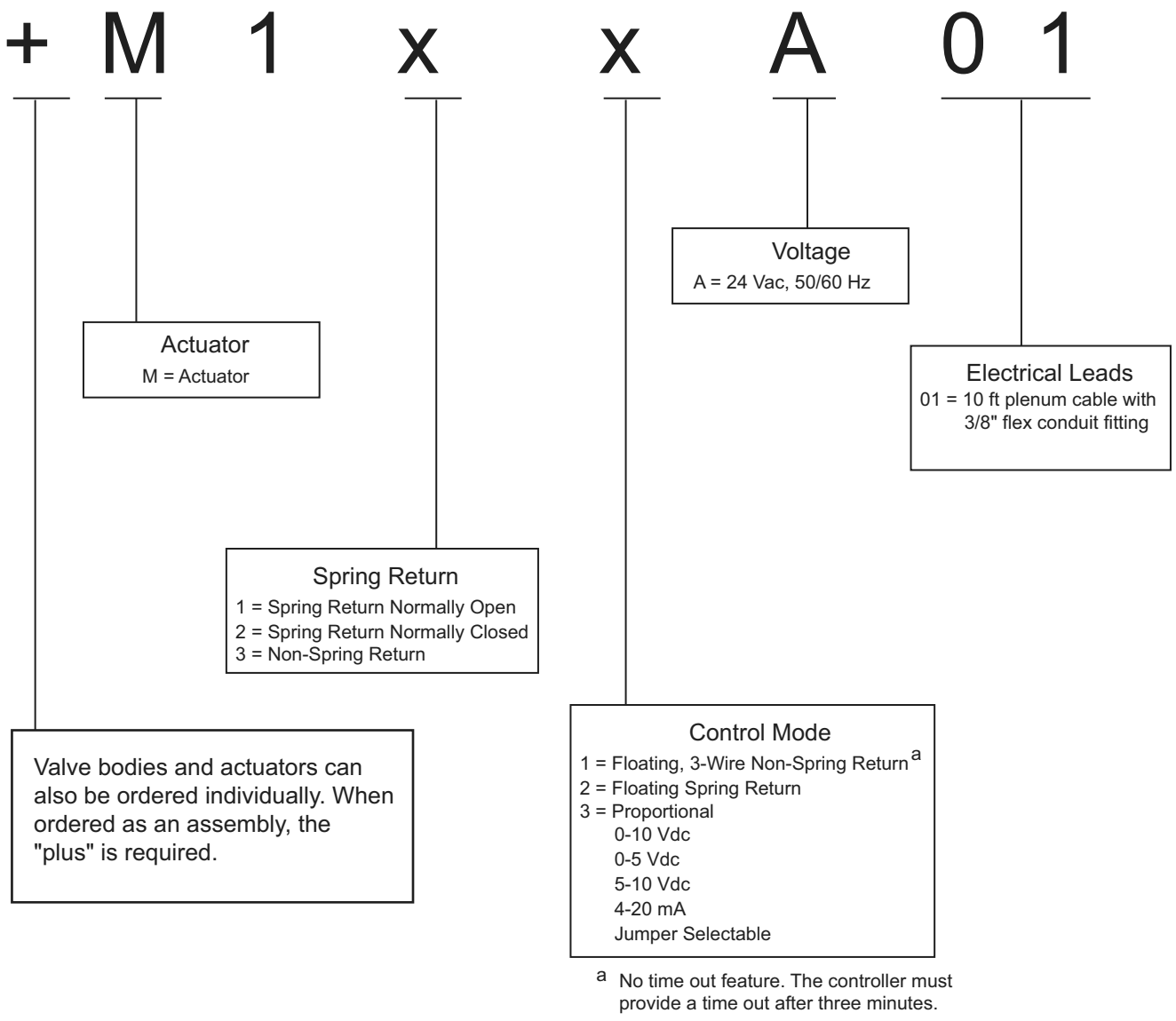
Valve Body Data
2 = Two-Way

End Fittings
N = NPT, Female

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

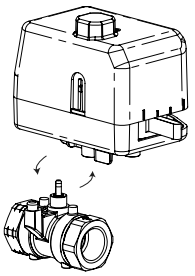
* Full port.

Valve Assemblies



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

TAC DuraDrive VBB Series Ball Valves with Brass Trim
Two-Way Spring Return



Spring Return
TAC DuraDrive
VBB Series

1/2 and 3/4 in. Threaded NPT Normally Open

Two-Way Spring Return

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

Two-Way Normally Open Assemblies.

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

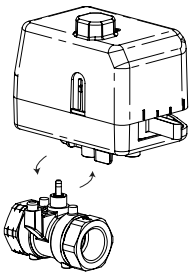
[a] Full port.

VBB2Nxx+M11xA01 *

Actuator Code Table.

Actuator Model (Reference pages)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
M112A01	Floating N.O. Spring Return	201	70	233	112
M113A01	Proportional, N.O. Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.	200	68	233	112

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



Spring Return
TAC DuraDrive
VBB Series

1/2 and 3/4 in. Threaded NPT Normally Closed

Two-Way Spring Return

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

Two-Way Normally Closed Assemblies.

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

[a] Full port.

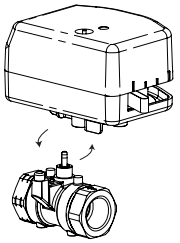
Actuator Code Table.

VBB2Nxx+M12xA01*

Actuator Model (Reference pages)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
M122A01	Floating N.C. Spring Return	201	70	233	112
M123A01	Proportional, N.C. Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.	200	68	233	112

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

TAC DuraDrive VBB Series Ball Valves with Brass Trim
Two-Way Non-Spring Return



Non-Spring Return
TAC DuraDrive
VBB Series

1/2 and 3/4 in. Threaded NPT

Two-Way Non-Spring Return

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

Two-Way Assemblies.

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

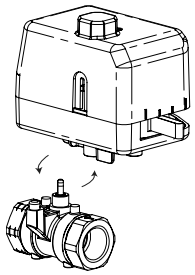
[a] Full port.

VBB2Nxx+M13xA01*

Actuator Code Table.

Actuator Model (Reference pages)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
M131A01	Floating Non- Spring Return	200	69	233	113
M133A01	Proportional, Non-Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.	200	67	233	113

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



Spring Return
TAC DuraDrive
VBS Series

1/2 and 3/4 in. Threaded NPT Normally Open

Two-Way Spring Return

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

Two-Way Normally Open Assemblies.

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

[a] Full port.

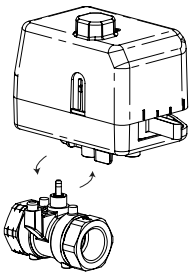
VBS2Nxx+M11xA01*

Actuator Code Table.

Actuator Model (Reference pages)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
M112A01	Floating N.O. Spring Return	201	70	233	112
M113A01	Proportional, N.O. Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.	200	68	233	112

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

TAC DuraDrive VBS Series Ball Valves with Stainless Steel Trim
Two-Way Spring Return



Spring Return
TAC DuraDrive
VBS Series

1/2 and 3/4 in. Threaded NPT Normally Closed

Two-Way Spring Return

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

Two-Way Normally Closed Assemblies.

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

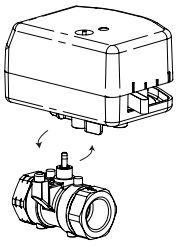
[a] Full port.

VBS2Nxx+M12xA01*

Actuator Code Table.

Actuator Model (Reference pages)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
M122A01	Floating N.C. Spring Return	201	70	233	112
M123A01	Proportional, N.C. Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.	200	68	233	112

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



Non-Spring Return
TAC DuraDrive
VBS Series

1/2 and 3/4 in. Threaded NPT

Two-Way Non-Spring Return

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

Two-Way Assemblies.

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

[a] Full port.

VBS2Nxx+M13xA01*

Actuator Code Table.

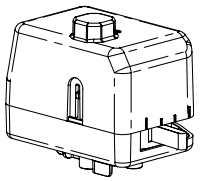
Actuator Model (Reference pages)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
M131A01	Floating	200	69	233	113
M133A01	Proportional, Non-Spring Return factory set for 4-20 mAdc direct acting. Field selectable for 0-5 Vdc, 0-10 Vdc, 4-20 mAdc, 5-10 Vdc and reverse acting.	200	67	233	113

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

TAC DuraDrive VBB/VBS Series Ball Valve Actuator Product Range

M11xA01 Series
M12xA01 Series
TAC DuraDrive™

24 Vac
Spring Return

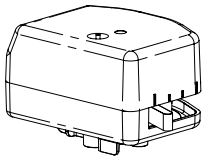


Specifications

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

M13xA01 Series
TAC DuraDrive™

24 Vac
Non-Spring Return



Specifications

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

Using Pipe Reducers with VBB/VBS Ball Valves

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

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

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

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

TAC DuraDrive 2000 Series Ball Valves

Features

- Available in a full range of line sizes, 1/2 to 3 in. for 2-way valves and 1/2 to 2 in. for 3-way valves.
- Close-off pressures to 130 psi (896 kPa).
- Blowout resistant stem.
- Valve body made of forged brass ASTM B283.
- Flow characterizing insert.
- Cvs from 0.38 to 266 (K_{VS} from 0.33 to 230.1).
- Low-friction seals and O-rings.
- ANSI Class IV (0.01% of Cv) shutoff with 2-way valves.
- Available in spring and non-spring return models.

Flow Characterization for Proportional and Floating Control

TAC DuraDrive Vx-2x13-xxx-9-xx series ball valve assemblies provide equal percentage flow, which is achieved with a flow characterizing insert (Figure-1). The parabolic shape of the orifice allows a gradual change in flow, so that equal movements of the valve stem, at any point of the flow range, change the existing flow an equal percentage, regardless of the flow rate. As shown in the graph in Figure-2, a ball valve equipped with the flow insert mirrors the flow characteristic of the coil, resulting in linear heat transfer.

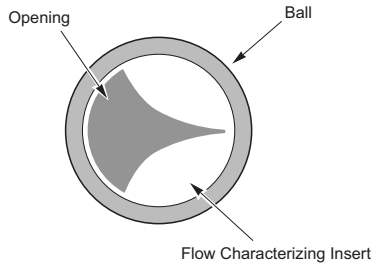


Figure 1 Flow Characterizing Insert.

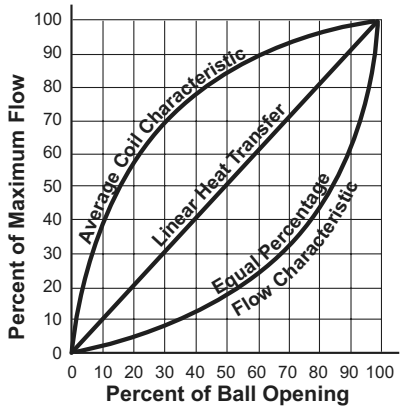


Figure 2 Equal Percentage Flow Control.

Table of Contents

2000 Series Ball

V x - 2 x 1 3 - x x x

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

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

Connection
3 = Threaded NPT

Actuator Code

Actuator Code [1]				
Model	**Code**	**Normal Position**	**Voltage**	**Type**
Two-Position				
MA40-7043	**526**	SR Close	24 Vac	2-Position
MA40-7043	**536**	SR Open	24 Vac	2-Position
MA4D-7033-100	**821**	SR Open	24 Vac	2-Position
MA4D-8033-100	**831**	SR Closed	24 Vac	2-Position
Floating				
MF40-7043	**526**	SR Close	24 Vac	3-Wire Floating
MF40-7043	**536**	SR Open	24 Vac	3-Wire Floating
MF4D-7033-100	**821**	SR Open	24 Vac	3-Wire Floating
MF4D-8033-100	**831**	SR Closed	24 Vac	3-Wire Floating
MF4E-60830-100	**880**	NSR	24 Vac	3-Wire Floating
Proportional				
MS40-7043	**526**	SR Close	24 Vac	2-10 Vdc
MS40-7043	**536**	SR Open	24 Vac	2-10 Vdc
MS4D-7033-100	**821**	SR Open	24 Vac	2-10 Vdc
MS4D-8033-100	**831**	SR Close	24 Vac	2-10 Vdc
MS4D-6083-100	**841**	NSR	24 Vac	2-10 Vdc

SR = Spring Return
NSR = Non-Spring Return

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

Valve Assemblies

- 9 - x x

Port Code

Two-Way Ball Valve Assemblies

Size	Port Code	Cv[a]	Kvs[e]
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[c]	10.1
3/4"*	13	1.2	1.0
	14	2.5	2.2
	15	4.3	3.7
	16	10.1	8.7
	17	14.7[c]	12.7
	18	28.6[c]	24.7
1"	21	4.4	3.8
	22	9.0	7.8
	23	15.3	13.2
	24	26.1	22.6
	27	54.2[c]	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[c]	35.6
	46	102.3[c]	88.5
1-1/2"	51	22.8	19.7
	52	41.3	35.7
	54	171.7[c]	148.5
2"	61	41.7	36.1
	63	71.1	61.5
	65	108[c]	93.4
	66	210	181.7
	67	266[c]	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[c]	174.7
3"	82	63	54.5
	85	145[c]	125.4

Three-Way Ball Valve Assemblies

Size	Port Code	A Port Cv[ab]	Kvs[e]
1/2"	01	033	0.28
	02	0.59	0.51
	03	1	0.86
	04	2.4	2.1
	05	4.3	3.7
	06	8.0[c]	6.9
3/4"	13	1.3	1.1
	14	2.4	2.1
	15	3.8	3.3
	16	11[cd]	10.9
1"	25	3.5	3.0
	26	4.5	3.9
	27	8.6	7.4
	28	10[c]	8.6
	31	30.8[c]	26.6
1-1/4"	43	8.7	7.5
	44	12.7	11.0
	45	19.4[c]	16.8
	46	34.1[c]	29.5
1-1/2"	53	13.4	11.6
	54	23.5	20.3
	55	32[c]	27.7
	56	61.1[c]	52.8
2"	61	23.9	20.7
	62	38.2	33.0
	63	56.7[c]	49.0
	64	108.5[c]	93.8

* Only available in VA models.

a. $k_{vs} = \frac{gpm}{\sqrt{\Delta P}}$ (where ΔP is measured in psi) Kvs = Cv / 1.156

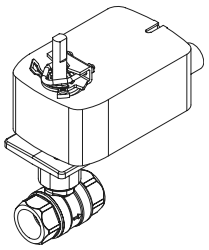
b. B port Cv is 80% of A port Cv.

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

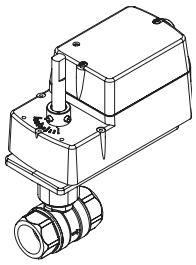
d. Previously Cv was 12.6, kvs was 10.9.

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

TAC DuraDrive 2000 Series Ball Valves
Two-Way Spring Return



Spring Return TAC DuraDrive
Vx-2213-5xx-9-xx



Spring Return TAC DuraDrive
Vx-2213-82x-9-xx
Vx-2213-83x-9-xx

1/2 to 3 in. Threaded NPT

Two-Way Spring Return Normally Open

Application	Chilled or hot water up to 50% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	-22 to 130 °F (-30 to 55 °C).
Ball Seat Leakage	ANSI class IV (0.01% of Cv).
Maximum Static Pressure	360 psi (25 bar).
Material	
Body	Forged brass (ASTM B283).
Ball	Nickel/Chromium-plated brass.
Stem	Brass.
Ball Seals	Reinforced Teflon® seals with EPDM O-rings.
Stem Seals	EPDM O-rings.
Mounting Plate	Glass-filled polymer.
Characterizing Insert	Glass-filled Noryl.

Two-Way Normally Open Assemblies.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two-Position	Input Voltage Vac
1/2	0.38 (0.33)	130 (896)	VA-2213-821-9-01	24
	0.68 (0.59)		VA-2213-821-9-02	
	1.3 (1.1)		VA-2213-821-9-03	
	2.6 (2.2)		VA-2213-821-9-04	
	4.7 (4.1)		VA-2213-821-9-05	
	8.0 (6.9)		VA-2213-821-9-06	
	11.7 (10.1)		VA-2213-821-9-07	
3/4	1.2 (1.0)	130 (896)	VA-2213-821-9-13	
	2.5 (2.2)		VA-2213-821-9-14	
	4.3 (3.7)		VA-2213-821-9-15	
	10.1 (8.7)		VA-2213-821-9-16	
	14.7 (12.7)		VA-2213-821-9-17	
	28.6 (24.7)		VA-2213-821-9-18	

Two-Way Normally Open Assemblies.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two-Position	Floating	Proportional[a]	Input Voltage Vac
1	4.4 (3.8)	100 (689.5)	VA-2213-821-9-21	VF-2213-821-9-21	VS-2213-821-9-21	24
	9.0 (7.8)		VA-2213-821-9-22	VF-2213-821-9-22	VS-2213-821-9-22	
	15.3 (13.2)		VA-2213-821-9-23	VF-2213-821-9-23	VS-2213-821-9-23	
	26.1 (22.6)		VA-2213-821-9-24	VF-2213-821-9-24	VS-2213-821-9-24	
	54.2 (46.9)		VA-2213-821-9-27	VF-2213-821-9-27	VS-2213-821-9-27	
1-1/4	4.4 (3.8)	70 (482.6)	VA-2213-536-9-41	VF-2213-536-9-41	VS-2213-536-9-41	24
	8.3 (7.2)		VA-2213-536-9-42	VF-2213-536-9-42	VS-2213-536-9-42	
	14.9 (12.9)		VA-2213-536-9-43	VF-2213-536-9-43	VS-2213-536-9-43	
	36.5 (31.6)		VA-2213-536-9-44	VF-2213-536-9-44	VS-2213-536-9-44	
	41.1 (35.6)		VA-2213-536-9-45	VF-2213-536-9-45	VS-2213-536-9-45	
	102.3 (88.5)		VA-2213-536-9-46	VF-2213-536-9-46	VS-2213-536-9-46	
1-1/2	22.8 (19.7)	70 (482.6)	VA-2213-536-9-51	VF-2213-536-9-51	VS-2213-536-9-51	24
	41.3 (35.7)		VA-2213-536-9-52	VF-2213-536-9-52	VS-2213-536-9-52	
	171.7 (148.5)		VA-2213-536-9-54	VF-2213-536-9-54	VS-2213-536-9-54	
2	41.7 (36.1)	70 (482.6)	VA-2213-536-9-61	VF-2213-536-9-61	VS-2213-536-9-61	24
	71.1 (61.5)		VA-2213-536-9-63	VF-2213-536-9-63	VS-2213-536-9-63	
	108 (93.4)		VA-2213-536-9-65	VF-2213-536-9-65	VS-2213-536-9-65	
	210 (181.7)		VA-2213-536-9-66	VF-2213-536-9-66	VS-2213-536-9-66	
	266 (230.1)		VA-2213-536-9-67	VF-2213-536-9-67	VS-2213-536-9-67	
2-1/2	45 (38.9)	70 (482.6)	VA-2213-536-9-71	VF-2213-536-9-71	VS-2213-536-9-71	24
	55 (47.6)		VA-2213-536-9-72	VF-2213-536-9-72	VS-2213-536-9-72	
	72.3 (62.5)		VA-2213-536-9-73	VF-2213-536-9-73	VS-2213-536-9-73	
	101 (87.4)		VA-2213-536-9-74	VF-2213-536-9-74	VS-2213-536-9-74	
	162 (140.1)		VA-2213-536-9-75	VF-2213-536-9-75	VS-2213-536-9-75	
	202 (174.7)		VA-2213-536-9-76	VF-2213-536-9-76	VS-2213-536-9-76	
3	63 (54.5)	70 (482.6)	VA-2213-536-9-82	VF-2213-536-9-82	VS-2213-536-9-82	24
	145 (125.4)		VA-2213-536-9-85	VF-2213-536-9-85	VS-2213-536-9-85	

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

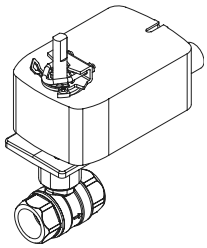
Actuator Code Table.

Vx-2213-xxx-9-xx

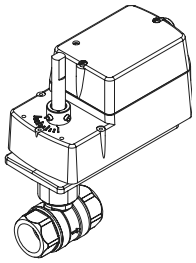
Actuator Codes[a]	Model Prefix	Actuator Model (Reference pages 114 thru 115)	Description	Plenum Cable Length	Wiring Diagrams		Dimension Information	
					Page	Figure	Page	Figure
821	VA	MA4D-7033-100	24 Vac 2-Position	10 ft.	176	13	221	100
821	VF	MF4D-7033-100	3-Wire Floating		181 to 183	25 to 28	221	100
821	VS	MS4D-7033-100	2 to 10 Vdc		196	58 to 59	221	100
536	VA	MA40-7043	24 Vac 2-Position	3 ft.	176	11	219	98
536	VF	MF40-7043	3-Wire Floating		179 to 181	21, 23 to 24	219	98
536	VS	MS40-7043	2 to 10 Vdc		188 to 189	40 to 42	219	98

[a] With 1/2-in conduit connection.

TAC DuraDrive 2000 Series Ball Valves
Two-Way Spring Return



Spring Return
TAC DuraDrive
Vx-2213-5xx-9-xx



Spring Return
TAC DuraDrive
Vx-2213-82x-9-xx
Vx-2213-83x-9-xx

1/2 to 3 in. Threaded NPT

Two-Way Spring Return Normally Closed

Application	Chilled or hot water up to 50% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	-22 to 130 °F (-30 to 55 °C).
Ball Seat Leakage	ANSI class IV (0.01% of Cv) .
Maximum Static Pressure	360 psi (25 bar).
Material	
Body	Forged brass (ASTM B283).
Ball	Nickel/Chromium-plated brass.
Stem	Brass.
Ball Seals	Reinforced Teflon® seals with EPDM O-rings.
Stem Seals	EPDM O-rings.
Mounting Plate	Glass-filled polymer.
Characterizing Insert	Glass-filled Noryl.

Two-Way Normally Closed Assemblies.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two-Position	Input Voltage Vac
1/2	0.38 (0.33)	130 (896)	VA-2213-831-9-01	24
	0.68 (0.59)		VA-2213-831-9-02	
	1.3 (1.1)		VA-2213-831-9-03	
	2.6 (2.2)		VA-2213-831-9-04	
	4.7 (4.1)		VA-2213-831-9-05	
	8.0 (6.9)		VA-2213-831-9-06	
	11.7 (10.1)		VA-2213-831-9-07	
3/4	1.2 (1.0)	130 (896)	VA-2213-831-9-13	
	2.5 (2.2)		VA-2213-831-9-14	
	4.3 (3.7)		VA-2213-831-9-15	
	10.1 (8.7)		VA-2213-831-9-16	
	14.7 (12.7)		VA-2213-831-9-17	
	28.6 (24.7)		VA-2213-831-9-18	

Two-Way Normally Closed Assemblies

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two-Position	Floating	Proportional[a]	Input Voltage Vac
1	4.4 (3.8)	100 (689.5)	VA-2213-831-9-21	VF-2213-831-9-21	VS-2213-831-9-21	24
	9.0 (7.8)		VA-2213-831-9-22	VF-2213-831-9-22	VS-2213-831-9-22	
	15.3 (13.2)		VA-2213-831-9-23	VF-2213-831-9-23	VS-2213-831-9-23	
	26.1 (22.6)		VA-2213-831-9-24	VF-2213-831-9-24	VS-2213-831-9-24	
	54.2 (46.9)		VA-2213-831-9-27	VF-2213-831-9-27	VS-2213-831-9-27	
1-1/4	4.4 (3.8)	70 (482.6)	VA-2213-526-9-41	VF-2213-526-9-41	VS-2213-526-9-41	24
	8.3 (7.2)		VA-2213-526-9-42	VF-2213-526-9-42	VS-2213-526-9-42	
	14.9 (12.9)		VA-2213-526-9-43	VF-2213-526-9-43	VS-2213-526-9-43	
	36.5 (31.6)		VA-2213-526-9-44	VF-2213-526-9-44	VS-2213-526-9-44	
	41.1 (35.6)		VA-2213-526-9-45	VF-2213-526-9-45	VS-2213-526-9-45	
	102.3 (88.5)		VA-2213-526-9-46	VF-2213-526-9-46	VS-2213-526-9-46	
1-1/2	22.8 (19.7)	70 (482.6)	VA-2213-526-9-51	VF-2213-526-9-51	VS-2213-526-9-51	24
	41.3 (35.7)		VA-2213-526-9-52	VF-2213-526-9-52	VS-2213-526-9-52	
	171.7 (148.5)		VA-2213-526-9-54	VF-2213-526-9-54	VS-2213-526-9-54	
2	41.7 (36.1)	70 (482.6)	VA-2213-526-9-61	VF-2213-526-9-61	VS-2213-526-9-61	24
	71.1 (61.5)		VA-2213-526-9-63	VF-2213-526-9-63	VS-2213-526-9-63	
	108 (93.4)		VA-2213-526-9-65	VF-2213-526-9-65	VS-2213-526-9-65	
	210 (181.7)		VA-2213-526-9-66	VF-2213-526-9-66	VS-2213-526-9-66	
	266 (230.1)		VA-2213-526-9-67	VF-2213-526-9-67	VS-2213-526-9-67	
2-1/2	45 (38.9)	70 (482.6)	VA-2213-526-9-71	VF-2213-526-9-71	VS-2213-526-9-71	24
	55 (47.6)		VA-2213-526-9-72	VF-2213-526-9-72	VS-2213-526-9-72	
	72.3 (62.5)		VA-2213-526-9-73	VF-2213-526-9-73	VS-2213-526-9-73	
	101 (87.4)		VA-2213-526-9-74	VF-2213-526-9-74	VS-2213-526-9-74	
	162 (140.1)		VA-2213-526-9-75	VF-2213-526-9-75	VS-2213-526-9-75	
	202 (174.7)		VA-2213-526-9-76	VF-2213-526-9-76	VS-2213-526-9-76	
3	63 (54.5)	70 (482.6)	VA-2213-526-9-82	VF-2213-526-9-82	VS-2213-526-9-82	24
	145 (125.4)		VA-2213-526-9-85	VF-2213-526-9-85	VS-2213-526-9-85	

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

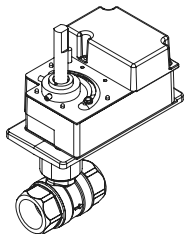
Actuator Code Table.

Vx-2213-xxx-9-xx

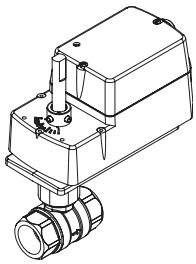
Actuator Codes[a]	Model Prefix	Actuator Model (Reference pages 114 thru 115)	Description	Plenum Cable Length	Wiring Diagrams		Dimension Information	
					Page	Figure	Page	Figure
831	VA	MA4D-8033-100	24 Vac 2-Position	10 ft.	176	13	221	100
831	VF	MF4D-8033-100	3-Wire Floating		182 to 183	25 to 28	221	100
831	VS	MS4D-8033-100	2 to 10 Vdc		196	58 to 59	221	100
526	VA	MA40-7043	24 Vac 2-Position	3 ft.	176	11	219	98
526	VF	MF40-7043	3-Wire Floating		179 to 181	21, 23 to 24	219	98
526	VS	MS40-7043	2 to 10 Vdc		188 to 189	40 to 42	219	98

[a] With 1/2-in conduit connection.

TAC DuraDrive 2000 Series Ball Valves
Two-Way Non-Spring Return



Non-Spring Return
TAC DuraDrive
VF-2213-880-9-xx



Non-Spring Return
TAC DuraDrive
Vx-2213-84x-9-xx

1/2 to 3 in. Threaded NPT

Two-Way Non-Spring Return

Application	Chilled or hot water up to 50% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	-22 to 130 °F (-30 to 55 °C).
Ball Seat Leakage	ANSI class IV .
Maximum Static Pressure	360 psi (25 bar).
Material	
Body	Forged brass (ASTM B283).
Ball	Nickel/Chromium-plated brass.
Stem	Brass.
Ball Seals	Reinforced Teflon® seals with EPDM O-rings.
Stem Seals	EPDM O-rings.
Mounting Plate	Glass-filled polymer.
Characterizing Insert	Glass-filled Noryl.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Floating	Proportional[a]	Input Voltage Vac
1	4.4 (3.8)	100 (689.5)	VF-2213-880-9-21	VS-2213-841-9-21	24
	9.0 (7.8)		VF-2213-880-9-22	VS-2213-841-9-22	
	15.3 (13.2)		VF-2213-880-9-23	VS-2213-841-9-23	
	26.1 (22.6)		VF-2213-880-9-24	VS-2213-841-9-24	
	54.2 (46.9)		VF-2213-880-9-27	VS-2213-841-9-27	
1-1/4	4.4 (3.8)	70 (482.6)	VF-2213-880-9-41	VS-2213-841-9-41	24
	8.3 (7.2)		VF-2213-880-9-42	VS-2213-841-9-42	
	14.9 (12.9)		VF-2213-880-9-43	VS-2213-841-9-43	
	36.5 (31.6)		VF-2213-880-9-44	VS-2213-841-9-44	
	41.1 (35.6)		VF-2213-880-9-45	VS-2213-841-9-45	
	102.3 (88.5)		VF-2213-880-9-46	VS-2213-841-9-46	
1-1/2	22.8 (19.7)	70 (482.6)	VF-2213-880-9-51	VS-2213-841-9-51	24
	41.3 (35.7)		VF-2213-880-9-52	VS-2213-841-9-52	
	171.7 (148.5)		VF-2213-880-9-54	VS-2213-841-9-54	
2	41.7 (36.1)	70 (482.6)	VF-2213-880-9-61	VS-2213-841-9-61	24
	71.1 (61.5)		VF-2213-880-9-63	VS-2213-841-9-63	
	108 (93.4)		VF-2213-880-9-65	VS-2213-841-9-65	
	210 (181.7)		VF-2213-880-9-66	VS-2213-841-9-66	
	266 (230.1)		VF-2213-880-9-67	VS-2213-841-9-67	
2-1/2	45 (38.9)	70 (482.6)	VF-2213-880-9-71	VS-2213-841-9-71	24
	55 (47.6)		VF-2213-880-9-72	VS-2213-841-9-72	
	72.3 (62.5)		VF-2213-880-9-73	VS-2213-841-9-73	
	101 (87.4)		VF-2213-880-9-74	VS-2213-841-9-74	
	162 (140.1)		VF-2213-880-9-75	VS-2213-841-9-75	
	202 (174.7)		VF-2213-880-9-76	VS-2213-841-9-76	
3	63 (54.5)	70 (482.6)	VF-2213-880-9-82	VS-2213-841-9-82	24
	145 (125.4)		VF-2213-880-9-85	VS-2213-841-9-85	

[a] Factory proportional control signal is direct-acting. An increase in control signal will close these models.

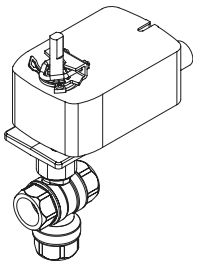
Actuator Code Table.

Vx-2213-xxx-9-xx

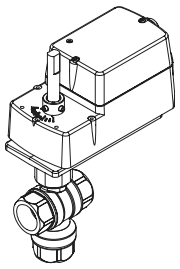
Actuator Codes	Model Prefix	Actuator Model (Reference pages 114 thru 115)	Description	Plenum Cable Length	Wiring Diagrams		Dimension Information	
					Page	Figure	Page	Figure
880	VF	MF4E-60830-100	3-Wire Floating	10 ft	183 to 184	29 to 31	222	101
841[a]	VS	MS4D-6083-100	2 to 10 Vdc		196	58 to 59	220	99

[a] With 1/2-in conduit connection.

TAC DuraDrive 2000 Series Ball Valves
Three-Way Mixing Spring Return



Spring Return
TAC DuraDrive
Vx-2313-5xx-9-xx



Spring Return
TAC DuraDrive
Vx-2313-82x-9-xx

1/2 to 2 in. Threaded NPT

Three-Way Mixing Spring Return Normally Open A to AB

Application	Chilled or hot water up to 50% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	-22 to 130 °F (-30 to 55 °C).
Ball Seat Leakage	ANSI class IV. (0.01% of Cv) piped coil-side outlet to A only.
Maximum Static Pressure	360 psi (25 bar).
Material	
Body	Forged brass (ASTM B283).
Ball	Nickel/Chromium-plated brass.
Stem	Brass.
Ball Seals	Reinforced Teflon® seals with EPDM O-rings.
Stem Seals	EPDM O-rings.
Mounting Plate	Glass-filled polymer.
Characterizing Insert	Glass-filled Noryl.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two-Position	Floating	Proportional[a]	Input Voltage Vac
1/2	0.33 (0.28)	50 (344)	VA-2313-821-9-01	VF-2313-821-9-01	VS-2313-821-9-01	24
	0.59 (0.51)		VA-2313-821-9-02	VF-2313-821-9-02	VS-2313-821-9-02	
	1.0 (0.86)		VA-2313-821-9-03	VF-2313-821-9-03	VS-2313-821-9-03	
	2.4 (2.1)		VA-2313-821-9-04	VF-2313-821-9-04	VS-2313-821-9-04	
	4.3 (3.7)		VA-2313-821-9-05	VF-2313-821-9-05	VS-2313-821-9-05	
	8.0 (6.9)		VA-2313-821-9-06	VF-2313-821-9-06	VS-2313-821-9-06	
3/4	1.3 (1.1)	50 (344)	VA-2313-821-9-13	VF-2313-821-9-13	VS-2313-821-9-13	24
	2.4 (2.1)		VA-2313-821-9-14	VF-2313-821-9-14	VS-2313-821-9-14	
	3.8 (3.3)		VA-2313-821-9-15	VF-2313-821-9-15	VS-2313-821-9-15	
	11.0 (10.9)		VA-2313-821-9-16	VF-2313-821-9-16	VS-2313-821-9-16	
1	3.5 (3.0)	50 (344)	VA-2313-821-9-25	VF-2313-821-9-25	VS-2313-821-9-25	24
	4.5 (3.9)		VA-2313-821-9-26	VF-2313-821-9-26	VS-2313-821-9-26	
	8.6 (7.4)		VA-2313-821-9-27	VF-2313-821-9-27	VS-2313-821-9-27	
	10 (8.6)		VA-2313-821-9-28	VF-2313-821-9-28	VS-2313-821-9-28	
	30.8 (26.6)		VA-2313-821-9-31	VF-2313-821-9-31	VS-2313-821-9-31	

[a] Factory proportional control signal is direct-acting. An increase in control signal will close these valves A to AB.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two-Position	Floating	Proportional[a]	Input Voltage Vac
1-1/4	8.7 (7.5)	40 (275)	VA-2313-536-9-43	VF-2313-536-9-43	VS-2313-536-9-43	24
	12.7 (11.0)		VA-2313-536-9-44	VF-2313-536-9-44	VS-2313-536-9-44	
	19.4 (16.8)		VA-2313-536-9-45	VF-2313-536-9-45	VS-2313-536-9-45	
	34.1 (29.5)		VA-2313-536-9-46	VF-2313-536-9-46	VS-2313-536-9-46	
1-1/2	13.4 (11.6)	40 (275)	VA-2313-536-9-53	VF-2313-536-9-53	VS-2313-536-9-53	24
	23.5 (20.3)		VA-2313-536-9-54	VF-2313-536-9-54	VS-2313-536-9-54	
	32 (27.7)		VA-2313-536-9-55	VF-2313-536-9-55	VS-2313-536-9-55	
	61.1 (52.8)		VA-2313-536-9-56	VF-2313-536-9-56	VS-2313-536-9-56	
2	23.9 (20.7)	40 (275)	VA-2313-536-9-61	VF-2313-536-9-61	VS-2313-536-9-61	24
	38.2 (33.0)		VA-2313-536-9-62	VF-2313-536-9-62	VS-2313-536-9-62	
	56.7 (49.0)		VA-2313-536-9-63	VF-2313-536-9-63	VS-2313-536-9-63	
	108.5 (93.8)		VA-2313-536-9-64	VF-2313-536-9-64	VS-2313-536-9-64	

[a] Factory proportional control signal is direct-acting. An increase in control signal will will close these valves A to AB.

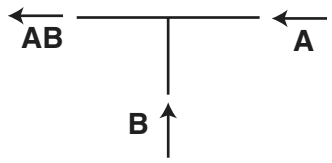
Actuator Code Table.

Vx-2313-xxx-9-xx

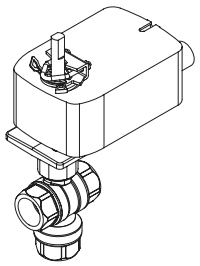
Actuator Codes[a]	Model Prefix	Actuator Model (Reference pages 114 thru 115)	Description	Plenum Cable Length	Wiring Diagrams		Dimension Information	
					Page	Figure	Page	Figure
821	VA	MA4D-7033-100	24 Vac 2-Position	10 ft	176	13	224	103
821	VF	MF4D-7033-100	3-Wire Floating		182 to 183	25 to 28	224	103
821	VS	MS4D-7033-100	2 to 10 Vdc		196	58 to 59	224	103
536	VA	MA40-7043	24 Vac 2-Position	3 ft	176	11	223	102
536	VF	MF40-7043	3-Wire Floating		179 to 181	21, 23 to 24	223	102
536	VS	MS40-7043	2 to 10 Vdc or 4 to 20 mA w/500 ohms		188 to 189	40 to 42	223	102

[a] With 1/2-in conduit connection.

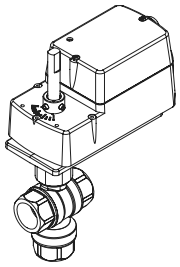
Flow Pattern



TAC DuraDrive 2000 Series Ball Valves
Three-Way Mixing Spring Return



Spring Return
TAC DuraDrive
Vx-2313-5xx-9-xx



Spring Return
TAC DuraDrive
Vx-2313-83x-9-xx

1/2 to 2 in. Threaded NPT

Three-Way Mixing Spring Return Normally Closed A to AB

Application	Chilled or hot water up to 50% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	-22 to 130 °F (-30 to 55 °C).
Ball Seat Leakage	ANSI class IV. (0.01% of Cv) piped coil-side outlet to A only.
Maximum Static Pressure	360 psi (25 bar).
Material	
Body	Forged brass (ASTM B283).
Ball	Nickel/Chromium-plated brass.
Stem	Brass.
Ball Seals	Reinforced Teflon® seals with EPDM O-rings.
Stem Seals	EPDM O-rings.
Mounting Plate	Glass-filled polymer.
Characterizing Insert	Glass-filled Noryl.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two-Position	Floating	Proportional[a]	Input Voltage Vac
1/2	0.33 (0.28)	50 (344)	VA-2313-831-9-01	VF-2313-831-9-01	VS-2313-831-9-01	24
	0.59 (0.51)		VA-2313-831-9-02	VF-2313-831-9-02	VS-2313-831-9-02	
	1.0 (0.86)		VA-2313-831-9-03	VF-2313-831-9-03	VS-2313-831-9-03	
	2.4 (2.1)		VA-2313-831-9-04	VF-2313-831-9-04	VS-2313-831-9-04	
	4.3 (3.7)		VA-2313-831-9-05	VF-2313-831-9-05	VS-2313-831-9-05	
	8.0 (6.9)		VA-2313-831-9-06	VF-2313-831-9-06	VS-2313-831-9-06	
3/4	1.3 (1.1)	50 (344)	VA-2313-831-9-13	VF-2313-831-9-13	VS-2313-831-9-13	24
	2.4 (2.1)		VA-2313-831-9-14	VF-2313-831-9-14	VS-2313-831-9-14	
	3.8 (3.3)		VA-2313-831-9-15	VF-2313-831-9-15	VS-2313-831-9-15	
	11.0 (10.9)		VA-2313-831-9-16	VF-2313-831-9-16	VS-2313-831-9-16	
1	3.5 (3.0)	50 (344)	VA-2313-831-9-25	VF-2313-831-9-25	VS-2313-831-9-25	24
	4.5 (3.9)		VA-2313-831-9-26	VF-2313-831-9-26	VS-2313-831-9-26	
	8.6 (7.4)		VA-2313-831-9-27	VF-2313-831-9-27	VS-2313-831-9-27	
	10 (8.6)		VA-2313-831-9-28	VF-2313-831-9-28	VS-2313-831-9-28	
	30.8 (26.6)		VA-2313-831-9-31	VF-2313-831-9-31	VS-2313-831-9-31	

[a] Factory proportional control signal is direct-acting. An increase in control signal will open these valves A to AB.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Two-Position	Floating	Proportional[a]	Input Voltage Vac
1-1/4	8.7 (7.5)	40 (275)	VA-2313-526-9-43	VF-2313-526-9-43	VS-2313-526-9-43	24
	12.7 (11.0)		VA-2313-526-9-44	VF-2313-526-9-44	VS-2313-526-9-44	
	19.4 (16.8)		VA-2313-526-9-45	VF-2313-526-9-45	VS-2313-526-9-45	
	34.1 (29.5)		VA-2313-526-9-46	VF-2313-526-9-46	VS-2313-526-9-46	
1-1/2	13.4 (11.6)	40 (275)	VA-2313-526-9-53	VF-2313-526-9-53	VS-2313-526-9-53	24
	23.5 (20.3)		VA-2313-526-9-54	VF-2313-526-9-54	VS-2313-526-9-54	
	32 (27.7)		VA-2313-526-9-55	VF-2313-526-9-55	VS-2313-526-9-55	
	61.1 (52.8)		VA-2313-526-9-56	VF-2313-526-9-56	VS-2313-526-9-56	
2	23.9 (20.7)	40 (275)	VA-2313-526-9-61	VF-2313-526-9-61	VS-2313-526-9-61	24
	38.2 (33.0)		VA-2313-526-9-62	VF-2313-526-9-62	VS-2313-526-9-62	
	56.7 (49.0)		VA-2313-526-9-63	VF-2313-526-9-63	VS-2313-526-9-63	
	108.5 (93.8)		VA-2313-526-9-64	VF-2313-526-9-64	VS-2313-526-9-64	

[a] Factory proportional control signal is direct-acting. An increase in control signal will open these valves A to AB.

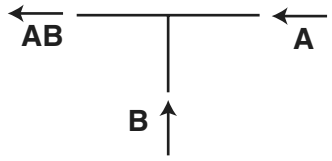
Actuator Code Table.

Vx-2313-xxx-9-xx

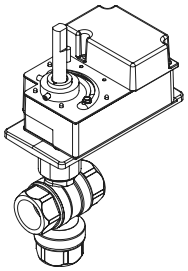
Actuator Codes[a]	Model Prefix	Actuator Model (Reference pages 114 thru 115)	Description	Plenum Cable Length	Wiring Diagrams		Dimension Information	
					Page	Figure	Page	Figure
831	VA	MA4D-8033-100	24 Vac 2-Position	10 ft	176	13	224	103
831	VF	MF4D-8033-100	3-Wire Floating		182 to 183	25 to 28	224	103
831	VS	MS4D-8033-100	2 to 10 Vdc		196	58 to 59	224	103
526	VA	MA40-7043	24 Vac 2-Position	3 ft	176	11	223	102
526	VF	MF40-7043	3-Wire Floating		179 to 181	21, 23 to 24	223	102
526	VS	MS40-7043	2 to 10 Vdc or 4 to 20 mA w/500 ohms		188 to 189	40 to 42	223	102

[a] With 1/2-in conduit connection.

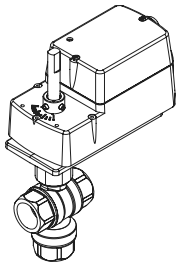
Flow Pattern



TAC DuraDrive 2000 Series Ball Valves
Three-Way Mixing Non-Spring Return



Non-Spring Return
TAC DuraDrive
Vx-2313-880-9-xx



Non-Spring Return
TAC DuraDrive
Vx-2313-84x-9-xx

1/2 to 2 in. Threaded NPT

Three-Way Mixing Non-Spring Return

Application	Chilled or hot water up to 50% glycol solution.
Flow Type	Equal percentage.
Fluid Temperature	20 to 250 °F (-7 to 121 °C).
Ambient Temperature	-22 to 130 °F (-30 to 55 °C).
Ball Seat Leakage	ANSI class IV. (0.01% of Cv) piped coil-side outlet to A only.
Maximum Static Pressure	360 psi (25 bar).
Material	
Body	Forged brass (ASTM B283).
Ball	Nickel/Chromium-plated brass.
Stem	Brass.
Ball Seals	Reinforced Teflon® seals with EPDM O-rings.
Stem Seals	EPDM O-rings.
Mounting Plate	Glass-filled polymer.
Characterizing Insert	Glass-filled Noryl.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Floating	Proportional[a]	Input Voltage Vac
1/2	0.33 (0.28)	50 (344)	VF-2313-880-9-01	VS-2313-841-9-01	24
	0.59 (0.51)		VF-2313-880-9-02	VS-2313-841-9-02	
	1.0 (0.86)		VF-2313-880-9-03	VS-2313-841-9-03	
	2.4 (2.1)		VF-2313-880-9-04	VS-2313-841-9-04	
	4.3 (3.7)		VF-2313-880-9-05	VS-2313-841-9-05	
	8.0 (6.9)		VF-2313-880-9-06	VS-2313-841-9-06	
3/4	1.3 (1.1)	50 (344)	VF-2313-880-9-13	VS-2313-841-9-13	24
	2.4 (2.1)		VF-2313-880-9-14	VS-2313-841-9-14	
	3.8 (3.3)		VF-2313-880-9-15	VS-2313-841-9-15	
	11.0 (10.9)		VF-2313-880-9-16	VS-2313-841-9-16	
1	3.5 (3.0)	50 (344)	VF-2313-880-9-25	VS-2313-841-9-25	24
	4.5 (3.9)		VF-2313-880-9-26	VS-2313-841-9-26	
	8.6 (7.4)		VF-2313-880-9-27	VS-2313-841-9-27	
	10 (8.6)		VF-2313-880-9-28	VS-2313-841-9-28	
	30.8 (26.6)		VF-2313-880-9-31	VS-2313-841-9-31	

[a] Factory proportional control signal is direct-acting. An increase in control signal will close A to AB port.

Size in.	Cv (K_{vs})	Close-Off Pressure psi (kPa)	Floating	Proportional[a]	Input Voltage Vac
1-1/4	8.7 (7.5)	40 (275)	VF-2313-880-9-43	VS-2313-841-9-43	24
	12.7 (11.0)		VF-2313-880-9-44	VS-2313-841-9-44	
	19.4 (16.8)		VF-2313-880-9-45	VS-2313-841-9-45	
	34.1 (29.5)		VF-2313-880-9-46	VS-2313-841-9-46	
1-1/2	13.4 (11.6)	40 (275)	VF-2313-880-9-53	VS-2313-841-9-53	24
	23.5 (20.3)		VF-2313-880-9-54	VS-2313-841-9-54	
	32 (27.7)		VF-2313-880-9-55	VS-2313-841-9-55	
	61.1 (52.8)		VF-2313-880-9-56	VS-2313-841-9-56	
2	23.9 (20.7)	40 (275)	VF-2313-880-9-61	VS-2313-841-9-61	24
	38.2 (33.0)		VF-2313-880-9-62	VS-2313-841-9-62	
	56.7 (49.0)		VF-2313-880-9-63	VS-2313-841-9-63	
	108.5 (93.8)		VF-2313-880-9-64	VS-2313-841-9-64	

[a] Factory proportional control signal is direct-acting. An increase in control signal will close A to AB port.

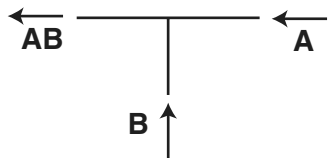
Actuator Code Table.

Vx-2313-xxx-9-xx

Actuator Codes	Model Prefix	Actuator Model (Reference pages 114 thru 115)	Description	Plenum Cable Length	Wiring Diagrams		Dimension Information	
					Page	Figure	Page	Figure
880	VF	MF4E-60830-100	3-Wire Floating	10 ft	183 to 184	29 to 31	226	105
841[a]	VS	MS4D-6083-100	2 to 10 Vdc		196	58 to 59	225	104

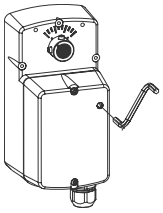
[a] With 1/2-in conduit connection.

Flow Pattern



Mx4D-x033-100 Series (821)(831) TAC DuraDrive™

24 Vac
30 in-lb (3.4 Nm)



Specifications

Connection:
10 ft. (3 m) Plenum cable with 1/2-in conduit connection

Housing:
Polymer, NEMA 2

Dimensions:
7-7/8 x 3-1/2 x 3-1/2
(200 x 89 x 89 mm)

Position Indicator:
Visual indicator

Override:
Manual

Control Signal:
MA4D-x033-100: Two-position SPST
MF4D-x033-100: Floating
MS4D-x033-100: 2-10 Vdc

Voltage:
24 Vac ± 20%
20-30 Vdc

VA @ 60 Hz
MA4D-x033-100: 5.1
MF4D-x033-100: 6.8
MS4D-x033-100: 6.1

Watts @ 60 Hz:
MA4D-x033-100: 3.6
MF4D-x033-100: 4.2
MS4D-x033-100: 3.4

Auxiliary Switch:
None

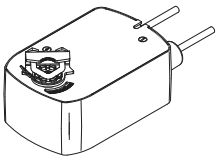
Timing (seconds):
MA4D-x033-100: Powered 56, SR 26
MF4D-x033-100: Powered 85, SR 21
MS4D-x033-100: Powered 85, SR 21

Feedback
Yes. Same voltage as input signal (MS4D)
MF4D: 2-10 Vdc.

General Instructions:
F-27170

Mx40-7043 Series (526)(536) TAC DuraDrive™

24 Vac
35 in-lb (4 Nm)



Specifications

Connection:
3 ft. (0.9 m) Plenum cable with 1/2-in conduit connection

Housing:
Aluminum diecast, NEMA 2

Dimensions:
6-13/16 x 4 x 3-1/2
(68 x 100 x 89 mm)

Position Indicator:
Visual indicator

Override:
None

Rotation:
(526) actuator mounted with "R" side up is spring return CW.
(536) actuator mounted with "L" side up is spring return CCW.

Control Signal:
MA40-7043: Two-position SPST
MF40-7043: Floating
MS40-7043: 2-10 Vdc, 4-20 mA with 500 ohm resistor. The control signal is factory set for direct action. It can be change in the field to reverse action.

Voltage:
24 Vac ± 20%
22-30 Vdc

VA @ 60 Hz
MA40-7043: 4.4
MF40-7043: 5.9
MS40-7043: 5.6

Watts @ 60 Hz:
MA40-7043: 2.9
MF40-7043: 4.4
MS40-7043: 4.2

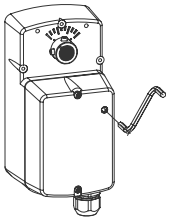
Auxiliary Switch:
One SPDT, 6A resistive @24 Vac

Timing (seconds):
MA40-7043: 50
MF40-7043: 130
MS40-7043: 130

Feedback
2-10 Vdc MS40 only

General Instructions:
F-26642, F-26644, F-26645

MS4D-6083-100
(841)
TAC DuraDrive™
24 Vac
70 in-lb (8 Nm)



Specifications

Connection:
10 ft. (3 m) Plenum cable with 1/2-in conduit connection

Housing:
Polymer, NEMA 2

Dimensions:
7-7/8 x 3-1/2 x 3-1/2
(200 x 89 x 89 mm)

Position Indicator:
Visual

Override:
Manual

Control Signal:
MS4D-6083-100: 2-10 Vac

Voltage:
24 Vac + 20% - 15%
20-30 Vdc

VA@60 Hz
5.2

Watts
2.7

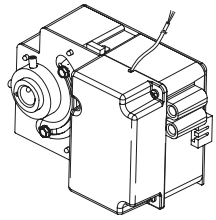
Feedback:
2-10 Vdc

Auxiliary Switch:
None

Timing (seconds):
90

General Instructions:
F-27170

MF4E-60830-100
(880)
TAC DuraDrive™
24 Vac
70 in-lb (8 Nm)



Specifications

Connection:
10 ft. (3 m) Plenum cable

Housing:
Plastic/steel, NEMA 1

Dimensions:
4-5/32 x 3-17/32 x 2-3/4
(110 x 90 x 70 mm)

Override:
Manual

Control Signal:
MF4E-60830-100: Floating

Voltage:
24 Vac + 20% - 15%

VA@60 Hz
2.0

Watts
2.0

Feedback:
None

Auxiliary Switch:
None

Timing (seconds):
90

General Instructions:
F-27108

Piping Installation Considerations

Mounting Angle of Valve Assembly

Be sure to allow the necessary clearance around the valve assembly. The valve assembly must be mounted so that the actuator is horizontally even with, or above, the valve. This ensures that any condensate that forms on the valve body will not travel into the actuator, where it may cause corrosion or electrical malfunction.

Piping

Figure-1 and Figure-2 illustrate 2-way and 3-way ball valve assembly piping.

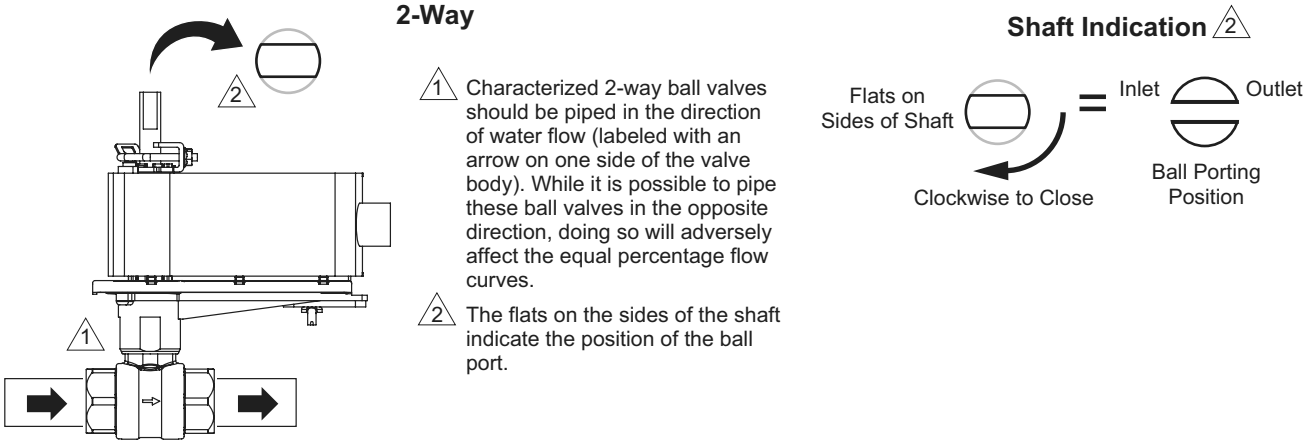


Figure 1 2-Way Valve Assemblies Piping Diagram.

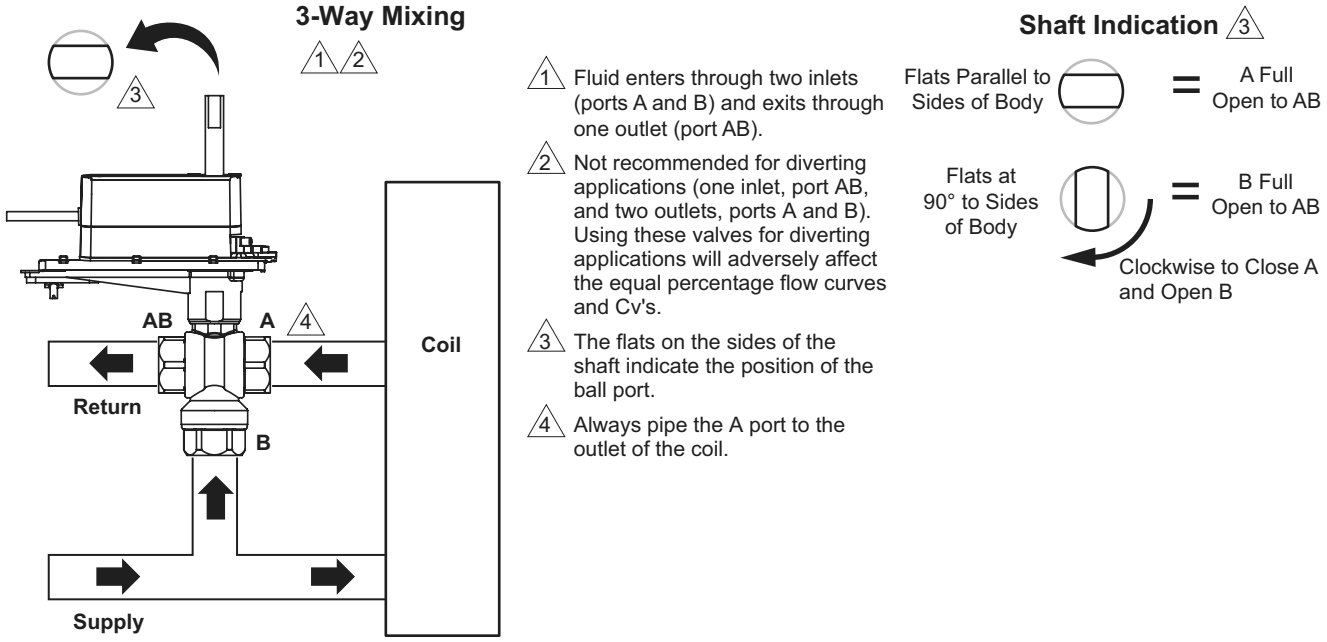


Figure 2 3-Way Mixing Valve Assemblies Piping Diagram.

Using Pipe Reducers with 2-Way Ball Valve Assemblies

The following table provides estimated effective C_v's when using pipe reducers with 2-way ball valve assemblies. Use these estimated effective Cv's in place of the rated Cv's when reducers or increasers are located within 6 pipe diameters upstream and 3 pipe diameters downstream of the valve.

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

Table-1 Estimated Effective Cv when Using Pipe Reducers with 2-Way Ball Valve Assemblies.

Valve Size (in.)	P Code	C_v	Estimated Effective C_v (k_{vs})									
			Pipe Size - inches (NPT)									
			1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5
1/2	01	0.38	0.38 (0.33)	0.38 (0.33)	0.38 (0.33)	—	—	—	—	—	—	—
	02	0.68	0.68 (0.59)	0.68 (0.59)	0.68 (0.59)	—	—	—	—	—	—	—
	03	1.3	1.3 (1.12)	1.3 (1.12)	1.3 (1.12)	—	—	—	—	—	—	—
	04	2.6	2.6 (2.24)	2.5 (2.16)	2.5 (2.16)	—	—	—	—	—	—	—
	05	4.7	4.7 (4.06)	4.3 (3.71)	4.1 (3.54)	—	—	—	—	—	—	—
	06	8.0	8.0 (6.9)	6.5 (5.6)	5.7 (4.9)	—	—	—	—	—	—	—
	07	11.7 [a]	11.7 (10.1)	7.9 (6.8)	6.7 (5.8)	—	—	—	—	—	—	—
3/4	13	1.2	—	1.2 (1.04)	1.2 (1.04)	1.2 (1.04)	1.2 (1.04)	—	—	—	—	—
	14	2.5	—	2.5 (2.16)	2.5 (2.16)	2.5 (2.16)	2.5 (2.16)	—	—	—	—	—
	15	4.3	—	4.3 (3.71)	4.3 (3.71)	4.2 (3.63)	4.2 (3.63)	—	—	—	—	—
	16	10.1	—	10.1 (8.7)	9.6 (8.3)	9.1 (7.9)	8.8 (7.6)	—	—	—	—	—
	17	14.7 [a]	—	14.7 (12.7)	7.1 (6.1)	6.5 (5.6)	6.2 (5.4)	—	—	—	—	—
	18	28.6 [a]	—	28.6 (24.7)	21.1 (18.2)	17.1 (14.8)	15.4 (13.3)	—	—	—	—	—
1	21	4.4	—	—	4.4 (3.8)	4.4 (3.8)	4.4 (3.8)	4.4 (3.8)	—	—	—	—
	22	9.0	—	—	9.0 (7.8)	8.9 (7.4)	8.8 (7.6)	8.7 (7.5)	—	—	—	—
	23	15.3	—	—	15.3 (13.2)	14.9 (12.9)	14.4 (12.5)	13.8 (11.9)	—	—	—	—
	24	26.1	—	—	26.1 (22.5)	24.4 (21.1)	22.4 (19.4)	20.3 (17.5)	—	—	—	—
	27	54.2 [a]	—	—	54.2 (46.8)	42.3 (36.6)	34.1 (29.5)	27.9 (24.1)	—	—	—	—
1-1/4	41	4.4	—	—	—	4.4 (3.8)	4.4 (3.8)	4.4 (3.8)	4.4 (3.8)	—	—	—
	42	8.3	—	—	—	8.3 (7.2)	8.3 (7.2)	8.2 (7.1)	8.2 (7.1)	—	—	—
	43	14.9	—	—	—	14.9 (12.9)	14.8 (12.8)	14.5 (12.5)	14.3 (12.3)	—	—	—
	44	36.5	—	—	—	36.5 (31.6)	35.0 (30.3)	31.5 (27.2)	29.6 (25.6)	—	—	—
	45	41.1 [a]	—	—	—	41.1 (35.5)	39.0 (33.7)	34.3 (29.7)	31.9 (27.5)	—	—	—
	46	102.3 [a]	—	—	—	102.3 (88.1)	79.1 (68.4)	53.3 (46.1)	45.5 (39.3)	—	—	—
1-1/2	51	22.8	—	—	—	—	22.8 (19.7)	22.4 (19.4)	22.0 (19.0)	21.8 (18.9)	—	—
	52	41.3	—	—	—	—	41.3 (35.7)	39.3 (33.9)	37.2 (32.1)	36.0 (31.1)	—	—
	54	171.7 [a]	—	—	—	—	171.7 (148.5)	101.2 (87.5)	76.6 (66.3)	67.2 (58.0)	—	—
2	61	41.7	—	—	—	—	—	41.7 (36.1)	41.2 (35.6)	40.6 (35.1)	39.7 (34.3)	—
	63	71.1	—	—	—	—	—	71.1 (61.4)	68.8 (59.5)	65.9 (57.0)	62.4 (53.9)	—
	65	108.0 [a]	—	—	—	—	—	108.0 (93.4)	100.3 (86.8)	92.0 (79.6)	83.0 (71.8)	—
	66	210.0	—	—	—	—	—	210.0 (181.7)	165.9 (143.5)	134.6 (116.4)	110.5 (95.6)	—
	67	266.0 [a]	—	—	—	—	—	266.0 (229.7)	189.7 (164.1)	146.4 (126.6)	116.7 (100.8)	—
2-1/2	71	45.0	—	—	—	—	—	—	45.0 (38.9)	43.6 (37.7)	42.5 (36.8)	42.0 (36.3)
	72	55.0	—	—	—	—	—	—	55.0 (47.5)	52.5 (45.3)	50.6 (43.7)	49.7 (42.9)
	73	72.3	—	—	—	—	—	—	72.3 (62.5)	66.6 (57.6)	63.0 (54.5)	61.2 (52.9)
	74	101.0	—	—	—	—	—	—	101.0 (87.4)	87.5 (75.7)	79.7 (68.9)	76.2 (65.9)
	75	162.0	—	—	—	—	—	—	162.0 (140.0)	119.0 (102.9)	101.3 (87.6)	94.3 (81.6)
	76	202.0 [a]	—	—	—	—	—	—	202.0 (174.4)	132.4 (114.5)	109.3 (94.5)	100.6 (87.0)
3	82	63.0	—	—	—	—	—	—	—	63.0 (54.4)	56.7 (49.0)	55.5 (47.9)
	85	145.0 [a]	—	—	—	—	—	—	—	145.0 (125.2)	96.8 (83.7)	90.6 (78.4)

[a] Denotes a full port valve, without the characterized insert.

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

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

Table-2 Estimated Effective Cv when Using Pipe Reducers with 3-Way Ball Valve Assemblies.

Valve Size (in.)	P Code	C_v (A Port)	Estimated Effective C_v (k_{vs})						
			Pipe Size - inches (NPT)						
			1/2	3/4	1	1-1/4	1-1/2	2	2-1/2
1/2	01	0.33	0.33 (0.29)	0.33 (0.29)	0.33 (0.29)	—	—	—	—
	02	0.59	0.59 (0.51)	0.59 (0.51)	0.59 (0.51)	—	—	—	—
	03	1.0	1.0 (0.86)	1.0 (0.86)	1.0 (0.86)	—	—	—	—
	04	2.4	2.4 (2.1)	2.3 (2.0)	2.3 (2.0)	—	—	—	—
	05	4.3	4.3 (3.7)	4.0 (3.5)	3.8 (3.3)	—	—	—	—
	06	8.0 [a]	8.0 (6.9)	7.9 (6.8)	5.7 (4.9)	—	—	—	—
3/4	13	1.3	—	1.3 (1.12)	1.3 (1.12)	1.3 (1.12)	1.3 (1.12)	—	—
	14	2.4	—	2.4 (2.1)	2.4 (2.1)	2.4 (2.1)	2.4 (2.1)	—	—
	15	3.8	—	3.8 (3.3)	3.8 (3.3)	3.74 (3.23)	3.7 (3.2)	—	—
	16	11 [a]	—	11 (9.5)	10.4 (9.0)	9.8 (8.5)	9.4 (8.1)	—	—
1	25	3.5	—	—	3.5 (3.0)	3.5 (3.0)	3.5 (3.0)	3.5 (3.0)	—
	26	4.5	—	—	4.5 (3.9)	4.5 (3.9)	4.5 (3.9)	4.5 (3.9)	—
	27	8.6	—	—	8.6 (7.4)	8.5 (7.3)	8.4 (7.2)	8.3 (7.2)	—
	31	30.8 [a]	—	—	30.8 (26.6)	28.0 (24.2)	25.2 (21.8)	22.3 (19.3)	—
1-1/4	43	8.7	—	—	—	8.7 (7.5)	8.6 (7.4)	8.6 (7.4)	8.5 (7.4)
	44	12.7	—	—	—	12.7 (11.0)	12.6 (10.9)	12.4 (10.7)	12.3 (10.6)
	45	19.4 [a]	—	—	—	19.4 (16.8)	19.2 (16.6)	18.5 (16.0)	18.1 (15.7)
	46	34.1 [a]	—	—	—	34.1 (29.4)	32.9 (28.4)	29.9 (25.9)	28.3 (24.4)
1-1/2	53	13.4	—	—	—	—	13.4 (11.6)	13.3 (11.5)	13.2 (11.4)
	54	23.5	—	—	—	—	23.5 (20.3)	23.1 (19.9)	22.7 (19.6)
	55	32.0 [a]	—	—	—	—	32.0 (27.7)	31.0 (26.8)	30.0 (25.9)
	56	61.1 [a]	—	—	—	—	61.1 (52.8)	54.9 (47.5)	49.7 (43.0)
2	61	23.9	—	—	—	—	—	23.9 (20.7)	23.5 (20.3)
	62	38.2	—	—	—	—	—	38.2 (33.0)	37.8 (32.7)
	63	56.7 [a]	—	—	—	—	—	56.7 (49.0)	55.5 (47.9)
	64	108.5 [a]	—	—	—	—	—	108.5 (93.9)	100.7 (87.1)

[a] Denotes a full port valve, without the characterized insert.

Cavitation Limitations on Valve Pressure Drop

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

Do not exceed the maximum differential pressure (pressure drop) for the valve selected. Refer to the chart in Figure-3.

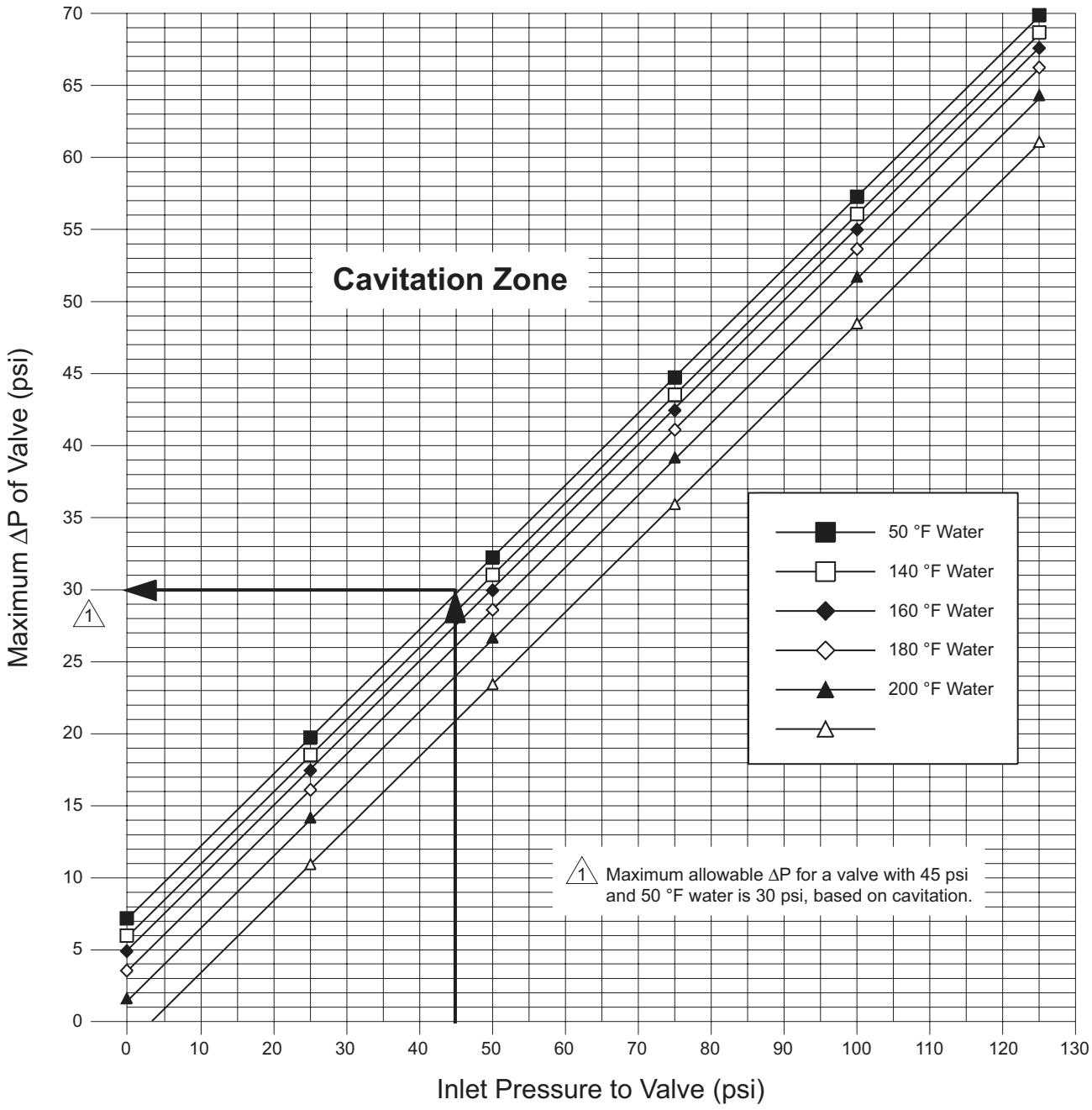
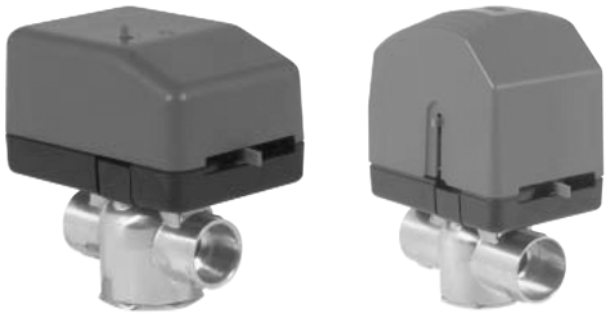


Figure 3 Maximum Allowable Differential Pressure (ΔP) for Water Valves.

TAC Erie ™ Zone Valves

Modulating Valve
Spring and Non-Spring Return

AT, AP Series



Features

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

Two Position
Spring and Non-Spring Return

AG, AH Series

Features

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

Table of Contents

Modulating Zone

V M 2 x x x [3]

Body Type
M = Modulating

Configuration
2 = 2-Way

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

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

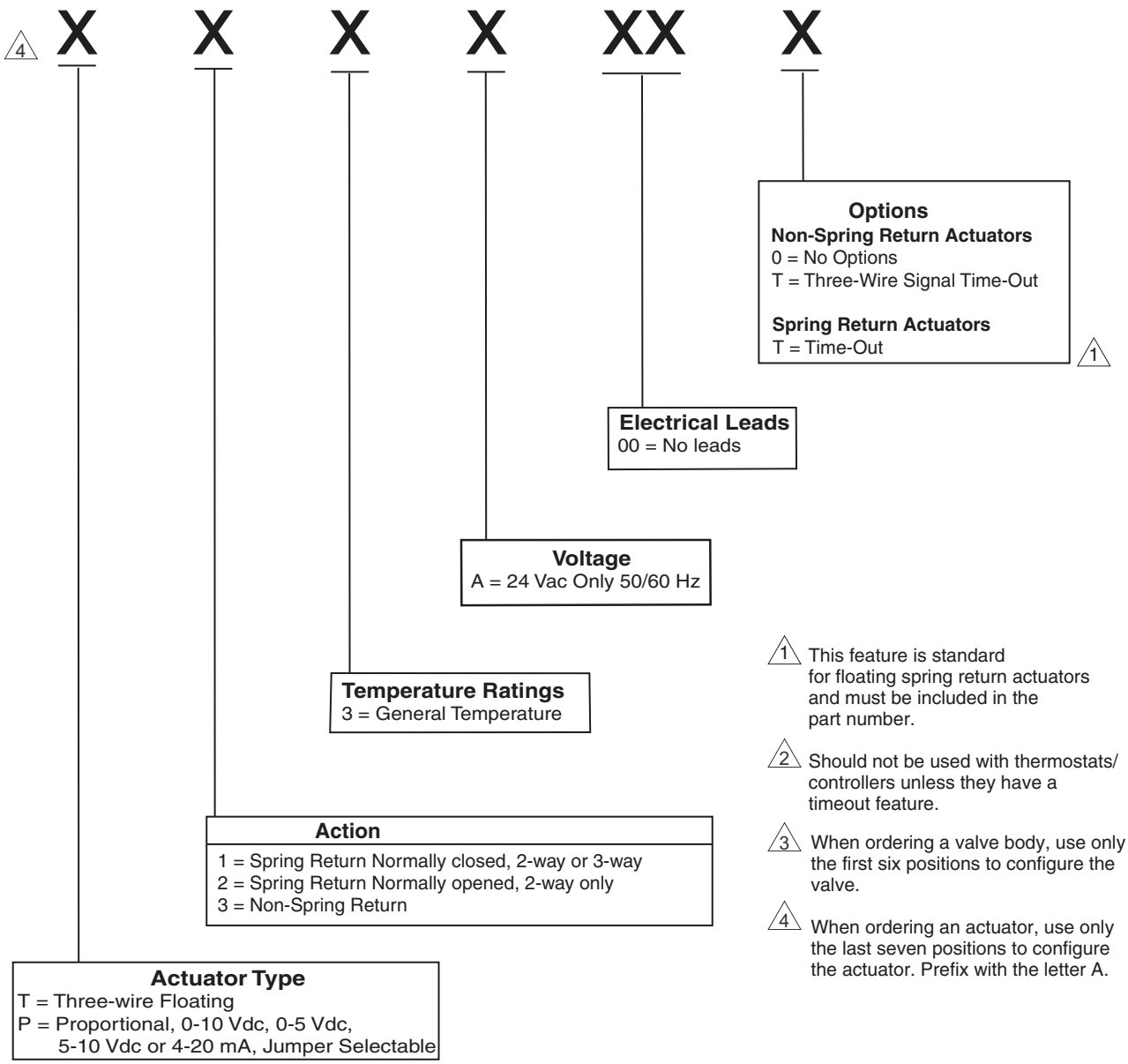
CV Size

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

Kvs Size

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

Valve Assemblies



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

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

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

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

Available Actuators

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

2

Two Position Zone Valve Assembly Configurator

Two-Position Zone

V X X X X X

1

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

*High temperature actuator must be used.

Configuration
2 = 2-Way
3 = 3-Way

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

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

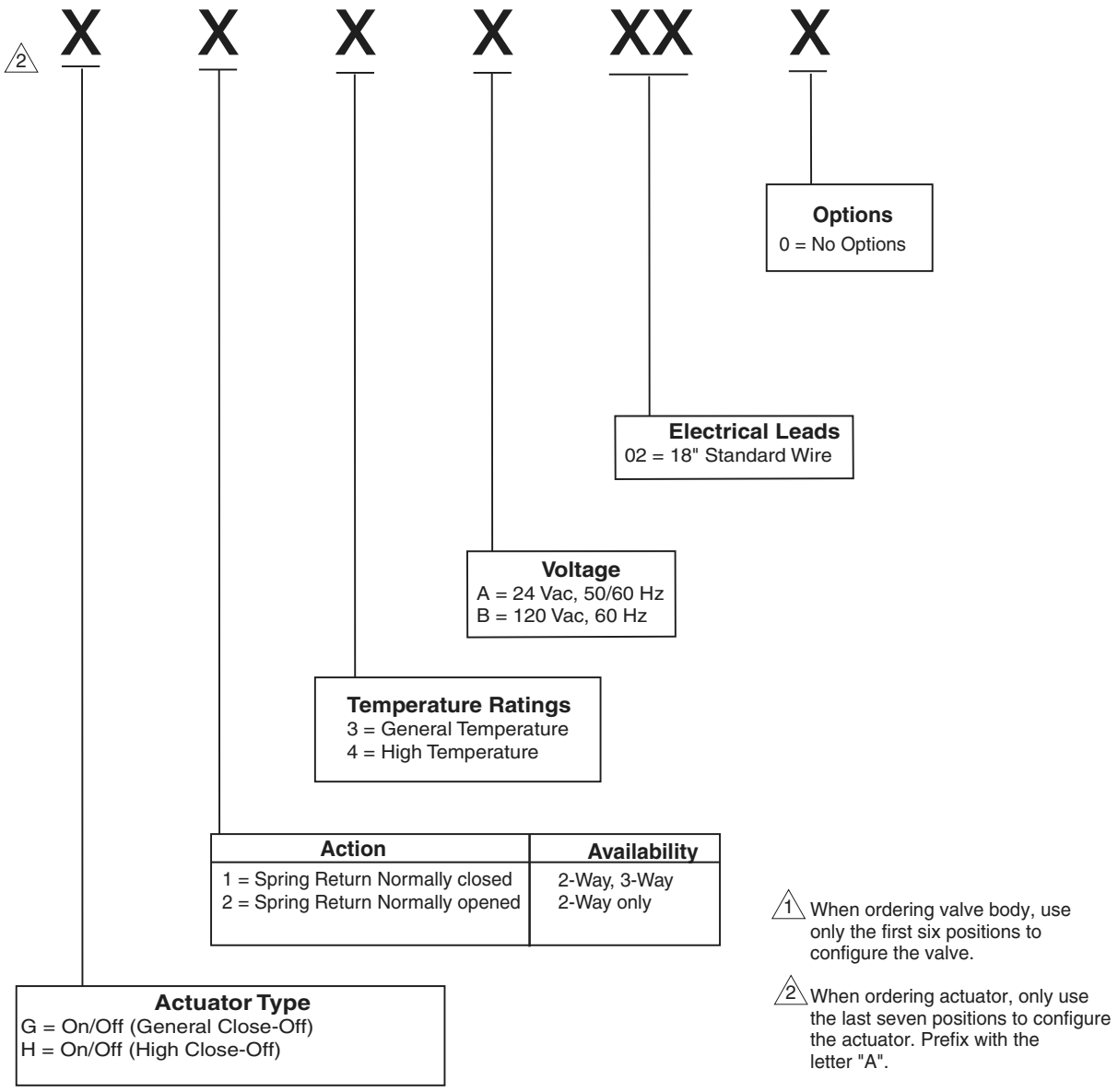
CV Size

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

Kvs Size

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

Valve Assemblies



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

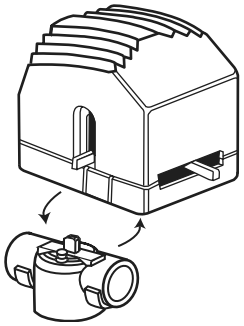
2 When ordering actuator, only use the last seven positions to configure the actuator. Prefix with the letter "A".

Body & Actuator Combination Requirements

Temperature Configurations

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

Actuator Spring Return Mode
A X X 3 X X X X
3 = General Temperature
4 = High Temperature
If actuator temp rating is 3, body style must be T.
If actuator temp rating is 4, body style can be S or T.



1/2 to 1-1/4 in. Sweat Ends

Two-Way Spring Return
Modulating
Normally Open

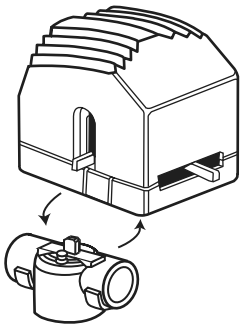
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT23A00T	3-Wire Floating with Timeout	173	4	235	115
AP23A000	0 to 10 Vdc 4 to 20 mA 1 to 5 Vdc 5 to 10 Vdc	174	5	235	115



1/2 to 1-1/4 in. Sweat Ends

Two-Way Spring Return
Modulating
Normally Closed

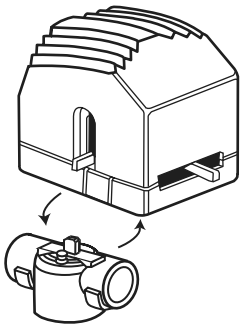
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT13A00T	3-Wire Floating with Timeout	173	4	235	115
AP13A000	0 to 10 Vdc 4 to 20 mA 1 to 5 Vdc 5 to 10 Vdc	174	5	235	115



1/2 to 1 in. NPT Ends

Two-Way Spring Return
Modulating
Normally Open

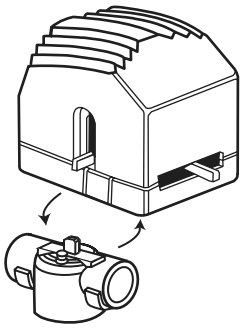
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT23A00T	3-Wire Floating with Timeout	173	4	235	115
AP23A000	0 to 10 Vdc 4 to 20 mA 1 to 5 Vdc 5 to 10 Vdc	174	5	235	115



1/2 to 1 in. NPT Ends

Two-Way Spring Return
Modulating
Normally Closed

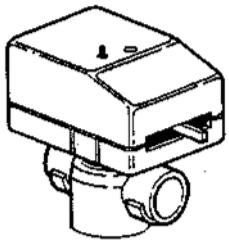
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT13A00T	3-Wire Floating with Timeout	173	4	235	115
AP13A000	0 to 10 Vdc 4 to 20 mA 1 to 5 Vdc 5 to 10 Vdc	174	5	235	115



1/2 to 1-1/4 in. Sweat Ends

Two-Way Non-Spring Return Modulating

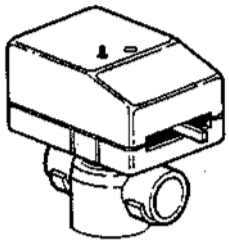
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT33A000	3-Wire Floating	174	6	234	114
AT33A00T	3-Wire Floating with Timeout	174	7	234	114
AP33A000	0 to 10 Vdc 4 to 20 mA field selectable	175	8	234	114



1/2 to 1 in. NPT Ends

Two-Way Non-Spring Return Modulating

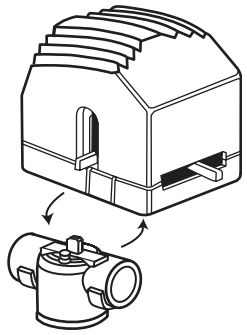
Flow Type		1 to 4 Cv equal %; 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT33A000	3-Wire Floating	174	6	234	114
AT33A00T	3-Wire Floating with Timeout	174	7	234	114
AP33A000	0 to 10 Vdc 4 to 20 mA field selectable	175	8	234	114



1/2 to 1-1/4 in. Sweat Ends

Three-Way Mixing Spring Return Modulating Normally Closed (B Port)

Flow Type		1 to 4 Cv equal % 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

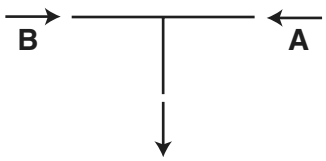
Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional[a] 0-10 V, 4-20 mA
		Spring Close	Motor Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM3211T13A00T	VM3211P13A000
	2 (1.7)	20 (138)	50 (344)	VM3212T13A00T	VM3212P13A000
	4 (3.5)	20 (138)	35 (241)	VM3213T13A00T	VM3213P13A000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

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

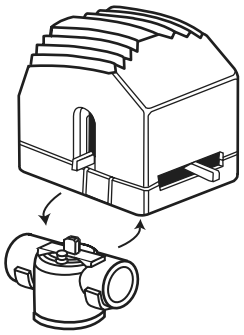
Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT13A00T	3-Wire Floating with Timeout	173	4	235	115
AP13A000	0 to 10 Vdc 4 to 20 mA 1 to 5 Vdc 5 to 10 Vdc	174	5	235	115

Flow Pattern



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



1/2 to 1 in. NPT Ends

Three-Way Mixing Spring Return Modulating Normally Closed (B Port)

Flow Type		1 to 4 Cv equal % 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

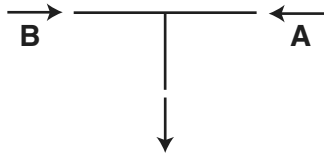
Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa)		Floating With Timeout 24 Vac	Proportional[a] 0-10 V, 4-20 mA
		Spring Close	Motor Close		
1/2	1 (0.8)	50 (344)	50 (344)	VM3221T13A00T	VM3221P13A000
	2 (1.7)	20 (138)	50 (344)	VM3222T13A00T	VM3222P13A000
	4 (3.5)	20 (138)	35 (241)	VM3223T13A00T	VM3223P13A000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

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

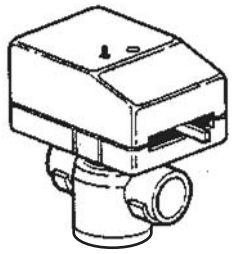
Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT13A00T	3-Wire Floating with Timeout	173	4	235	115
AP13A000	0 to 10 Vdc 4 to 20 mA 1 to 5 Vdc 5 to 10 Vdc	174	5	235	115

Flow Pattern



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



1/2 to 1-1/4 Sweat

Three-Way Mixing Non-Spring Return Modulating

Flow Type		1 to 4 Cv equal % 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV
Fluid Temperature		32 to 200 °F @ 104° F ambient (0 to 93 °C @ 40 °C)

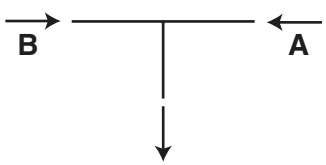
Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Floating Requires Thermostat/Controller with Timeout. 24 Vac	Proportional[a] 0-10 V, 4-20 mA, 0-5 Vdc or 5-10 Vdc
1/2	1 (0.8)	50 (344)	VM3211T33A00T	VM3211T33A000	VM3211P33A000
	2 (1.7)	50 (344)	VM3212T33A00T	VM3212T33A000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

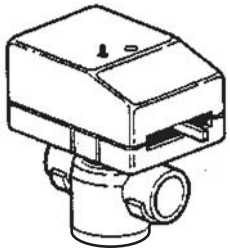
[a] Factory proportional control signal is direct-acting. An increase in control signal will open B port and close A port.

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT33A000	3-Wire Floating	174	6	234	114
AT33A00T	3-Wire Floating with Timeout	174	7	234	114
AP33A000	0 to 10 Vdc 4 to 20 mA field selectable	175	8	234	114

Flow Pattern





1/2 to 1 in. NPT Ends

Three-Way Mixing Non-Spring Return Modulating

Flow Type		1 to 4 Cv equal % 7.5/8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle/Plug	Highly saturated nitrile
Fluid Temperature		32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

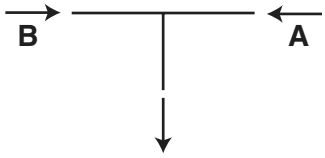
Size in.	Cv (K_{vs})	Close Off Pressure psi (kPa) Motor Close	Floating With Timeout 24 Vac	Floating Requires Thermostat/Controller with Timeout. 24 Vac	Proportional[a] 0-10 V, 4-20 mA
1/2	1 (0.8)	50 (344)	VM3221T33A00T	VM3221T33A000	VM3221P33A000
	2 (1.7)	50 (344)	VM3222T33A00T	VM3222T33A000	VM3222P33A000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

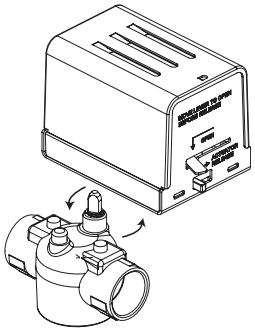
[a] Factory proportional control signal is direct-acting. An increase in control signal will open B port and close A port.

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AT33A000	3-Wire Floating	174	6	234	114
AT33A00T	3-Wire Floating with Timeout	174	7	234	114
AP33A000	0 to 10 Vdc 4 to 20 mA field selectable	175	8	234	114

Flow Pattern





1/2 to 1-1/4 in. Sweat Ends

Two-Way Spring Return

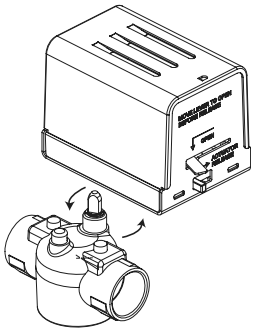
General Close-Off Two-Position

Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water or 15 psi Steam
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AG13A020, AG23A020 AG14A020, AG24A020	2-Position	173	3	236	116
AG13B020, AG23B020 AG14B020, AG24B020	2-Position	173	3	236	116



1/2 to 1 in. Female NPT Ends

Two-Way Spring Return

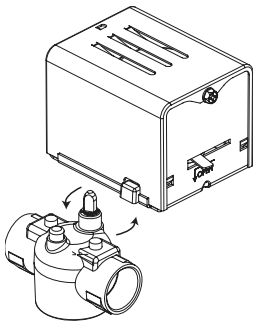
General Close-Off Two-Position

Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water or 15 psi Steam
Maximum Static Pressure		300 psi (20.6 bar))
Seat Leakage		ANSI IV

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AG13A020, AG23A020 AG14A020, AG24A020	2-Position	173	3	236	116
AG13B020, AG23B020 AG14B020, AG24B020	2-Position	173	3	236	116



1/2 to 1-1/4 in. Sweat Ends

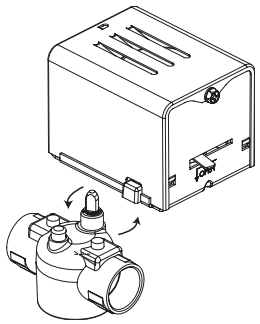
Two-Way Spring Return
High Close-Off
Two-Position

Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water or 15 psi Steam
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AH13A020, AH23A020 AH14A020, AH24A020	2-Position	173	3	236	117
AH13B020, AH23B020 AH14B020, AH24B020	2-Position	173	3	236	117



1/2 to 1 in. Female NPT Ends

Two-Way Spring Return

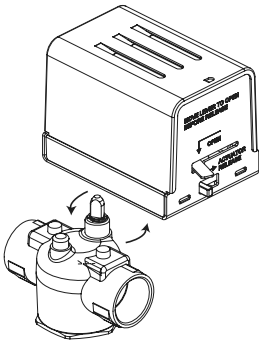
High Close-Off Two-Position

Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) Water VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C) Water or 15 psi Steam
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AH13A020, AH23A020 AH14A020, AH24A020	2-Position	173	3	236	117
AH13B020, AH23B020 AH14B020, AH24B020	2-Position	173	3	236	117



1/2 to 1-1/4 in. Sweat Ends

Three-Way Mixing or Diverting Spring Return

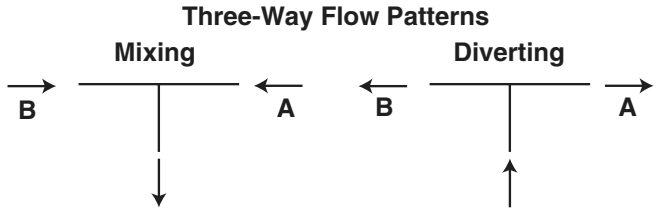
Normally Closed (B Port) General Close-Off Two-Position

Flow Type		1 to 4 Cv equal % 8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

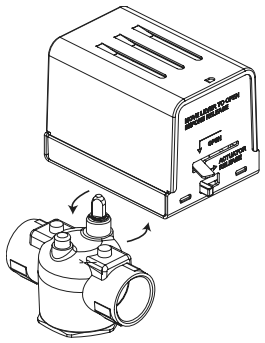
Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AG13A020, AG14A020	2-Position	173	3	236	116
AG13B020, AG14B020	2-Position	173	3	236	116



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

TAC Erie™ Zone Valves
Three-Way Mixing or Diverting Spring Return



1/2 to 1 in. Female NPT Ends

Three-Way Mixing or Diverting Spring Return

Normally Closed (B Port)

General Close-Off Two-Position

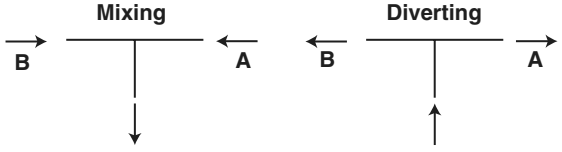
Flow Type		1 to 4 Cv equal % 8 Cv linear
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VS)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

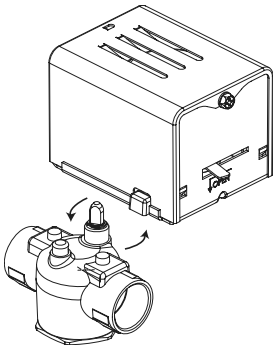
Actuator Code Table.

Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AG13A020, AG14A020	2-Position	173	3	236	116
AG13B020, AG14B020	2-Position	173	3	236	116

Three-Way Flow Patterns



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



1/2 to 1-1/4 in. Sweat Ends

Three-Way Mixing or Diverting Spring Return

Normally Closed (B Port) High Close-Off Two-Position

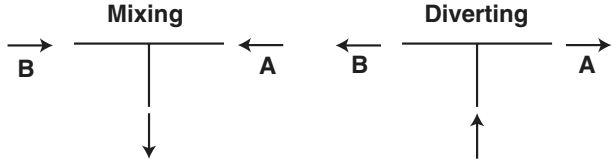
Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

Actuator Code Table.

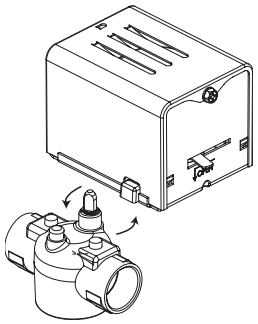
Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AH13A020, AH14A020	2-Position	173	3	236	117
AH13B020, AH14B020	2-Position	173	3	236	117

Three-Way Flow Patterns



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

TAC Erie™ Zone Valves
Three-Way Mixing or Diverting Spring Return



1/2 to 1 in. Female NPT Ends

Three-Way Mixing or Diverting Spring Return

Normally Closed (B Port) High Close-Off Two-Position

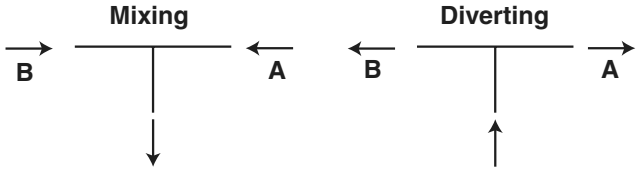
Flow Type		On, off, normally open or closed
Material	**Body**	Forged brass
	Seat	Brass
	Stem	Nickel plated brass
	Paddle	Highly saturated nitrile (VS), Buna N (VT)
Fluid Temperature		VT Series: 32 to 200 °F @ 104 °F ambient (0 to 93 °C @ 40 °C) VS Series: 32 to 250 °F @ 169 °F ambient (0 to 121 °C @ 76 °C)
Maximum Static Pressure		300 psi (20.6 bar)
Seat Leakage		ANSI IV

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

Actuator Code Table.

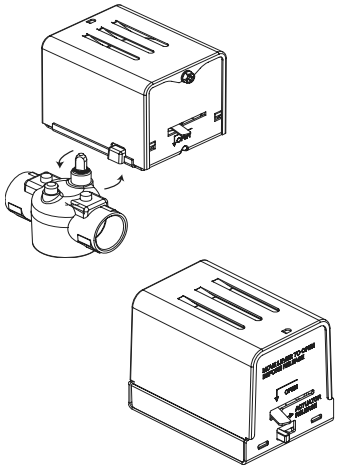
Actuator Model (Reference pages 146 thru 148)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
AH13A020, AH14A020	2-Position	173	3	236	117
AH13B020, AH14B020	2-Position	173	3	236	117

Three-Way Flow Patterns



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

TAC Erie™ AG, AH Series
Spring Return Actuator
Two-Position



Connections: 18 in. leads.

Housing: NEMA 1.

Dimensions: G Series: 2-3/8 H x 2-3/8 W x 3-11/16 D in. (60 x 60 x 96 mm)
H Series: 2-7/16 H x 2-5/8 W x 3-11/16 D in. (62 x 67 x 93 mm)

Override: Manual (normally closed models only).

Motor Type: Hysteresis synchronous.

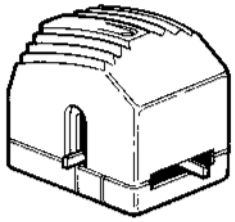
General Instructions: Refer to F-26496.

Agency Listing:

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

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

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



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

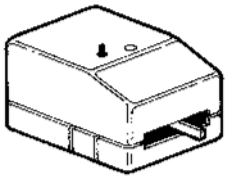
UL-873.Underwriters Laboratories (File #E9429 Category Temperature Indicating and Regulating Equipment).
European Community: EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
CUL: UL listed for use in Canada by Underwriters Laboratory. Canadian Standards C22.2 No. 24.
Australia: This product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

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

[a] For transformer sizing a minimum of 10 VA per actuator is required to allow for in-rush.

[b] Can only be used on 2-way valve.

TAC Erie™ APx3, ATx3 Series
Non-Spring Return Actuator
Modulating



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

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

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

Piping

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

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

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

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

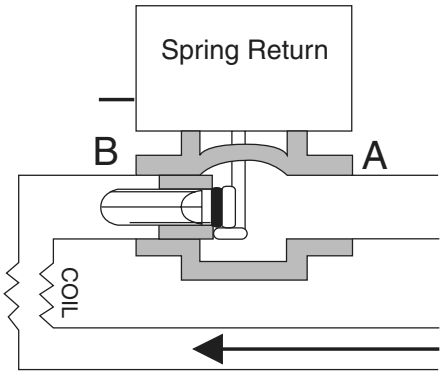


Figure 1 Two-Way Valve Normally Closed.

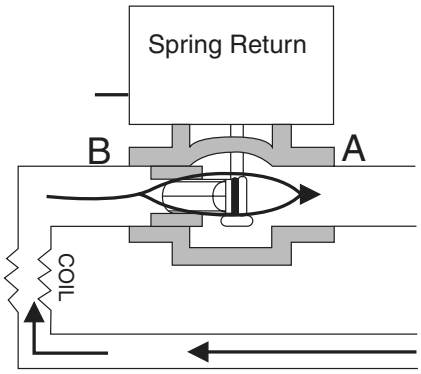


Figure 2 Two-Way Valve Normally Open.

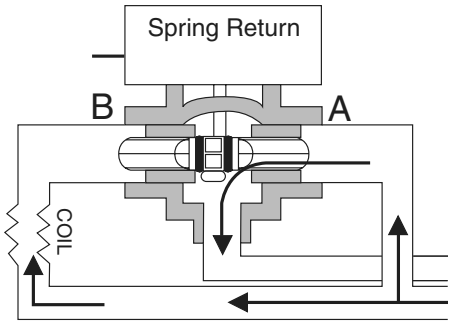


Figure 3 Three-Way Valve B Port Piped to Coil Outlet Normally Closed.

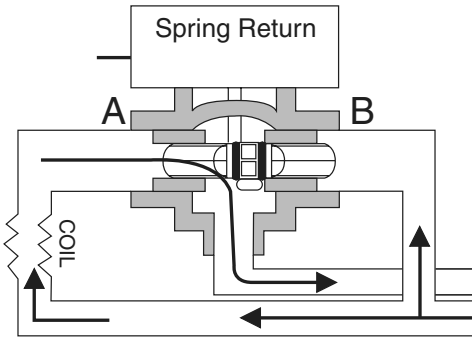


Figure 4 Three-Way Valve A Port Piped to Coil Outlet Normally Open

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

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

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

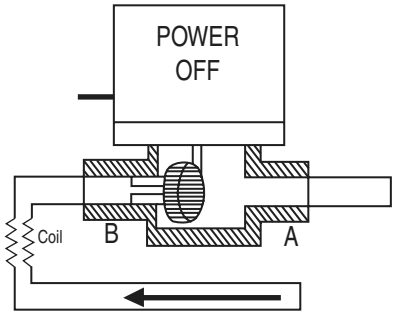


Figure 5 Two-Way Valve with Normally Closed Actuator.

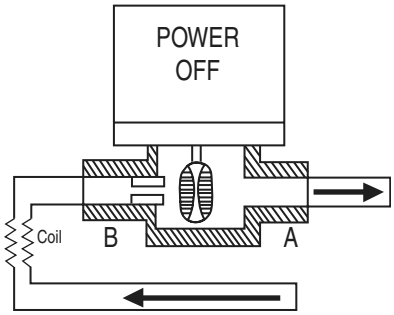


Figure 6 Two-Way Valve with Normally Open Actuator.

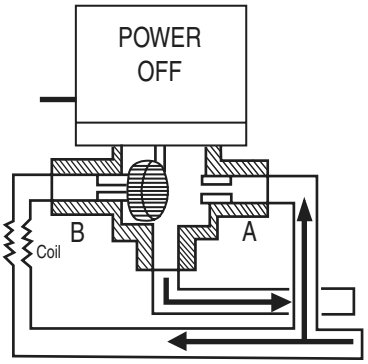


Figure 7 Three-Way Valve in Mixing Configuration Normally Closed to the Coil.

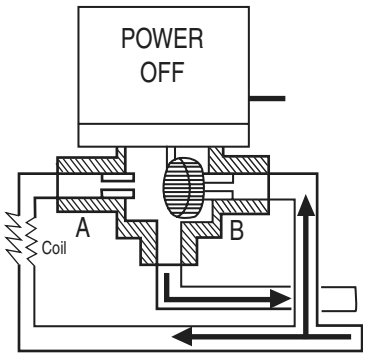


Figure 8 Three-Way Valve in Mixing Configuration Normally Open to the Coil.

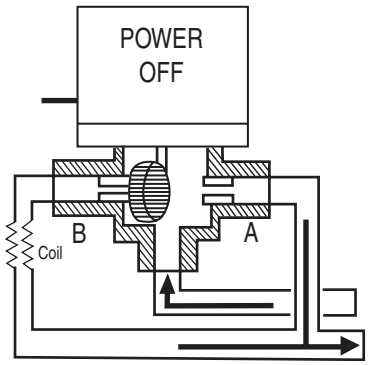


Figure 9 Three-Way Valve in Diverting Configuration Normally Closed to the Coil.

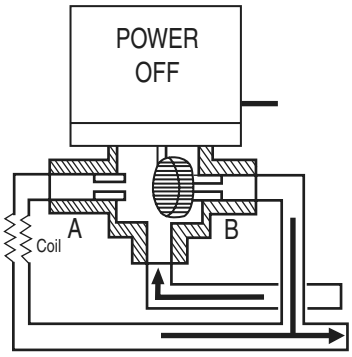
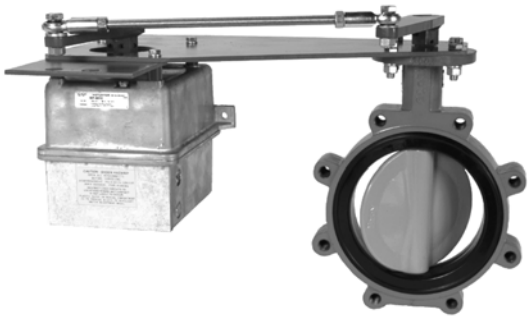


Figure 10 Three-Way Valve in Diverting Configuration Normally Open to the Coil.



TAC's butterfly valve line offers a wide range of two- and three-way sizes, using 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 resiliant seat. These features provide years of optimum performance and reliability.

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 built in O-ring seal
- Peroxide cured EPDM seats offer elastomeric stability
- 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 idsc
- Wide choice of electric actuators and control signals
- Cast iron lug bodies mate with ANSI class 125/150 flanges
- Bubble tight shut-off
- Bidirectional flow
- Three- way models can be piped in either mixing or diverting configurations.

Table of Contents

Rubber Lined Butterfly

V X X X - 6 X X X -

Control Signal Type
A = Two Position
B = Body Only
F = Floating (SPDT, center off)
K = Pneumatic
S = Proportional (Vdc, mAdc)

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

Accessory
4 = Positive positioner
S = Auxiliary switch
Leave the digit blank for no accessories.

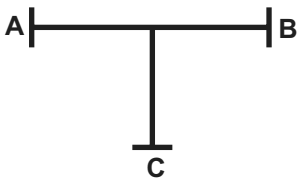
Type
6 = Butterfly

Style
2 = 2-Way
3 = 3-Way

Power Loss Action
0 = NSR
1 = NO
2 = NC

Flow Pattern[cd]

Pattern	Main Valve[a]	Main Valve Position	Linked Valve
0 = 2-Way	-	-	-
1 = 3-Way[b]	A	NC	C
2 = 3-Way[b]	B	NC	C
7 = 3-Way[b]	B	NO	C
8 = 3-Way[b]	A	NO	C
9 = Special	-	-	-



a. The letter indicates the main valve and where the actuator is mounted.
b. Refer to the flow diagram to the right.
c. The view represented is looking down on the stem side of the valve.
d. 3-Way models can be piped in either mixing or diverting configurations.

Valve Assemblies

XXXX - X - XX

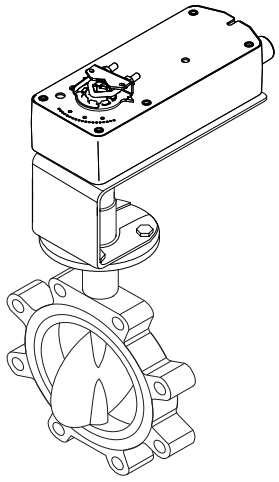
Actuator Code
SR = Spring Return
NSR = Non-Spring Return

Body Style
L = Nylon disc and lug body

Port Code
11 = 2"
12 = 2.5"
13 = 3"
14 = 4"
15 = 5"
16 = 6"
17 = 8"
18 = 10"
19 = 12"
21 = 16"
22 = 18"

Actuator Code[a]	On/Off or Floating SR with	Actuator Code	Modulating SR (0 to 10 Vdc)
556 556D	MA41-7153 (VAx)	556 556D	MS41-7153 (VSx)
556 556D	MF41-7153 (VFx)	_	_
Actuator Code[a]	**On/Off or Floating SR with 2 SPDT Auxiliary Switches**	**Actuator Code**	**Modulating SR (0 to 10 Vdc, 4 to 20 mA) with 2 SPDT Auxiliary Switches**
556 556D	MA41-7153 -502 (VAxS)	556 556D	MS41-7153-502 (VSxS)
556 556D	MF41-7153-502 (VFxS)	_	_
Actuator Code[a]	**On/Off or Floating NSR**	**Actuator Code**	**Modulating NSR (0 to 10 Vdc, 4 to 20 mA)**
E24	NR-2216-521 (VFx)	E24	NR-2216-541 (VSx)
E25	NR-2224-521 (VFx)	E25	NR-2224-541 (VSx)
E25D	NR-2224-521 (VFx)	E25D	NR-2224-541 (VSx)
Actuator Code[a]	**On/Off or Floating NSR with 2 SPDT Auxiliary Switches**	**Actuator Code**	**Modulating NSR (0 to 10 Vdc, 4 to 20 mA) with 2 SPDT Auxiliary Switches**
E24	NR-2216-522 (VFxS)	E24	NR-2216-542 (VSxS)
E25	NR-2224-522 (VFxS)	E25	NR-2224-542 (VSxS)
E25D	NR-2224-522 (VFxS)	E25D	NR-2224-542 (VSxS)
Actuator Code	**On/Off or Floating NSR with 1 SPDT Auxiliary Switches**	**Actuator Code**	**Modulating NSR (0 to 10 Vdc, 4 to 20 mA) with 2 SPDT Auxiliary Switches**
907	MP-9810-129 (VAxS or VFxS)	909	MP-9810-129/CP-8391-456 (VSxS)
Actuator Code	**On/Off NSR with 2 SPDT Auxiliary Switches**	**Actuator Code**	**Modulating NSR (0 to 10 Vdc, 4 to 20 mA) with 2 SPDT Auxiliary Switches**
E10	700051-113A0536/A (VAxS)	E12	700051-113A0536/B (VSxS)
E20	700121-113A0536/A (VAxS)	E22	700121-113A0536/B (VSxS)
E30	700201-113A0536/A (VAxS)	E32	700201-113A0536/B (VSxS)
E40	700301-113A0536/A (VAxS)	E42	700301-113A0536/B (VSxS)
E50	700501-113A0536/A (VAxS)	E52	700501-113A0536/B (VSxS)
E60	700651-113A0536/A (VAxS)	E62	700651-113A0536/B (VSxS)

[a] D = Dual actuators



2 to 4 in. Lug Bodies

Two-Way Spring Return Normally Open

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

Two-Way Normally Open Assemblies

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position	Floating	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VAF-6210-556-L-11	VFF-6210-556-L-11	VSF-6210-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-6210-556-L-12	VFF-6210-556-L-12	VSF-6210-556-L-12	24
3	461 (399)	175 (1207)	VAF-6210-556D-L-13	VFF-6210-556D-L-13	VSF-6210-556D-L-13	24
4	841 (727)	50 (345)	VAU-6210-556D-L-14	VFU-6210-556D-L-14	VSU-6210-556D-L-14	24

Vxxx-6210-556x-L-xx

Actuator Code Table.

Actuator Codes	Model Prefix[a]	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
556[b]	VAxx	MA41-7153	24vac, on/off, SR	176	12	227	106
556[bc]	VAxS	MA41-7153-502	24vac, on/off, SR, 2-SPDT aux switches	176 180	12 22	227	106
556[b]	VFxx	MF41-7153	24vac, Floating, SR	179 to 181	21 to 24	227	106
556[bc]	VFxS	MF41-7153-502	24vac, Floating, SR, 2-SPDT aux switches	179 to 181	21 to 24	227	106
556[b]	VSxx	MS41-7153	24vac, modulating, SR	194 to 195	55 to 57	227	106
556[bc]	VSxS	MS41-7153-502	24vac, on/off, SR, 2-SPDT aux switches	180 194 to 195	22 55 to 57	227	106

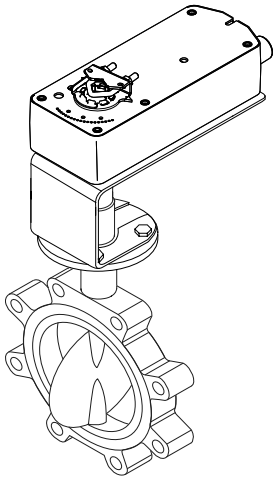
[a] For optional two SPDT auxiliary switch models the letter “S” must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

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

Butterfly Valves

Two-Way Spring Return Rubber Lined



2 to 4 in. Lug Bodies

Two-Way Spring Return Normally Closed

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

Two-Way

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position	Floating	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VAF-6220-556-L-11	VFF-6220-556-L-11	VSF-6220-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-6220-556-L-12	VFF-6220-556-L-12	VSF-6220-556-L-12	24
3	461 (399)	175 (1207)	VAF-6220-556D-L-13	VFF-6220-556D-L-13	VSF-6220-556D-L-13	24
4	841 (727)	50 (345)	VAU-6220-556D-L-14	VFF-6220-556D-L-14	VSF-6220-556D-L-14	24

Vxxx-6220-556x-L-xx

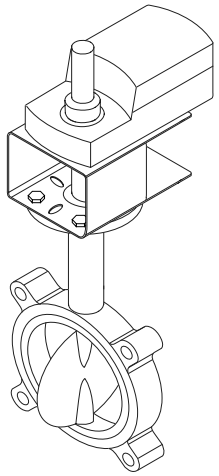
Actuator Code Table.

Actuator Codes	Model Prefix[a]	Actuator Model	Description	Wiring		Dimensions	
				Page	Figure	Page	Figure
556[b]	VAxx	MA41-7153	24 Vac, on/off, SR	176	12	227	106
556[bc]	VAxS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches	176 180	12 22	227	106
556[b]	VFxx	MF41-7153	24 Vac, Floating, SR	179 to 181	21 to 24	227	106
556[bc]	VFxS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches	179 to 181	21 to 24	227	106
556[b]	VSxx	MS41-7153	24 Vac, Modulating, SR	194 to 195	55 to 57	227	106
556[bc]	VSxS	MS41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches	180 194 to 195	22 55 to 57	227	106

[a] For optional two SPDT auxiliary switch models the letter “S” must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

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



2 to 6 in. Lug Bodies

Two-Way Non-Spring Return Rubberlined

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

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position or Floating	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VFF-6200-E24-L-11	VSF-6200-E24-L-11	24
2.5	282 (244)	175 (1207)	VFF-6200-E24-L-12	VSF-6200-E24-L-12	24
3	461 (399)	175 (1207)	VFF-6200-E25-L-13	VSF-6200-E25-L-13	24
4	841 (727)	175 (1207)	VFF-6200-E25D-L-14	VSF-6200-E25D-L-14	24
		50 (345)	VFU-6200-E25-L-14	VSU-6200-E25-L-14	24
5	1376 (1190)		VFU-6200-E25-L-15	VSU-6200-E25-L-15	24
6	1850 (1600)		VFU-6200-E25D-L-16	VSU-6200-E25D-L-16	24

Vxxx-6200-E2xx-L-xx

Actuator Code Table.

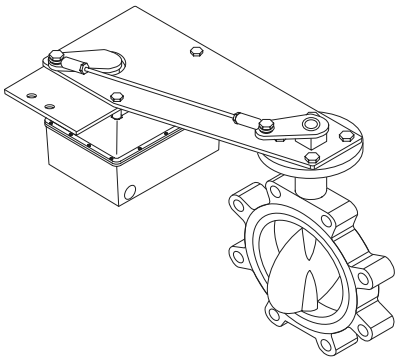
Actuator Codes	Model Prefix[a]	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
E24	VFxx	NR-2216-521	24 Vac, Floating, on/off, NSR	202	72 to 73	229	108
E24	VFxS	NR-2216-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux Switch	202 to 203	72, 73, 75	229	108
E24	VSxx	NR-2216-541	24 Vac, Modulated, NSR	202	74	229	108
E24	VSxS	NR-2216-542	24 Vac, Modulated, NSR, 2 SPDT aux Switch	202 to 203	74 to 75	229	108
E25[b]	VFxx	NR-2224-521	24 Vac, Floating, on/off, NSR	202	72, 73	229	108
E25[bc]	VFxS	NR-2224-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux Switch	202 to 203	72, 73, 75	229	108
E25[b]	VSxx	NR-2224-541	24 Vac, Modulated, NSR	202	74	229	108
E25[bc]	VSxS	NR-2224-542	24 Vac, Modulated, NSR, 2 SPDT aux Switch	202 to 203	74 to 75	229	108

[a] For optional two SPDT auxiliary switch models the letter "S" must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

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

Butterfly Valves
Two-Way Non-Spring Return, Rubber Lined, High Torque



6 to 12 in. Lug Bodies

Two-Way Non-Spring Return

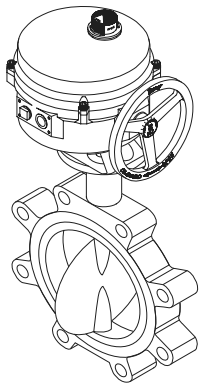
Flow Type		Equal % bidirectional.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc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

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	On/Off or Floating	Proportional	Voltage Vac
6	1850 (1600)	175 (1207)	VAFS-6200-907-L-16	VSFS-6200-909-L-16	120
8	3316 (2868)	175 (1207)	VAFS-6200-907-L-17	VSFS-6200-909-L-17	120
		50 (345)	VAUS-6200-907-L-17	VSUS-6200-909-L-17	120
10	5430 (4697)	175 (1207)	VAFS-6200-907-L-18	VSFS-6200-909-L-18	120
		50 (345)	VAUS-6200-907-L-18	VSUS-6200-909-L-18	120
12	8077 (6987)	175 (1207)	VAFS-6200-907-L-19	VSFS-6200-909-L-19	120
		50 (345)	VAUS-6200-907-L-19	VSUS-6200-909-L-19	120

Actuator Code Table.

VxxS-6200-90x-L-xx

Actuator Codes	Model Prefix	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
907	VAxS	MP-9810-129	120 Vac, on/off, Floating, NSR	186	37	Consult Factory	
909	VSxS	MP-9810-129	With CP-8391-456 Modulated	175	9		



2 to 18 in. Lug Bodies

Two-Way Non-Spring Return NEMA 4 with Hand Wheel

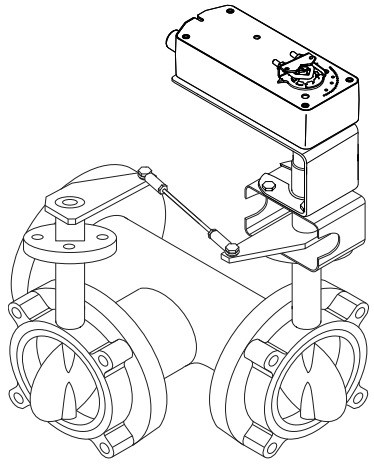
Flow Type		Equal % bidirectional.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem Seals	Self adjusting double U cup.
	Disc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

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position	Proportional	Voltage Vac
2	144 (125)	175 (1207)	VAFS-6200-E10-L-11	VSFS-6200-E12-L-11	120
2.5	282 (244)	175 (1207)	VAFS-6200-E10-L-12	VSFS-6200-E12-L-12	120
3	461 (399)	175 (1207)	VAFS-6200-E10-L-13	VSFS-6200-E12-L-13	120
4	841 (727)	50 (345)	VAUS-6200-E10-L-14	VSUS-6200-E12-L-14	120
		175 (1207)	VAFS-6200-E10-L-14	VSFS-6200-E12-L-14	120
5	1376 (1190)	50 (345)	VAUS-6200-E10-L-15	VSUS-6200-E12-L-15	120
		175 (1207)	VAFS-6200-E20-L-15	VSFS-6200-E22-L-15	120
6	1850 (1600)	50 (345)	VAUS-6200-E20-L-16	VSUS-6200-E22-L-16	120
		175 (1207)	VAFS-6200-E20-L-16	VSFS-6200-E22-L-16	120
8	3316 (2868)	50 (345)	VAUS-6200-E20-L-17	VSUS-6200-E22-L-17	120
		175 (1207)	VAFS-6200-E30-L-17	VSFS-6200-E32-L-17	120
10	5430 (4697)	50 (345)	VAUS-6200-E30-L-18	VSUS-6200-E32-L-18	120
		175 (1207)	VAFS-6200-E40-L-18	VSFS-6200-E42-L-18	120
12	8077 (6987)	50 (345)	VAUS-6200-E40-L-19	VSUS-6200-E42-L-19	120
		175 (1207)	VAFS-6200-E50-L-19	VSFS-6200-E52-L-19	120
14	10538 (9115)	50 (345)	VAUS-6200-E50-L-20	VSUS-6200-E52-L-20	120
		1750 (1207)	VAFS-6200-E60-L-20	VSFS-6200-E62-L-20	120
16	13966 (12081)	50 (345)	VAUS-6200-E60-L-21	VSUS-6200-E62-L-21	120
18	17214 (14890)	50 (345)	VAUS-6200-E60-L-22	VSUS-6200-E62-L-22	120

VxxS-6200-Exx-L-xx

Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
E10	VAxS	S70-0051-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	231	110
E20	VAxS	S70-0121-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	231	110
E30	VAxS	S70-0201-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	231	110
E40	VAxS	S70-0301-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	231	110
E50	VAxS	S70-0501-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	231	110
E60	VAxS	S70-0651-A	120 Vac, on/off, NEMA4, 2 SPDT aux swtich, manual override	173	2	231	110
E12	VSxS	S70-0051-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	231	110
E22	VSxS	S70-0121-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	231	110
E32	VSxS	S70-0201-B	120 Vac, modulated, NEMA4, 2-SPDT aux switch, manual override	172	1	231	110
E42	VSxS	S70-0301-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	231	110
E52	VSxS	S70-0501-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	231	110
E62	VSxS	S70-0651-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	231	110



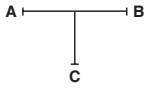
2 to 4 in. Lug Bodies

Three-Way Spring Return Normally Open

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

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position[a]	Floating[a]	Proportional[a]	Voltage Vac
2	144 (125)	175 (1207)	VAF-631x-556-L-11	VFF-631x-556-L-11	VSF-631x-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-631x-556D-L-12	VFF-631x-556D-L-12	VSF-631x-556D-L-12	24
3	461 (399)	175 (1207)	VAF-631x-556D-L-13	VFF-631x-556D-L-13	VSF-631x-556D-L-13	24
4	841 (727)	50 (345)	VAU-631x-556D-L-14	VFU-631x-556D-L-14	VSU-631x-556D-L-14	24

[a] Select 7 or 8 for the "x".
8 = Actuator is mounted on the main valve at "A" and is NO.
7 = Actuator is mounted on the main valve at "B" and is NO.
The linked valve for 7 and 8 is "C".



Actuator Code Table.

Vxxx-631x-556x-L-xx

Actuator Codes	Model Prefix[a]	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
556[b]	VAxx	MA41-7153	24 Vac, on/off, SR	176	12	228	107
556[bc]	VAxS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches	176 180	12 22	228	107
556[b]	VFxx	MF41-7153	24 Vac, Floating, SR	179 to 181	21 to 24	228	107
556[bc]	VFxS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches	179 to 181	21 to 24	228	107
556[b]	VSxx	MS41-7153	24 vac, Modulating, SR	194 to 195	55 to 57	228	107
556[bc]	VSxS	MS41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches	180 194 to 195	22 55 to 57	228	107

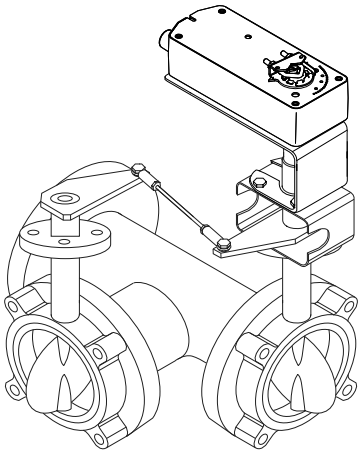
[a] For optional two SPDT auxiliary switch models the letter "S" must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

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

Butterfly Valves

Three-Way Spring Return Rubber Lined



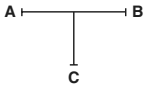
2 to 4 in. Lug Bodies

Three-Way Spring Return Normally Closed

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

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position[a]	Floating[a]	Proportional[a]	Voltage Vac
2	144 (125)	175 (1207)	VAF-632x-556-L-11	VFF-632x-556-L-11	VSF-632x-556-L-11	24
2.5	282 (244)	175 (1207)	VAF-632x-556D-L-12	VFF-632x-556D-L-12	VSF-632x-556D-L-12	24
3	461 (399)	175 (1207)	VAF-632x-556D-L-13	VFF-632x-556D-L-13	VSF-632x-556D-L-13	24
4	841 (727)	50 (345)	VAU-632x-556D-L-14	VFU-632x-556D-L-14	VSU-632x-556D-L-14	24

[a] Select 1 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 Code Table.

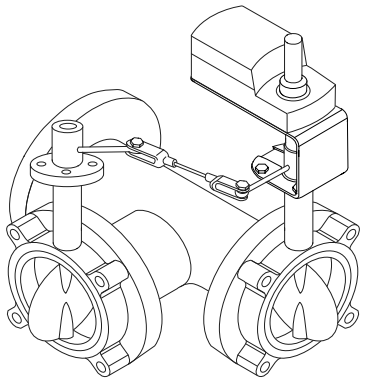
Vxxx-632x-556x-L-xx

Actuator Codes	Model Prefix[a]	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
556[b]	VAxx	MA41-7153	24 Vac, on/off, SR	176	12	228	107
556[bc]	VAxS	MA41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches	176 180	12 22	228	107
556[b]	VFxx	MF41-7153	24 Vac, Floating, SR	179 to 181	21 to 24	228	107
556[bc]	VFxS	MF41-7153-502	24 Vac, Floating, SR, 2 SPDT aux switches	179 to 181	21 to 24	228	107
556[b]	VSxx	MS41-7153	24 Vac, Modulating, SR	194 to 195	55 to 57	228	107
556[bc]	VSxS	MS41-7153-502	24 Vac, on/off, SR, 2 SPDT aux switches	180 194 to 195	22 55 to 57	228	107

[a] For optional two SPDT auxiliary switch models the letter "S" must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting.

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



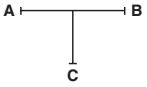
2 to 6 in. Lug Bodies

Three-Way Non-Spring Return

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

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	On/Off or Floating[a]	Proportional[a]	Voltage Vac
2	144 (125)	175 (1207)	VFF-630x-E24-L-11	VSF-630x-E24-L-11	24
2.5	282 (244)	175 (1207)	VFF-630x-E25-L-12	VSF-630x-E25-L-12	24
3	461 (399)	175 (1207)	VFF-630x-E25-L-13	VSF-630x-E25-L-13	24
4	841 (727)	175 (1207)	VFF-630x-E25D-L-14	VSF-630x-E25D-L-14	24
		50 (345)	VFU-630x-E25-L-14	VSU-630x-E25-L-14	24
5	1376 (1190)		VFU-630x-E25D-L-15	VSU-630x-E25D-L-15	24
6	1850 (1600)		VFU-630x-E25D-L-16	VSU-630x-E25D-L-16	24

[a] Select 1 or 2 for the "x".
1 = Actuator is mounted on the main valve at "A" and is NC.
2 = Actuator is mounted on the main valve at "B" and is NC.
The linked valve for 1 and 2 is "C".



Actuator Code Table.

Vxxx-E2xx-L-xx

Actuator Codes	Model Prefix[a]	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
E24	VFxx	NR-2216-521	24 Vac, Floating, on/off, NSR	202	72, 73	230	109
E24	VFxS	NR-2216-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux switch	202 to 203	72, 73, 75	230	109
E24	VSxx	NR-2216-541	24 Vac, Modulated, NSR	202	74	230	109
E24	VSxS	NR-2216-542	24 Vac, Modulated, NSR, 2 SPDT aux switch	202 to 203	74 to 75	230	109
E25[b]	VFxx	NR-2224-521	24 Vac, Floating, on/off, NSR	202	72 to 73	230	109
E25[bc]	VFxS	NR-2224-522	24 Vac, Floating, on/off, NSR, 2 SPDT aux switch	202 to 203	72, 73, 75	230	109
E25[b]	VSxx	NR-2224-541	24 Vac, Modulated, NSR	202	74	230	109
E25[bc]	VSxS	NR-2224-542	24 Vac, Modulated, NSR, 2 SPDT aux switch	202 to 203	74 to 75	230	109

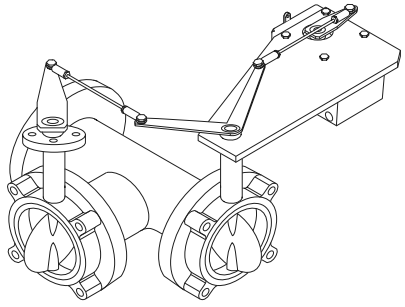
[a] For optional two SPDT auxiliary switch models the letter "S" must be added to the model prefix field. EX: VxxS

[b] D = Dual mounting (E25D).

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

Butterfly Valves

Three-Way Non-Spring Return, Rubber Lined, High Torque



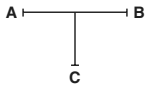
6 to 12 in. Lug Bodies

Three-Way Non-Spring Return

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

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	On/Off or Floating[a]	Proportional[a]	Voltage Vac
6	1850 (1600)	175 (1207)	VAFS-630x-907-L-16	VSFS-630x-909-L-16	120
8	3316 (2868)	175 (1207)	VAFS-630x-907-L-17	VSFS-630x-909-L-17	120
		50 (345)	VAUS-630x-907-L-17	VSUS-630x-909-L-17	120
10	5430 (4697)	175 (1207)	VAFS-630x-907-L-18	VSFS-630x-909-L-18	120
		50 (345)	VAUS-630x-907-L-18	VSUS-630x-909-L-18	120
12	8077 (6987)	175 (1207)	VAFS-630x-907-L-19	VSFS-630x-909-L-19	120
		50 (345)	VAUS-630x-907-L-19	VSUS-630x-909-L-19	120

[a] Select 1 or 2 for the "x".
1 = Actuator is mounted on the main valve at "A" and is NC.
2 = Actuator is mounted on the main valve at "B" and is NC.
The linked valve for 1 and 2 is "C".

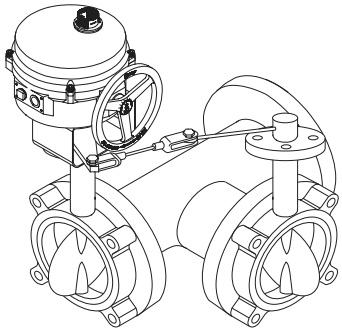


VxxS-630x-90x-L-xx

Actuator Code Table.

Actuator Codes	Model Prefix[a]	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
907	VAxS	MP-9810-129	120 Vac, on/off, floating, NSR	186	37	Consult Factory	
909	VSxS	MP-9810-129	With CP-8391-456	175	9		

[a] Includes SPDT Ausxiliary Switch.



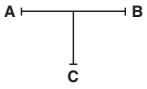
2 to 16 in. Lug Bodies

Three-Way Non-Spring Return NEMA 4 with Hand Wheel

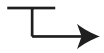
Flow Type		Equal % linear bidirectional. Mixing or diverting configurations.
Material	**Body**	Polyester coated cast iron, ASTM A126 Class B lug. Mates with ANSI 125/150 flanges.
	Seat	EPDM tongue and groove seat and molded O-ring flange seal. Peroxide cured.
	Stem	Stainless steel double D stem.
	Stem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

Size in.	Cv (K_{vs}) @ 90°	Close-Off Pressure psi (kPa)	Two Position[a]	Proportional[a]	Voltage Vac
2	144 (125)	175 (1207)	VAFS-630x-E10-L-11	VSFS-630x-E12-L-11	120
2.5	282 (244)	175 (1207)	VAFS-630x-E10-L-12	VSFS-630x-E12-L-12	120
3	461 (399)	175 (1207)	VAFS-630x-E10-L-13	VSFS-630x-E12-L-13	120
4	841 (727)	50 (345)	VAUS-630x-E10-L-14	VSUS-630x-E12-L-14	120
		175 (1207)	VAFS-630x-E10-L-14	VSFS-630x-E12-L-14	120
5	1376 (1190)	50 (345)	VAUS-630x-E10-L-15	VSUS-630x-E12-L-15	120
		175 (1207)	VAFS-630x-E20-L-15	VSFS-630x-E22-L-15	120
6	1850 (1600)	50 (345)	VAUS-630x-E20-L-16	VSUS-630x-E22-L-16	120
		175 (1207)	VAFS-630x-E20-L-16	VSFS-630x-E22-L-16	120
8	3316 (2868)	50 (345)	VAUS-630x-E20-L-17	VSUS-630x-E22-L-17	120
		175 (1207)	VAFS-630x-E30-L-17	VSFS-630x-E32-L-17	120
10	5430 (4697)	50 (345)	VAUS-630x-E30-L-18	VSUS-630x-E32-L-18	120
		175 (1207)	VAFS-630x-E40-L-18	VSFS-630x-E42-L-18	120
12	8077 (6987)	50 (345)	VAUS-630x-E40-L-19	VSUS-630x-E42-L-19	120
		175 (1207)	VAFS-630x-E50-L-19	VSFS-630x-E52-L-19	120
14	10538 (9115)	50 (345)	VAUS-630x-E50-L-20	VSUS-630x-E52-L-20	120
		1750 (1207)	VAFS-630x-E60-L-20	VSFS-630x-E62-L-20	120
16	13966 (12081)	50 (345)	VAUS-630x-E60-L-21	VSUS-630x-E62-L-21	120

[a] Select 1 or 2 for the "x".
1 = Actuator is mounted on the main valve at "A" and is NC.
2 = Actuator is mounted on the main valve at "B" and is NC.
The linked valve for 1 and 2 is "C".



VxxS-630x-Exx-L-xx

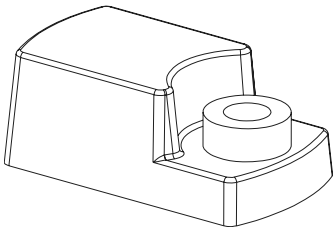


Actuator Code Table.

Actuator Codes	Model Prefix	Actuator Model	Description	Wiring		Dimension Information	
				Page	Figure	Page	Figure
E10	VAxS	S70-0051-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	232	111
E20	VAxS	S70-0121-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	232	111
E30	VAxS	S70-0201-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	232	111
E40	VAxS	S70-0301-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	232	111
E50	VAxS	S70-0501-A	120 Vac, on/off, NEMA4, 2 SPDT aux switch, manual override	173	2	232	111
E60	VAxS	S70-0651-A	120 Vac, on/off, NEMA4, 2 SPDT aux swtich, manual override	173	2	232	111
E12	VSxS	S70-0051-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	232	111
E22	VSxS	S70-0121-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	232	111
E32	VSxS	S70-0201-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	232	111
E42	VSxS	S70-0301-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	232	111
E52	VSxS	S70-0501-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	232	111
E62	VSxS	S70-0651-B	120 Vac, modulated, NEMA4, 2 SPDT aux switch, manual override	172	1	232	111

NR-2216-5xx Series (E24)

Non-Spring Return
20-30 Vac/24 Vdc
140 in-lb (15.8 Nm)

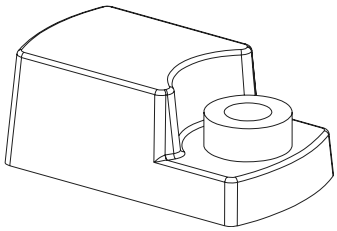


Specifications

Connection:
Screw terminals
Housing:
Polymer, NEMA 2
Dimensions:
7 L x 4 W x 2.5 H inches
(180 x 100 x 64.5 mm)
Position Indicator:
Scale
Override:
Yes
Control Signal:
NR-226-52x: Floating
NR-2216-54x: Proportional
The control signal is factory set for direct action. It can be changed in the field for reverse action.
Voltage:
20-30 Vac or
24 Vdc
VA @ 60 Hz
NR-2216-52x: 6.5
NR-2216-54x: 7.5
Feedback
NR-2216-54x, 0-10 or 2-10 Vdc
Auxiliary Switch:
NR-2216-5x2, 2 SPDT
Timing (seconds):
115

NR-2224-5xx Series (E25)

Non-Spring Return
20-30 Vac/24 Vdc
210 in-lb (23.7 Nm)

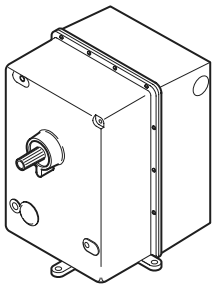


Specifications

Connection:
Screw terminals
Housing:
Polymer, NEMA 2
Dimensions:
7 L x 4 W x 2.5 H inches
(180 x 100 x 64.5 mm)
Position Indicator:
Scale
Override:
Yes
Control Signal:
NR-226-52x: Floating
NR-2216-54x: Proportional
The control signal is factory set for direct action. It can be changed in the field for reverse action.
Voltage:
20-30 Vac or
24 Vdc
VA @ 60 Hz
NR-2224-52x: 6.5
NR-2224-54x: 7.5
Feedback
NR-2224-54x, 0-10 or 2-10 Vdc
Auxiliary Switch:
NR-2224-5x2, 2 SPDT
Timing (seconds):
115

MP-9810-129 (907)

Non-Spring Return
120 Vac
1300 in-lb (146 Nm)



Specifications

Connection:
Coded screw terminals

Housing:
Aluminum diecast, with 1/2" conduit knockouts on each side

Dimensions:
9-9/16 H x 9-1/2 W x 10-1/2 D in. (243 x 241x 267 mm)

Position Indicator:
None

Override:
None

Rotation:
CW/CCW

Control Signal:
On/Off, Floating, Proportional
Proportional requires CP-8391-456 drive.

Voltage:
120 Vac

VA @ 60 Hz
1.8

Auxiliary Switch:
SPDT

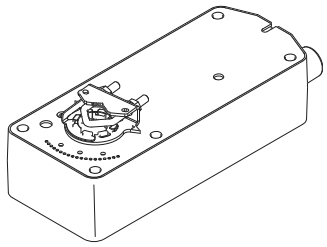
Timing (seconds):
115

Feedback:
100 ohm

General Instructions:
F-11331

Mx41-7153 Series (556)

Spring Return
120 Vac
133 in-lb (15 N)



Specifications

Connection:
3 ft. (0.9 m) Appliance cable

Housing:
Aluminum diecast, NEMA 2 with conduit connector in the down position

Dimensions:
10-1/2 x 4 x 3-1/2 (267 x 110 x 89 mm)

Position Indicator:
Visual indicator

Override:
Manual

Motor Type:
Brushless

Rotation:
With left side out 0 to 90° CW is standard from factory.

Control Signal:
MA41-7153: Two-position SPST
MF41-7153: Floating
MS41-7153: 2-10 Vdc
The control signal is factory set for direct action. It can be changed in the field to reverse action.

Voltage:
24 Vac ± 20%
22-30 Vdc

VA@60 HZ
9.7

Feedback:
MA41 and MF41: None
MS41: 2-10 Vdc

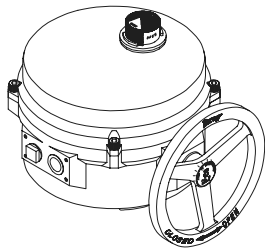
Auxiliary Switch:
Mx41-7153-502 2-SPDT

Timing (seconds):
Powered <190
Spring return <30

General Instructions:
F-26642

S70-0xxx1-x Series
(E10) (E20) (E30) (E40) (E50) (E60)
(E12) (E22) (E32) (E42) (E52) (E62)

120 Vac
500 - 6500 in-lb (56.5 - 734 Nm)



Specifications

Connection:
Coded screw terminals

Housing:
Aluminum die cast, NEMA 4

Dimensions:
700051 (E10)(E12): 7.5 H x 9.5 W x 6.7 D in. (190 x 241x 170 mm)

700121 (E20)(E22), 700201 (E30)(E32): 10.1 H x 12.8 W x 8.1 D in. (256.5 x 325 x 206 mm)

700301 (E40)(E-2), 700501 (E50)(E52),

700651 (E60)(E62): 12.1 H x 15.5 W x 8.8 D in. (307.5 x 394 x 223.5 mm)

Position Indicator:
Yes

Override:
Yes

Rotation:
CW/CCW

Control Signal:
700051-A (E10), 700121-A (E20), 700201-A (E30), 700301-A (E40), 700501-A (E50), 7000651-A (E60): Two Position or floating.

700051-B (E12), 700121-B (E22), 700201-B (E32), 700501-B (E52), 700651-B (E62): 4-20 mA.

Voltage:
120 Vac

VA @ 60 Hz
1.4 - 3

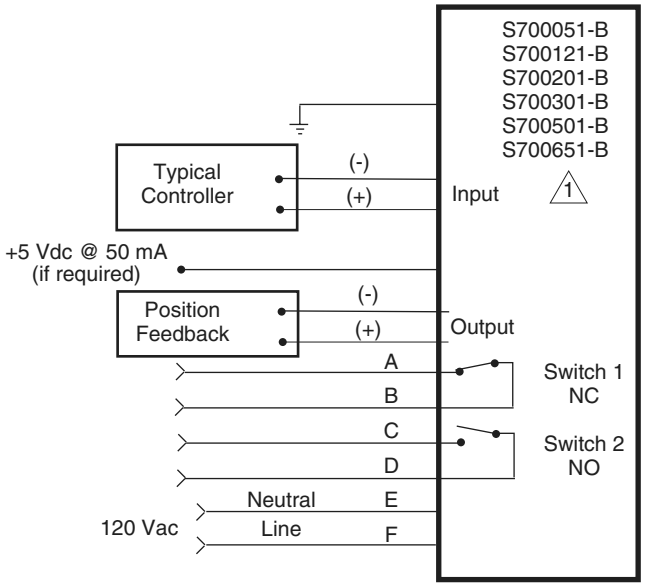
Auxiliary Switch:
2 SPDT

Timing (seconds):
2-Position - Max 18 sec.
Proportional - 30 sec.

Feedback:
Proportional models

Butterfly Valve Actuator Product Range
Non-Spring Return

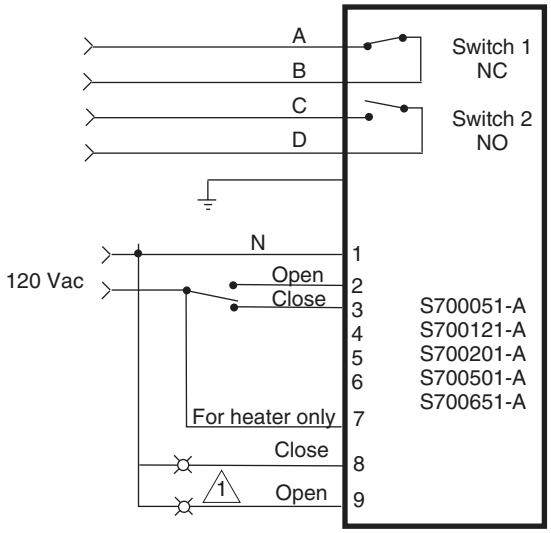
Actuator Model	Wiring Diagrams	
	Page	Figure
700xx1	172 and 173	1 to 2
MP-9810-129 with CP-8391-456	175	9
M131A01	200	69
M132A01	201	69
M112A01	201	70
M122A01	201	70
M13xA01	201	71
M1x2A01	201	71
M133A01	200	67
M113A01	200	68
M123A01	200	68
MA40-7043	176	11
MA40-7170	175	10
MA40-7173	175	10
MA41-7073	176, 203	12, 76
MA41-7150	176	12
MA41-7153	176, 180, 203	12, 22, 76
MA51-7100	177	14
MA51-7103-100	177	14
MA51-7200	177	14
MA51-7203	177	14
MA61-7200	177	14
MA61-7203	177	14
MA4D-7033-100	176	13
MA4D-8033-100	176	13
MF-22303	177	15
MF-23303	177	15
MF-63103	177	16
MF-63123-411	186	36
MF40-7043	179 to 181	21, 23 to 24
MF40-7173	178	17 to 18
MF41-60x3	178	19
MF41-6153	179	20
MF41-6343	178	17
MF41-7073	180, 203	21 to 24, 76
MF41-7153	179 to 181, 203	21 to 24, 76
MF51-7103-100	185 to 186	32 to 35
MF51-7203	185 to 186	32 to 35
MF61-7203	185 to 186	32 to 35
MF4D-7033-100	181 to 183	25 to 28
MF4D-8033-100	181 to 183	25 to 28
MF4E-60430-100	183 to 184	29 to 31
MF4E-60830-100	183 to 184	29 to 31
MP-9810-129	186	37
MS-22353	187 to 188	38 to 39
MS40-7043	188 to 189	40 to 42
MS40-7170	190	43 to 44
MS40-7173	190 to 192	45 to 48
MS41-6043	192	50
MS41-6083	192	50
MS41-6153	193	51 to 52
MS41-6340	193 to 194	53 to 54
MS41-6343	193 to 194	53 to 54
MS41-7073	180 and 194 to 195, 203	22 and 55 to 57, 76
MS41-7153	180 and 194 to 195, 203	22 and 55 to 57, 76
MS51-7103-100	197	60 to 62
MS51-7203	197 to 199	61, 63 to 66
MS61-7203	197 to 199	61, 63 to 66
MS4D-6083-100	196	58 to 59
MS4D-7033-100	196	58 to 59
MS4D-8033-100	196	58 to 59
AG13A020 AG14A020 AG23A020 AG24A020	173	3
AG13B020 AG14B020 AG23B020 AG24B020	173	3
AH13A020 AH14A020 AH23A020 AH24A020	173	3
AH13B020 AH14B020 AH23B020 AH24B020	173	3
AP13A000	174	5
AP23A000	174	5
AP33A000	175	8
AT13A00T	173	4
AT23A00T	173	4
AT33A000	174	6
AT33A00T	174	7
NR-22xx-52x	202	72 to 73
NR-22xx-54x	202	74
NR-2216-5X2 NR-2224-5x2	203	75



1 Switches shown for 4-20 mA input and Output.
Fail in closed position upon loss of signal, and forward acting mode.

	Command Input				Command Output			Forward	Reverse	Fail In Last	Fail Enable	Fail Close	Fail Open
Switch	4-20 mA	0-5V	0-10V	2-10V	4-20 mA	0-5 V	0-10 V						
1	ON	OFF	OFF	OFF									
2	OFF	OFF	ON	ON									
3	OFF	OFF	OFF	ON									
4					ON	OFF	OFF						
5					OFF	ON	ON						
6					OFF	ON	OFF						
7								OFF	ON				
8										OFF	ON		
9												OFF	ON
10	OFF	ON	ON	ON									

Figure 1 700xx1 Modulating Actuators.



1 Remote indicator for On/Off position.

Figure 2 700xx1 Two-Position Actuators.

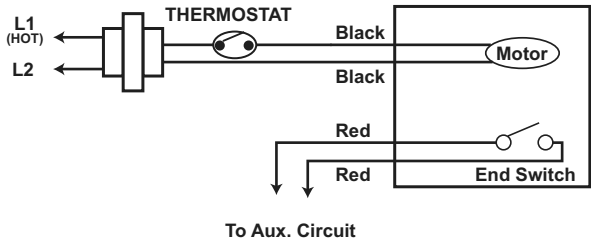


Figure 3 AG/AH TAC Erie PopTop with Wire Leads.

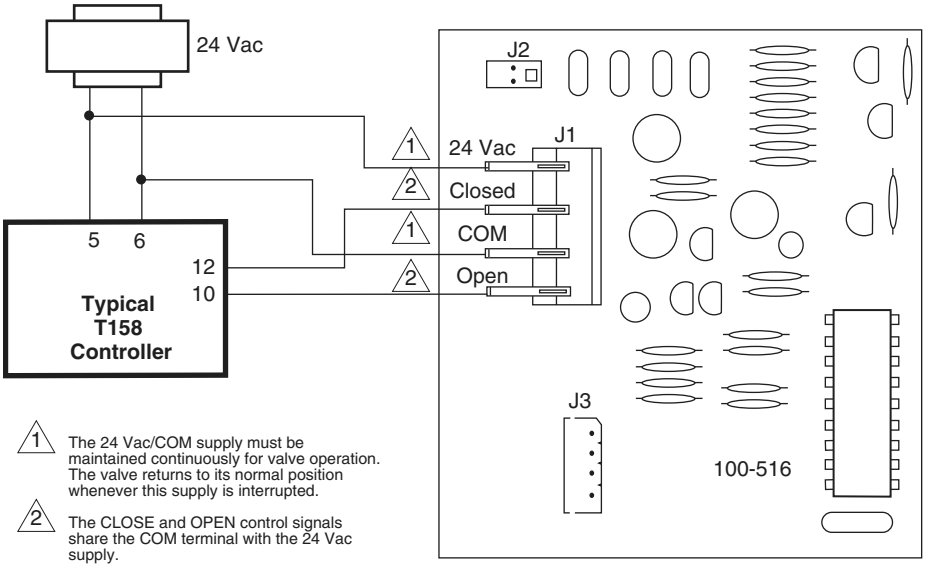


Figure 4 ATx3A00T TAC Erie PopTop 3-Wire Floating Actuator with Time-Out.

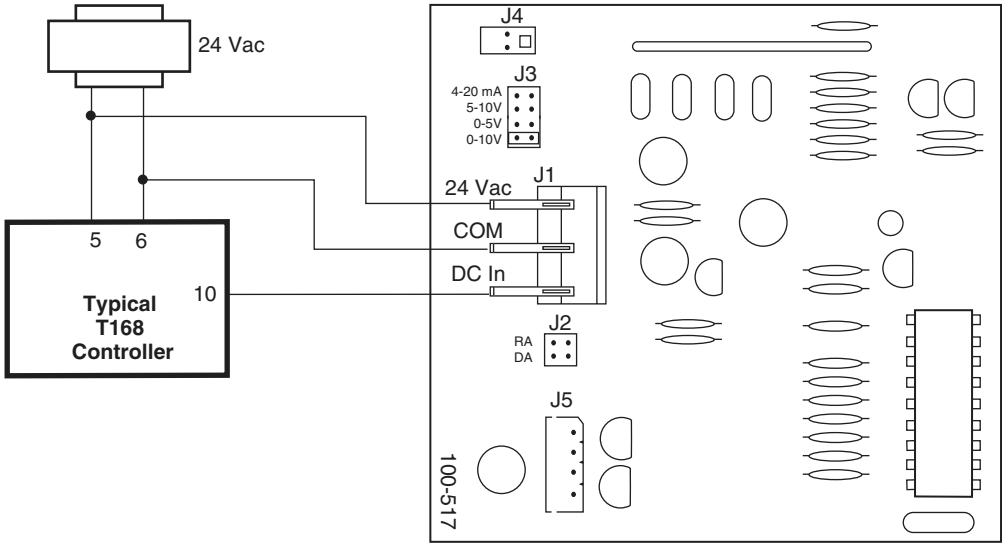


Figure 5 APx3A000 TAC Erie PopTop Three-Wire Proportional Actuator.

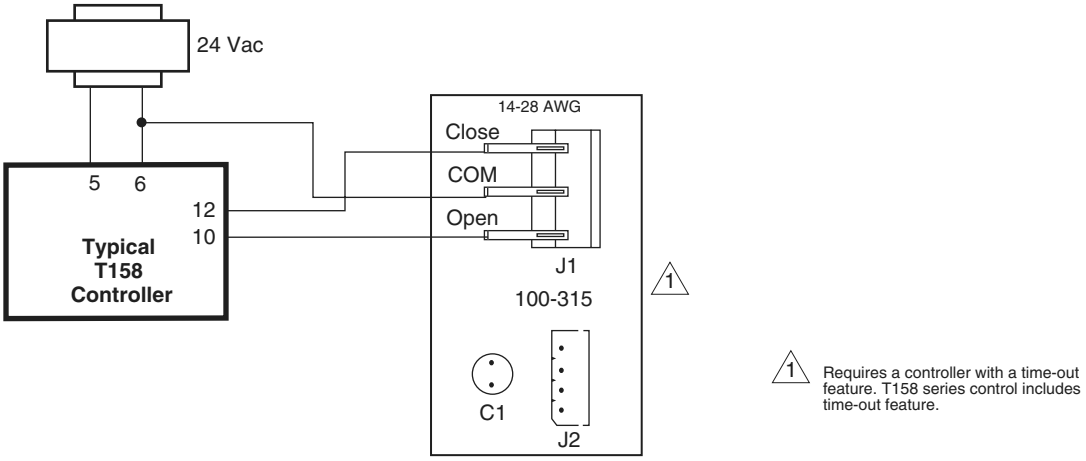


Figure 6 AT33A000 TAC Erie PopTop Three-Wire Floating Non-Spring Return Actuator.

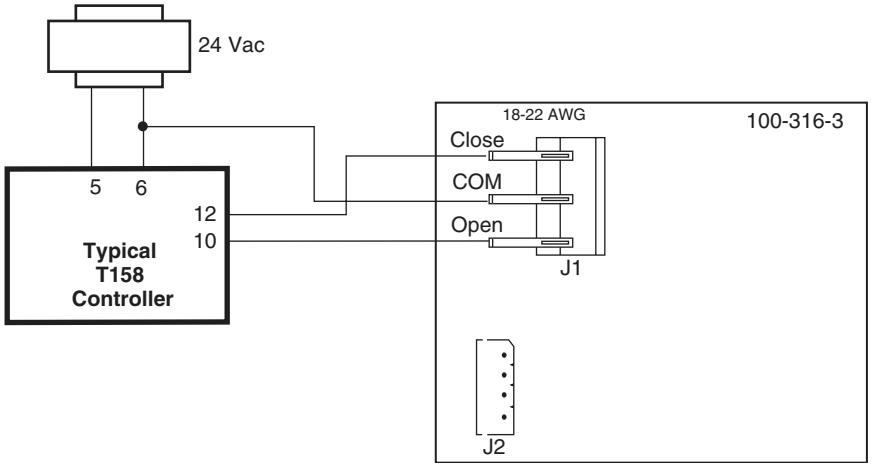


Figure 7 AT33A00T TAC Erie PopTop Three-Wire Floating Non-Spring Return Actuator with Time-Out.

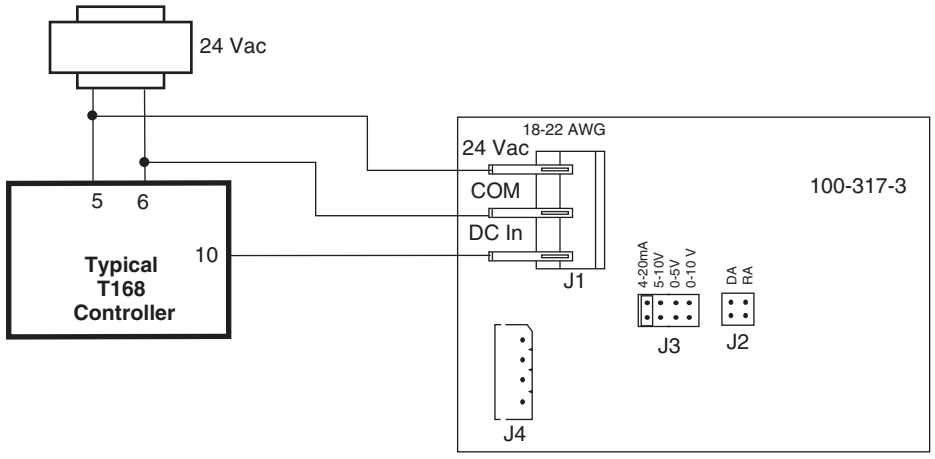


Figure 8 AP33A000 TAC Erie PopTop Three-Wire Proportional Non-Spring Return Actuator.

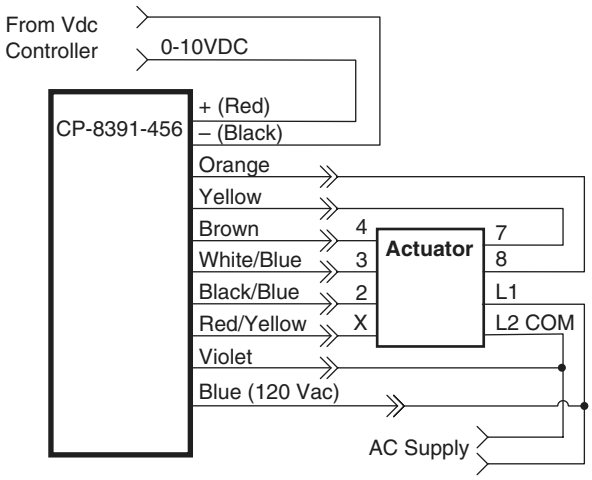
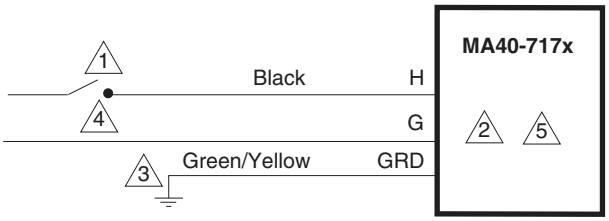


Figure 9 Typical Wiring Diagram CP-8391-456 to MP-9810-129



1 SPST or Triac Controller. Multiple MA40-7173 actuators may be powered by a single 24 Vac transformer.

2 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

3 Ground wire may be Green on some models.

4

Voltage	Wire (H) or L1)	Wire (G) or L2)
24 V	Black	Black/Blue
120 V	Black	White

5 As viewed from "L" side power drives clockwise.

Figure 10 MA40-717x.

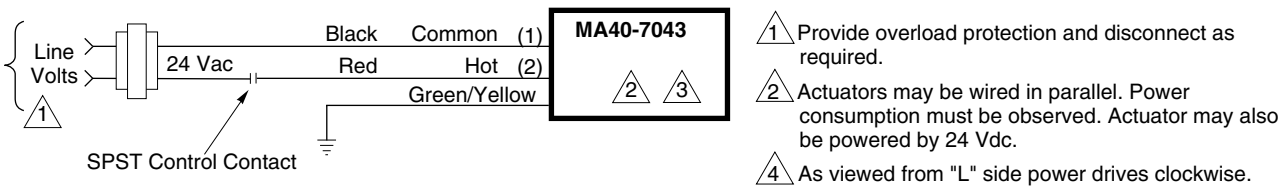
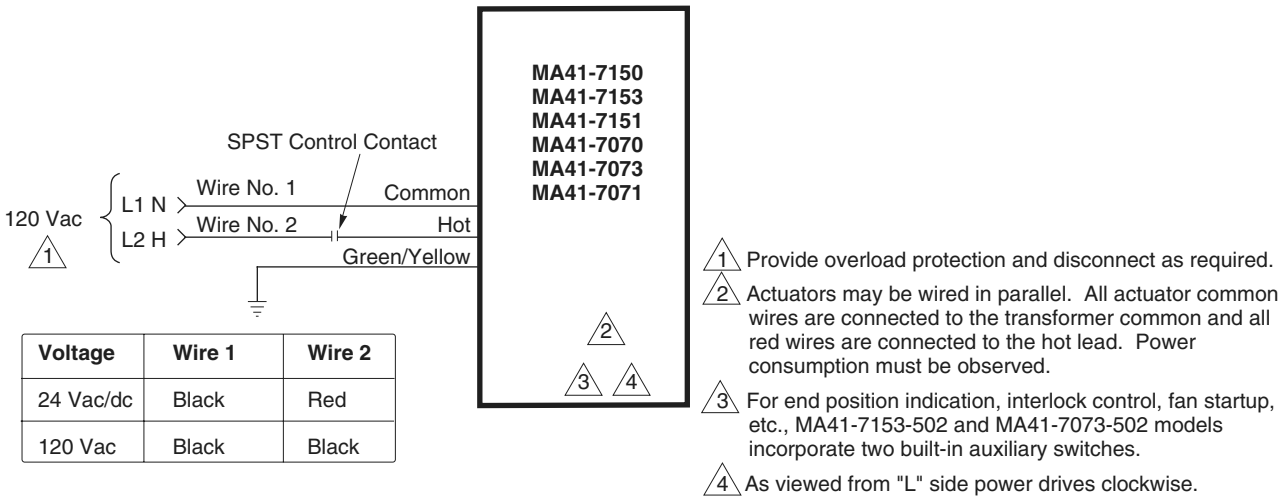


Figure 11 MA40-7043 and MA40-7043-501 for 24 Vac Basic.



Voltage	Wire 1	Wire 2
24 Vac/dc	Black	Red
120 Vac	Black	Black

Figure 12 MA41-7xxx Basic.

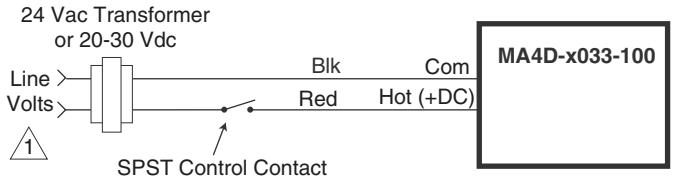
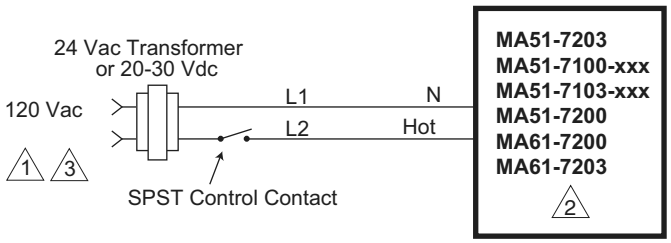


Figure 13 MA4D-x033-100.



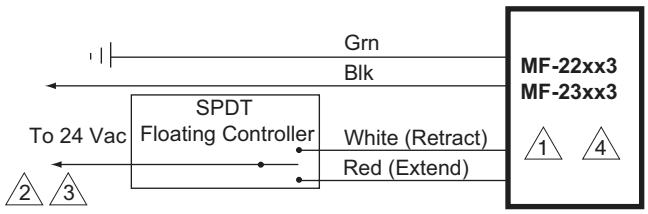
Voltage	L1 N	L2 Hot
24 Vac	Black	Red
120 Vac	White	Black

1 Provide overload protection and disconnect as required.

2 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

3 Applied power extends actuator. Spring returns when power is removed.

Figure 14 MA51-7x0x, MA61-720x Two Position Actuators.



CAUTION: Each actuator must have its own separate controller output or relay.

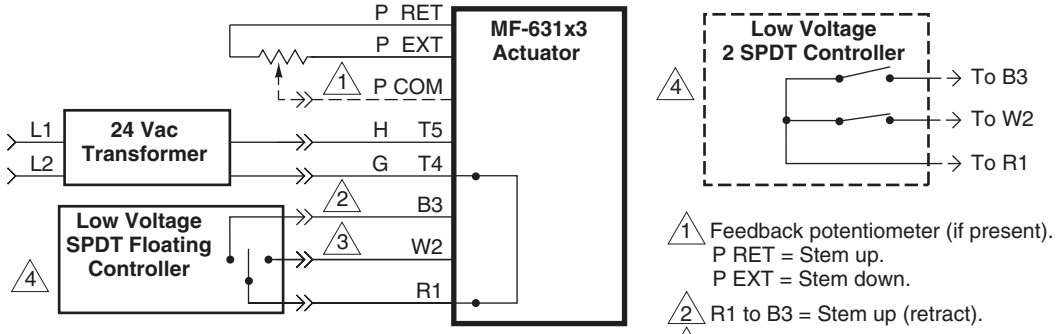
1 Provide overload protection and disconnect as required.

2 Two-position 3-wire control is possible by use of a form-C controller output (MF-22xx3 series).

3 Actuator retract wire may be White/Green on some models.

4 CAUTION MF-23xx3 models: The controller drive circuit must be disabled after 3 minutes or less

Figure 15 MF-2xxx3 with SPDT Floating Control or Two SPST Control Contacts.



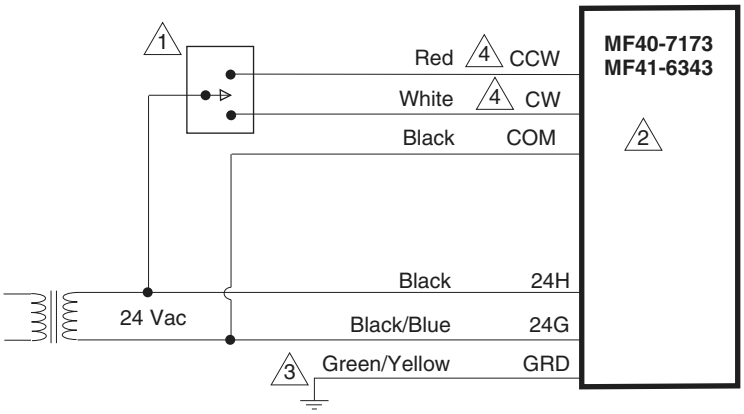
1 Feedback potentiometer (if present).
P RET = Stem up.
P EXT = Stem down.

2 R1 to B3 = Stem up (retract).

3 R1 to W2 = Stem down (extend).

4 Optional low voltage 2 SPST Controller.

Figure 16 MF-631x3 SPDT Floating Controller.



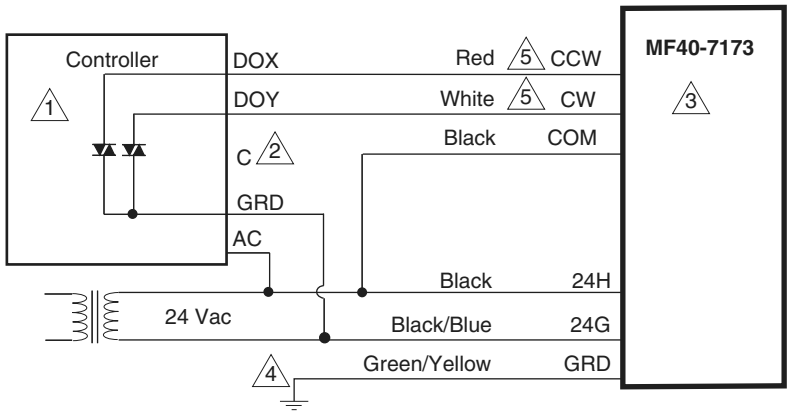
1 SPDT Floating or Switch/Controller or 2 SPST.

2 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

3 Ground wire may be Green on some models.

4 As viewed from "L" side.
MF40-7173: spring return CCW.

Figure 17 MF40-7173, MF41-6343 SPDT Controller.



1 Triacs switching to 24G.

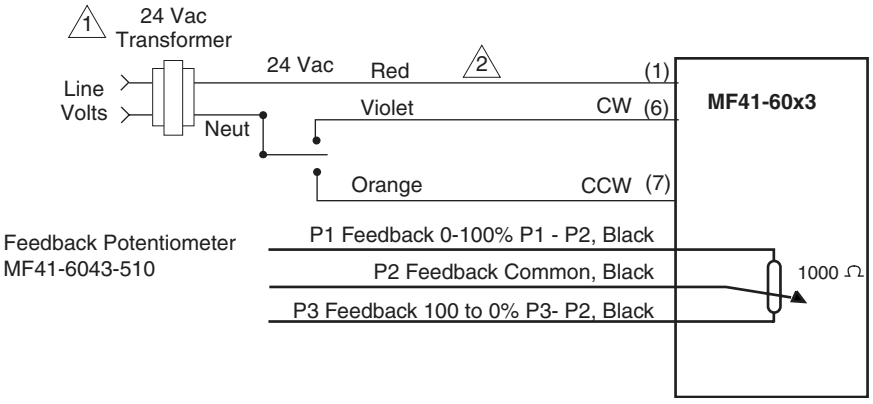
2 Do not connect drive wiring to C terminal of controller.

3 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

4 Ground wire may be Green on some models.

5 As viewed from "L" side.
Spring return CCW

Figure 18 MF40-7173 Triacs Switching to 24G.



1 Provide overload protection and disconnect as required.

Earth Ground isolating class 2 Transformer.

CE: Safety Isolating Transformer per EM 60742

2 Actuators are provided with color coded wires. Wire numbers are provided for reference.

Figure 19 MF41-60x3.

Figure 20 MF41-6153.

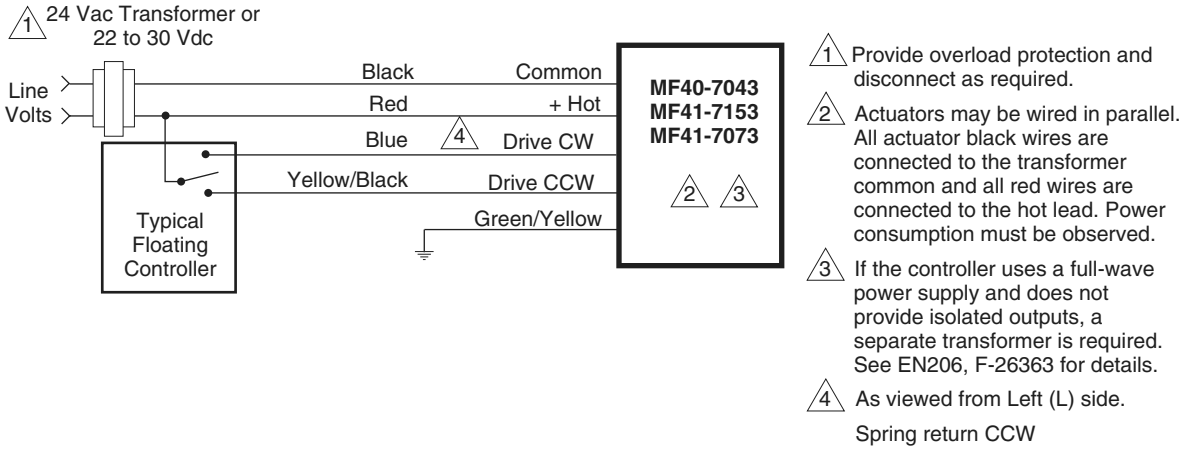
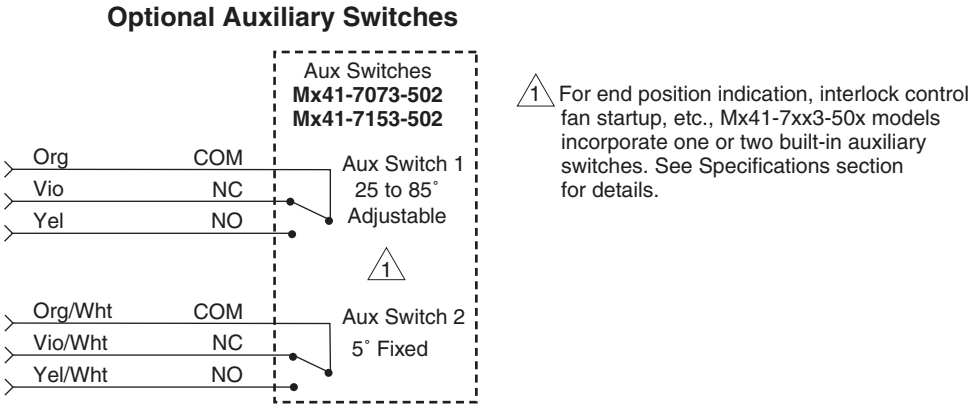


Figure 21 MF4x-7xx3.



Mx40-707x-502 and Mx40-715x-502 units manufactured prior to the date code 0141 (October 6, 2001) used the following color coding for the auxiliary switches:

Auxiliary Switch 1

Orange:	Fixed auxiliary switch common (com)
Yellow:	Fixed auxiliary switch normally closed (NC)
Violet:	Fixed auxiliary switch normally open (NO)

Auxiliary Switch 2

Orange/white:	Fixed auxiliary switch common (com)
Yellow/white:	Fixed auxiliary switch normally closed (NC)
Violet/white:	Fixed auxiliary switch normally open (NO)

Figure 22 Mx41-7073-502 and Mx41-7153-502 Optional Auxiliary Switches.

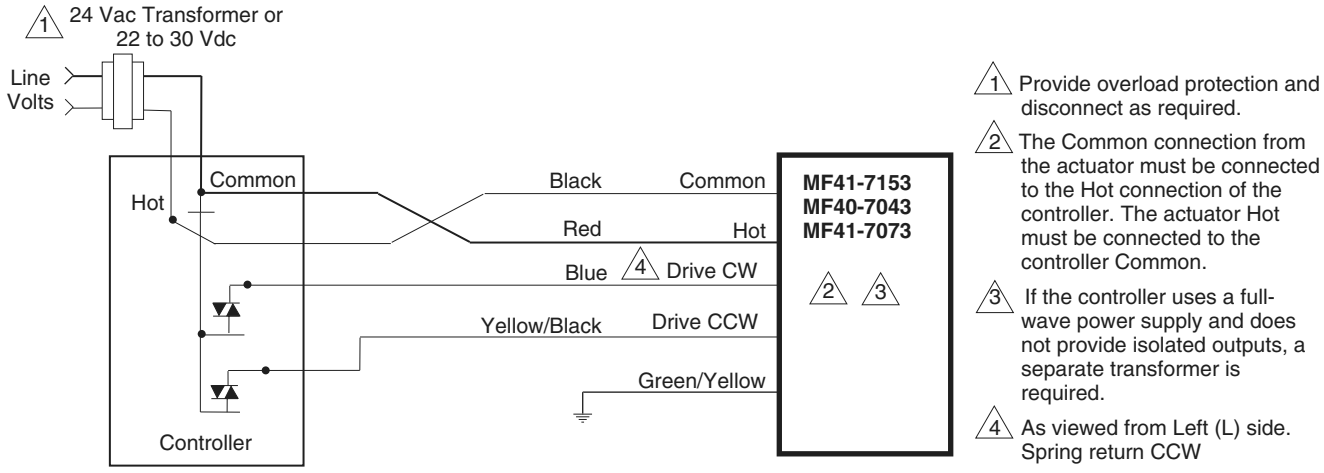


Figure 23 MF4x-7xx3 with Triac Sink.

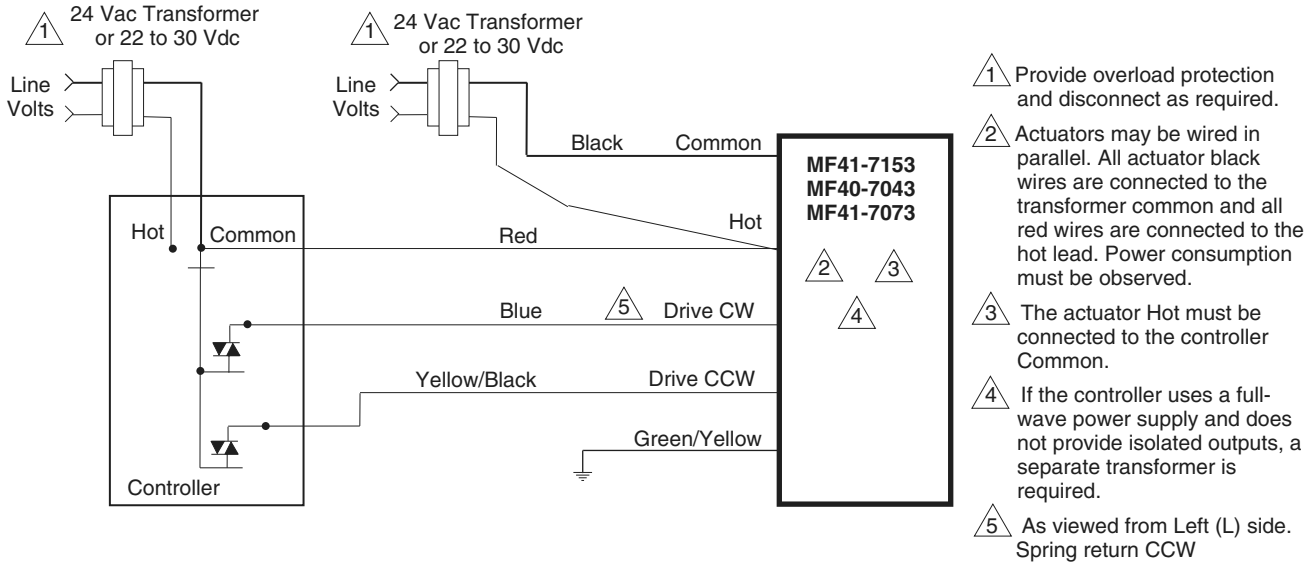


Figure 24 MF4x-7xx3 with Triac Sink and Separate Transformers.

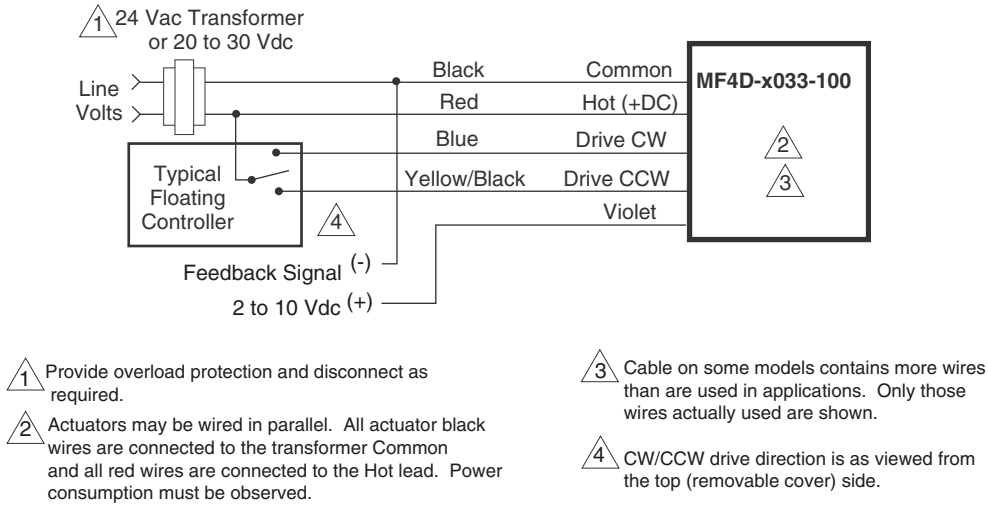
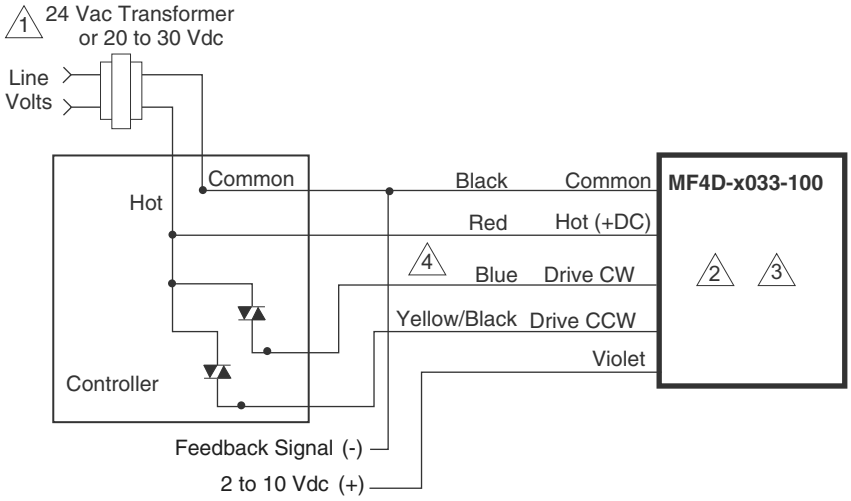


Figure 25 MF4D-x033-100.



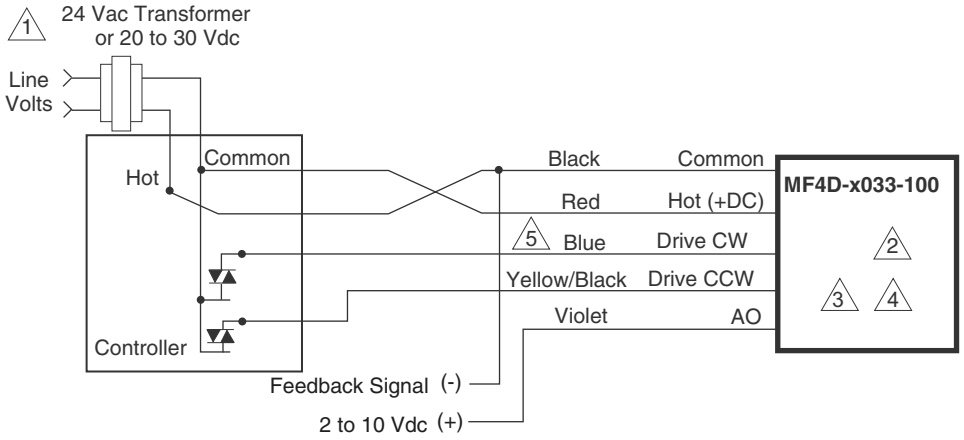
1 Provide overload protection and disconnect as required.

2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer Common and all red wires are connected to the Hot lead. Power consumption must be observed.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 CW/CCW drive direction is as viewed from the top (removable cover) side.

Figure 26 MF4D-x033-100 Triac Source.



1 Provide overload protection and disconnect as required.

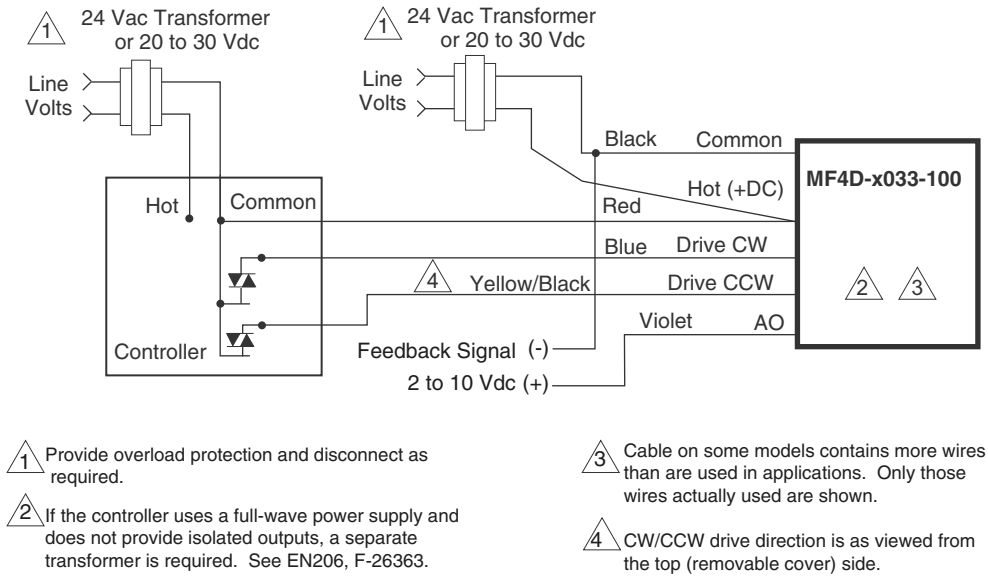
2 The Common connection from the actuator must be connected to the Hot connection of the controller. The actuator Hot must be connected to the controller Common.

3 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required. See EN206, F-26363.

4 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

5 CW/CCW drive direction is as viewed from the top (removable cover) side.

Figure 27 MF4D-x033-100 Triac Sink.



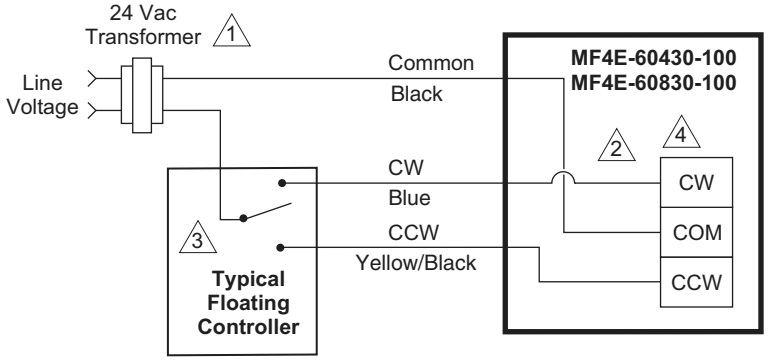
1 Provide overload protection and disconnect as required.

2 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required. See EN206, F-26363.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 CW/CCW drive direction is as viewed from the top (removable cover) side.

Figure 28 MF4D-x033-100 Triac Sink with Separate Transformers.



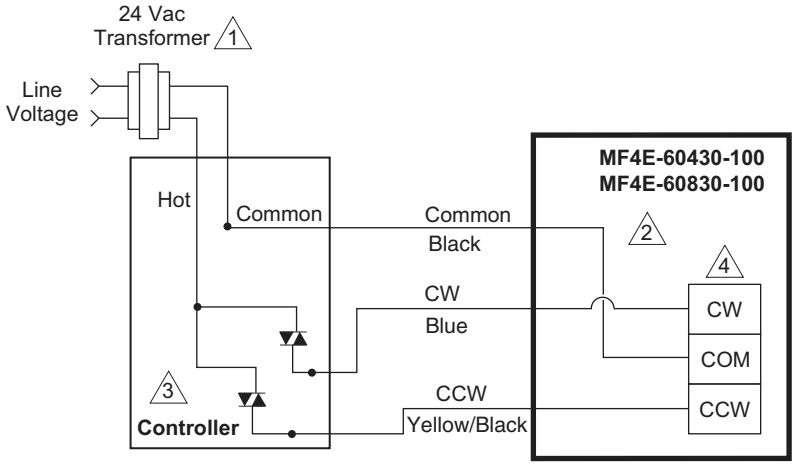
1 Provide overload protection and a disconnect as required.

2 Actuators may be wired in parallel only if they have the same rotational speed (stroke timing). When doing so, be sure to observe power consumption limits.

3 To increase actuator life, design the system with a time-out feature that removes power from the actuator between uses. For example, such a device may stop controller output after powering the actuator in one direction for 3 minutes or more.

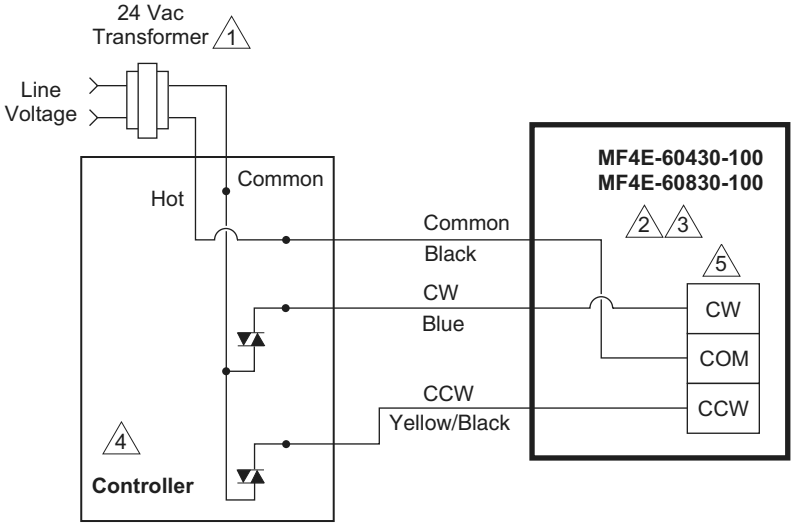
4 CW/CCW drive direction is as viewed from the top of the actuator.

Figure 29 MF4E-60430-100 and MF4E-60830-100.



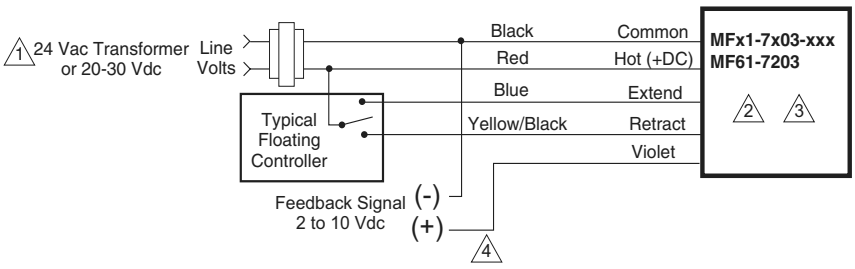
1. Provide overload protection and a disconnect as required.
2. Actuators may be wired in parallel only if they have the same rotational speed (stroke timing). When doing so, be sure to observe power consumption limits.
3. To increase actuator life, design the system with a time-out feature that removes power from the actuator between uses. For example, such a device may stop controller output after powering the actuator in one direction for 3 minutes or more.
4. CW/CCW drive direction is as viewed from the top of the actuator.

Figure 30 MF4E-60430-100, MF4E-60830-100 Traic Source.



1. Provide overload protection and a disconnect as required.
2. Actuators may be wired in parallel only if they have the same rotational speed (stroke timing). When doing so, be sure to observe power consumption limits.
3. The Common connection from the actuator must be connected to the Hot connection of the controller.
4. To increase actuator life, design the system with a time-out feature that removes power from the actuator between uses. For example, such a device may stop controller output after powering the actuator in one direction for 3 minutes or more.
5. CW/CCW drive direction is as viewed from the top of the actuator.

Figure 31 MF4E-60430-100, MF4E-60830-100 Triac Sink.



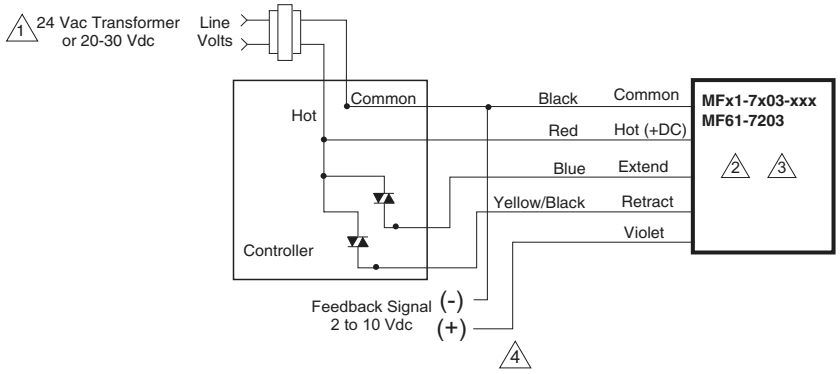
1 Provide overload protection and disconnect as required. If controller uses a full wave power supply and does not provide isolated outputs, a separate transformer must be used.

2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 Feedback only available on MF51-7103 models.

Figure 32 MF51-7x03-xxx and MF61-7203.



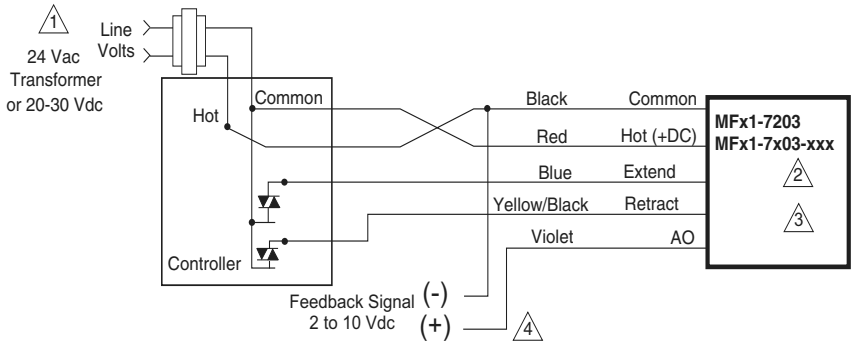
1 Provide overload protection and disconnect as required. If controller uses a full wave power supply and does not provide isolated outputs, a separate transformer must be used.

2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 Feedback only available on MF51-7103 models.

Figure 33 MF51-7x03-xxx, MF61-7203 Triac Source.



1 Provide overload protection and disconnect as required. If controller uses a full wave power supply and does not provide isolated outputs, a separate transformer must be used.

2 The Common connection from the actuator must be connected to the Hot connection of the controller. The actuator Hot must be connected to the controller Common.

3 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

4 Feedback only available on MF51-7103 models.

Figure 34 MF51-7x03-xxx, MF61-7203 Triac Sink.

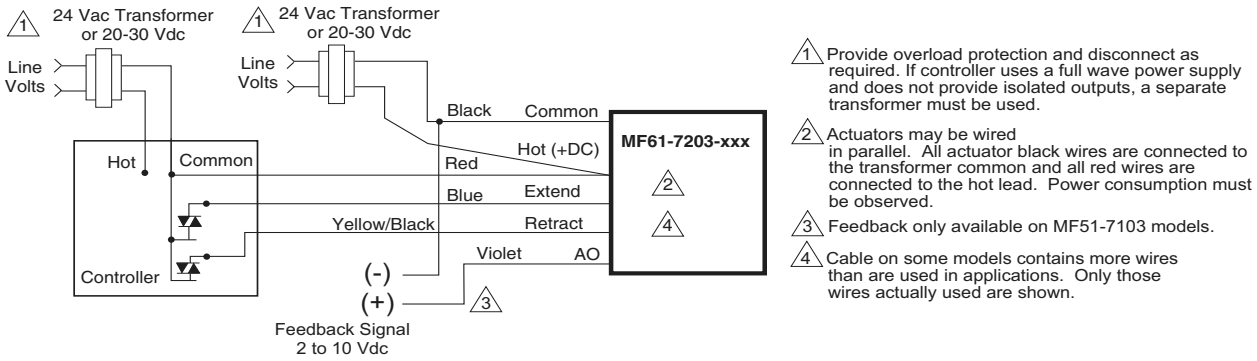


Figure 35 MF51-7x03-xxx, MF61-7203 Triac Sink with Separate Transformers.

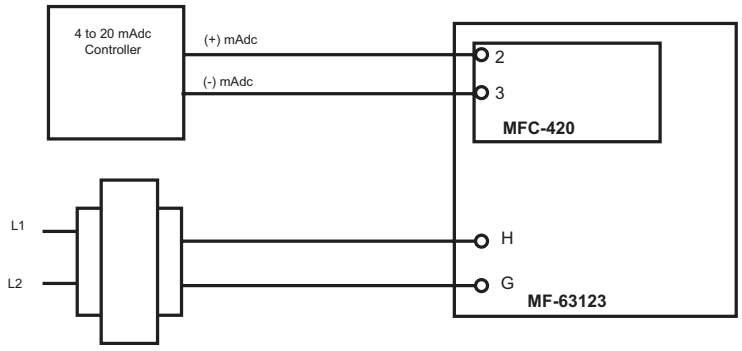


Figure 36 MF-63123-411 (MF-63123 with MFC-420 Card) 4 to 20 mA Input.

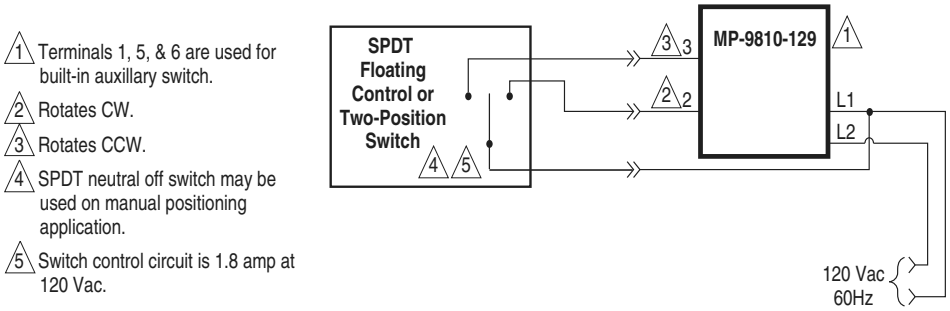
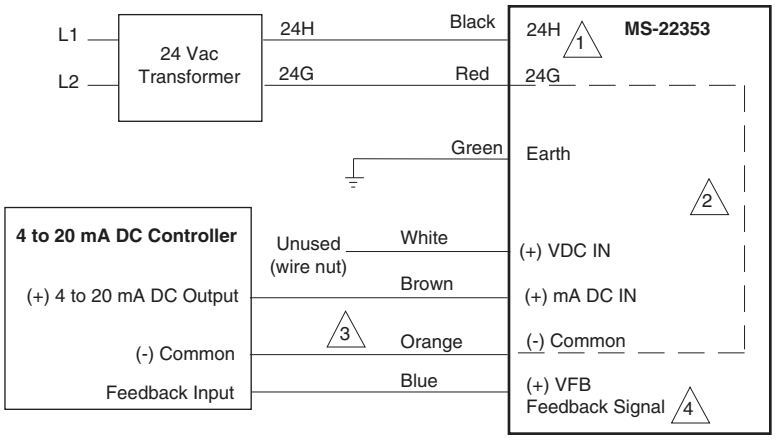


Figure 37 Typical Reversible Floating or Two-Position MP-9810-129.



1 The MS-22353 actuator contains a half-wave rectifier power supply. When connecting multiple devices to a common transformer, connect 24H and 24G with half-wave rectifier or isolated power supplied devices, only. Refer to EN 206 (F-26363).

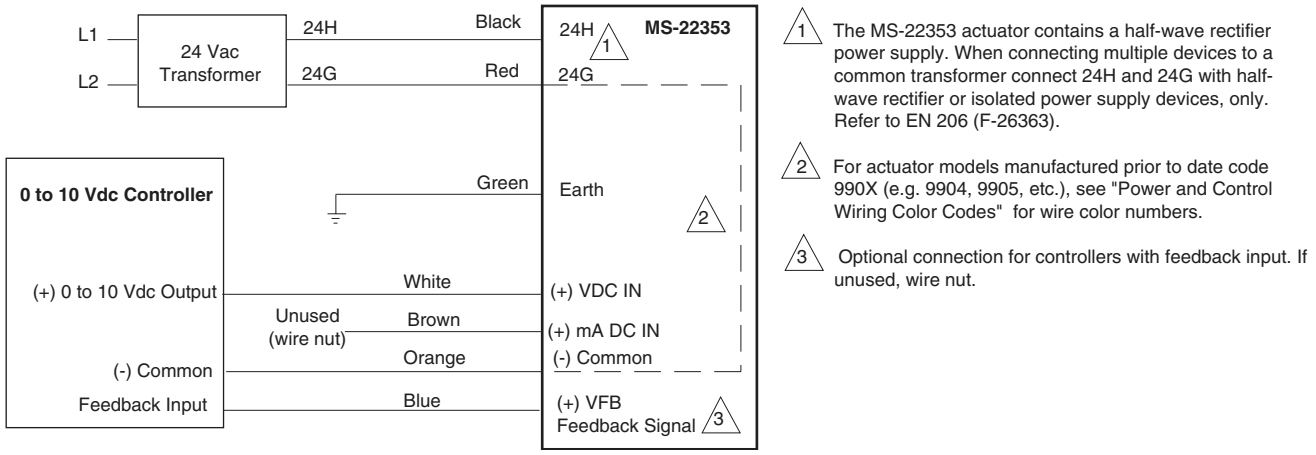
2 For actuator models manufactured prior to date code 990X (e.g. 9904, 9905, etc.), see "Power and Control Wiring Color Codes" for wire color numbers.

3 The input impedance between Brown and Orange for each actuator is 100 ohms nominal.

4 Optional connection for controllers with feedback input. If unused, wire nut.

	Actuator Label	Description	Wire Codes Color Only (Current Models)
Actuator Power	Earth	Earth Ground	Green
	24 H	24 Vac	Black
	24 G	24 Vac	Red
Proportional Control Signals	+ VDC (IN)	2 to 10 Vdc Input	White
	- COMMON	DC Common Ground	Orange
	+ mADC (IN)	4 to 20 mADC Input	Brown
Feedback Control Signal	+ VFB	Actuator Feedback	Blue

Figure 38 MS-22353 4 to 20 mAdc Proportional Control.



	Actuator Label	Description	Wire Codes Color Only (Current Models)
Actuator Power	Earth	Earth Ground	Green
	24 H	24 Vac	Black
	24 G	24 Vac	Red
Proportional Control Signals	+ VDC (IN)	2 to 10 Vdc Input	White
	- COMMON	DC Common Ground	Orange
	+ mADC (IN)	4 to 20 mADC Input	Brown
Feedback Control Signal	+ VFB	Actuator Feedback	Blue

Figure 39 MS-22353 2 to 10 Vdc Proportional Control.

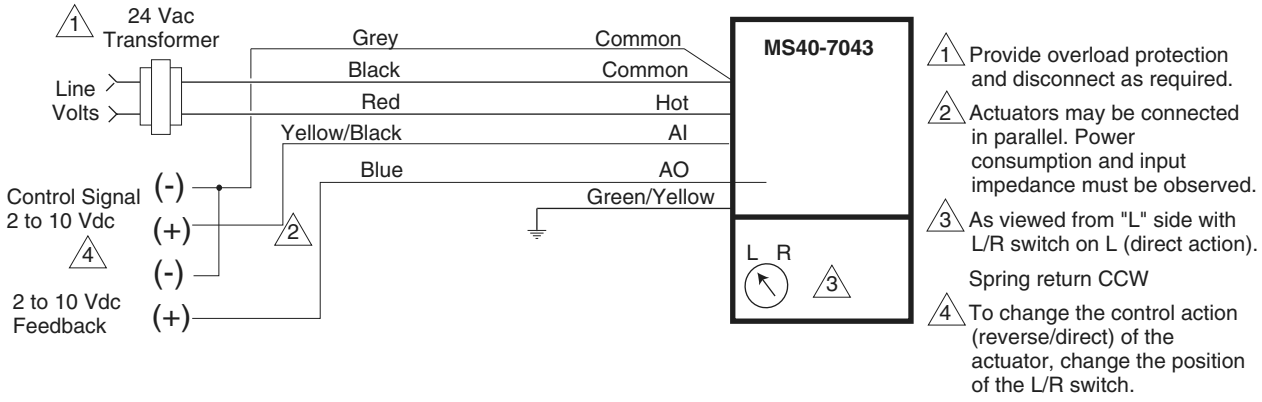
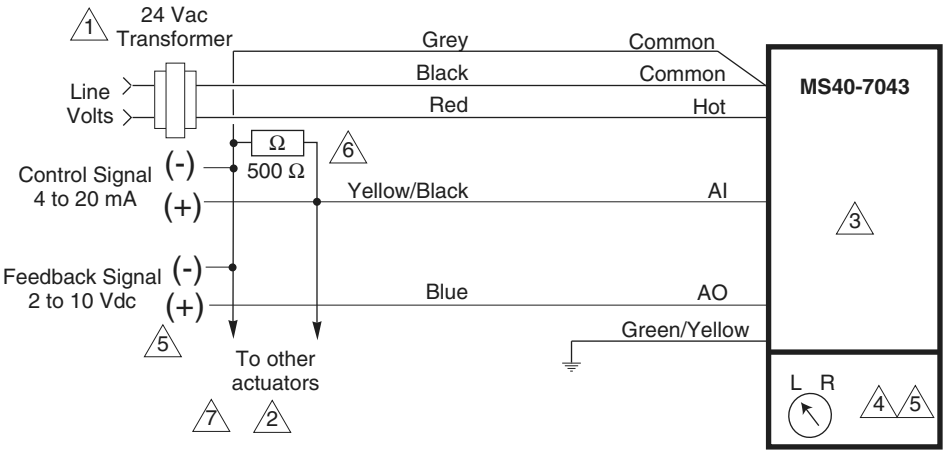


Figure 40 MS40-7043 2 to 10 Vdc Control.



1 Provide overload protection and disconnect as required.

2 For unison operation in 4 to 20 mA applications, up to four actuators, mounted on separate shafts may be wired in parallel. With four actuators wired to one 500 ohm resistor, a +2% shift of the control signal may be required. Power consumption and input impedance limits must be observed. Actuator input impedance is 80 k ohm.

3 For end position indication, interlock control, fan startup, etc., MS40-7043-501 model incorporates one built-in auxiliary switch.

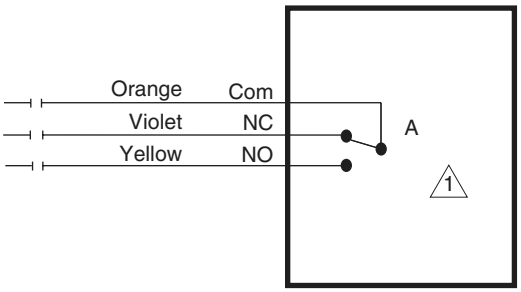
4 As viewed from "L" side with L/R switch on L. (direct action) Spring return CCW

5 To change the control action (reverse/direct) of the actuator change the position of the L/R switch.

6 A field supplied 500 ohm resistor (AM-708) is required between the gray and yellow/black leads to convert the 4 to 20 mAdc control signal to 2 to 10 Vdc.

7 Only connect common to negative (-) leg of control circuits.

Figure 41 MS40-7043 4 to 20 mA Control with 2 to 10 Vdc Feedback Control.



1 For end position indication, interlock control fan startup, etc., MS40-7XX3-50X models incorporate one or two built-in auxiliary switches. See Specifications section for details.

Model #	Switch	Switch Type
MS40-7043-501	A	Adjustable, 0 - 1 scale
	B	None

Figure 42 MS40-7043-501 Optional Auxiliary Switches.

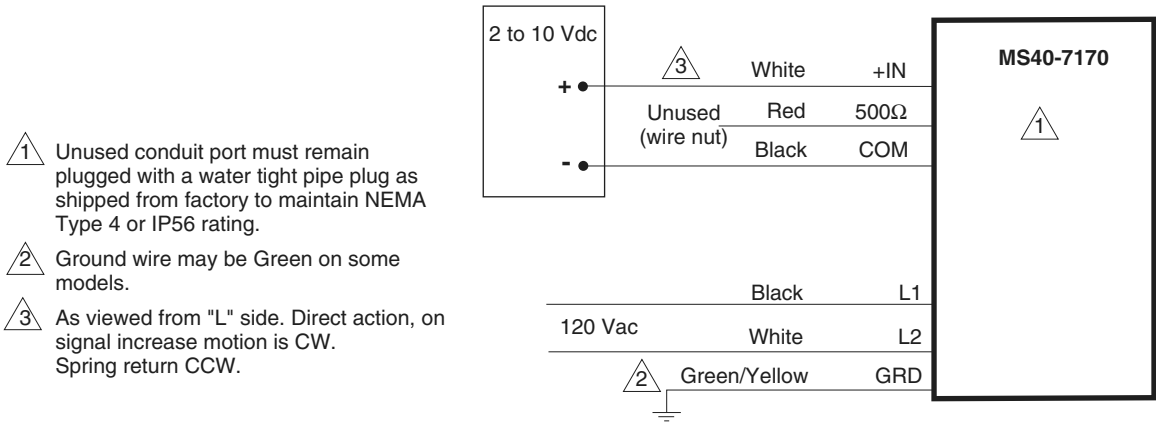


Figure 43 MS40-7170 2 to 10 Vdc (120 Vac).

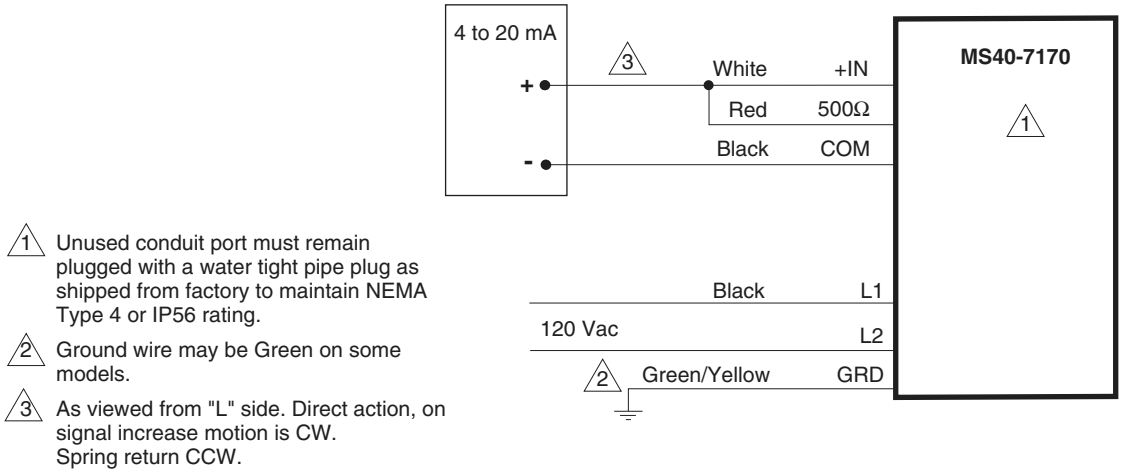


Figure 44 MS40-7170 4 to 20 mA (120 Vac).

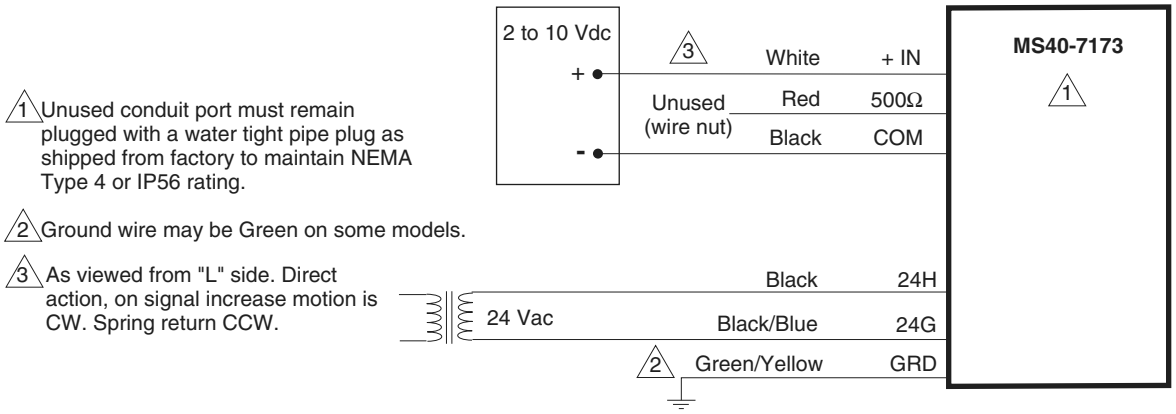


Figure 45 MS40-7173 2 to 10 Vdc.

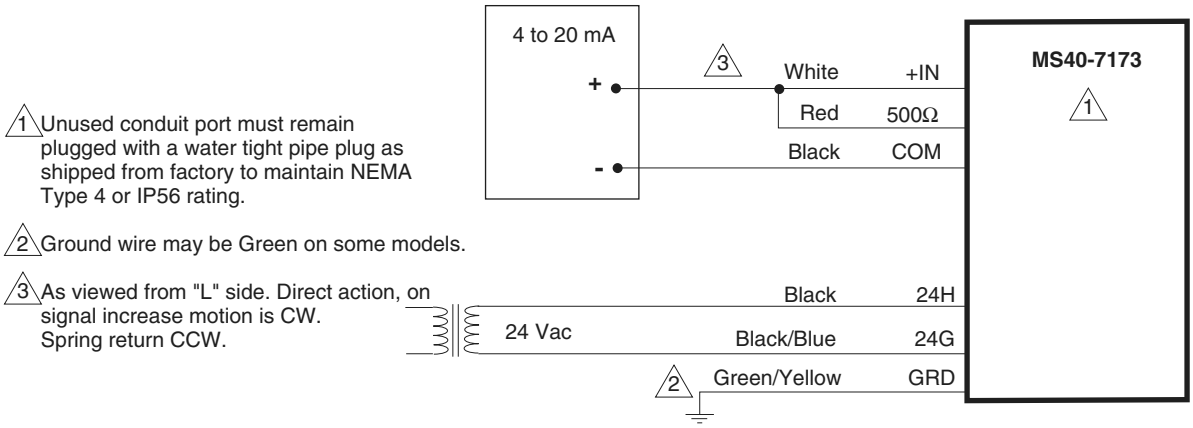
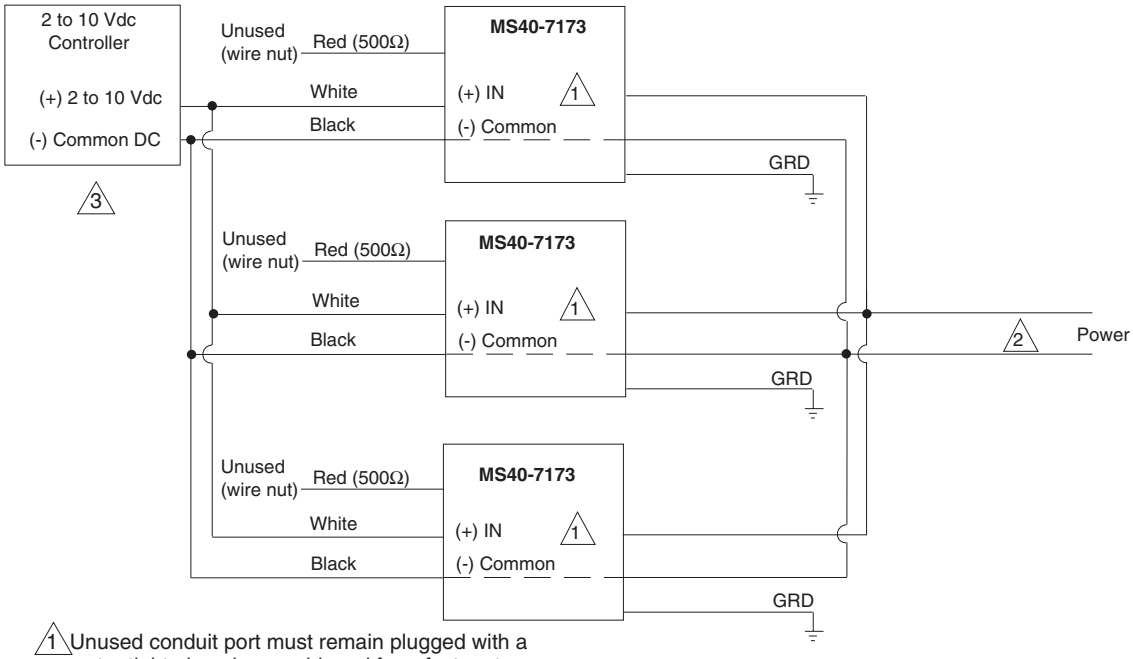


Figure 46 MS40-7173 4 to 20 mA.



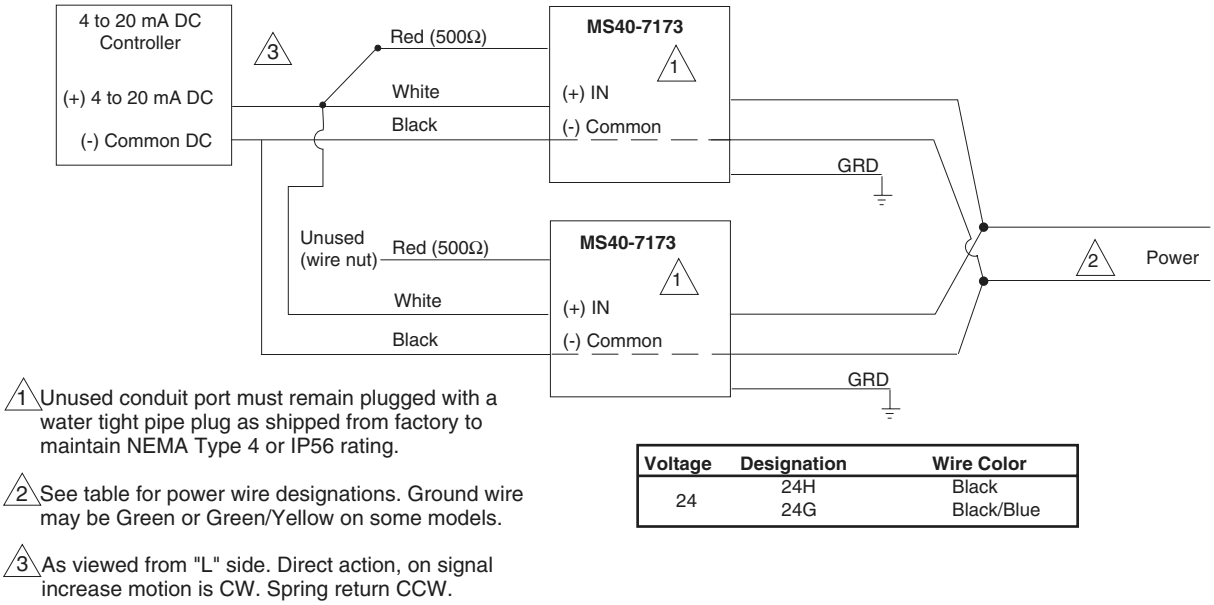
1 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

2 See table for power wire designations. Ground wire may be Green or Green/Yellow on some models.

3 As viewed from "L" side. Direct action, on signal increase motion is CW. Spring return CCW.

Voltage	Designation	Wire Color
24	24H	Black
	24G	Black/Blue

Figure 47 MS40-7173 2 to 10 Vdc Control using Multiple Actuators.



1 Unused conduit port must remain plugged with a water tight pipe plug as shipped from factory to maintain NEMA Type 4 or IP56 rating.

2 See table for power wire designations. Ground wire may be Green or Green/Yellow on some models.

3 As viewed from "L" side. Direct action, on signal increase motion is CW. Spring return CCW.

Voltage	Designation	Wire Color
24	24H	Black
	24G	Black/Blue

Figure 48 MS40-7173 4 to 20 mAdc Control using Multiple Actuators.

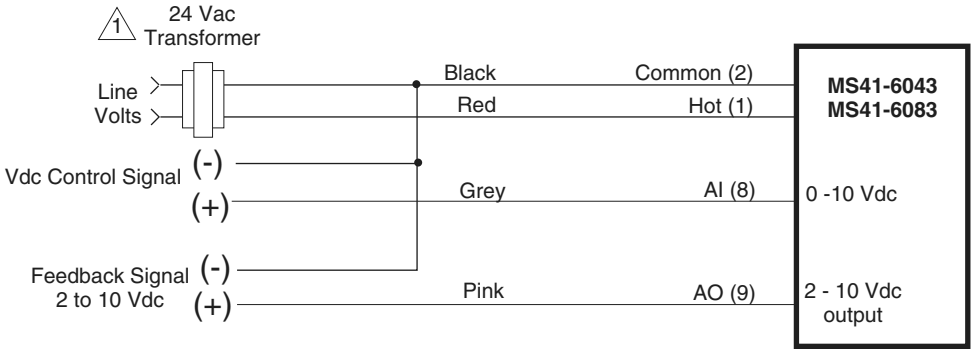


Figure 49 MS41-6043 and MS41-6083 24 Vac 0-10 Vdc Input.

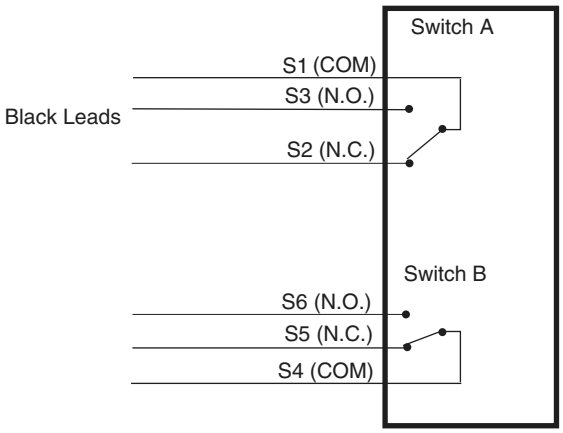


Figure 50 MS41-6043-502, -522, and MS41-6083-502 Auxiliary Switch Models.

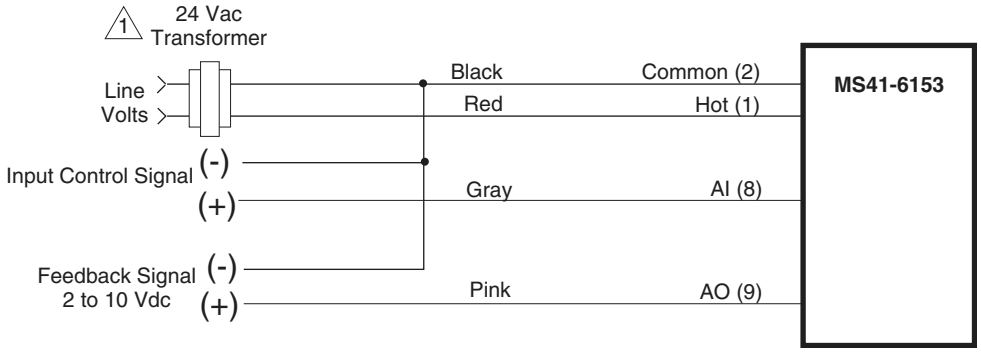


Figure 51 MS41-6153 24 Vac 0-10 Vdc Input Standard.

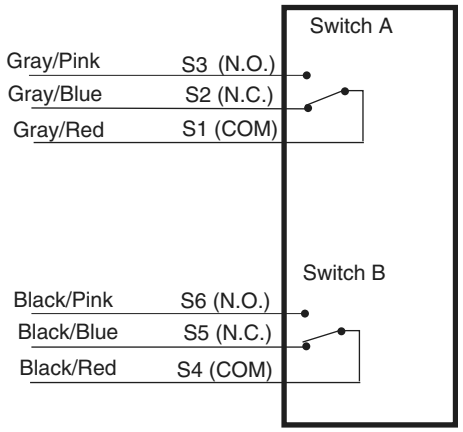


Figure 52 MS41-6153-502 Auxiliary Switch Models.

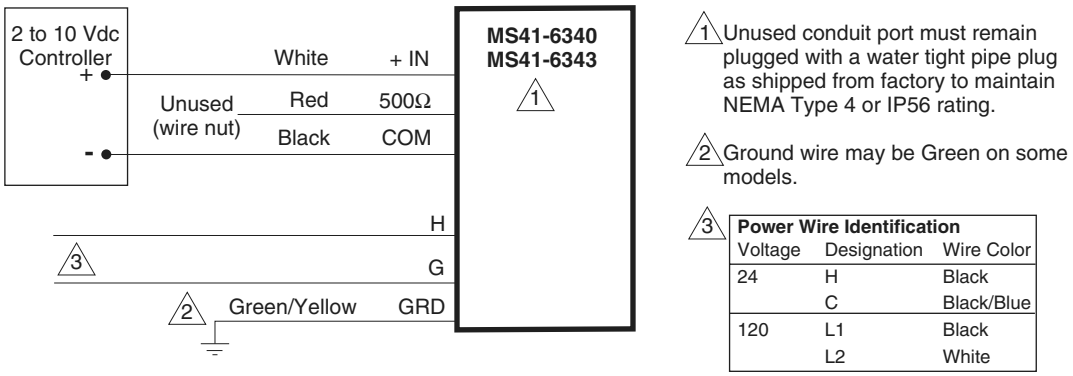


Figure 53 MS41-634x for 2 to 10 Vdc Controller with a 24 or 120 Vac Actuator.

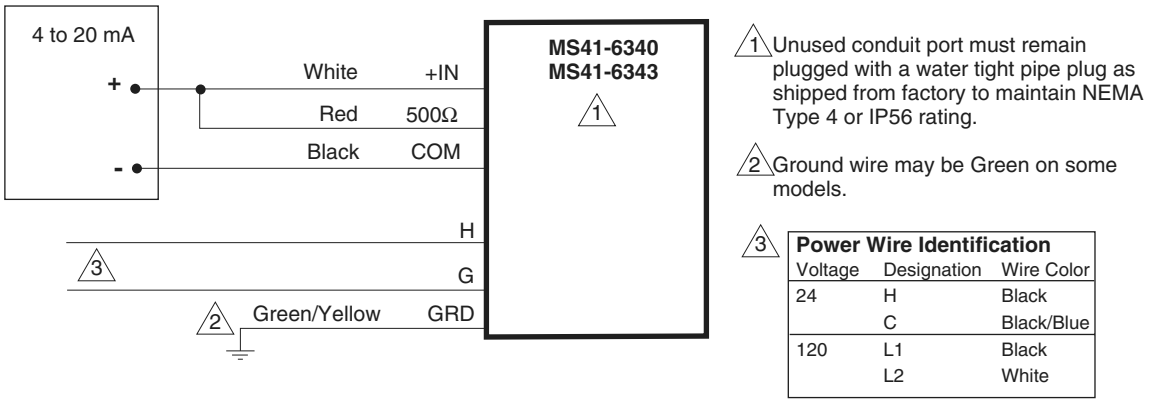


Figure 54 MS41-634x for 4 to 20 mA Controller with a 24 or 120 Vac Actuator.

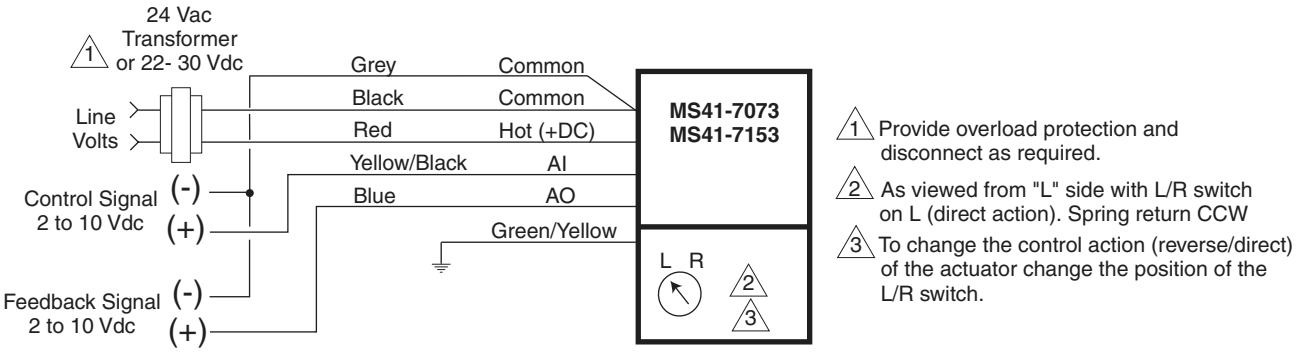
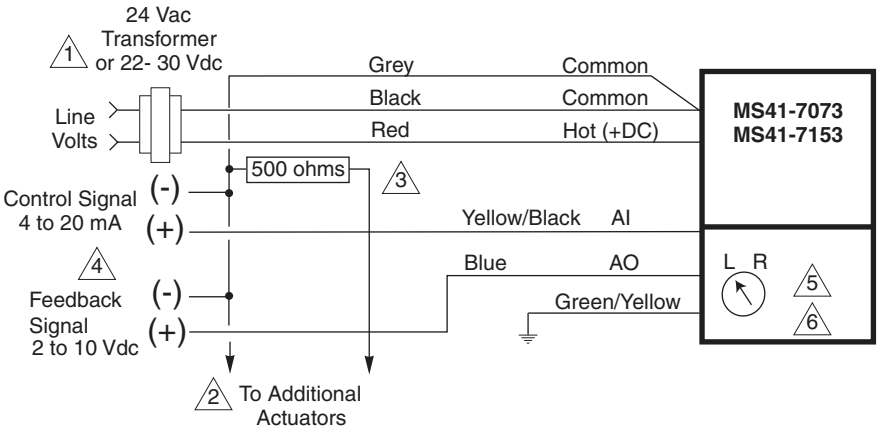


Figure 55 MS41-7xx3 2 to 10 Vdc.



1 Provide overload protection and disconnect as required.

2 With four actuators wired to one 500 ohm resistor, a +2% shift of the control signal may be required. (Actuator input impedance is 80 k ohm.)

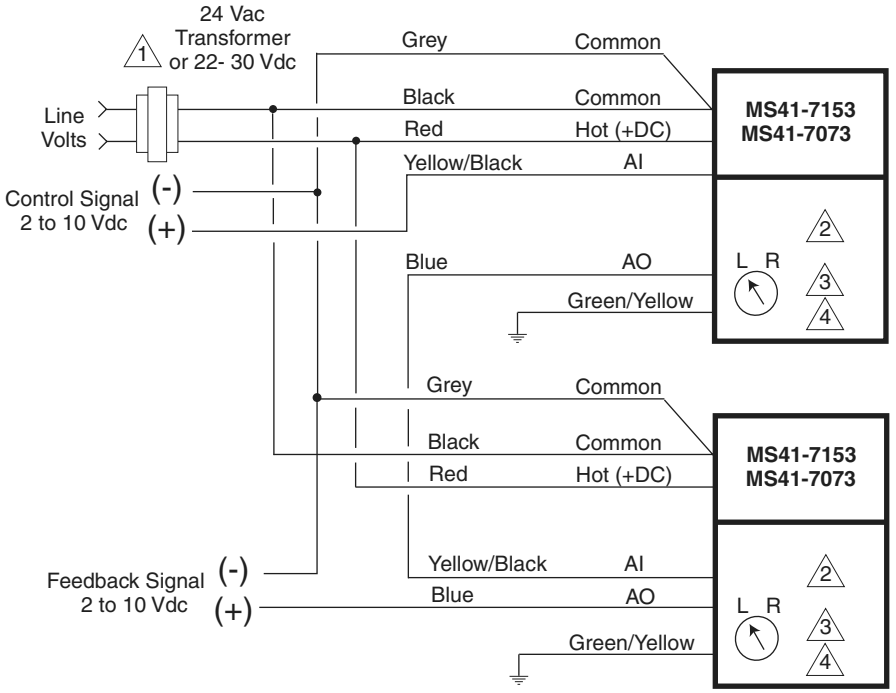
3 A field-supplied 500 ohm resistor (AM-708) is required between the gray and yellow/black leads to convert the 4 to 20 mAdc control signal to 2 to 10 Vdc.

4 Only connect common to negative (-) leg of control circuits.

5 As viewed from "L" side with L/R switch on L (direct action). Spring return CCW

6 To change the control action (reverse/direct) of the actuator change the position of the L/R switch.

Figure 56 MS41-7xx3 4 to 20 mAdc.



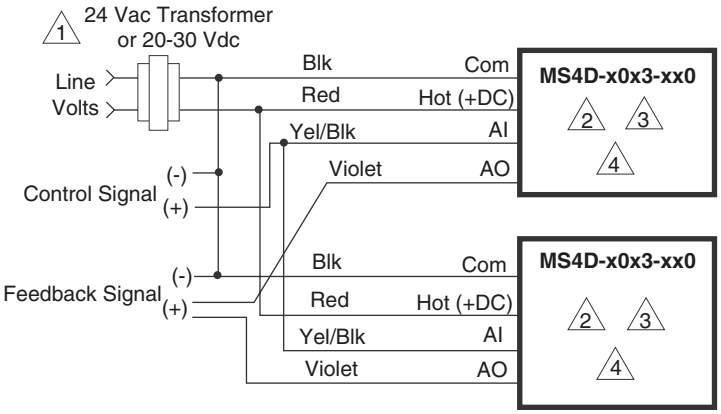
1 Provide overload protection and disconnect as required.

2 As viewed from "L" side with L/R switch on L (direct action). Spring return CCW.

3 To change the control action (reverse/direct) of the actuator change the position of the L/R switch.

4 Both actuators must be set to operate in the same direction.

Figure 57 Two MS41-7xx3 Actuators on the Same Damper Shaft.



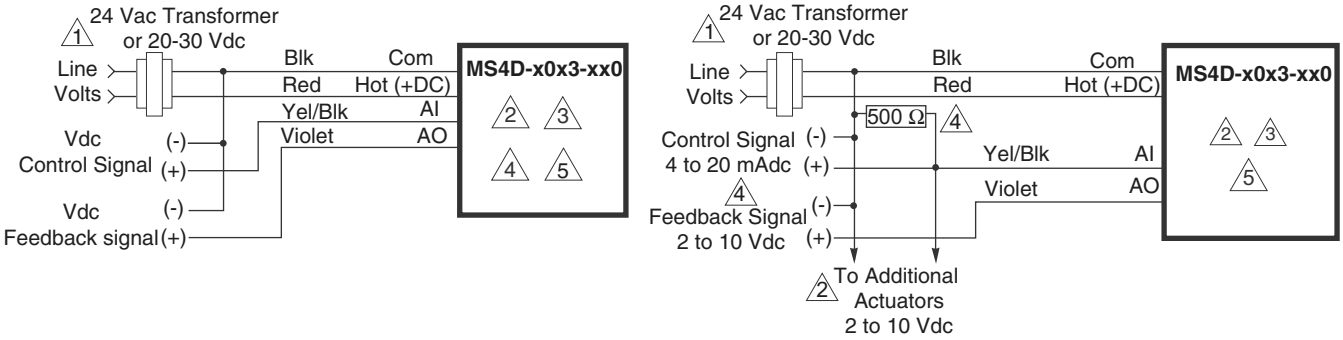
1 Provide overload protection and disconnect as required.

2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer Common and all red wires are connected to the Hot lead. Power consumption must be observed.

3 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.

4 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

Figure 58 MS4D-x0x3-xx0 for Proportional Control 24 Vac Models Wired in Parallel.



1 Provide overload protection and disconnect as required.

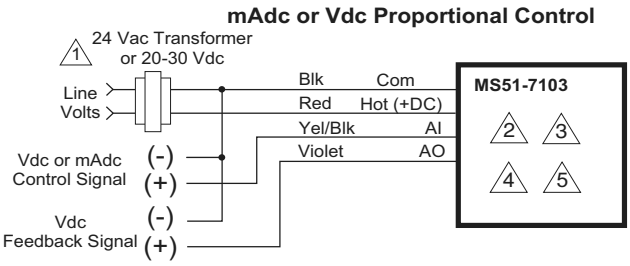
2 Actuators may be wired in parallel. All actuator black wires are connected to the transformer Common and all red wires are connected to the Hot lead. Power consumption must be observed.

3 If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.

4 On MS4D-x033-x60 (4-20 mAdc) models a 500 resistor is incorporated in the product. Do not use an external resistor.

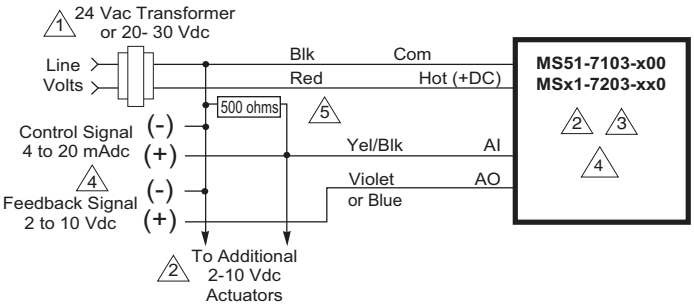
5 Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

Figure 59 MS4D-x0x3-xx0 for Proportional Control 24 Vac Basic Models.



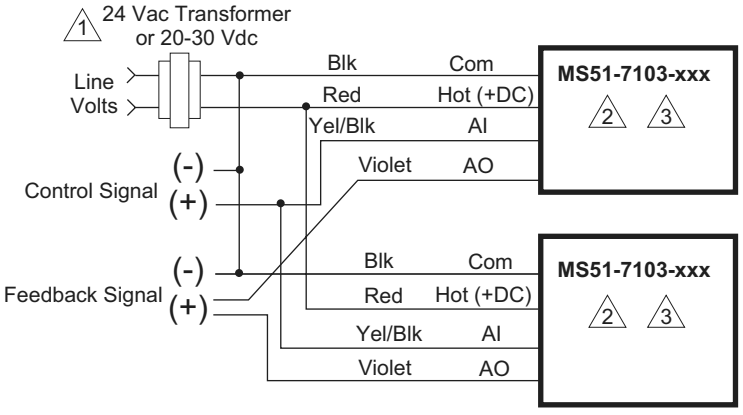
1. Provide overload protection and disconnect as required.
2. Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.
3. If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.
4. On MS51-7103-x60 (4-20 mAdc) models a 500 ohm resister is incorporated in the product. Do not use an external resistor.
5. Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

Figure 60 MS51-7103.



1. Provide overload protection and disconnect as required.
2. Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.
3. If the controller uses a full-wave power supply and does not provide isolated outputs, a separate transformer is required.
4. Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.
5. AM-708 load resistor to convert signal to 2 to 10 Vdc.

Figure 61 MS51-7103-xx0, MSx1-7203-xx0 4 to 20 mAdc with 2 to 10 Vdc Actuators.



1. Provide overload protection and disconnect as required.
2. Actuators may be wired in parallel. All actuator black wires are connected to the transformer common and all red wires are connected to the hot lead. Power consumption must be observed.
3. Cable on some models contains more wires than are used in applications. Only those wires actually used are shown.

Figure 62 MS51-7103-xxx Wired in Parallel.

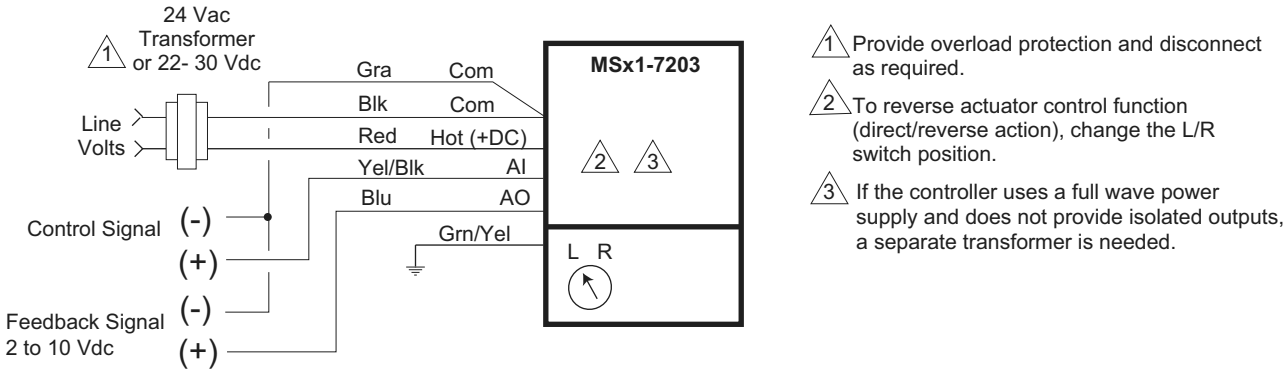


Figure 63 MSx1-7203 for 4 to 20 mAdc Proportional Control.

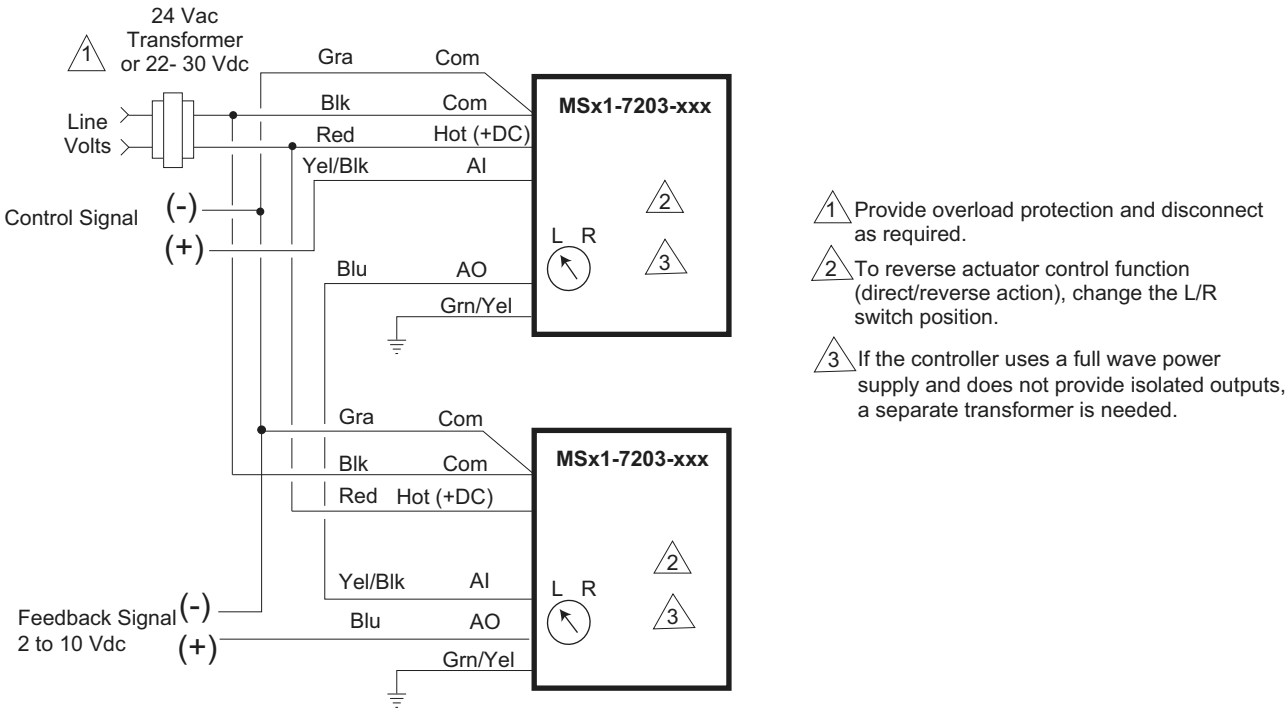
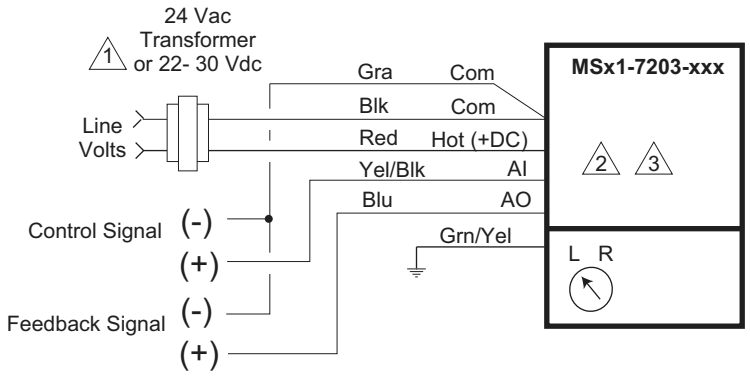


Figure 64 MSx1-7203 2 to 10 Vdc Proportional Control Wired in Parallel.

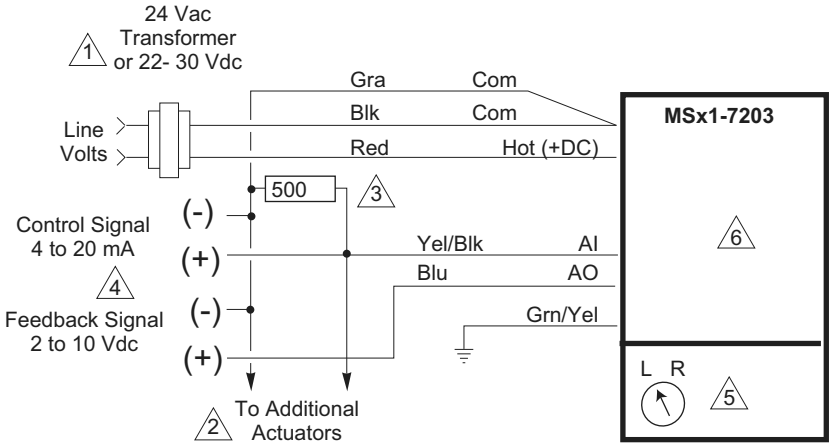


1 Provide overload protection and disconnect as required.

2 To reverse actuator control function (direct/reverse action), change the L/R switch position.

3 If the controller uses a full wave power supply and does not provide isolated outputs, a separate transformer is needed.

Figure 65 MSx1-7203-xxx 4 to 20 mAdc Proportional Control



1 Provide overload protection and disconnect as required.

2 With four actuators wired to one 500 ohm resistor, a +2% shift of the control signal may be required. (Actuator input impedance is 80 k ohm.)

3 A field-supplied 500 ohm resistor (AM-708) is required between the gray and yellow/black leads to convert the 4 to 20 mAdc control signal to 2 to 10 Vdc.

4 Only connect common to negative (-) leg of control circuits.

5 To reverse actuator control function (direct/reverse action), change the L/R switch position.

6 If the controller uses a full wave power supply and does not provide isolated outputs, a separate transformer is needed.

Figure 66 MSx1-7203 4 to 20 mA Converted to 2 to 10 Vdc.

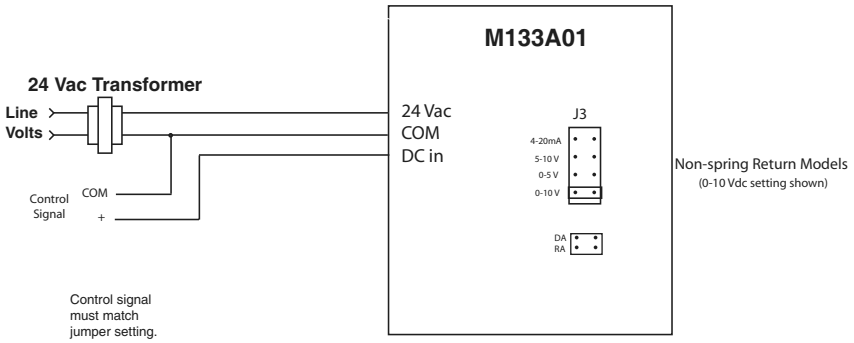


Figure 67 M133A01 Proportional Non-Spring Return.

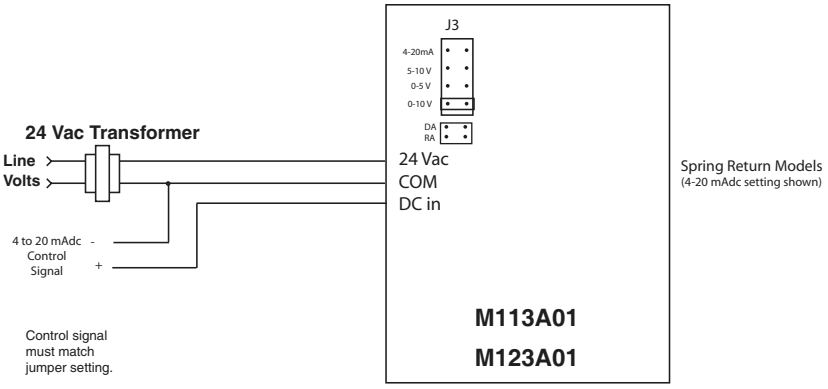


Figure 68 M113A01 and M123A01 Proportional Spring Return.

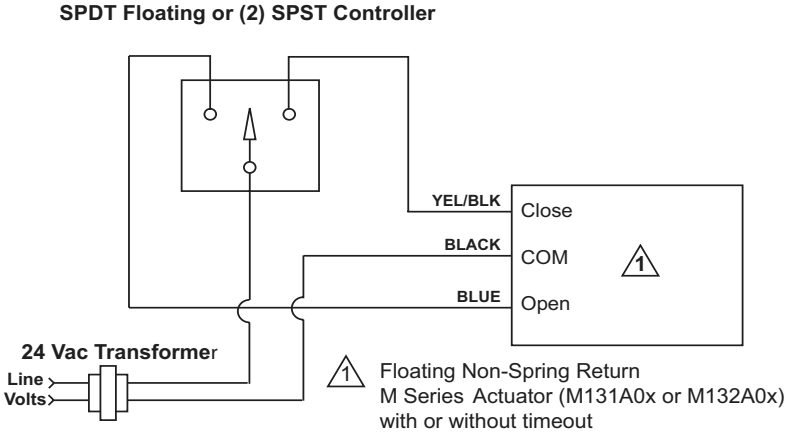
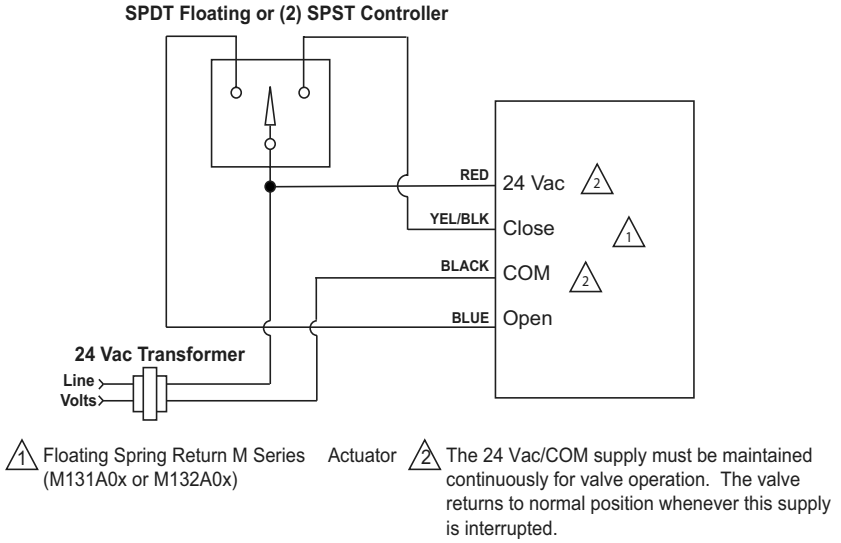


Figure 69 M131A01 or M132A01 Floating Non-Spring Return.



1 Floating Spring Return M Series Actuator (M131A0x or M132A0x)

2 The 24 Vac/COM supply must be maintained continuously for valve operation. The valve returns to normal position whenever this supply is interrupted.

Figure 70 M112A01 or M122A01 Floating.

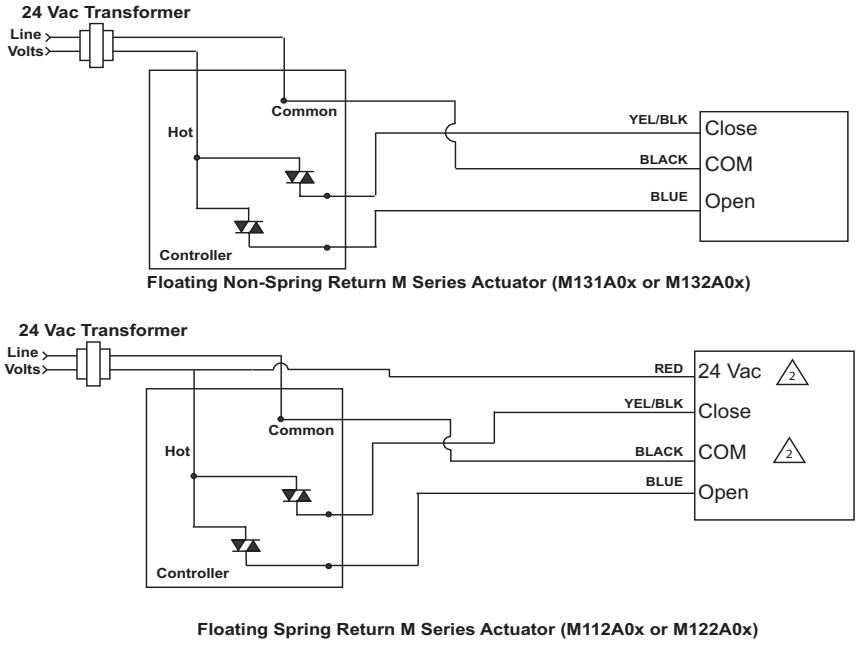


Figure 71 M13xA01 and M1x2A01 Triac Source Wiring.

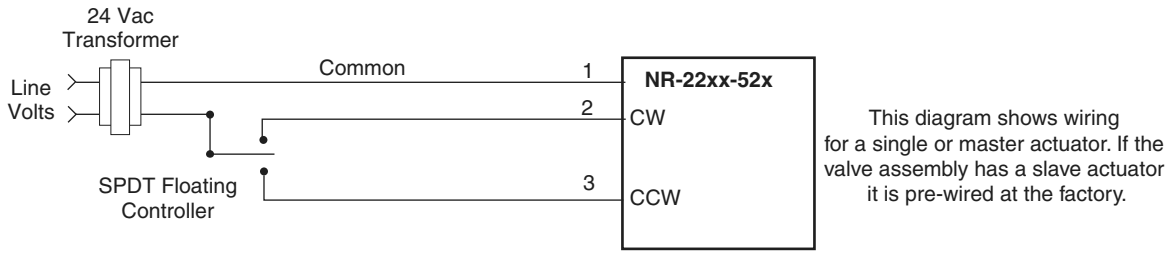


Figure 72 NR-22xx-52x Floating.

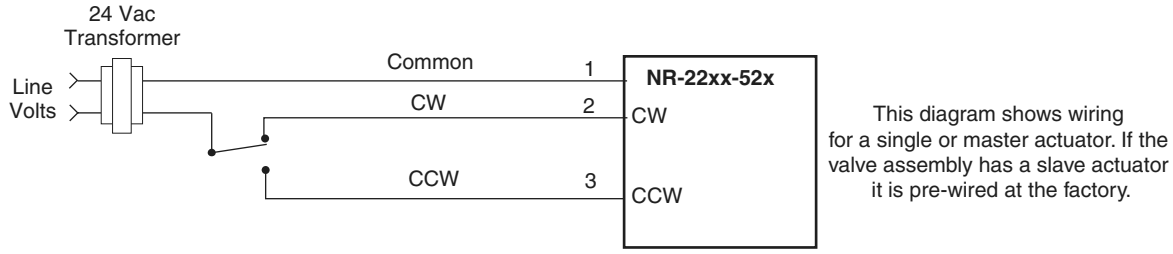


Figure 73 NR-22xx-52x Two Position.

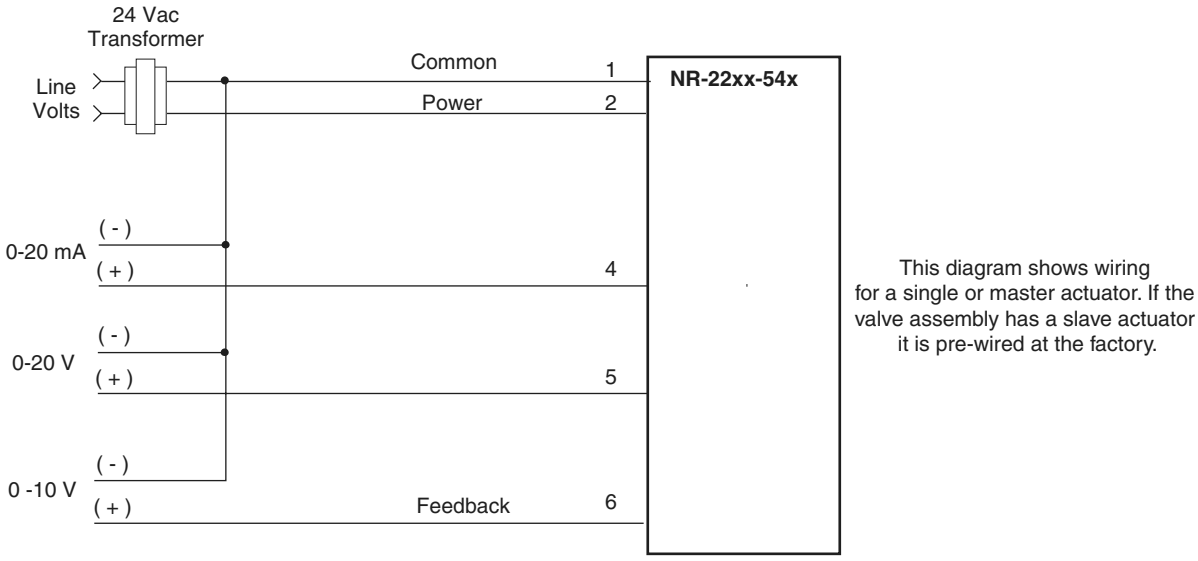


Figure 74 NR-22xx-54x Proportional NSR.

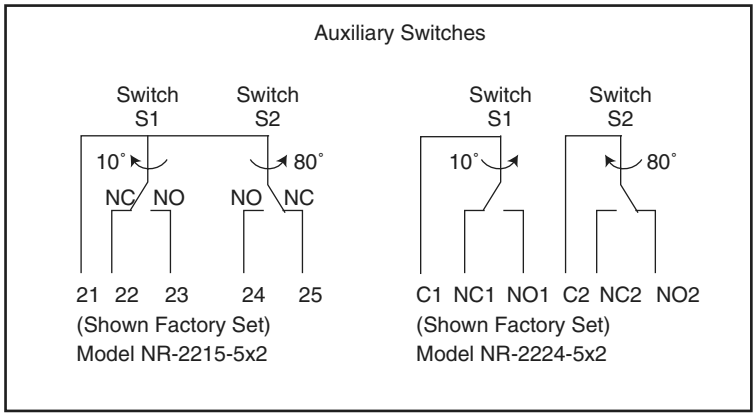
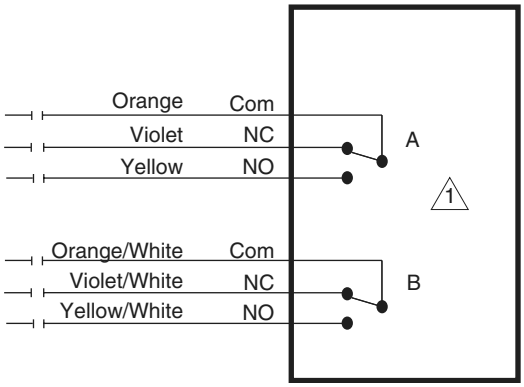


Figure 75 NR-2216-5x2 and NR-2224-5x2 Auxiliary Switches.



1 For end position indication, interlock control fan startup, etc., MS41-7XX3-50X models incorporate one or two built-in auxiliary switches. See Specifications section for details.

Model #	Switch	Switch Type
Mx41-7153-502 Mx41-7073-502	A	Adjustable, 25° - 85°
	B	Fixed at 5°

Figure 76 Mx41-7xxx-50x Auxiliary Switches.

Actuator/Valve Assembilies	Dimensional Information	
	Page	Figure
MA40-7043 with 1-1/4 to 3" 2-Way Ball Valve	219	98
MA40-7043 with 1/2 to 2" 3-Way Ball Valve	223	102
MA40-7170 with 5 to 6" Flanged 2-Way Globe Valve	214	88
MA40-7170 with 5 to 6" Flanged 3-Way Globe Valve	214	89
MA40-7173 with 5 to 6" Flanged 2-Way Globe Valve	214	88
MA40-7173 with 5 to 6" Flanged 3-Way Globe Valve	214	89
MA41-7150 with 6" Flanged 2-Way Globe Valve	216	92
MA41-7150 with 6" Flanged 3-Way Globe Valve	216	93
MA41-7153 with 6" Flanged 2-Way Globe Valve	216	92
MA41-7153 with 6" Flanged 3-Way Globe Valve	216	93
MA51-7100 with 1/2 to 2" 2-Way Globe Valve	210	80
MA51-7100 with 1/2 to 2" 3-Way Globe Valve	210	81
MA51-7103-100 with 1/2 to 2" 2-Way Globe Valve	210	80
MA51-7103-100 with 1/2 to 2" 3-Way Globe Valve	210	81
MA51-7200 with 1-1/4 to 2” 2-Way Globe Valve	211	82
MA51-7200 with 1-1/4 to 2" 3-Way Globe Valve	211	83
MA51-7203 with 1-1/4 to 2” 2-Way Globe Valve	211	82
MA51-7203 with 1-1/4 to 2” 3-Way Globe Valve	211	83
MA61-7200 with 2-1/2 to 5" Flanged 2-Way Globe Valve	217	94
MA61-7200 with 2-1/2 to 5" Flanged 3-Way Globe Valve	217	95
MA61-7203 with 2-1/2 to 5" Flanged 2-Way Globe Valve	217	94
MA61-7203 with 2-1/2 to 5" Flanged 3-Way Globe Valve	217	95
MA4D-7033-100 with 1/2 to 1" 2-Way Ball Valve	221	100
MA4D-7033-100 with 1/2 to 1" 3-Way Ball Valve	224	103
MA4D-8033-100 with 1/2 to 1" 2-Way Ball Valve	221	100
MA4D-8033-100 with 1/2 to 1" 3-Way Ball Valve	224	103
MF-22303 with 1/2 to 2" 2-Way Globe Valve	209	78
MF-22303 with 1/2 to 2” 3-Way Globe Valve	213	86
MF-23303 with 1/2 to 2" 2-Way Globe Valve	209	78
MF-23303 with 1/2 to 2" 3-Way Globe Valve	213	86
MF-63103 with 1/2 to 2" 2-Way Globe Valve	209	79
MF-63103 with 1/2 to 2" 3-Way Globe Valve	213	87
MF-63103 with 2-1/2 to 5" 2-Way Globe Valve	218	96
MF-63103 with 2-1/2 to 5" 3-Way Globe Valve	218	97
MF-63123-411 with 1/2 to 2" 2-Way Globe Valve	209	79
MF-63123-411 with 2-1/2 to 5" 2-Way Globe Valve	218	96
MF-63123-411 with 2-1/2 to 5" 3-Way Globe Valve	218	97
MF40-7043 with 1-1/4 to 3" 2-Way Ball Valve	219	98
MF40-7043 with 1/2 to 2" 3-Way Ball Valve	223	102
MF40-7173 with 5 to 6" Flanged 2-Way Globe Valve	214	88
MF40-7173 with 5 to 6" Flanged 3-Way Globe Valve	214	89
MF41-6043 with 1 to 2" 2-Way Globe Valve	208	76
MF41-6083 with 1-1/4 to 2" 2-Way Globe Valve	208	76
MF41-6153 with 2" 2-Way Globe Valve	212	84
MF41-6153 with 2" 3-Way Globe Valve	212	85
MF41-6343 with 6" Flanged 2-Way Globe Valve	215	90
MF41-6343 with 6" Flanged 3-Way Globe Valve	215	91
MF41-7153 with 6" Flanged 2-Way Globe Valve	216	92
MF41-7153 with 6" Flanged 3-Way Globe Valve	216	93

Dimensions

Actuator/Valve Assemblies	Dimensional Information	
	Page	Figure
MF51-7103-100 with 1/2 to 2" 2-Way Globe Valve	210	80
MF51-7103-100 with 1/2 to 2" 3-Way Globe Valve	210	81
MF51-7203 with 1-1/4 to 2" 2-Way Globe Valve	211	82
MF51-7203 with 1-1/4 to 2" 3-Way Glove Valve	211	83
MF61-7203 with 2-1/2 to 5" Flanged 2-Way Globe Valve	217	94
MF61-7203 with 2-1/2 to 5" Flanged 3-Way Globe Valve	217	95
MF4E-60830-100 with 1/2 to 3" 2-Way Ball Valve	222	101
MF4E-60830-100 with 1/2 to 2" 3-Way Ball Valve	226	105
MF4D-7033-100 with 1/2 to 1" 2-Way Ball Valve	221	100
MF4D-7033-100 with 1/2 to 1" 3-Way Ball Valve	224	103
MF4D-8033-100 with 1/2 to 1" 2-Way Ball Valve	221	100
MF4D-8033-100 with 1/2 to 1" 3-Way Ball Valve	224	103
MP-9810-129 6 to 12" 2-Way Butterfly Valve	Consult Factory	
MS-22353 with 1/2 to 2" 2-Way Globe Valve	209	78
MS40-7043 with 1-1/4 to 3" 2-Way Ball Valve	219	98
MS40-7043 with 1/2 to 2" 3-Way Ball Valve	223	102
MS40-7170 with 5 to 6" Flanged 2-Way Globe Valve	214	88
MS40-7170 with 5 to 6" Flanged 3-Way Globe Valve	214	89
MS40-7173 with 5 to 6" Flanged 3-Way Globe Valve	214	89
MS41-6043 with 1 to 2" 2-Way Globe Valve	208	76
MS41-6083 with 1-1/4 to 2" 3-Way Globe Valve	208	77
MS41-6153 with 2" 2-Way Globe Valve	212	84
MS41-6153 with 2" 3-Way Globe Valve	212	85
MS41-6340 with 6" Flanged 2-Way Globe Valve	215	90
MS41-6340 with 6" Flanged 3-Way Globe Valve	215	91
MS41-6343 with 6" Flanged 2-Way Globe Valve	215	90
MS41-6343 with 6" Flanged 3-Way Globe Valve	215	91
MS41-7153 with 6" Flanged 2-Way Globe Valve	216	92
MS41-7153 with 6" Flanged 3-Way Globe Valve	216	93
MS51-7103-100 with 1/2 to 2" 2-Way Globe Valve	210	80
MS51-7103-100 with 1/2 to 2" 3-Way Globe Valve	210	81
MS51-7203 with 1-1/4 to 2" 2-Way Globe Valve	211	82
MS51-7203 with 1-1/4 to 2" 3-Way Globe Valve	211	83
MS61-7203 with 2-1/2 to 5" Flanged 2-Way Globe Valve	217	94
MS61-7203 with 2-1/2 to 5" Flanged 3-Way Globe Valve	217	95
MS4D-6083 with 1/2 to 2" 3-Way Ball Valve	225	104
MS4D-6083-100 with 1/2 to 3" 2-Way Ball Valve	220	99
MS4D-7033-100 with 1/2 to 1" 2-Way Ball Valve	221	100
MS4D-7033-100 with 1/2 to 1" 3-Way Ball Valve	224	103
MS4D-8033-100 with 1/2 to 1" 2-Way Ball Valve	221	100
MS4D-8033-100 with 1/2 to 1" 3-Way Ball Valve	224	103
Mx41-7153 with 2 to 4" 2-Way Butterfly Valve	227	106
Mx41-7153 with 2 to 4" 3-Way Butterfly Valve	228	107
NR-2216 2-Way Butterfly Valve	229	108
NR-2216 3-Way Butterfly Valve	230	109
S70-0xxx with 2 to 18" 2-Way Butterfly Valve	231	110
S70-0xxx with 2 to 18" 3-Way Butterfly Valve	232	111
VBB2Nxx+M11xA01 2-Way Spring Return	233	112
VBB2Nxx+M12xA01 2-Way Spring Return	233	112
VBS2Nxx+M11xA01 2-Way Spring Return	233	112
VBS2Nxx+M12xA01 2-Way Spring Return	233	112
VBB2Nxx+M13xA01 2-Way Non-Spring Return	233	113
VBS2Nxx+M13xA01 2-Way Non-Spring Return	233	113

Actuator/Valve Assembilies	Dimensional Information	
	Page	Figure
AG13A020 VT/VS General Close-Off	236	116
AG14A020 VT/VS General Close-Off	236	116
AG23A020 VT/VS General Close-Off	236	116
AG24A020 VT/VS General Close-Off	236	116
AG13B020 VT/VS General Close-Off	236	116
AG14B020 VT/VS General Close-Off	236	116
AG23B020 VT/VS General Close-Off	236	116
AG24B020 VT/VS General Close-Off	236	116
AH13A020 VT/VS High Close-Off	236	117
AH14A020 VT/VS High Close-Off	236	117
AH23A020 VT/VS High Close-Off	236	117
AH24A020 VT/VS High Close-Off	236	117
AH13B020 VT/VS High Close-Off	236	117
AH14B020 VT/VS High Close-Off	236	117
AH23B020 VT/VS High Close-Off	236	117
AH24B020 VT/VS High Close-Off	236	117
AP13A000 VM Modulating Spring Return	235	115
AP23A000 VM Modulating Spring Return	235	115
AP33A000 VM Modulating Non-Spring Return	234	114
AT13A00T VM Modulating Spring Return	235	115
AT23A00T VM Modulating Spring Return	235	115
AT33A000 VM Modulating Non-Spring Return	234	114
AT33A00T VM Modulating Non-Spring Return	234	114

Dimensions — 1 to 2" 2-Way Globe Valve Assemblies										
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)								
		Two-Way (Refer to Figure 76)					Three-Way (Refer to Figure 77)			
		A	B	C	D	E	A	B	C	D
NPT Two-Way Vx-7213-505-4-P	1	4-5/8 (117)	N/A	1-3/16 (30)	1-13/16 (46)	7-1/16 (179)	4-5/8 (118)	1-3/4 (44)	1-3/16 (30)	6-7/16 (164)
	1-1/4	4-5/8 (117)	N/A	1-3/8 (35)	1-13/16 (46)	7-1/16 (179)	4-5/8 (118)	1-3/4 (44)	1-7/16 (37)	6-11/16 (170)
	1-1/2	5-3/8 (136)	N/A	1-1/2 (138)	1-7/8 (48)	7-1/8 (181)	5-3/8 (137)	1-13/16 (46)	1-9/16 (40)	6-13/16 (173)
	2	6-1/8 (156)	N/A	1-9/16 (40)	2-1/8 (54)	7-3/8 (187)	6-1/8 (156)	2-1/4 (57)	2-1/4 (57)	7-1/2 (190)

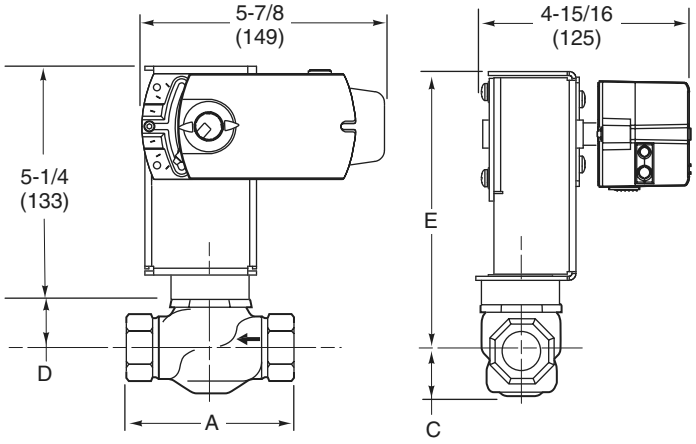


Figure 76 MF41-6043 and MS41-60x3 With 1 to 2" Two-Way Globe Valve.

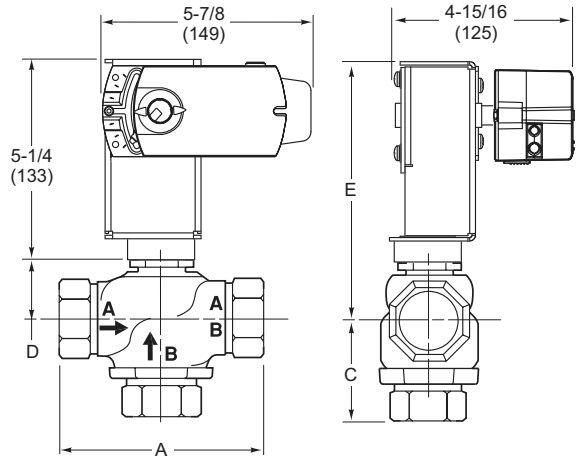


Figure 77 Mx41-60x3 with 2" Three-Way Globe Valve.

Dimensions — 1/2" to 2" 2-Way Globe Valve Assemblies					
Valve Body				Actuator Series (Code)	
				MS-22353 (Refer to Figure 78)	MF-631X3 (Refer to Figure 79)
Part Number	Size In.	A	C	E	E
Vx-7213-255-4-P Vx-7213-256-4-P Vx-7213-265-4-P Vx-7213-301-4-P Vx-7213-422-4-P	1/2	3 (76)	1-1/16 (27)	4-1/8 (108)	7-1/8 (181)
	3/4	3-5/8 (92)	1-1/16 (27)	4-1/8 (108)	7-1/8 (181)
	1	4-5/8 (117)	1-1/8 (29)	4-13/16 (122)	7-13/16 (198)
	1-1/4	4-5/8 (117)	1-3/8 (35)	4-13/16 (122)	7-13/16 (198)
	1-1/2	5-3/8 (137)	1-1/2 (38)	4-7/8 (124)	7-7/8 (200)
	2	6-1/8 (156)	1-9/16 (40)	5-1/8 (130)	8-1/8 (206)

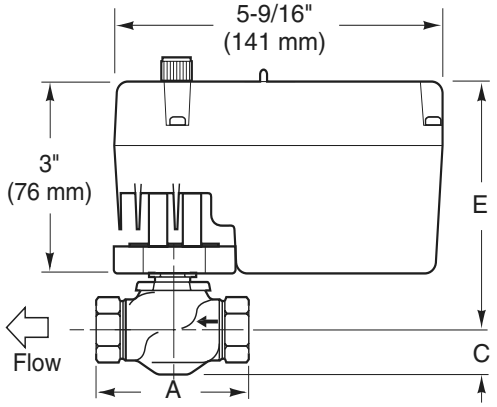


Figure 78 Mx-2xxx3 with 1/2 to 2" 2-Way Globe Valve.

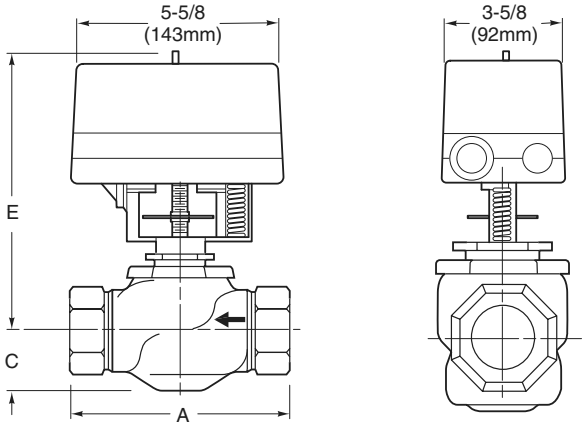
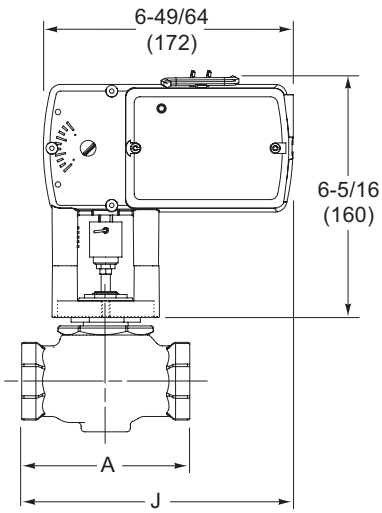


Figure 79 MF-63103 and MF-63123-411 With 1/2 to 2" 2-Way Globe Valve.

Dimensions — 1/2" to 2" Globe Valve Assemblies

Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimetres)							
		2-Way (Refer to Figure 80				3-Way (Refer to Figure 81)			
		A	C	E	J	A	C	E	J
NPT 2-Way (N.C.) Vx-7223-8xx-4-P Vx-7263-8xx-4-P Vx-7283-8xx-4-P 3-Way Vx-731x-8xx-4-P Vx-732x-8xx-4-P	1/2	3-1/16 (78)	1-3/16 (30)	7-7/16 (189)	6-5/8 (168)	3-1/16 (78)	1-3/4 (44)	7-7/16 (189)	6-5/8 (168)
	3/4	3-5/8 (92)	1-3/16 (30)	7-7/16 (189)	6-7/8 (175)	3-5/8 (92)	1-13/16 (46)	7-7/16 (189)	6-7/8 (175)
	1	4-5/8 (118)	1-3/4 (44)	7-1/2 (190)	7-3/8 (187)	4-5/8 (118)	1-3/4 (44)	7-1/2 (191)	7-3/8 (187)
	1-1/4	4-5/8 (118)	1-3/4 (44)	7-3/4 (197)	7-3/8 (187)	4-5/8 (118)	1-3/4 (44)	7-3/4 (197)	7-3/8 (187)
	1-1/2	5-3/8 (137)	1-13/16 (46)	7-7/8 (200)	7-13/16 (198)	5-3/8 (137)	1-13/16 (46)	7-7/8 (200)	7-13/16 (198)
	2	6-1/8 (156)	2-1/4 (57)	8-9/16 (217)	8-5/32 (208)	6-1/8 (156)	2-1/4 (57)	8-9/16 (217)	8-5/32 (208)
NPT 2-Way (N.O.) Vx-7213-8xx-4-P Vx-7253-8xx-4-P Vx-7273-8xx-4-P	1/2	3-1/16 (78)	1-3/16 (30)	7-7/16 (189)	6-5/8 (168)	—			
	3/4	3-5/8 (92)	1-1/16 (27)	7-7/16 (189)	6-7/8 (175)				
	1	4-5/8 (118)	1-3/16 (30)	8-1/8 (206)	7-3/8 (187)				
	1-1/4	4-5/8 (118)	1-3/8 (35)	8-1/8 (206)	7-3/8 (187)				
	1-1/2	5-3/8 (137)	1-1/2 (38)	8-3/16 (208)	7-13/16 (198)				
	2	6-1/8 (156)	1-9/16 (40)	8-7/16 (214)	8-5/32 (208)				



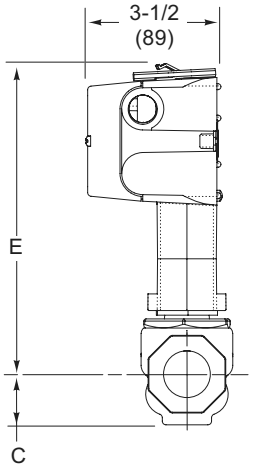
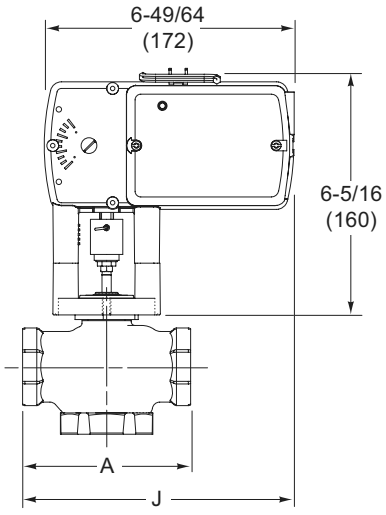


Figure 80 Mx51-710x with 1/2 to 2" 2-Way Globe Valve.



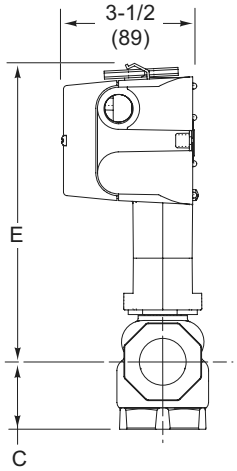


Figure 81 Mx51-710x with 1/2 to 2" 3-Way Globe Valve.

Dimensions — 1-1/4" to 2" Globe Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimetres)							
		2-Way (Refer to Figure 82)				3-Way (Refer to Figure 83)			
		A	C	E	J	A	C	E	J
NPT 2-Way (N.C.) Vx-7223-59x-4-P Vx-7263-59x-4-P Vx-7283-59x-4-P	1-1/4	4-5/8 (117)	1-3/4 (44)	8-3/8 (213)	11-11/16 (297)	4-5/8 (117)	1-3/4 (44)	8-3/8 (213)	11-11/16 (297)
	1-1/2	5-3/8 (137)	1-13/16 (46)	8-1/2 (216)	12-1/16 (306)	5-3/8 (137)	1-13/16 (46)	8-1/2 (216)	12-1/16 (306)
3-Way Vx-73xx-59x-4-P	2	6-1/8 (156)	2-1/4 (57)	9-3/16 (233)	12-7/16 (316)	6-1/8 (156)	2-1/4 (57)	9-3/16 (233)	12-7/16 (316)
NPT 2-Way (N.O.) Vx-7213-59x-4-P Vx-7253-59x-4-P Vx-7273-59x-4-P	1-1/4	4-5/8 (117)	1-3/8 (35)	8-3/4 (222)	11-11/16 (297)	—			
	1-1/2	5-3/8 (137)	1-1/2 (38)	8-13/16 (224)	12-1/16 (306)				
	2	6-1/8 (156)	1-9/16 (40)	9-1/16 (230)	12-7/16 (316)				

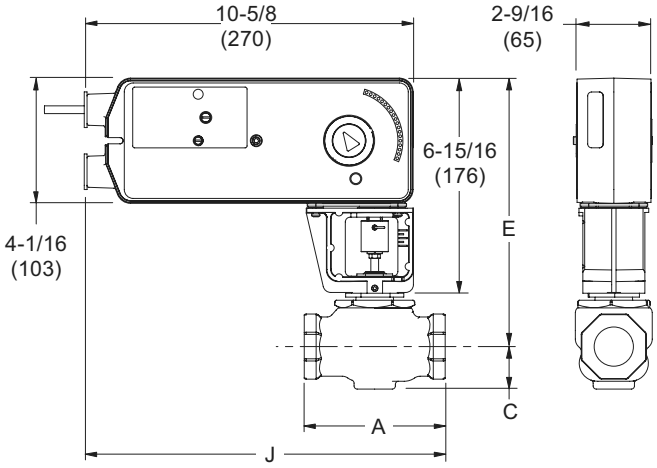


Figure 82 Mx51-720x with 1-1/4 to 2" 2-Way Globe Valve.

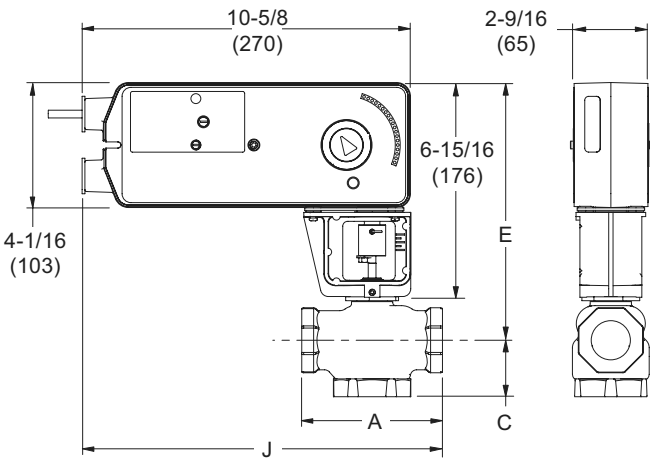


Figure 83 Mx51-720x with 1-1/4 to 2" 3-Way Globe Valve.

Dimensions — 2" Globe Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimetres)							
		2-Way (Refer to Figure 84)				3-Way (Refer to Figure 85)			
		A	C	D	E	A	C	D	E
NPT 3-Way VX-73XX-508-4-P	2	—				6-1/8 (156)	2-1/4 (57)	2-1/4 (57)	7-1/2 (190)
NPT 2-Way (N.O.) VX-7213-508-4-P	2	6-1/8 (156)	1-9/16 (40)	2-1/8 (54)	7-3/8 (187)	—			

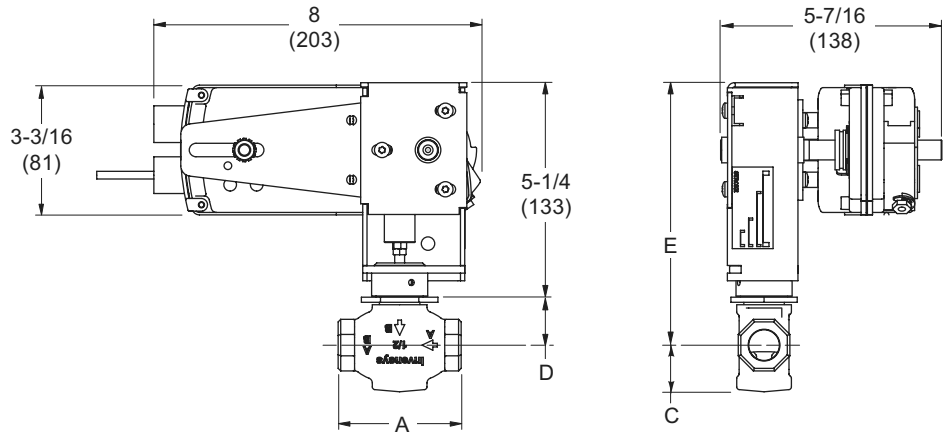


Figure 84 MX41-6153 with 2" 2-Way Globe Valve.

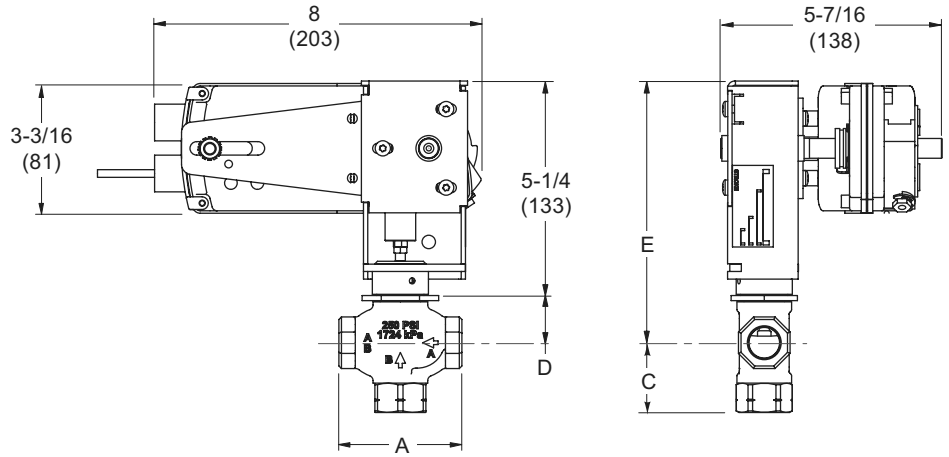


Figure 85 MX41-6153 with 2" 3-Way Globe Valve.

Dimensions — 1/2" to 2" 3-Way Globe Valve Assemblies, Mixing and Diverting					
Valve Body				Actuator Series	
				MS-22353 (Refer to Figure 86)	MF-631X3 (Refer to Figure 87)
Part Number	Size In.	A	C	E	E
Vx-73x3-255-4-P Vx-73x3-256-4-P Vx-73x3-265-4-P Vx-73x3-301-4-P Vx-73x3-422-4-P	1/2	3 (76)	1-3/8 (35)	4-1/8 (105)	7-1/8 (181)
	3/4	3-5/8 (92)	1-11/16 (43)	4-1/8 (105)	7-1/8 (181)
	1	4-5/8 (117)	1-9/16 (40)	4-3/16 (106)	7-3/16 (183)
	1-1/4		1-5/8 (41)	4-7/16 (113)	7-7/16 (189)
	1-1/2	5-3/8 (137)	1-5/8 (41)	4-9/16 (116)	7-1/2 (191)
	2	6-1/8 (156)	1-7/8 (48)	4-5/8 (117)	7-5/8 (194)

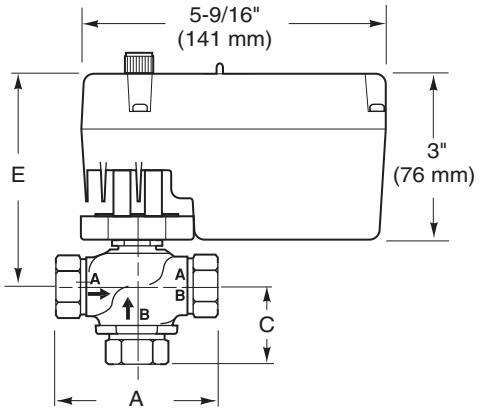


Figure 86 MF-23xx3 With 1/2 to 2" 3-Way Globe Valve.

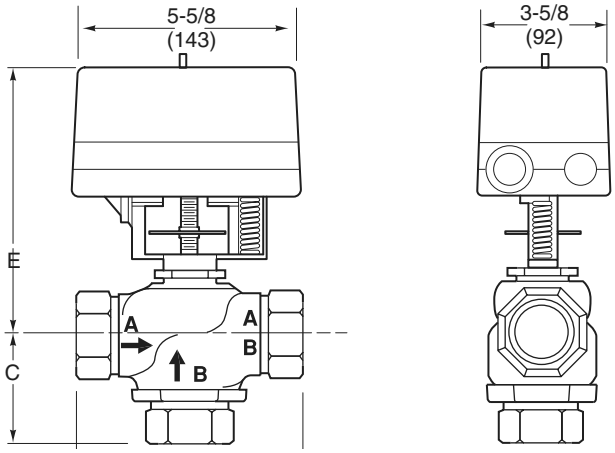


Figure 87 MF-631x3 With 1/2 to 2" 3-Way Globe Valve.

Dimensions — 5" to 6" Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimeters)										
			2-Way (Refer to Figure 88)						3-Way (Refer to Figure 89)					
			A	C	E	F	G	H	A	C	E	F	G	H
2-Way Vx-8213-57x-5-P 3-Way Vx-8303-57x-5-P	5	15	13 (330)	6-15/16 (176)	18-3/16 (462)	10 (254)	8-1/2 (216)	10-1/16 (256)	13 (330)	8-13/16 (224)	17-1/4 (464)	10 (254)	8-1/2 (216)	10-1/16 (256)
	6	16	14 (356)	7-1/2 (190)	19-15/16 (507)	11 (280)	9-1/2 (241)	12 (305)	14 (356)	9-3/4 (248)	20-1/4 (515)	11 (280)	9-1/2 (241)	12 (305)
2-Way Vx-8223-57x-5-P	5	15	13 (330)	5-7/16 (138)	19-3/8 (492)	10 (254)	8-1/2 (216)	10-1/16 (256)	—	—	—	—	—	—
	6	16	14 (356)	6-1/4 (159)	21-3/8 (543)	11 (280)	9-1/2 (241)	12 (305)	—	—	—	—	—	—

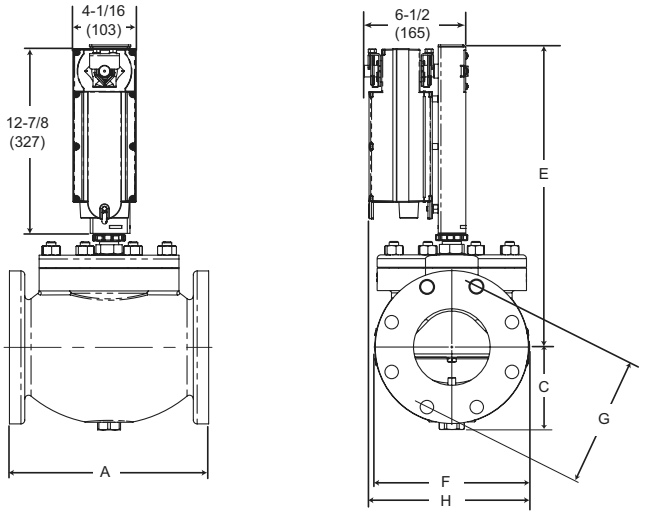


Figure 88 Mx40-717x with 5 to 6" Flanged 2-Way Globe Valves.

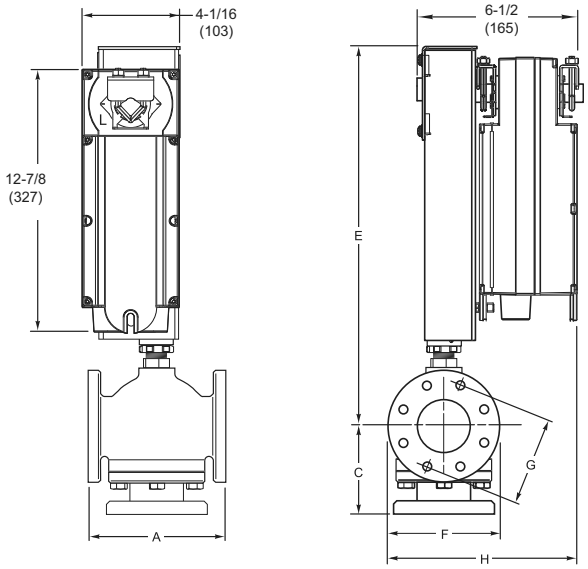


Figure 89 Mx40-717x with 5 to 6" Flanged 3-Way Globe Valves.

Dimensions - 6" Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	Valve Dimensions in inches (millimeters)											
		2-Way (Refer to Figure 90)						3-Way (Refer to Figure 91)					
		A	C	E	F	G	H	A	C	E	F	G	H
2-Way Vx-8213-51x-5-16 3-Way Vx-8303-51x-5-16	6	14 (356)	7-1/2 (190)	19-15/16 (507)	11 (280)	9-1/2 (241)	12 (305)	14 (356)	9-3/4 (248)	20-1/4 (515)	11 (280)	9-1/2 (241)	12 (305)
2-Way Vx-8223-516-5-16	6	14 (356)	6-1/4 (159)	21-3/8 (543)	11 (280)	9-1/2 (241)	12 (305)	—	—	—	—	—	—

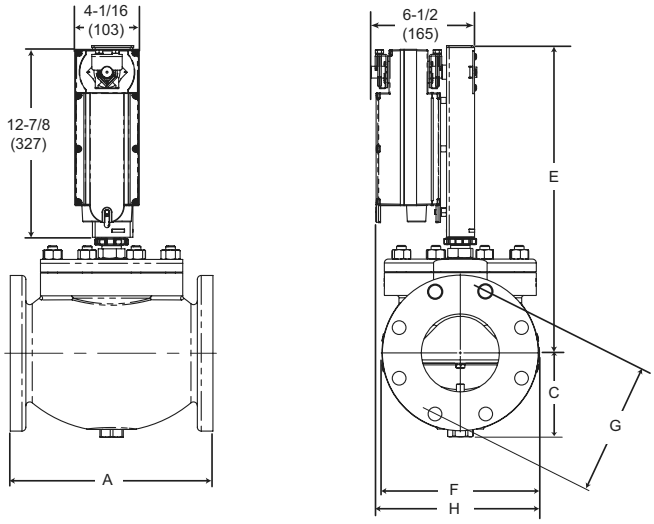


Figure 90 Mx41-634x with 6" Flanged 2-Way Globe Valves.

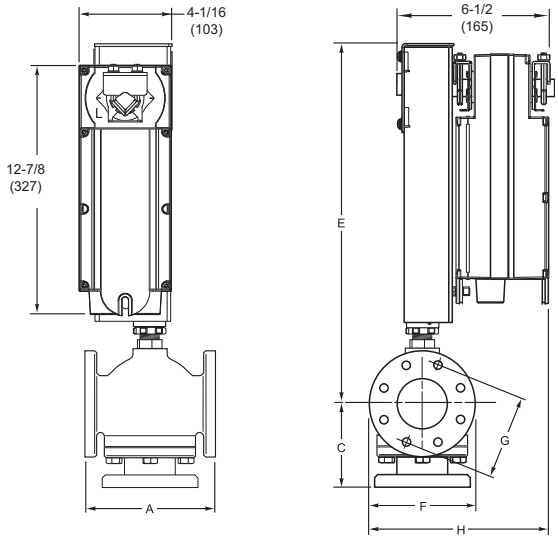


Figure 91 Mx41-634x with 6" Flanged 3-Way Globe Valves.

Dimensions — 6" Flanged Globe Valve Assemblies													
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimeters)										
			2-Way (Refer to Figure 92)						3-Way (Refer to Figure 93)					
			A	C	E	F	G	H	A	C	E	F	G	H
2-Way Vx-8213-55x-5-P 3-Way Vx-8303-55x-5-P	6”	16	14 (356)	7-1/2 (190)	19-15/16 (507)	11 (280)	9-1/2 (241)	12 (305)	14 (356)	9-3/4 (248)	20-9/16 (522)	11 (280)	9-1/2 (241)	12 (305)
2-Way Vx-8223-55x-5-P	6”	16	14 (356)	6-1/4 (159)	21-3/8 (543)	11 (280)	9-1/2 (241)	12 (305)	—	—	—	—	—	—

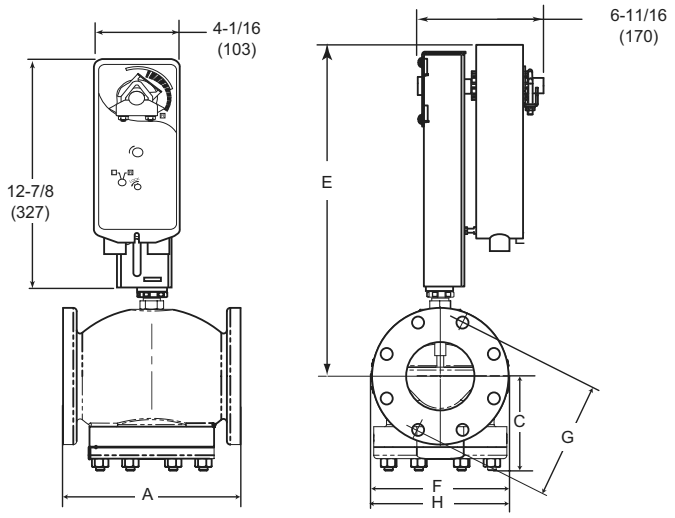


Figure 92 Mx41-715x with 6" Flanged 2-Way Globe Valves.

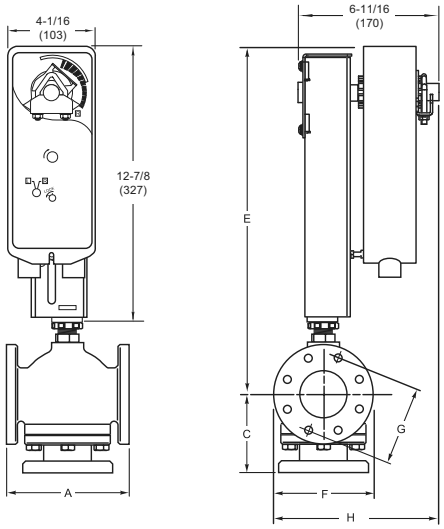


Figure 93 Mx41-715x with 6" Flanged 3-Way Globe Valves.

Dimensions - 2-1/2" to 5" Flanged Globe Valve Assemblies												
Valve Assembly Part Number	Valve Size	P Code	Valve Dimensions in inches (millimeters)									
			2-Way (Refer to Figure 94)					3-Way (Refer to Figure 95)				
			A	C	E	F	G	A	C	E	F	G
2-Way Vx-8213-59x-5-P 3-Way Vx-8303-59x-5-P	2-1/2”	12	8-9/16 (217)	4 (102)	12-3/8 (314)	7 (178)	5-1/2 (140)	8-9/16 (217)	5-7/16 (138)	13-3/4 (349)	7 (178)	5-1/2 (140)
	3”	13	9-1/2 (241)	4-5/8 (117)	12-5/8 (320)	7-1/2 (191)	6 (152)	9-1/2 (241)	6-3/8 (162)	14 (356)	7-1/2 (191)	6 (152)
	4”	14	11-1/2 (292)	5-1/2 (140)	13-3/8 (340)	9 (229)	7-1/2 (191)	11-1/2 (292)	8-7/16 (214)	14-3/4 (375)	9 (229)	7-1/2 (191)
	5”	15	13 (330)	6-15/16 (176)	15-1/8 (384)	10 (254)	8-1/2 (216)	13 (330)	8-13/16 (224)	15-1/8 (384)	10 (254)	8-1/2 (216)
2-Way Vx-8223-59x-5-P	2-1/2”	12	8-9/16 (217)	4 (102)	13 (330)	7 (178)	5-1/2 (140)	—	—	—	—	—
	3”	13	9-1/2 (241)	4-1/4 (108)	14-1/2 (368)	7-1/2 (191)	6 (152	—	—	—	—	—
	4”	14	11-1/2 (292)	4-15/16 (125)	15-3/8 (391)	9 (229)	7-1/2 (191)	—	—	—	—	—
	5”	15	13 (330)	5-7/16 (138)	16-5/16 (415)	10 (254)	8-1/2 (216)	—	—	—	—	—

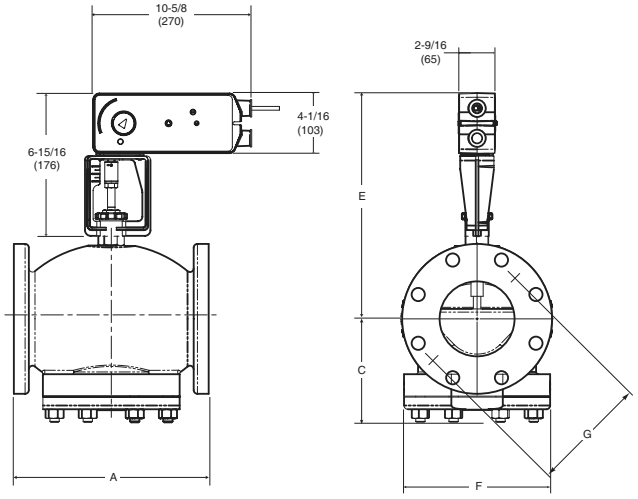


Figure 94 Mx61-720x with 2-1/2" to 5" Flanged 2-Way Globe Valves

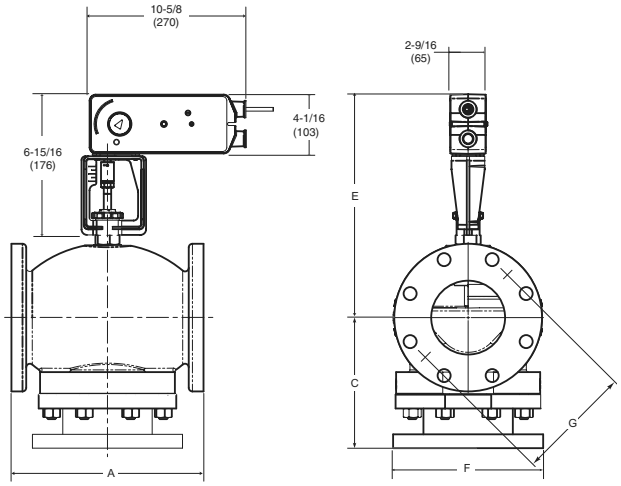


Figure 95 Mx61-720x with 2-1/2" to 5" Flanged 3-Way Globe Valves

Dimensions - 2-1/2" to 5" Flanged Globe Valve Assemblies

Valve Assembly Part Number	Valve Size	p Code	Valve Dimensions in inches (millimeters)									
			2-Way (Refer to Figure 96)					3-Way (Refer to Figure 97)				
			A	C	E	F	G	A	C	E	F	G
2-Way Vx-8213-301-5-P Vx-8213-422-5-P 3-Way Vx-8303-301-5-P Vx-8303-422-5-P	2-1/2”	12	8-9/16 (217)	4 (102)	13-5/16 (338)	7 (178)	5-1/2 (140)	8-9/16 (217)	5-7/16 (138)	10-1/4 (260)	7 (178)	5-1/2 (140)
	3”	13	9-1/2 (241)	4-5/8 (117)	12-5/8 (320)	7-1/2 (191)	6 (152)	9-1/2 (241)	6-3/8 (162)	10-1/2 (267)	7-1/2 (191)	6 (152)
	4”	14	11-1/2 (292)	5-1/12 (140)	12-3/8 (315)	9 (229)	7-1/2 (191)	11-1/2 (292)	8-7/16 (214)	11-1/4 (286)	9 (229)	7-1/2 (191)
	5”	15	13 (330)	6-15/16 (176)	14-15/16 (379)	10 (254)	8-1/2 (216)	13 (330)	8-13/16 (224)	14-15/16 (379)	10 (254)	8-1/2 (216)
2-Way Vx-8223-301-5-P Vx-8223-422-5-P	2-1/2”	12	8-9/16 (217)	4 (102)	9-9/16 (243)	7 (178)	5-1/2 (140)	—	—	—	—	—
	3”	13	9-1/2 (241)	4-1/4 (108)	11-1/16 (281)	7-1/2 (191)	6 (152)	—	—	—	—	—
	4”	14	11-1/2 (292)	4-15/16 (125)	13-3/4 (349)	9 (229)	7-1/2 (191)	—	—	—	—	—
	5”	15	13 (330)	5-7/16 (138)	16-1/16 (408)	10 (254)	8-1/2 (216)	—	—	—	—	—

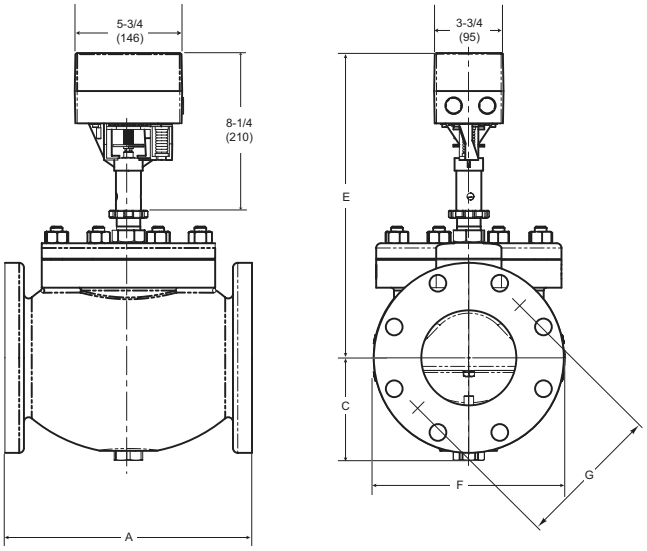


Figure 96 Mx-631x3 Series with Flanged 2-Way Globe Valves

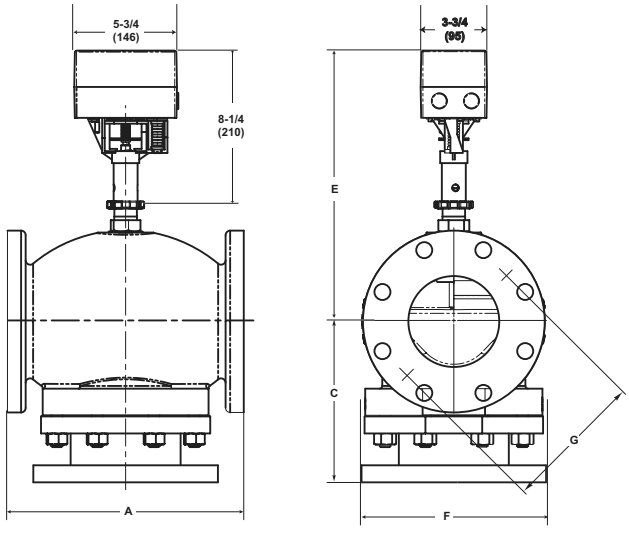


Figure 97 Mx-631x3 Series with Flanged 3-Way Globe Valves

Dimensions — 1-1/4" to 3" 2-Way 2000 Series Ball Valve Assemblies						
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 98)			
			A	B	C	D
2-Way VA-2213-526-9-P VA-2213-536-9-P VF-2213-526-9-P VF-2213-536-9-P VS-2213-526-9-P VS-2213-536-9-P	1-1/4	41, 42, 43, 45	3 (76)	7-1/4 (184)	8-7/16 (215)	3-1/8 (79)
		44, 46	3-5/8 (92)	7-1/4 (184)	9-1/8 (231)	3-1/4 (82)
	1-1/2	51, 53	4-11/16 (119)	8-1/16 (205)	9-1/8 (231)	3-1/4 (82)
		52, 54	4-1/16 (103)	7-1/2 (190)	9-5/8 (244)	3-3/4 (95)
	2	61, 65	4-21/32 (118)	8 (203)	9-5/8 (244)	3-3/4 (95)
		63, 66, 67	4-15/16 (125)	7-7/8 (200)	10-3/8 (264)	4-1/16 (103)
	2-1/2	71, 72, 76, 73, 74, 75	4-3/4 (121)	8 (203)	10-3/8 (264)	4-1/16 (103)
	3	82, 85	5-1/16 (129)	8-1/4 (210)	10-9/16 (268)	4-1/16 (103)

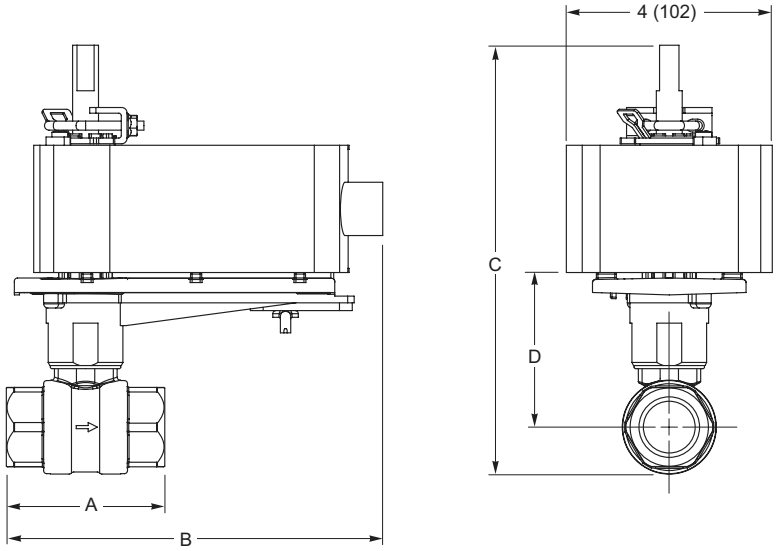


Figure 98 Mx40-704x with 1-1/4 to 3" 2-Way Ball Valve.

Dimensions — 1/2" to 3" 2-Way 2000 Series Ball Valve Assemblies						
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 99)			
			A	B	C	D
2-Way VS-2213-841-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	6-7/8 (175)	8 (203)	2-3/4 (69)
		6	3-11/32 (85)	7 (178)	8-3/16 (208)	2-7/8 (72)
	3/4	11, 12, 13, 14, 15, 17	2-5/8 (67)	6-7/16 (163)	8 (203)	2-3/4 (69)
		16, 18	2-5/8 (67)	6-5/8 (168)	8-3/16 (208)	2-7/8 (72)
	1	21, 23	3-1/16 (78)	7 (178)	8-1/2 (216)	3 (76)
		22, 25	3-3/4 (95)	7-3/8 (188)	8-3/16 (208)	2-7/8 (72)
		24, 26	4-5/16 (110)	7-5/8 (194)	9-1/8 (231)	3-1/4 (82)
		27	3-1/16 (78)	7-13/16 (200)	8-1/2 (216)	3 (76)
	1-1/4	41, 42, 43, 45	3 (76)	5-13/32 (112)	8-7/16 (215)	3-1/8 (79)
		44, 46	3-5/8 (92)	7-3/32 (180)	9-1/8 (231)	3-1/4 (82)
	1-1/2	51, 53	4-11/16 (119)	7-13/16 (198)	9-1/8 (231)	3-1/4 (82)
		52, 54	4-1/16 (103)	7-11/32 (186)	9-5/8 (244)	3-3/4 (95)
	2	61, 65	4-21/32 (118)	7-3/4 (196)	9-5/8 (244)	3-3/4 (95)
		63, 66, 67	4-15/16 (125)	7-5/8 (195)	10-3/8 (264)	4-1/16 (103)
	2-1/2	71, 72, 76, 73, 74, 75	4-3/4 (121)	7-7/8 (200)	10-3/8 (264)	4-1/16 (103)
	3	82, 85	5-1/16 (129)	8 (203)	10-9/16 (268)	4-1/16 (103)

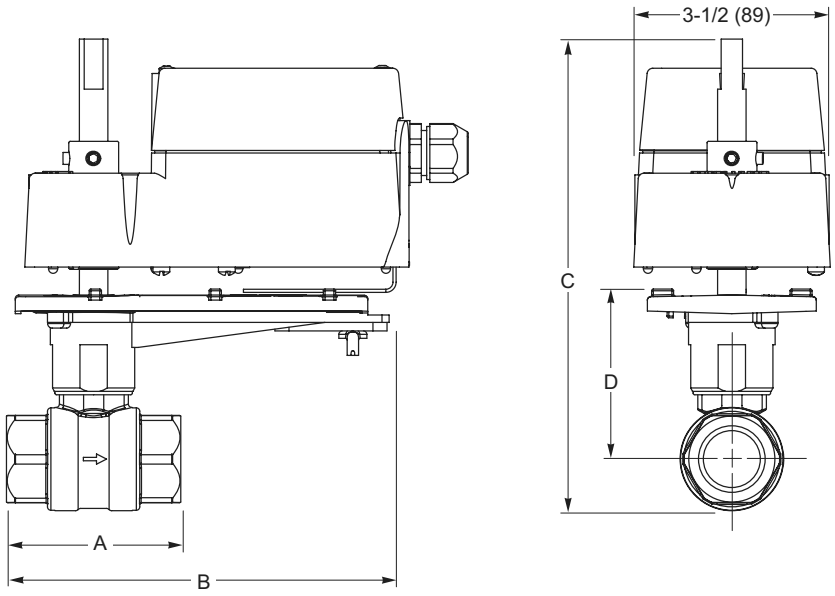


Figure 99 MS4D-6083-100 with 1/2 to 3" 2-Way Ball Valve.

Dimensions — 1/2" to 1" 2-Way 2000 Series Ball Valve Assemblies						
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 100)			
			A	B	C	D
2-Way VA-2213-821-9-P VA-2213-831-9-P VF-2213-821-9-P VF-2213-831-9-P VS-2213-821-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	6-7/8 (175)	8 (203)	2-3/4 (69)
		6	3-11/32 (85)	7 (178)	8-3/16 (208)	2-7/8 (72)
	3/4	11, 12, 13, 14, 15, 17	2-5/8 (67)	6-7/16 (163)	8 (203)	2-3/4 (69)
		16, 18	2-5/8 (67)	6-5/8 (168)	8-3/16 (208)	2-7/8 (72)
	1	21, 23	3-1/16 (78)	7 (178)	8-1/2 (216)	3 (76)
		22, 25	3-3/4 (95)	7-3/8 (188)	8-3/16 (208)	2-7/8 (72)
		24, 26	4-5/16 (110)	7-5/8 (194)	9-1/8 (231)	3-1/4 (82)
		27	3-1/16 (78)	7-13/16 (200)	8-1/2 (216)	3 (76)

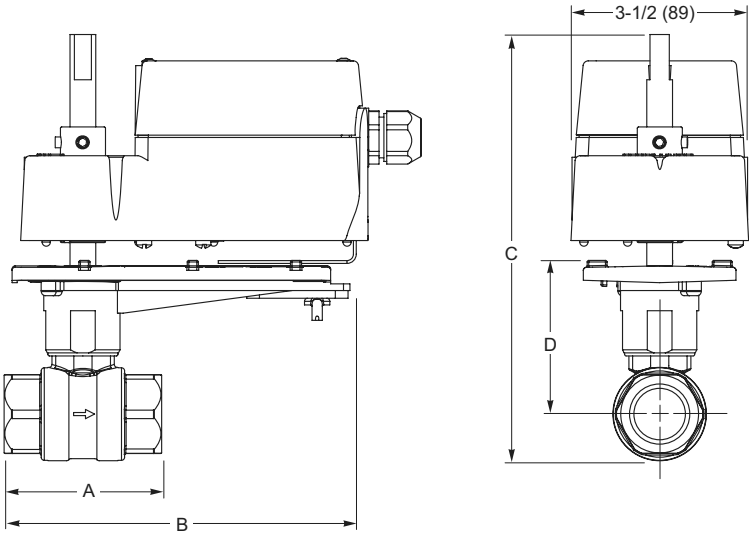


Figure 100 Mx4D-x03x with 1/2 to 1" 2-Way Ball Valve.

Dimensions — 1/2" to 3" 2-Way 2000 Series Ball Valve Assemblies						
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 101)			
			A	B	C	D
2-Way VF-2213-880-9-P	1/2	1, 2, 3, 4, 5, 7	2-3/8 (60)	7-1/8 (181)	8 (203)	2-3/4 (69)
		6	3-11/32 (85)	6-7/8 (175)	8-3/16 (208)	2-7/8 (72)
	3/4	11, 12, 13, 14, 15, 17	2-3/8 (60)	7 (170)	8 (203)	2-3/4 (69)
		16, 18	2-5/8 (67)	7 (170)	8-3/16 (208)	2-7/8 (72)
	1	21, 23	3-1/16 (78)	7-1/4 (184)	8-1/2 (216)	3 (76)
		22, 25	3-3/4 (95)	7-9/16 (192)	8-3/16 (208)	2-7/8 (72)
		24, 26	4-5/16 (110)	7-7/8 (200)	9-1/8 (231)	3-1/4 (82)
		27	3-1/16 (78)	8 (203)	8-1/2 (216)	3 (76)
	1-1/4	41, 42, 43, 45	3 (76)	7-1/4 (184)	8-7/16 (215)	3-1/8 (79)
		44, 46	3-5/8 (92)	7-1/4 (184)	9-1/8 (231)	3-1/4 (82)
	1-1/2	51, 53	4-11/16 (119)	7-9/16 (192)	9-1/8 (231)	3-1/4 (82)
		52, 54	4-1/16 (103)	7-1/16 (179)	9-5/8 (244)	3-3/4 (95)
	2	61, 65	4-21/32 (118)	7-1/2 (191)	9-5/8 (244)	3-3/4 (95)
		63, 66, 67	4-15/16 (125)	7-7/16 (189)	10-3/8 (264)	4-1/16 (103)
	2-1/2	71, 72, 76, 73, 74, 75	4-3/4 (121)	7-9/16 (192)	10-3/8 (264)	4-1/16 (103)
	3	82, 85	5-1/16 (129)	7-3/4 (197)	10-9/16 (268)	4-1/16 (103)

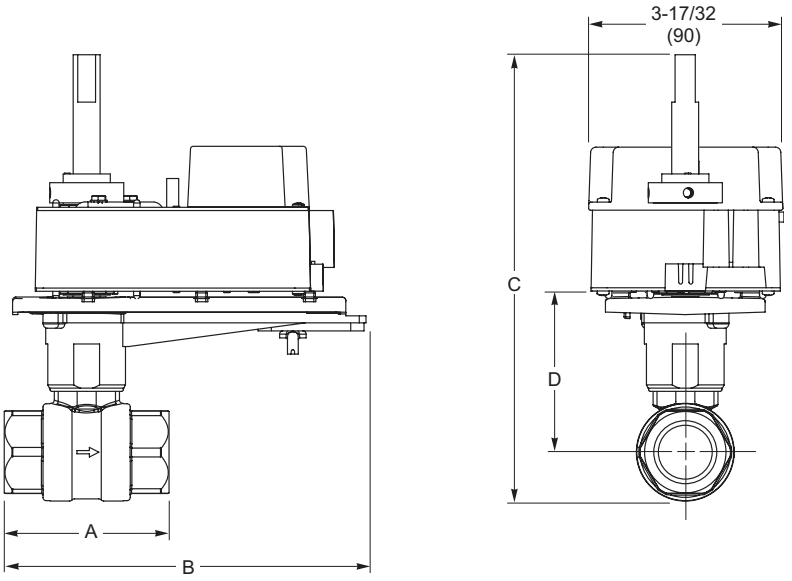


Figure 101 MF4E-60830-100 with 1/2 to 3" 2-Way Ball Valve.

Dimensions — 1/2" to 2" 3-Way 2000 Series Ball Valve Assemblies							
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 102)				
			A	B	C	D	E
3-Way VA-2313-526-9-P VA-2313-536-9-P VF-2313-526-9-P VF-2313-536-9-P VS-2313-526-9-P VS-2313-536-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	7 (178)	9-5/16 (237)	2-7/8 (72)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-5/8 (67)	7 (178)	9-5/16 (237)	2-7/8 (72)	2 (51)
	1	21, 22, 23, 24, 25, 28	3-3/4 (95)	7-11/16 (195)	9-1/2 (238)	2-7/8 (72)	2-1/16 (52)
		27, 30	3-1/16 (78)	7-1/4 (184)	9-7/8 (251)	3 (76)	2-7/16 (62)
		26, 29, 31	4-5/16 (110)	8-1/4 (210)	10-7/8 (275)	3-1/4 (82)	3-1/8 (80)
	1-1/4	45	3 (76)	7-1/4 (184)	9-7/8 (251)	3 (76)	2-7/16 (61)
		41, 43, 44, 46	3-5/8 (92)	7-5/8 (194)	10-1/2 (267)	3-1/4 (82)	2-13/16 (72)
	1-1/2	51, 52, 53, 55	4-1/2 (114)	8-1/4 (210)	10-3/8 (264)	3-1/4 (82)	2-3/4 (69)
		54, 56	4-1/16 (103)	7-1/16 (179)	11-3/8 (288)	3-3/4 (95)	3-3/16 (81)
	2	61, 63	3-15/16 (100)	7-9/16 (192)	11-1/4 (287)	3-3/4 (95)	3-1/8 (79)
		62, 64	5 (127)	8-1/4 (210)	12-1/4 (314)	4-1/16 (103)	3-7/8 (98)

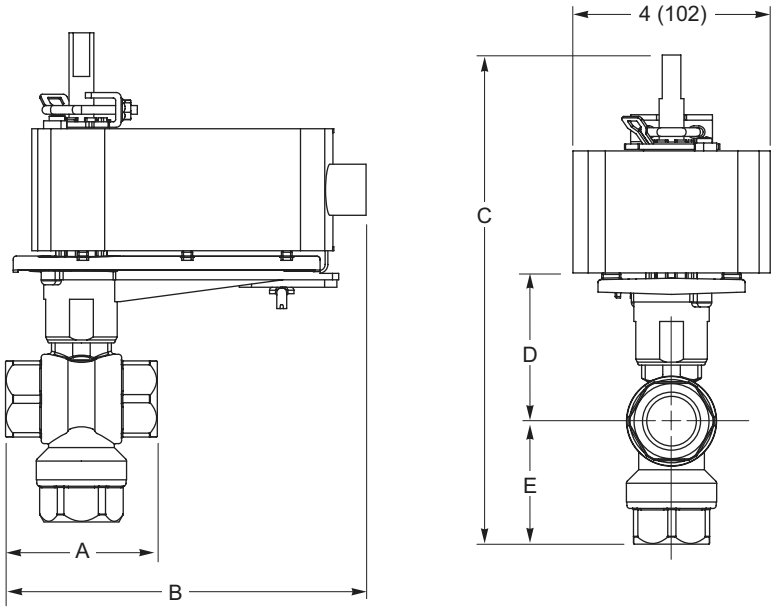


Figure 102 Mx40-704x with 1/2 to 2" 3-Way Ball Valve.

Dimensions — 1/2" to 1" 3-Way 2000 Series Ball Valve Assemblies							
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 103)				
			A	B	C	D	E
3-Way VA-2313-821-9-P VA-2313-831-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	6-3/4 (171)	9-5/16 (237)	2-7/8 (72)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-5/8 (67)	6-7/8 (175)	9-5/16 (237)	2-7/8 (72)	2 (51)
VF-2313-821-9-P VF-2313-831-9-P	1	21, 22, 23, 24, 25, 28	3-3/4 (95)	7-1/2 (191)	9-1/2 (238)	2-7/8 (72)	2-1/16 (52)
VS-2313-821-9-P thru VS-2313-839-9-P		27, 30	3-1/16 (78)	7 (178)	9-7/8 (251)	3 (76)	2-7/16 (62)
		26, 29, 31	4-5/16 (110)	7 (178)	10-7/8 (275)	3-1/4 (82)	3-1/8 (80)

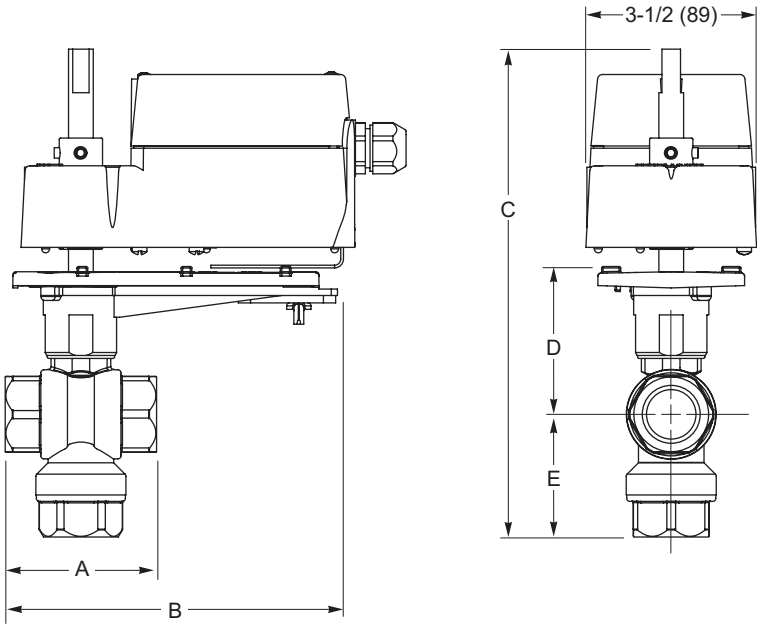


Figure 103 Mx4D-x03x with 1/2 to 1" 3-Way Ball Valve.

Dimensions — 1/2" to 2" 3-Way 2000 Series Ball Valve Assemblies							
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 104)				
			A	B	C	D	E
3-Way VS-2313-841-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	6-3/4 (171)	9-5/16 (237)	2-7/8 (72)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-5/8 (67)	6-7/8 (175)	9-5/16 (237)	2-7/8 (72)	2 (51)
	1	21, 22, 23, 24, 25, 28	3-3/4 (95)	7-1/2 (191)	9-1/2 (238)	2-7/8 (72)	2-1/16 (52)
		27, 30	3-1/16 (78)	7 (178)	9-7/8 (251)	3 (76)	2-7/16 (62)
		26, 29, 31	4-5/16 (110)	7 (178)	10-7/8 (275)	3-1/4 (82)	3-1/8 (80)
	1-1/4	45	3 (76)	7 (178)	9-7/8 (251)	3 (76)	2-7/16 (61)
		41, 43, 44, 46	3-5/8 (92)	7-3/8 (188)	10-1/2 (267)	3-1/4 (82)	2-13/16 (72)
	1-1/2	51, 52, 53, 55	4-1/2 (114)	7-3/4 (197)	10-3/8 (264)	3-1/4 (82)	2-3/4 (69)
		54, 56	4-1/16 (103)	7-1/4 (184)	11-3/8 (288)	3-3/4 (95)	3-3/16 (81)
	2	61, 63	3-15/16 (100)	8-7/16 (214)	11-1/4 (287)	3-3/4 (95)	3-1/8 (79)
		62, 64	5 (127)	7-1/2 (191)	12-1/4 (314)	4-1/16 (103)	3-7/8 (98)

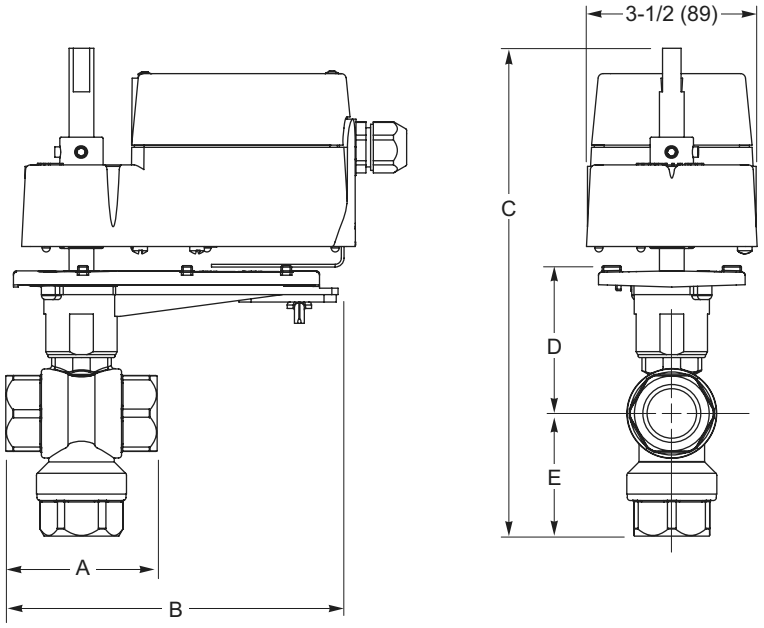


Figure 104 MS4D-608x with 1/2 to 3" 3-Way Ball Valve.

Dimensions — 1/2" to 2" 3-Way 2000 Series Ball Valve Assemblies							
Valve Assembly Part Number	Valve Size in.	P Code	Valve Dimensions in inches (millimetres) (Refer to Figure 105)				
			A	B	C	D	E
3-Way VF-2313-880-9-P	1/2	1, 2, 3, 4, 5, 6	2-5/8 (67)	7 (178)	9-5/16 (237)	2-7/8 (72)	2 (51)
	3/4	11, 12, 13, 14, 15, 16	2-5/8 (67)	7 (178)	9-5/16 (237)	2-7/8 (72)	2 (51)
	1	21, 22, 23, 24, 25, 28	3-3/4 (95)	7-11/16 (195)	9-1/2 (238)	2-7/8 (72)	2-1/16 (52)
		27, 30	3-1/16 (78)	7-1/4 (184)	9-7/8 (251)	3 (76)	2-7/16 (62)
		26, 29, 31	4-5/16 (110)	8-1/4 (210)	10-7/8 (275)	3-1/4 (82)	3-1/8 (80)
	1-1/4	45	3 (76)	6-3/4 (171)	9-7/8 (251)	3 (76)	2-7/16 (61)
		41, 43, 44, 46	3-5/8 (92)	7-5/8 (194)	10-1/2 (267)	3-1/4 (82)	2-13/16 (72)
	1-1/2	51, 52, 53, 55	4-1/2 (114)	7-3/4 (197)	10-3/8 (264)	3-1/4 (82)	2-3/4 (69)
		54, 56	4-1/16 (103)	7-1/4 (184)	11-3/8 (288)	3-3/4 (95)	3-3/16 (81)
	2	61, 63	3-15/16 (100)	7-1/8 (181)	11-1/4 (287)	3-3/4 (95)	3-1/8 (79)
		62, 64	5 (127)	7-3/4 (197)	12-1/4 (314)	4-1/16 (103)	3-7/8 (98)

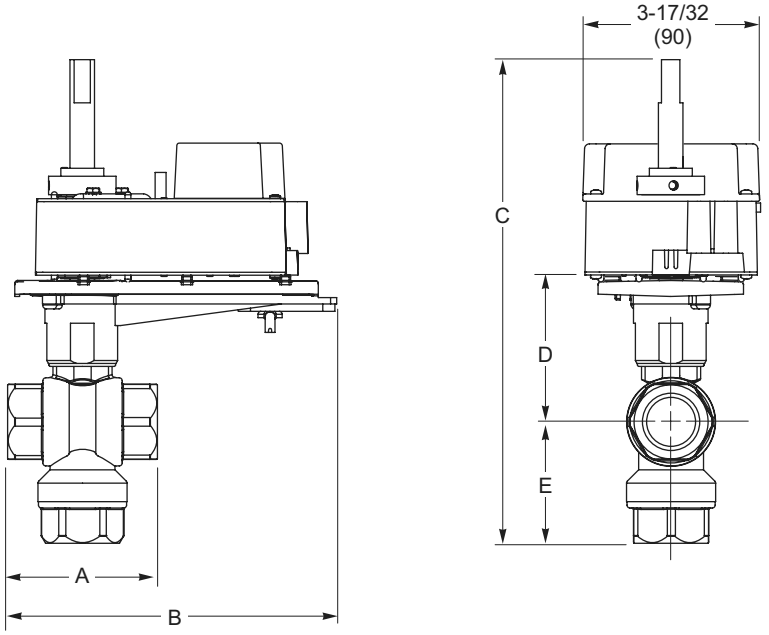


Figure 105 MF4E-60830-100 with 1/2 to 2" 3-Way Ball Valve.

Dimensions — 2" to 4" TAC DuraDrive 2-Way Butterfly Valve Assemblies										
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimetres) (Refer to Figure 106)								
		A	B	C	D	E	F	G	H	K
VxFx-62x0-556-L-11	2	3.69 (94)	1.62 (41)	2.00 (51)	2.30 (59)	5.50 (140)	6 (152)	—	4 (102)	12.5 (318)
VxFx-62x0-556-L-12	2-1/2	4.19 (106)	1.75 (45)	2.50 (64)	2.57 (65)	6.00 (152)	6 (152)	—	4 (102)	12.5 (318)
VxFx-62x0-556D-L-13	3	4.88 (124)	1.75 (45)	3.00 (76)	2.81 (71)	6.25 (159)	11.75 (298)	19 (483)	4 (102)	—
VxUx-62x0-556D-L-14	4 U	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (179)	11.75 (298)	19 (483)	4 (102)	—

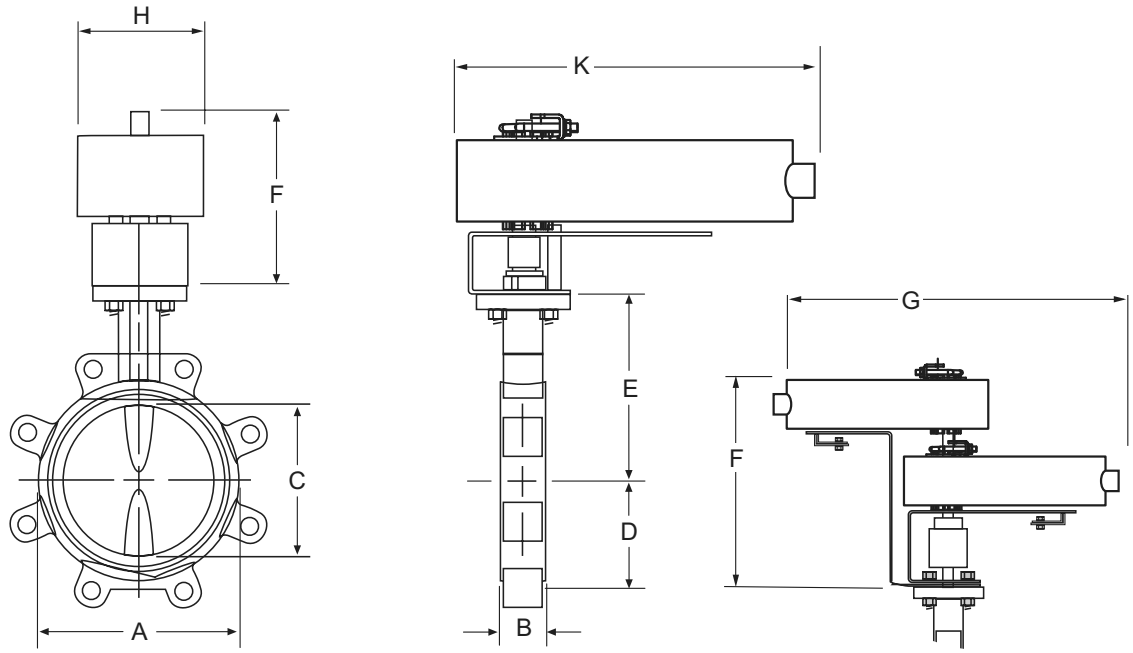


Figure 106 Mx41-7153 with 2" to 4" 2-Way Butterfly Valves.

Dimensions — 2" to 4" TAC DuraDrive 3-Way Butterfly Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimetres) (Refer to Figure 107)							
		A	B	C	D	E	F	G	H
VxFx-63xx-556-L-11	2	2.00 (51)	4.50 (114)	3.00 (76)	1.62 (41)	5.50 (140)	7.5 (190.5)	—	12 (305)
VxFx-63xx-556D-L-12	2-1/2	2.50 (64)	5.00 (127)	3.50 (89)	1.80 (46)	6.00 (152)	13.25 (336)	19 (483)	13 (330)
VxFx-63xx-556D-L-13	3	3.00 (76)	5.50 (140)	3.80 (97)	1.80 (46)	6.20 (157)	13.25 (336)	19 (483)	13.5 (343)
VxUx-63xx-556D-L-14	4 U	4.00 (102)	6.50 (1.65)	4.50 (114)	2.00 (51)	7.00 (179)	13.25 (336)	19 (483)	14.5 (368)

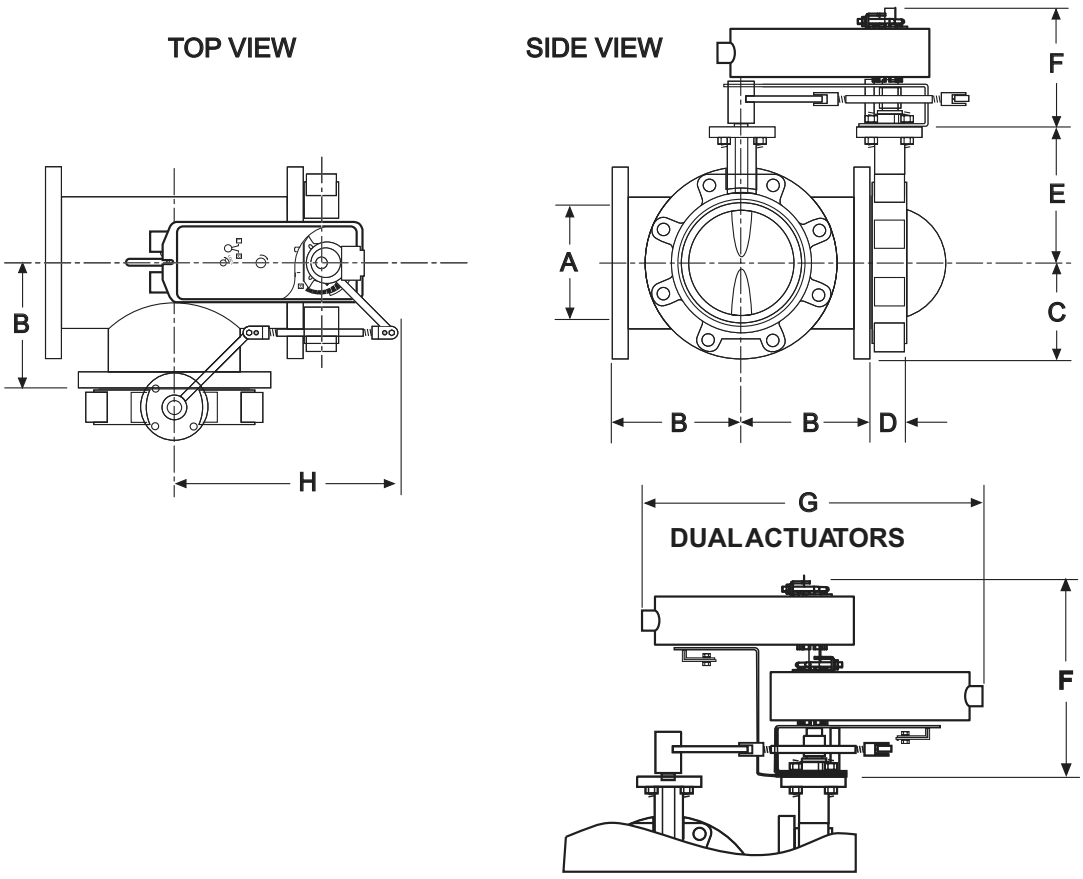


Figure 107 Mx41-7153 with 2" to 4" 3-Way Butterfly Valves.

Dimensions — 2" to 6" 2-Way Butterfly Valve Assemblies											
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimetres) (Refer to Figure 108)									
		A	B	C	D	E	F	G	H	J	K
VxFx-6200-E24-L-11	2	3.69 (94)	1.62 (41)	2.00 (51)	2.30 (59)	5.50 (140)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxFx-6200-E24-L-12	2-1/2	4.19 (106)	1.75 (45)	2.50 (64)	2.57 (65)	6.00 (152)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxFx-6200-E25-L-13	3	4.88 (124)	1.75 (45)	3.00 (76)	2.81 (71)	6.25 (159)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxUx-6200-E25-L-14	4 U	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (179)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxFx-6200-E25D-L-14	4 F	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (179)	11.75 (298)	16 (404)	5 (127)	2 (51)	—
VxUx-6200-E25-L-15	5 U	7.06 (179)	2.12 (54)	5.00 (127)	4.61 (117)	7.50 (190)	6 (152)	—	4 (102)	2 (51)	7.5 (191)
VxUx-6200-E25D-L-16	6 U	8.12 (206)	2.12 (54)	5.75 (146)	5.06 (129)	8.00 (203)	11.75 (298)	16 (404)	5 (127)	2 (51)	—

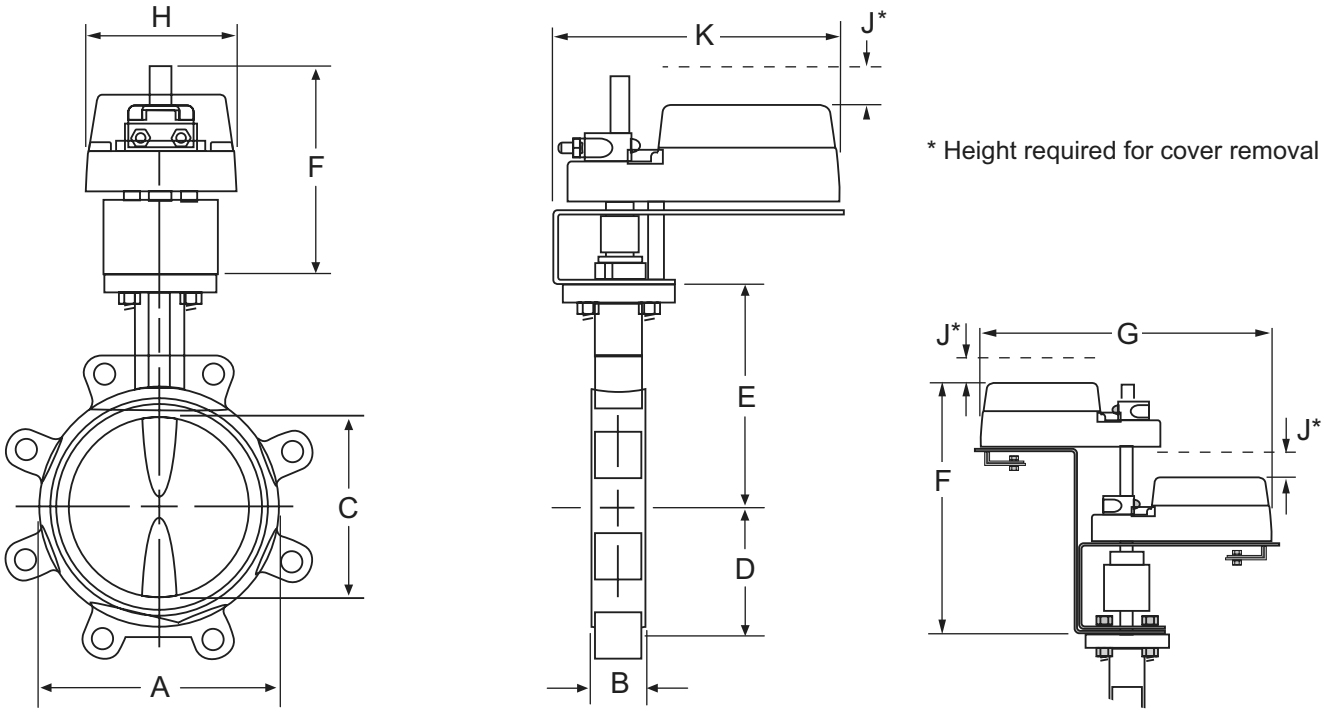


Figure 108 NR-22xx with 2" to 6" 2-Way Butterfly Valves.

Dimensions — 2" to 6" 3-Way Butterfly Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimetres) (Refer to Figure 109)							
		A	B	C	D	E	F	G	H
VxFx-630x-E24-L-11	2	2.00 (51)	4.50 (114)	3.00 (76)	1.62 (41)	5.50 (140)	7.5 (191)	—	12.00 (305)
VxFx-630x-E24-L-12	2-1/2	2.50 (64)	5.00 (127)	3.50 (89)	1.80 (46)	6.00 (152)	7.5 (191)	—	13.00 (330)
VxFx-630x-E25-L-13	3	3.00 (76)	5.50 (140)	3.80 (97)	1.80 (46)	6.20 (157)	7.5 (191)	—	13.50 (343)
VxUx-630x-E25-L-14	4 U	4.00 (102)	6.50 (165)	4.50 (114)	2.00 (51)	7.00 (179)	7.5 (191)	—	14.50 (368)
VxFx-630x-E25D-L-14	4 F	4.00 (102)	6.50 (165)	4.50 (114)	2.00 (51)	7.00 (179)	7.5 (191)	—	14.50 (368)
VxUx-630x-E25D-L-15	5 U	5.00 (127)	7.50 (190)	5.00 (127)	2.12 (54)	7.50 (190)	13.25 (337)	16 (406)	15.50 (394)
VxUx-630x-E25D-L-16	6 U	5.80 (147)	8.00 (203)	5.50 (140)	2.12 (54)	8.00 (203)	13.25 (337)	16 (406)	16.25 (413)

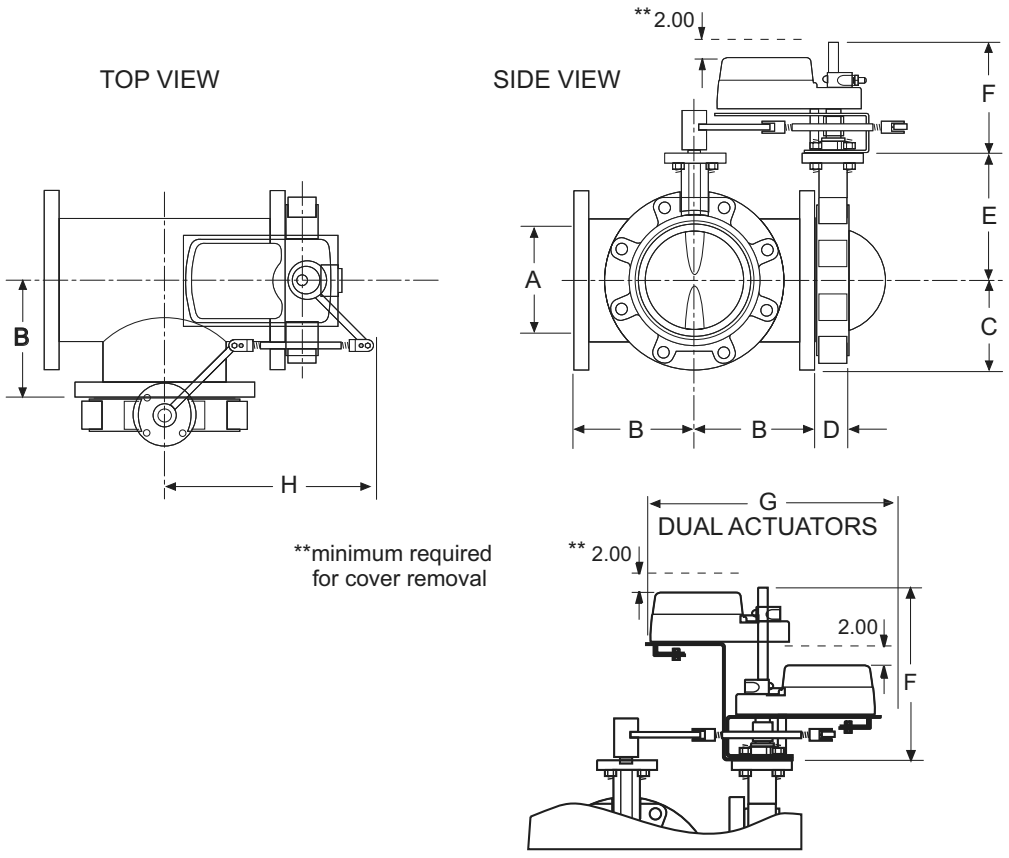


Figure 109 NR-22xx with 2" to 6" 3-Way Butterfly Valves.

Dimensions — 2" to 18" 2-Way Butterfly Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimeters) (Refer to Figure 108)							
		A	B	C	D	E	F	G	H
VxFS-6200-E1x-L-11	2	3.69 (94)	1.62 (41)	2.00 (51)	2.30 (58)	5.50 (140)	6.7 (170)	7.5 (191)	5.8 (147)
VxFS-6200-E1x-L-12	2-1/2	4.19 (106)	1.75 (44)	2.50 (63)	2.57 (65)	6.00 (152)	6.7 (170)	7.5 (191)	5.8 (147)
VxFS-6200-E1x-L-13	3	4.88 (124)	1.75 (44)	3.00 (76)	2.81 (71)	6.25 (159)	6.7 (170)	7.5 (191)	5.8 (147)
VxUS-6200-E1x-L-14	4 U	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (178)	6.7 (170)	7.5 (191)	5.8 (147)
VxFS-6200-E1x-L-14	4 F	6.06 (154)	2.00 (51)	4.00 (102)	4.09 (104)	7.00 (178)	6.7 (170)	7.5 (191)	5.8 (147)
VxUS-6200-E1x-L-15	5 U	7.06 (179)	2.12 (54)	5.00 (127)	4.61 (117)	7.50 (190)	6.7 (170)	7.5 (191)	5.8 (147)
VxFS-6200-E2x-L-15	5 F	7.06 (179)	2.12 (54)	5.00 (127)	4.61 (117)	7.50 (190)	8.1 (206)	10.1 (257)	7.8 (198)
VxUS-6200-E2x-L-16	6 U	8.12 (206)	2.12 (54)	5.75 (146)	5.06 (129)	8.00 (203)	8.1 (206)	10.1 (257)	7.8 (198)
VxFS-6200-E2x-L-16	6 F	8.12 (206)	2.12 (54)	5.75 (146)	5.06 (129)	8.00 (203)	8.1 (206)	10.1 (257)	7.8 (198)
VxUS-6200-E2x-L-17	8 U	10.50 (267)	2.50 (63)	7.75 (199)	6.05 (154)	9.50 (241)	8.1 (206)	10.1 (257)	7.8 (198)
VxFS-6200-E3x-L-17	8 F	10.50 (267)	2.50 (63)	7.75 (199)	6.05 (154)	9.50 (241)	8.1 (206)	10.1 (257)	7.8 (198)
VxUS-6200-E3x-L-18	10 U	12.75 (324)	2.50 (63)	9.75 (248)	7.69 (195)	10.75 (273)	8.1 (206)	10.1 (257)	7.8 (198)
VxFS-6200-E4x-L-18	10 F	12.75 (324)	2.50 (63)	9.75 (248)	7.69 (195)	10.75 (273)	8.8 (224)	12.1 (307)	9.5 (241)
VxUS-6200-E4x-L-19	12 U	14.88 (378)	3.00 (76)	11.75 (298)	9.02 (229)	12.25 (311)	8.8 (224)	12.1 (307)	9.5 (241)
VxFS-6200-E5x-L-19	12 F	14.88 (378)	3.00 (76)	11.75 (298)	9.02 (229)	12.25 (311)	8.8 (224)	12.1 (307)	9.5 (241)
VxUS-6200-E5x-L-20	14 U	17.05 (433)	3.00 (76)	13.25 (337)	9.93 (252)	13.62 (346)	8.8 (224)	12.1 (307)	9.5 (241)
VxFS-6200-E6x-L-20	14 F	17.05 (433)	3.00 (76)	13.25 (337)	9.93 (252)	13.62 (346)	8.8 (224)	12.1 (307)	9.5 (241)
VxUS-6200-E6x-L-21	16 U	19.21 (488)	4.00 (102)	15.25 (338)	11.30 (287)	14.75 (375)	8.8 (224)	12.1 (307)	9.5 (241)
VxUS-6200-E6x-L-22	18 U	21.12 (536)	4.25 (108)	17.25 (438)	12.16 (309)	16.00 (406)	8.8 (224)	12.1 (307)	9.5 (241)

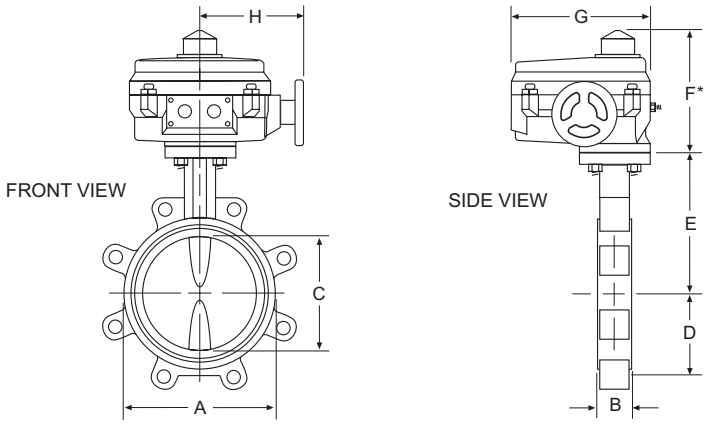


Figure 110 S70-0xxx with 2" to 18" 2-Way Butterfly Valves.

Dimensions — 2" to 16" 3-Way Butterfly Valve Assemblies									
Valve Assembly Part Number	Valve Size in.	Dimensions in inches (millimeters) (Refer to Figure 111)							
		A	B	C	D	E	F	G	H
VxFS-630x-E1x-L-11	2	2.00 (51)	4.50 (114)	3.00 (76)	1.62 (41)	5.50 (140)	9.7 (246)	5.8 (147)	11 (279)
VxFS-630x-E1x-L-12	2-1/2	2.50 (63)	5.00 (127)	3.50 (89)	1.80 (46)	6.00 (152)	9.7 (246)	5.8 (147)	11.6 (295)
VxFS-630x-E1x-L-13	3	3.00 (76)	5.50 (140)	3.80 (97)	1.80 (46)	6.20 (157)	9.7 (246)	5.8 (147)	12 (305)
VxUS-630x-E1x-L-14	4 U	4.00 (102)	6.50 (165)	4.50 (114)	2.00 (51)	7.00 (179)	9.7 (246)	5.8 (147)	13.9 (353)
VxFS-630x-E2x-L-14	4 F	4.00 (102)	6.50 (165)	4.50 (114)	2.00 (51)	7.00 (179)	11.1 (282)	7.8 (198)	15.2 (386)
VxUS-630x-E1x-L-15	5 U	5.00 (127)	7.50 (190)	5.00 (127)	2.12 (54)	7.50 (190)	9.7 (246)	5.8 (147)	14.29 (363)
VxFS-630x-E2x-L-15	5 F	5.00 (127)	7.50 (190)	5.00 (127)	2.12 (54)	7.50 (190)	11.1 (282)	7.8 (198)	16.3 (414)
VxUS-630x-E2x-L-16	6 U	5.80 (147)	8.00 (203)	5.50 (140)	2.12 (54)	8.00 (203)	11.1 (282)	7.8 (198)	16.8 (427)
VxFS-630x-E2x-L-16	6 F	5.80 (147)	8.00 (203)	5.50 (140)	2.12 (54)	8.00 (203)	11.1 (282)	7.8 (198)	16.8 (427)
VxUS-630x-E2x-L-17	8 U	7.80 (198)	9.00 (229)	6.80 (173)	2.50 (63)	9.50 (241)	11.1 (282)	7.8 (198)	18 (457)
VxFS-630x-E3x-L-17	8 F	7.80 (198)	9.00 (229)	6.80 (173)	2.50 (63)	9.50 (241)	11.1 (282)	7.8 (198)	18 (457)
VxUS-630x-E3x-L-18	10 U	9.80 (249)	11.00 (279)	8.00 (203)	2.50 (63)	10.80 (274)	11.1 (282)	7.8 (198)	20 (508)
VxFS-630x-E5x-L-18	10 F	9.80 (249)	11.00 (279)	8.00 (203)	2.50 (63)	10.80 (274)	12.8 (325)	9.5 (241)	21.5 (546)
VxUS-630x-E5x-L-19	12 U	11.80 (300)	12.00 (305)	9.50 (241)	3.00 (76)	12.20 (310)	12.8 (325)	9.5 (241)	22.74 (578)
VxFS-630x-E6x-L-19	12 F	11.80 (300)	12.00 (305)	9.50 (241)	3.00 (76)	12.20 (310)	12.8 (325)	9.5 (241)	22.74 (578)
VxUS-630x-E5x-L-20	14 U	13.20 (335)	14.00 (356)	10.50 (267)	3.00 (76)	13.60 (345)	12.8 (325)	9.5 (241)	24.74 (628)
VxFS-630x-E6x-L-21	16 U	15.20 (386)	15.00 (381)	11.80 (300)	4.00 (102)	14.80 (376)	12.8 (325)	9.5 (241)	26.25 (667)

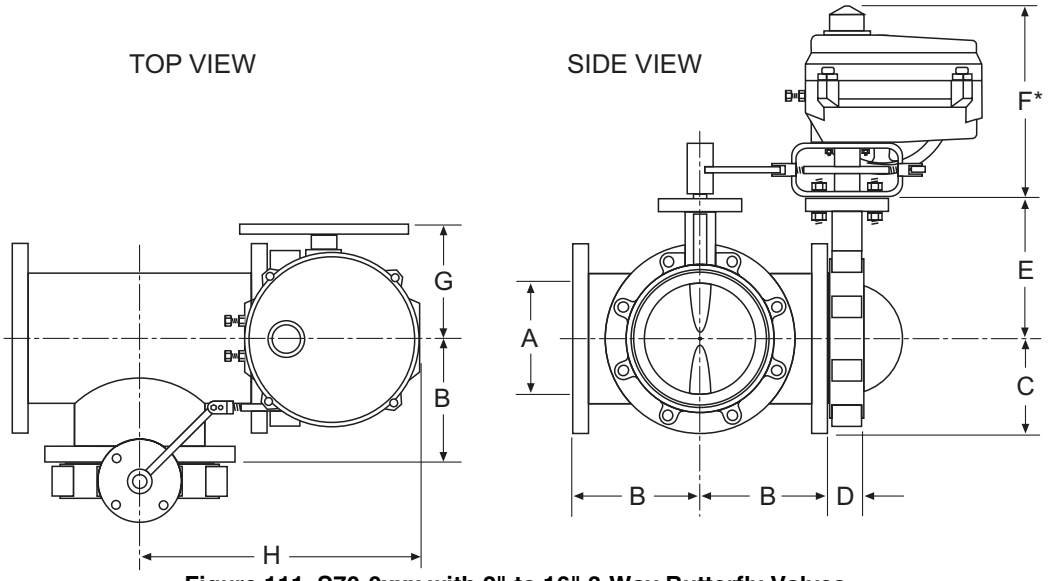


Figure 111 S70-0xxx with 2" to 16" 3-Way Butterfly Valves.

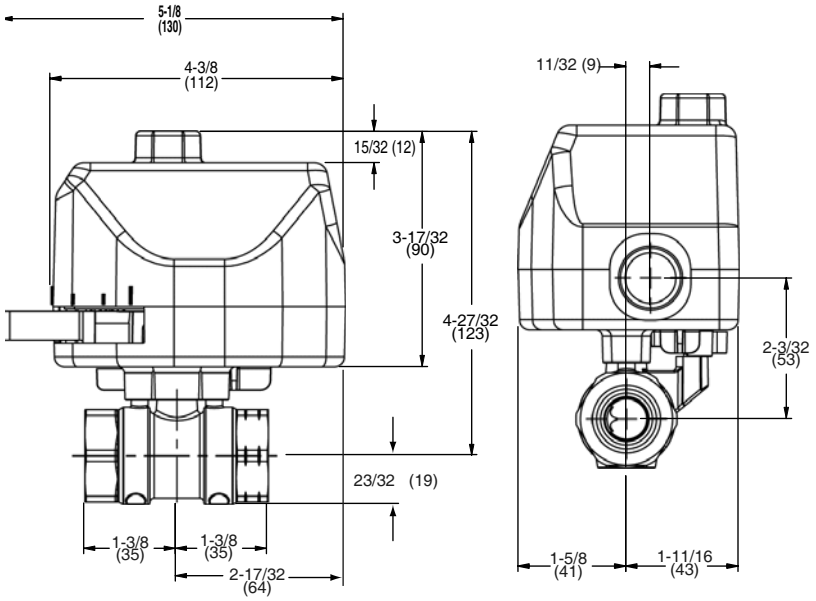


Figure 112 VBB/VBS Series 2Nxx+M11xA01 and 2Nxx+M12xA01 Spring Return Ball Valves.

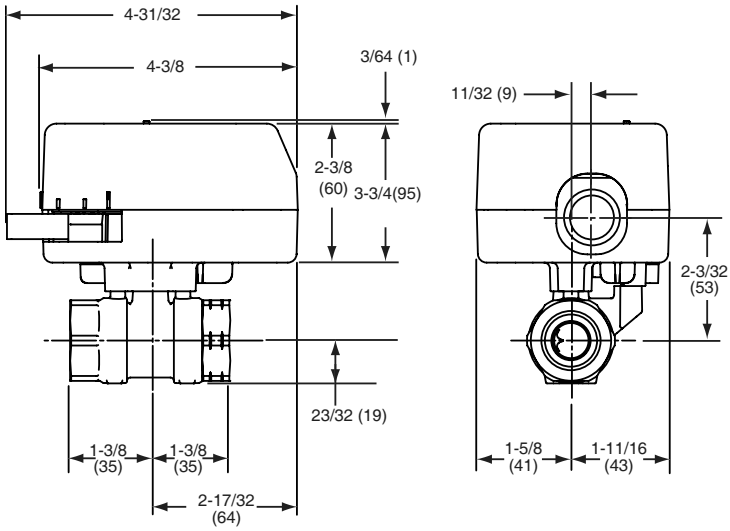


Figure 113 VBB/VBS Series 2Nxx+M13xA01 Non-Spring Return Ball Valves

Dimensions — 1/2" to 1-1/4" Zone Valve Assemblies			
Valve Body Size inches	**Valve Dimensions in inches (millimeters) (Refer to Figure 114)**		
	A	**B 2-Way**	**C 3-Way**
1/2" Sweat	1-5/16 (33)	15/16 (23)	1-5/16 (33)
3/4" Sweat	1-3/8 (35)	15/16 (23)	1-11/16 (43)
1" Sweat	1-11/16 (43)	15/16 (23)	1-11/16 (43)
1-1/4" Sweat	1-7/8 (47)	1 (25)	1-13/16 (46)
1/2" NPT	1-3/8 (35)	15/16 (23)	1-5/16 (33)
3/4" NPT	1-11/16 (43)	15/16 (23)	1-7/16 (37)
1" NPT	1-7/8 (47)	1 (25)	1-11/16 (43)

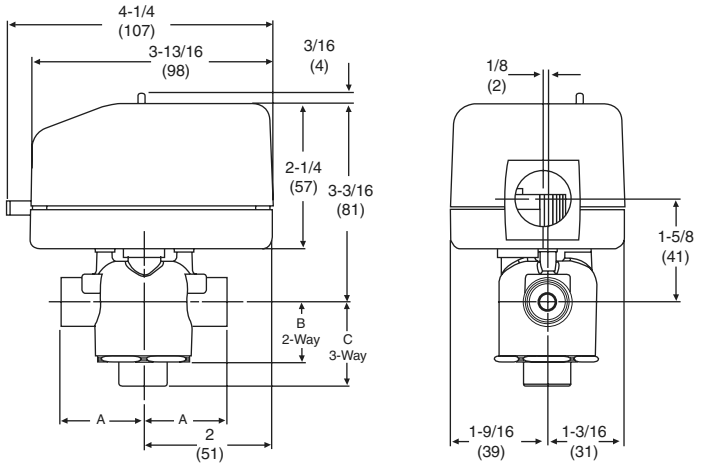


Figure 114 VM Modulating Ax33A00x Non-Spring Return.

Dimensions — 1/2" to 1-1/4" Zone Valve Assemblies			
Valve Body Size inches	**Valve Dimensions in inches (millimeters) (Refer to Figure 115)**		
	A	**B 2-Way**	**C 3-Way**
1/2" Sweat	1-5/16 (33)	15/16 (23)	1-5/16 (33)
3/4" Sweat	1-3/8 (35)	15/16 (23)	1-11/16 (43)
1" Sweat	1-11/16 (43)	15/16 (23)	1-11/16 (43)
1-1/4" Sweat	1-7/8 (47)	1 (25)	1-13/16 (46)
1/2" NPT	1-3/8 (35)	15/16 (23)	1-5/16 (33)
3/4" NPT	1-11/16 (43)	15/16 (23)	1-7/16 (37)
1" NPT	1-7/8 (47)	1 (25)	1-11/16 (43)

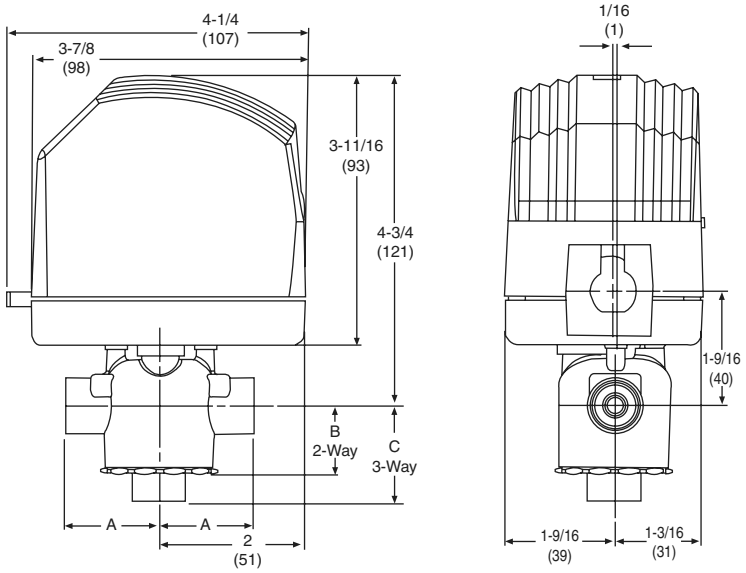
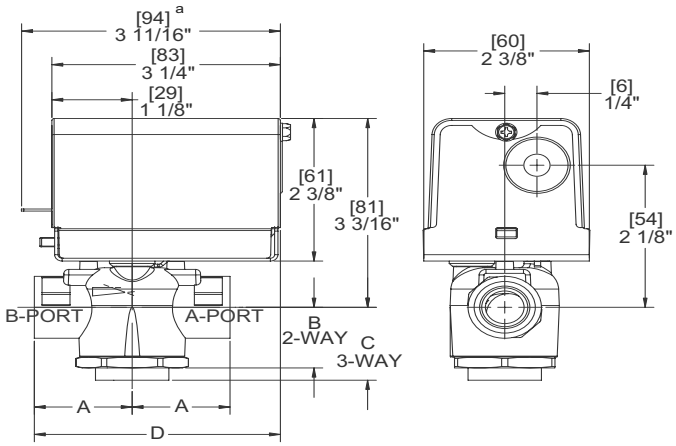


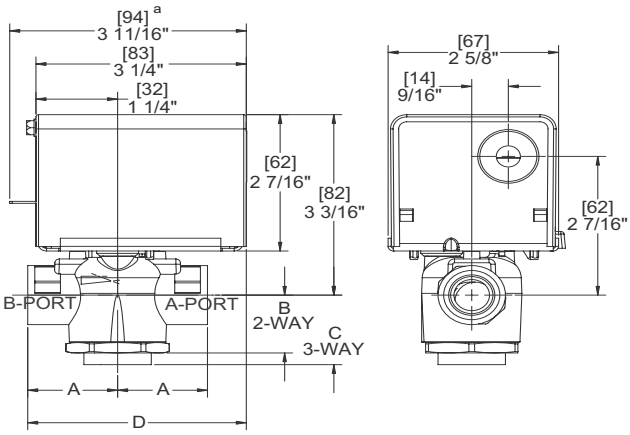
Figure 115 VM Modulating Axx3A00x Spring Return.

Dimensions — 1/2" to 1-1/4" Zone Valve Assemblies					
Valve Body Size inches	Valve Dimensions in inches (millimeters)				
	A	B 2-Way	C 3-Way	D (General Close-Off) (Refer to Figure 116)	D (High Close-off) (Refer to Figure 117)
1/2" Sweat	1-5/16 (33)	15/16 (23)	1-5/16 (33)	3-5/16 (84)	3-5/8 (92)
3/4" Sweat	1-3/8 (35)	15/16 (23)	1-11/16 (43)	3-3/8 (86)	3-3/4 (95)
1" Sweat	1-11/16 (43)	15/16 (23)	1-11/16 (43)	3-5/8 (92)	4 (102
1-1/4" Sweat	1-7/8 (47)	1 (25)	1-13/16 (46)	3-11/16 (94)	4-1/8 (105)
1/2" NPT	1-3/8 (35)	15/16 (23)	1-5/16 (33)	3-3/8 (86)	3-3/4 (95)
3/4" NPT	1-11/16 (43)	15/16 (23)	1-7/16 (37)	3-5/8 (92)	4 (102
1" NPT	1-7/8 (47)	1 (25)	1-11/16 (43)	3-11/16 (94)	4-1/8 (105)



[a] Normally closed model only.

Figure 116 VT/VS AG Series General Close-Off.



[a] Normally closed model only.

Figure 117 VT/VS AH Series High Close-Off.

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