

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.

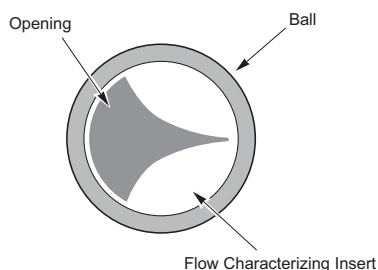


Figure 1 Flow Characterizing Insert.

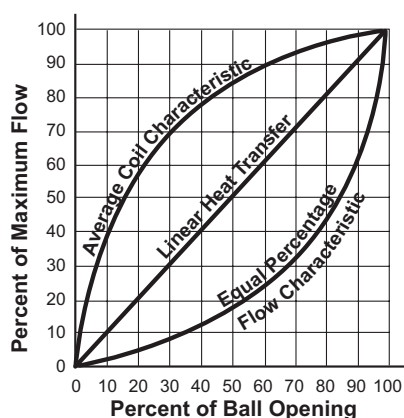


Figure 2 Equal Percentage Flow Control.

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Ball Valves

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

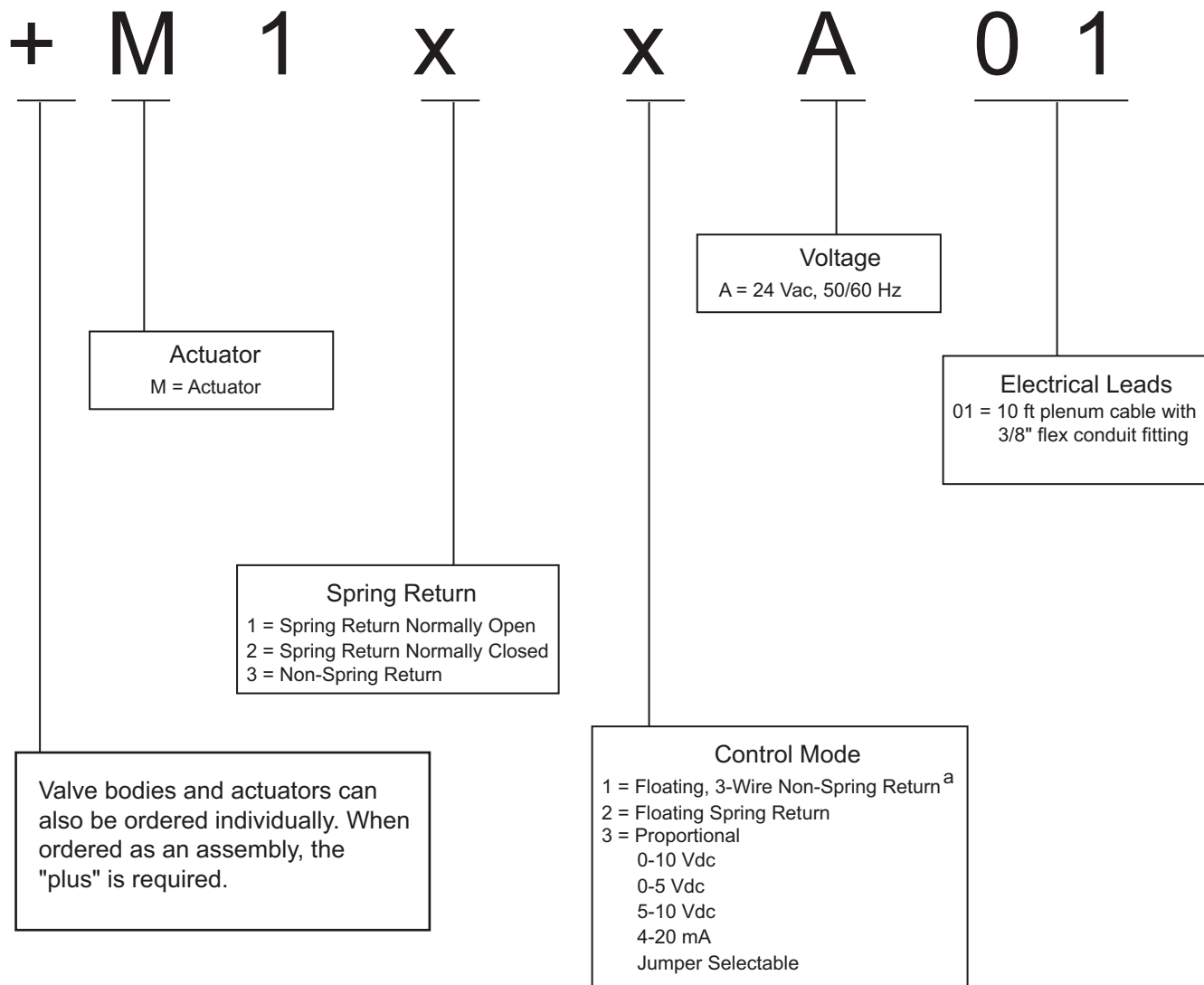
End Fittings
 N = NPT, Female

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.

Ball Valves

Valve Assemblies

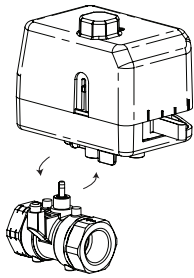


Ball Valves

^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.

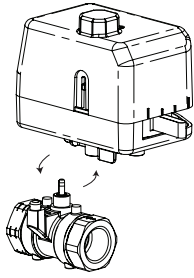
Actuator Code Table.

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 mA _{dc} direct acting. Field selectable for 0-5 V _{dc} , 0-10 V _{dc} , 4-20 mA _{dc} , 5-10 V _{dc} and reverse acting.	200	68	233	112

VBB2Nxx+M11xA01*

* 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 Spring Return



**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.

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 mA _{dc} direct acting. Field selectable for 0-5 V _{dc} , 0-10 V _{dc} , 4-20 mA _{dc} , 5-10 V _{dc} and reverse acting.	200	68	233	112

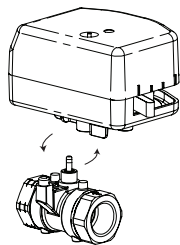
VBB2Nxx+M12xA01*

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

Ball Valves

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.

Actuator Code Table.

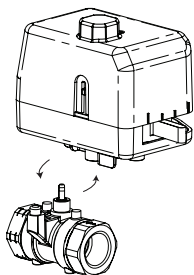
Actuator Model (Reference pages)	Description	Wiring Diagrams		Dimension Information	
		Page	Figure	Page	Figure
M131A01	Floating Non- Spring Return	200	69	233	113
M133A01	Proportional, Non-Spring Return factory set for 4-20 mA _{dc} direct acting. Field selectable for 0-5 V _{dc} , 0-10 V _{dc} , 4-20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

VBB2Nxx+M13xA01*



* 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 Open**

Two-Way Spring Return

Chilled or hot water up to 60% glycol solution.

Equal percentage.

20 to 250 °F (-7 to 121 °C).

Application

Flow Type

Fluid Temperature

Ambient Temperature

Ball Seat Leakage

**System Static Pressure
Limits**

Material

32 to 140 °F (0 to 60 °C) at maximum fluid temperature.

ANSI class IV (0.01% of Cv).

600 psig (4137 kPa).

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.

Ball Valves

Actuator Code Table.

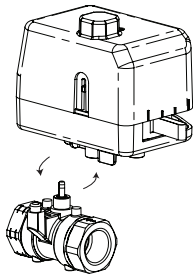
VBS2Nxx+M11xA01*
→

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.

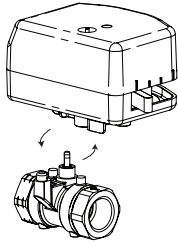
Actuator Code Table.

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 mA _{dc} direct acting. Field selectable for 0-5 V _{dc} , 0-10 V _{dc} , 4-20 mA _{dc} , 5-10 V _{dc} and reverse acting.	200	68	233	112

VBS2Nxx+M12xA01*
→

* 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 Non-Spring Return



**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.

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

VBS2Nxx+M13xA01*

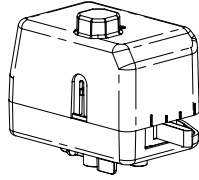
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* Actuator equipped with 10 foot plenum cable and 3/8-in flex conduit fitting.

Ball Valves

TAC DuraDrive VBB/VBS Series Ball Valve Actuator Product Range

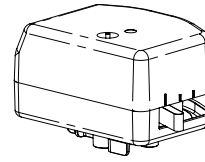
**M11xA01 Series
M12xA01 Series
TAC DuraDrive™**
24 Vac
Spring Return



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.
(90.1 x 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 NPT Threaded	Cv (k_{vs})	Estimated Effective Cv (k_{vs})				
			Pipe Size — Inches				
			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 VBB/VBS Series Ball Valve Actuator Product Range

Ball Valves

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.

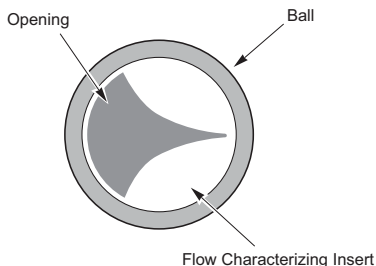


Figure 1 Flow Characterizing Insert.

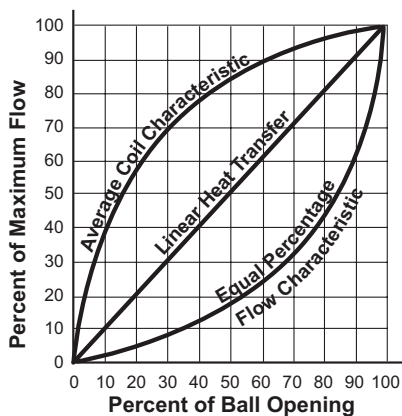


Figure 2 Equal Percentage Flow Control.

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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

Ball Valves

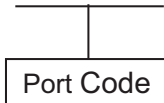
Actuator Code ¹				
Model	Code	Normal Position	Voltage	Type
Two-Position				
MA40-7043	526	SR Close	24 Vac	2-Position
MA40-7043	536	SR Open	24 Vac	2-Position
MA4D-7033-100	821	SR Open	24 Vac	2-Position
MA4D-8033-100	831	SR Closed	24 Vac	2-Position
Floating				
MF40-7043	526	SR Close	24 Vac	3-Wire Floating
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



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
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
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
	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
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

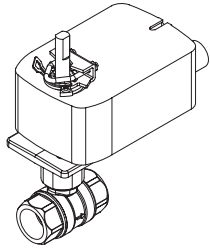
- a. $k_{vs} = \frac{\text{gpm}}{\sqrt{\Delta P}}$ (where ΔP is measured in psi) $Kvs = Cv / 1.156$
- b. B port Cv is 80% of A port Cv.
- c. Denotes a full port valve, without the characterized insert.
- d. Previously Cv was 12.6, kvs was 10.9.
- e. $k_{vs} = \frac{\text{m}^3/\text{h}}{\sqrt{\Delta P}}$ (where ΔP is measured in bar; 1 bar = 100 kPa)

* Only available in VA models.

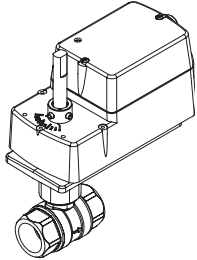
Ball Valves

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

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.

1/2 to 3 in. Threaded NPT

Two-Way Spring Return Normally Open

Ball Valves

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	

TAC DuraDrive 200 Series Ball Valves Two-Way Spring Return


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	

Ball Valves

^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.

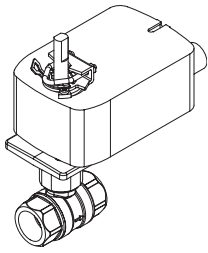
Vx-2213-xxx-9-xx


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

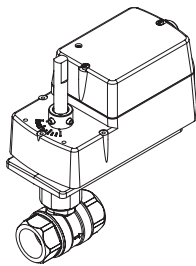
^a With 1/2-in conduit connection.

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.

Ball Valves

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	

TAC DuraDrive 200 Series Ball Valves

Two-Way Spring Return


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	

Ball Valves

^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.

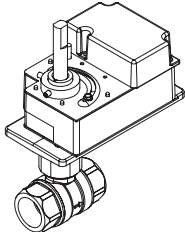
Vx-2213-xxx-9-xx


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

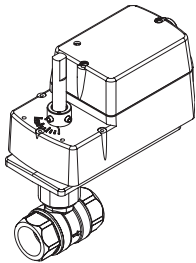
^a With 1/2-in conduit connection.

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

Chilled or hot water up to 50% glycol solution.

Equal percentage.

20 to 250 °F (-7 to 121 °C).

-22 to 130 °F (-30 to 55 °C).

ANSI class IV .

360 psi (25 bar).

Application

Flow Type

Fluid Temperature

Ambient Temperature

Ball Seat Leakage

Maximum Static Pressure

Material

Body

Ball

Stem

Ball Seals

Stem Seals

Mounting Plate

Characterizing Insert

Forged brass (ASTM B283).

Nickel/Chromium-plated brass.

Brass.

Reinforced Teflon® seals with EPDM O-rings.

EPDM O-rings.

Glass-filled polymer.

Glass-filled Noryl.

TAC DuraDrive 2000 Series Ball Valves

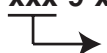
Two-Way Non-Spring Return

Ball Valves

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.

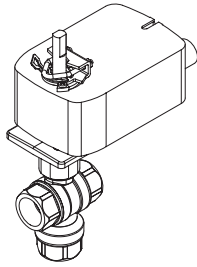
Vx-2213-xxx-9-xx


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

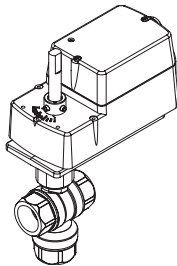
^a With 1/2-in conduit connection.

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.

Ball Valves

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.

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

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.

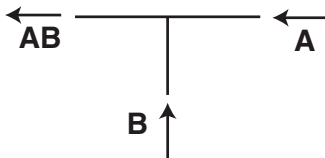
Actuator Code Table.

Vx-2313-xxx-9-xx
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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.

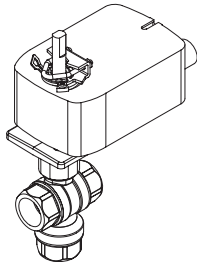
Flow Pattern



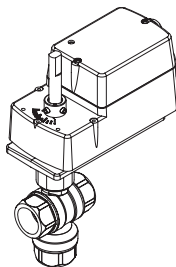
Ball Valves

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.

Ball Valves

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	

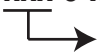
^a Factory proportional control signal is direct-acting. An increase in control signal will open these valves A to AB.

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

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	

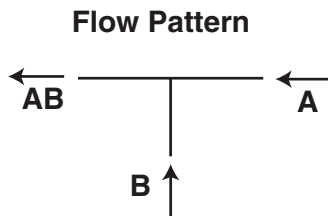
^a Factory proportional control signal is direct-acting. An increase in control signal will open these valves A to AB.

Actuator Code Table.

Vx-2313-xxx-9-xx


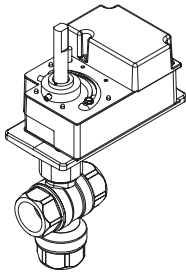
Actuator Codes ^a	Model Prefix	Actuator Model (Reference pages 114 thru 115)	Description	Plenum Cable Length	Wiring Diagrams		Dimension Information	
					Page	Figure	Page	Figure
831	VA	MA4D-8033-100	24 Vac 2-Position	10 ft	176	13	224	103
831	VF	MF4D-8033-100	3-Wire Floating		182 to 183	25 to 28	224	103
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.

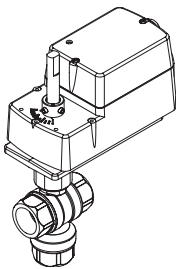


TAC DuraDrive 2000 Series Ball Valves

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.

Ball Valves

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	

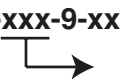
^a Factory proportional control signal is direct-acting. An increase in control signal will close A to AB port.

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

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.

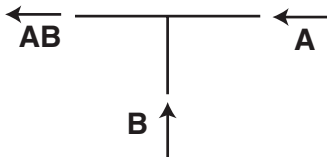
Actuator Code Table.

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



Ball Valves