VB-7300 Three-Way Globe Valve Bodies

- High rangeability provides fine accurate control for more efficient, responsive and comfortable regulation.
- Tight sealing A port with ultra-low energy leakage on shutoff for energy conservation with soft seating.
- High operating differential pressure rating of up to 87 psi for reliable operation in demanding applications.
- Multiple Cv choices for matching loads closely.
- Product is environmentally friendly and meets other ANSI, PED, ASTM, and CRN standards.

- Danger: Do not use for combustible gas applications. The VB-7300 series valves are not rated for combustible applications, and if used in these applications, gas leaks and explosions could result.

Three-Way Globe Valves

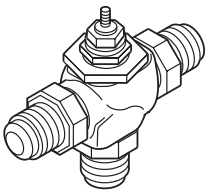
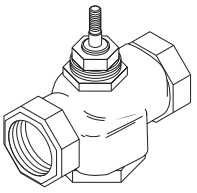
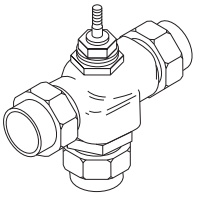
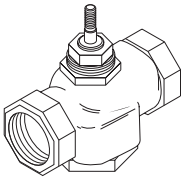
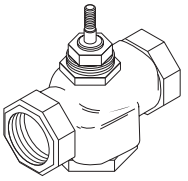
The Venta VB-7300 Series 1/2" to 2" three-way globe valves feature the industry's highest performance, most energy efficient control valves for chilled and hot water applications. Units have a patented precision plug for high controllability providing efficient heat transfer over a broad range of HVAC applications. The Venta VB-7300's seal design provides tight close-off to ensure energy efficiency and provides a high tolerance to high differential pressures.

The Venta VB-7300 valves are used for two-position, floating or proportional control applications. Valve assemblies may be purchased from the factory or purchased separately, requiring an actuator with linkage.

Energy Efficiency

Schneider Electric

Product Selection: Mixing Valves

Three-Way Brass Trim Mixing Valves Body Type [b]			5/8" OD 45° SAE Flared 	Threaded NPT 	Union Sweat 	Metric Rp 	NPT Threaded with Stainless Steel Trim 
Series Part Numbers			VB-7312-0-4-	VB-7313-0-4-	VB-7314-0-4-	VB-7315-0-4-	VB-7363-0-4-
Pipe Size			1/2" I.D.	1/2" to 2"		15 to 50 mm	1/2" to 2"
Stem Action			Stem Up Closes A Port and Opens B Port to the Common AB Port				
ANSI Pressure Class			250 psi (up to 400 psi below 150°F)			PN 16, 250 psi (up to 400 psi below 150°F)	250 psi. (up to 400 psi below 150°F)
ANSI A Port Seat Leakage			ANSI III [d]	Designed to ANSI V with ANSI IV above 35 psi (241 kPa) close off. Long term seat leakage dependent on proper water conditioning maintenance of the system. [a]			
ANSI B Port Seat Leakage			ANSI III				
Control Media and Temperature			20 to 281°F (-7 to 138°C) water (up to 60% glycol/water solution)				20 to 340°F (-7 to 171°C) water (up to 60% glycol/ water solution)
Water Flow Curve			Modified Linear				
Allowable ΔP for water			35 psi (241 kPa) max. for normal life. [d]	87 psi (600 kPa) Max. for normal life [a]			
Size	Cv	Kvs					
1/2"	2.2	1.9	VB-7312-0-4-02	VB-7313-0-4-02	VB-7314-0-4-02	VB-7315-0-4-02	VB-7363-0-4-02
	4.4	3.8	VB-7312-0-4-04	VB-7313-0-4-04	VB-7314-0-4-04	VB-7315-0-4-04	VB-7363-0-4-04
3/4"	7.5	6.5	–	VB-7313-0-4-06	VB-7314-0-4-06	VB-7315-0-4-06	VB-7363-0-4-06
1"	12	10.4	–	–	–	–	VB-7363-0-4-08
	14	12.1	–	VB-7313-0-4-08	VB-7314-0-4-08 [c]	VB-7315-0-4-08	–
1-1/4"	20	17.3	–	VB-7313-0-4-09	VB-7314-0-4-09 [c]	VB-7315-0-4-09	VB-7363-0-4-09
1-1/2"	28	24.2	–	VB-7313-0-4-10	VB-7314-0-4-10 [c]	VB-7315-0-4-10	VB-7363-0-4-10
2"	36	31.3	–	–	–	–	VB-7363-0-4-11
	41	35.5	–	VB-7313-0-4-11	VB-7314-0-4-11 [c]	VB-7315-0-4-11	–

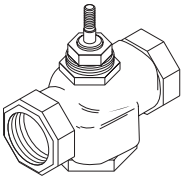
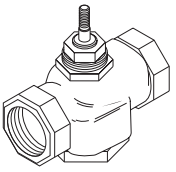
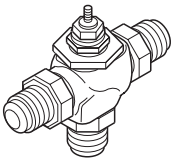
a. To minimize noise, ensure the flow rate in the piping is less than 10 ft (3M) / Second and the differential pressure is less than 35 psi (241 kPa), operating with differential pressures above 35 psi may result in additional noise but is acceptable up to 87 psi (600 kPa). Operating within the cavitation zone may result in noise and internal valve damage. VB-7313-0-4-xx, VB-7314-0-4-xx, VB-7315-0-4-xx & VB-7363-0-4-xx only.

b. The VB-7363-0-4- series has stainless steel trim. See page 4 for the complete materials specifications.

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

d. To minimize noise, ensure the flow rate in the piping is less than 10 Ft (3M) / second and the maximum differential pressure is less than 35 psi (241 kPa). Operating within the cavitation zone or an operating differential pressure above 35 psi (241 kPa) may result in noise and internal valve damage. VB-7312-0-4-xx only.

Product Selection: Diverting and Sequencing Valves

Three-Way Brass Trim Diverting and Sequencing Valves Body Types			Diverting Threaded NPT 	Diverting Metric Rp 	5/8" OD 45° SAE Flared Sequencing 
Series Part Numbers			VB-7323-0-4-	VB-7325-0-4-	VB-7332-0-4-
Pipe Size			1/2" to 2"	15 to 50 mm	1/2" I.D.
Stem Action			Stem Up Closes A Port and Opens AB Port to the Common B Port	Stem Up Closes A Port and Opens AB Port to the Common B Port	Stem Up Opens B to AB and Stem Down Opens A to AB, Stem Mid Position A and B are Both Closed
ANSI Pressure Class			250 psi (up to 400 psi below 150°F)	PN 16, 250 psi (up to 400 psi below 150°F)	250 psi (up to 400 psi below 150°F)
ANSI A Port Seat Leakage			ANSI III		
ANSI B Port Seat Leakage			ANSI III		
Control Media and Temperature			20 to 281°F (-7 to 138°C) water (up to 60% glycol/water solution)		
Water Flow Curve			Modified Linear		Sequencing, Modified Linear
Allowable ΔP for water			35 psi (241 kPa) Max. for normal Life [a]		
Size	Cv	Kvs			
1/2"	2.2	1.9	–	–	VB-7332-0-4-03
	4.4	3.8	VB-7323-0-4-04	VB-7325-0-4-04	VB-7332-0-4-04
3/4"	7.5	6.5	VB-7323-0-4-06	VB-7325-0-4-06	–
1"	14	12.1	VB-7323-0-4-08	VB-7325-0-4-08	–
1-1/4"	20	17.3	VB-7323-0-4-09	VB-7325-0-4-09	–
1-1/2"	28	24.2	VB-7323-0-4-10	VB-7325-0-4-10	–
2"	40	34.6	VB-7323-0-4-11	VB-7325-0-4-11	–

a. Maximum recommended differential pressure in open position. Do not exceed recommended differential pressure (pressure drop) or integrity of parts may be affected.

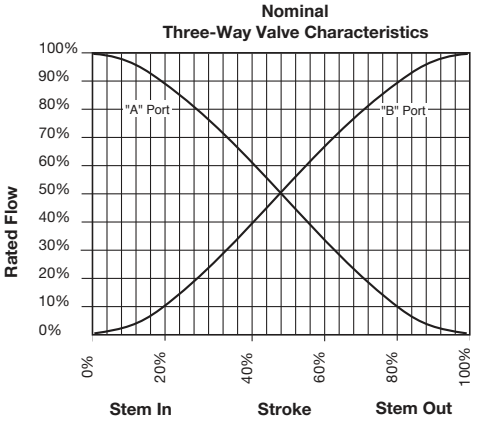
Flow Characteristics

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

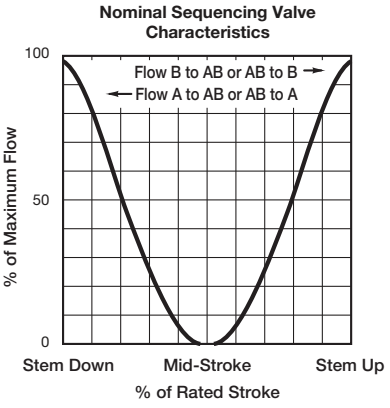
Three-way diverting valves are designed so that the flow from the inlet port (B) to the outlet ports (A and AB) is modified linear.

Sequencing valves have both ports (A and B) closed off in the center of stroke and have modified linear flow for each port as it opens to supply it's coil.

Rangeability is greater than 100:1 for both the A and B ports



Three Way Mixing and Diverting Valves

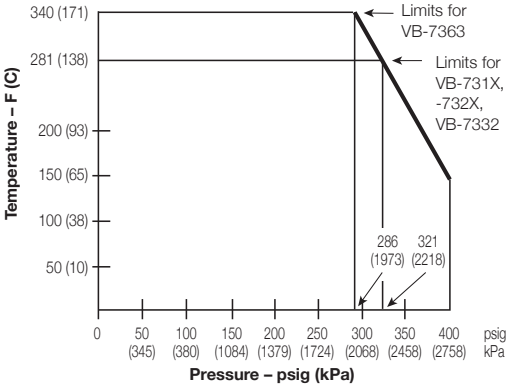


VB-7332 Sequencing Valve

Temperature Pressure Ratings

Consult the appropriate valve linkage general instruction sheet for the effect of valve body ambient temperatures on specific actuators. Ratings conform with published values and disclaimer.

VB-73xx-0-x-P (Cast Bronze Body)
Standards: Pressure to ANSI B16.15 Class 250 with 400 psig up to 150° F decreasing to 321 psig at 281° F, ASTM B584



VB-7300 Three-Way Globe Valves Material Specifications

Material		VB-7313, VB-7314, VB-7315	VB-7312, VB-7332	VB-7323, VB-7325	VB-7363
Body		Bronze ASTM, B584			
A Port Seat		Brass			316 Stainless Steel
B Port Seat		Bronze ASTM, B584			316 Stainless Steel
Stem		316 Stainless Steel			
Plug		Brass			316 Stainless Steel
Packing		Spring-Loaded PTFE/EPDM			
A Port Seal	1/2" and 3/4"	PTFE	Metal to Metal	Metal to Metal with EPDM Port Isolation	PTFE
	1" to 2"	EPDM	Metal to Metal	Metal to Metal with EPDM Port Isolation	PTFE
B Port Seal	1/2" and 3/4"	Metal to Metal	Metal to Metal	Metal to Metal with EPDM Port Isolation	Metal to Metal 316 Stainless Steel
	1" to 2"	Metal to Metal	Metal to Metal	Metal to Metal with EPDM Port Isolation	Metal to Metal 316 Stainless Steel

Packing and Seal materials: Polytetrafluoroethylene (PTFE), ethylene propylene diene monomer (EPDM)

Valve Sizing and Selection

Sizing for Water

Two-position

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

Proportional and Floating

Proportional and floating control valves are usually selected to take a pressure drop equal to at least 50% of the "available pressure." As "available pressure" is often difficult to calculate, the normal procedure is to select the valve using a pressure drop at least equal to the drop in the coil or other load being controlled (except where small booster pumps are used) with a minimum recommended pressure drop of 5 psi (34 kPa). When the design temperature drop is less than 60°F (33°C) for conventional heating systems, higher pressure drops across the valve are needed for good results.

Do Not Exceed the MAXIMUM Recommended Pressure Drop Of the Valve

Conventional Heating System

Design Temperature Load Drop °F (°C)	Recommended Pressure Drop (% of Available Pressure)	Multiplier on Load Drop
60 (33) or more	50%	1x Load Drop
40 (22)	66%	2x Load Drop
20 (11)	75%	3x Load Drop

Cv (Flow Coefficient) Determination

The valves' water capacity 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 ΔP = 1 psi with the valve completely open

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

ΔP = Differential pressure in psi (pressure drop)

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 (Cv's) for valve bodies are given on pages 2 and 3.

Metric (SI) Units

Kvs is defined as the flow in m3/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)

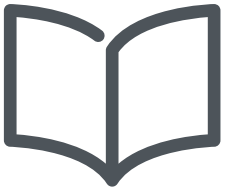
m^3/h = Cubic metres/hour (15.6 °C)

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.

Additional Valve Sizing Information



For more information, download these documents from our website.

- CA-27 Three-Way Valves Application Information, F-12348
- Valve Selection Chart Water, F-11080
- Valve Selection Chart Steam, F-11366
- CA-28 Control Valve sizing F-13755

Valve / Actuator Selection Guides with Close Off Pressure Ratings.

- Linked Globe Valve Assemblies Selection Guide (Rack) F-26752
- Linked Globe Valve Assemblies Selection Guide (Linear) F-27252
- Forta/Globe Valve Selection Guide F-27490
- Globe Valve Catalog (Pneumatic / Geartrain F-27414

Cavitation Limitations on Valve Pressure Drop

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

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

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

$$Pm = 0.5 (P1 - Pv)$$

Where:

Pm = Maximum allowable pressure drop (psi)
P1 = Absolute inlet pressure (psia)
Pv = Absolute vapor pressure (psia)

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

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

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

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

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 adjusted to provide higher downstream back pressures. Valves having harder seat materials should be furnished if inlet velocities cannot be lowered.

Vapor Pressure Of Water Table

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

Seat Leakage Classes

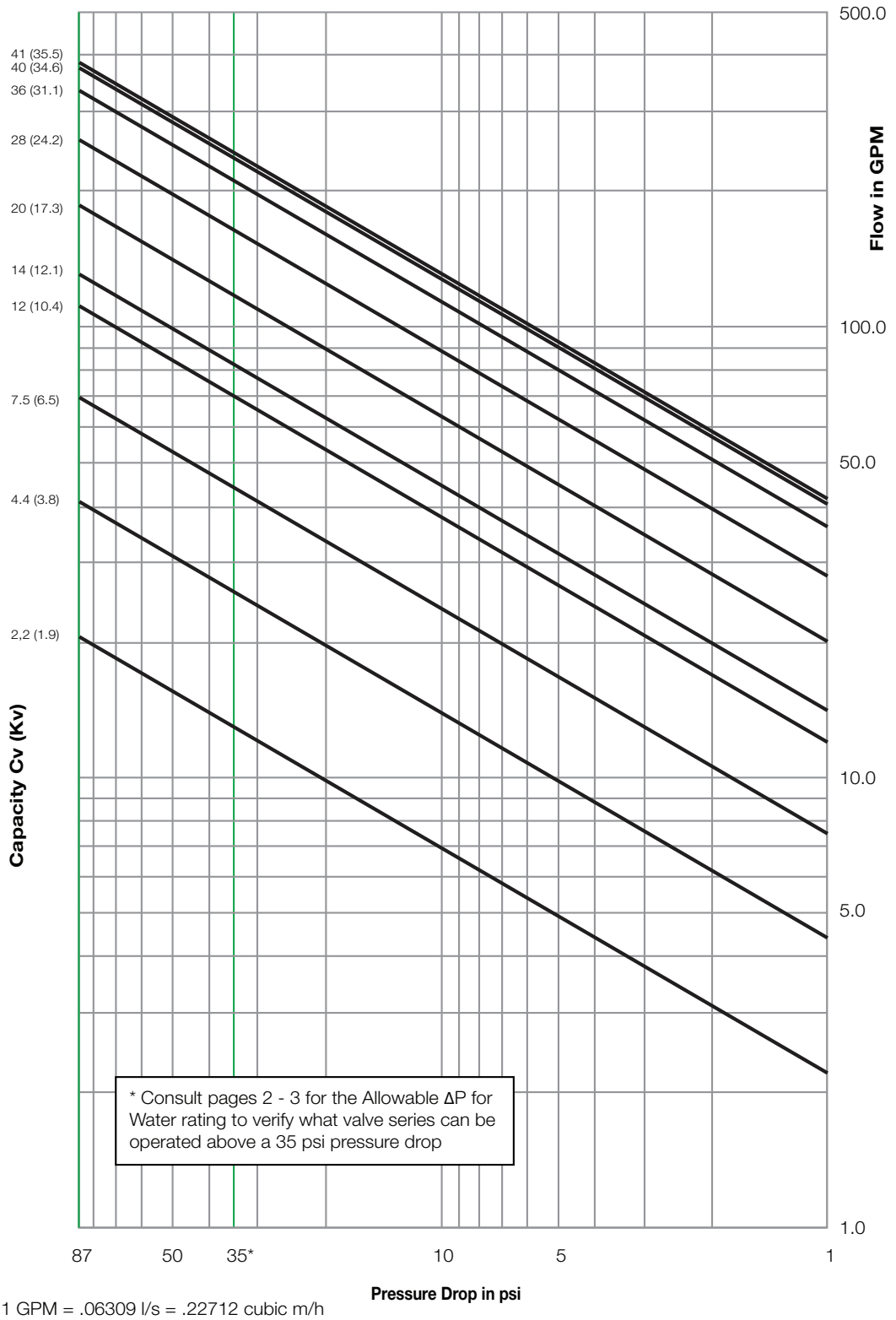
ANSI/FCI 70-2 Leakage Class	Maximum Seat Leakage
Class II	0.5% of rated Cv
Class III	0.1% of Rated Cv
Class IV	0.01% of Rated Cv
Class V	0.0005 ml per minute per inch of orifice diameter per psi differential

Water Capacity Graph Instructions

To Select the approproate valve Cv from the Graph:

1. Select the required flow from the “Flow in GPM” axis.
2. Select available pressure drop from the “Pressure Drop in psi” axis.
3. Select the appropriate line and follow to the Capacity Cv (Kv) listing to choose the closest valve Cv flow coefficient.
4. Confirm the selection by calculation from the water equations (optional).

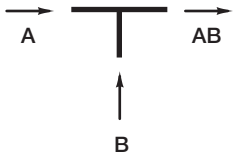
Water Capacity



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

Three Way Valve Port Connections

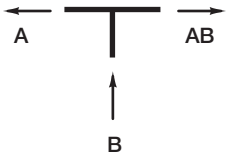
Mixing Flow Pattern



Stem up flow is B to AB, stem down flow is A to AB

VB-7312, VB-7313, VB-7314, VB-7315, VB-7363 Mixing Valves

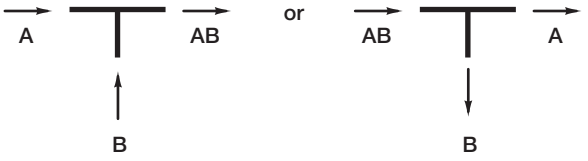
Diverting Flow Pattern



Stem up flow is B to AB, stem down flow is B to A

VB-7323, VB-7325 Diverting Valves

Sequencing Flow Patterns

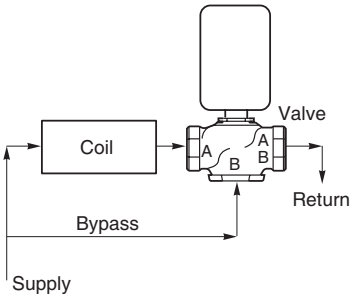


Stem up flow is B to AB or AB to B, Mid stroke is no flow, stem down is flow A to AB or AB to A

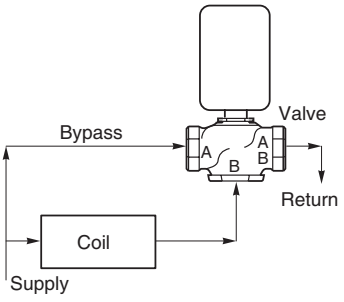
VB-7332 Sequencing Valve
See page 9 for Sequencing Valve piping configurations

Typical Piping - Mixing Valves

VB-7312, VB-7313, VB-7314, VB-7315, VB-7363

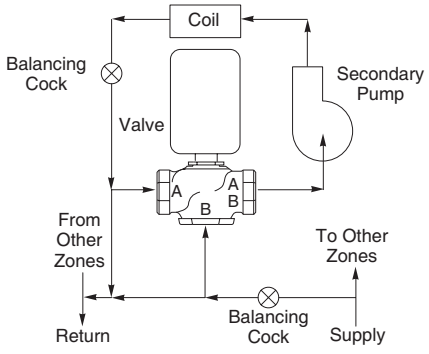


Stem down flow through coil.
Stem up flow through coil bypass.

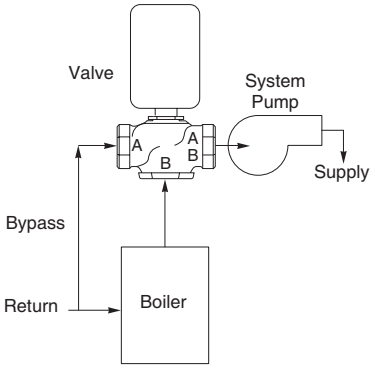


Stem up flow through coil.
Stem down flow through coil bypass.

Typical Piping for Control of Heating or Cooling Coil



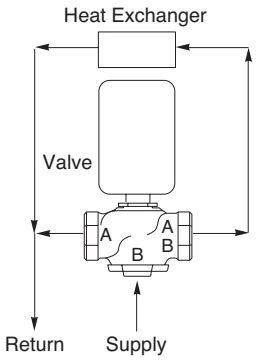
Typical Primary-Secondary Piping



Typical Boiler Hot Water Reset

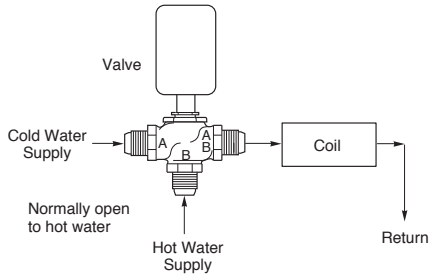
Typical Piping - Diverting Valves

VB-7323, VB-7325

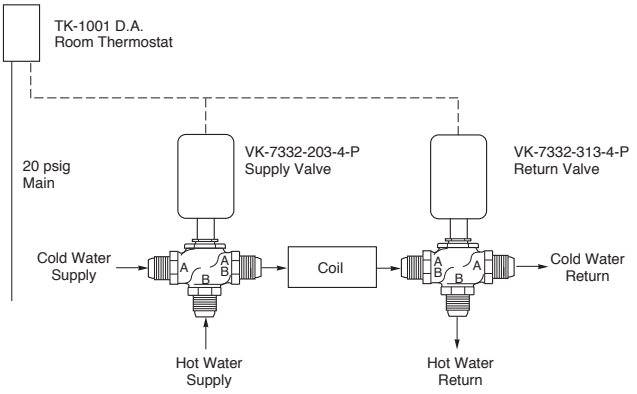


Typical Piping - Sequencing Valves

VB-7332



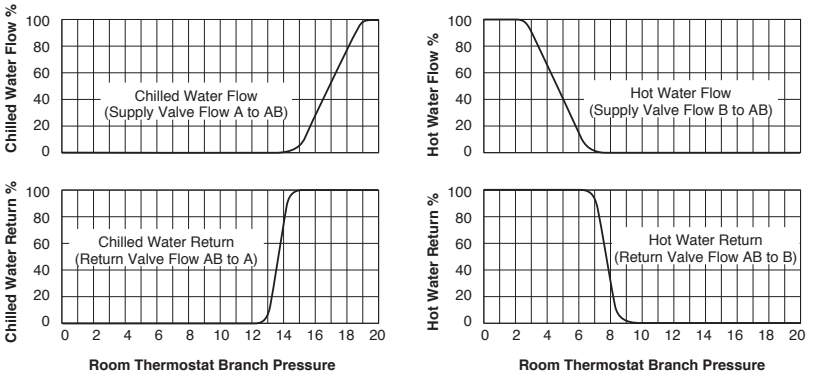
Typical Piping for Three-Pipe Single Coil



Typical Piping for Pneumatic Four-Pipe Single Coil

	Supply	Return	Combined
Port Code C_V	-3 2.2	-3 2.2	— 1.5
Port Code C_V	-3 2.2	-4 4.4	— 2.0
Port Code C_V	-4 4.4	-4 4.4	— 3.12

Four-Pipe Flow Calculations for Valves in Four-Pipe Single Coil Applications

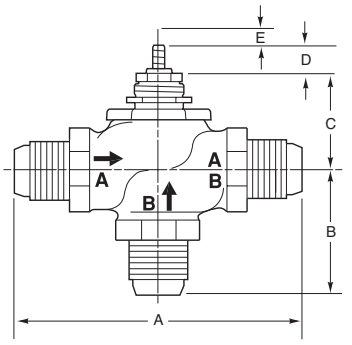


Room Thermostat Branch Pressure

SAE Flared: VB-7312-0-4-P, VB-7332-0-4-P

Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04 for 7312	1/2”	4 (102)	2-1/4 (57)	1-11/16 (43)	3/4 (19)	7/16 (11)
02, 03 for 7332					15/16 (24)	

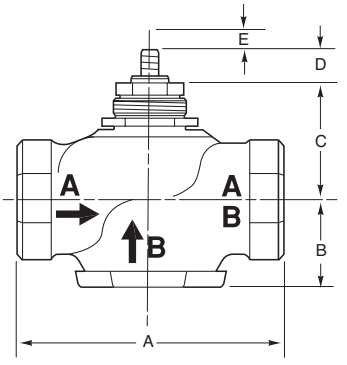
* Stem Down



Threaded NPT and Rp: VB-7313-0-4-P, VB-7315-0-4-P, VB-7363

Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04	1/2”	3-1/16 (78)	1-3/4 (45)	1-11/16 (43)	3/4 (19)	7/16 (11)
06	3/4”	3-5/8 (92)				
08	1”	4-5/8 (118)	1-3/8 (35)	1-3/4 (45)		
09	1-1/4”		1-5/8 (41)	2 (51)		
10	1-1/2”	5-3/8 (137)	1-3/4 (45)	1-1/8 (29)		
11	2”	6-1/8 (156)	1-7/8 (48)	1-3/16)		

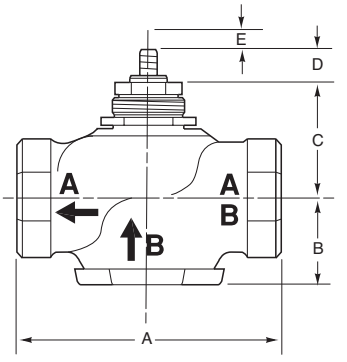
* Stem Down



Threaded NPT and Rp: VB-7323-0-4-P, VB-7325-0-4-P

Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04	1/2”	3-1/16 (78)	1-3/4 (45)	1-11/16 (43)	3/4 (19)	7/16 (11)
06	3/4”	3-5/8 (92)				
08	1”	4-5/8 (118)	1-3/8 (35)	1-3/4 (45)		
09	1-1/4”		1-5/8 (41)	2 (51)		
10	1-1/2”	5-3/8 (137)	1-3/4 (45)	1-1/8 (29)		
11	2”	6-1/8 (156)	1-7/8 (48)	1-3/16)		

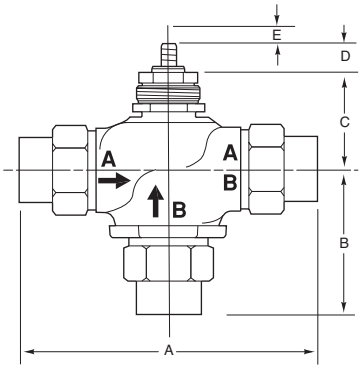
* Stem Down



Union Sweat: VB-7314-0-4-P

Valve Port Code (P)	Valve Size	Dimensions in Inches (mm)				
		A	B	C	D*	E stroke
02, 04	1/2”	4-3/16 (106)	2-7/16 (62)	1-11/16 (43)	3/4 (19)	7/16 (11)
06	3/4”	5-7/16 (138)	2-1/2 (64)			
08	1”	6-5/8 (168)	3-1/8 (79)	1-3/4 (45)		
09	1-1/4”	6-13/16 (173)	3-1/2 (89)	2 (51)		
10	1-1/2”	8-5/16 (211)	3-5/8 (92)	1-1/8 (29)		
11	2”	9-3/16 (233)	4 (102)	1-3/16 (30)		

* Stem Down



Stem and Bonnet Nut Thread Information for All VB-7000 Valve Series

Valve Stem Threads: 1/4”-28 UNF-2A Thread
Bonnet Nut Threads: 1-1/4” -16 Thread
Bonnet Nut Outer Hex Size: 1-5/8” (use M-370 1-5/8” Open End Wrench or equivalent)