Bronze Cage Trim Valves
3/4 Through 2 Inch

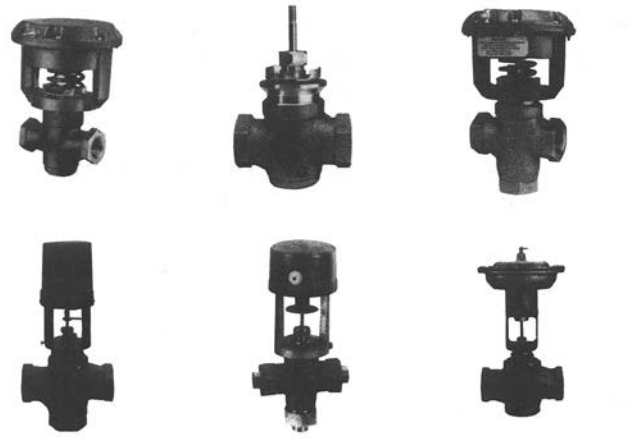


Figure 1: Bronze Cage Trim Valves

The 3/4 through 2 inch cage trim valve line is designed to accurately regulate the flow of steam or hot and cold water through coils or heat exchangers of all types, in a wide range of HVAC applications.

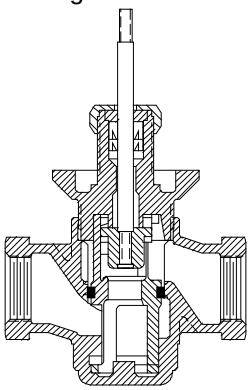
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Part No. 14-1059-3, Rev. A
Code No. LIT-977170

Features and Benefits	
❑ **Cast Bronze Valves are Available with a Wide Range of Pneumatic and Electric Actuators**	Offers a broad selection to choose from
❑ **Designed for Use in Hot Water, Chilled Water, or Steam Applications**	Universally applicable and compatible with Glycol solutions
❑ **Uses Standard Johnson Controls Self-adjusting U-cup Packings**	Ensures reliability and extends life of the valve
❑ **Body Rated to 400 psig (2800 kPa) Static Pressure**	Valves can be used in all locations within the same building

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Features

All cage trim valves feature a removable cage trim



design, which provides valve plug guiding throughout the travel range and permits high rangeability. A modulating valve plug provides an equal percentage relationship between valve travel and flow at a constant pressure drop. A composition disc that provides tight shutoff is bonded and molded into the valve plug. Markings are provided on the valve body indicating the direction of flow for proper piping.

The V-3754, V-3974, and V-4324 Series Valves are available in sizes ranging from 3/4 to 1-1/2 inches, and come furnished with a factory installed exposed type pneumatic actuator (V-3000-1). Enclosed actuators (V-3000-2) are also available for locations where a concealed spring is desired (field installation is required).

The V-5254, V-5464, and V-5844 Series Valves are available in 1-1/2 and 2 inch valve body sizes and come furnished with a factory installed 4R actuator.

A factory mounted V-9502 Valve Positioner is available where sequencing is desired or additional positioning power is necessary. Also available with the 4R actuator is an optional electro-pneumatic positioner (EPP-1000), which provides accurate and precise electronic control of pneumatic valve actuators.

Cage trim valves are also available for electric actuation. The VB-3754, VB-3974, and VB-4324 Series Valves, in sizes ranging from 3/4 to 2 inches are available for field installation to a variety of actuators. Factory installation is also available by specifying the appropriate code number in conjunction with a VA-805x (for 3/4 to 1-1/2 inch), VA-715x (for 3/4 to 2 inch), VA-720x (for 1-1/2 and 2 inch), or a M100 Series Electric Motor Actuator with Y20EBD-x Linkage Kit (for 3/4 to 2 inch sizes).

Figure 2: Normally Open, Push-Down-To-Close, 3/4 and 1 in. (Internal View)

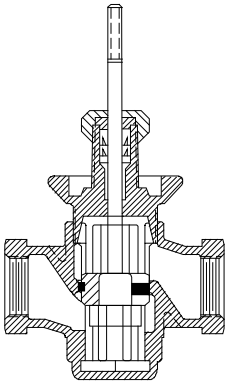


Figure 3: Normally Closed, Push-Down-To-Open, 3/4 and 1 in. (Internal View)

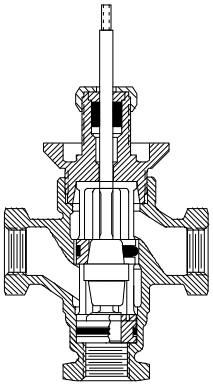


Figure 4: Three Way Mixing, 3/4 and 1 in. (Internal View)

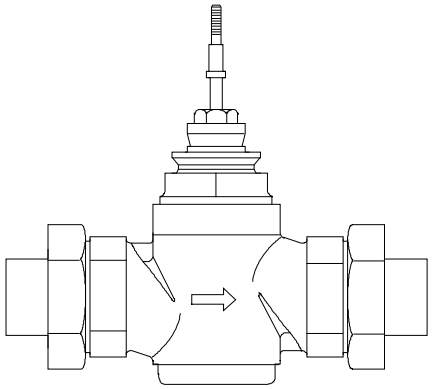


Figure 5: Normally Open and Normally Closed with Union Sweat End Connections (External View)

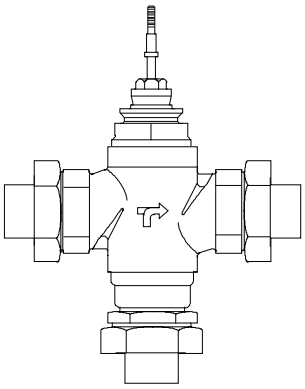


Figure 6: Three Way Mixing with Union Sweat End Connections (External View)

*P*neumatic Actuator Selection

V-3000 Series Pneumatic Actuators

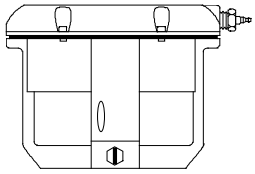


Figure 7: V-3000 Series Pneumatic Actuators

The V-3000 Series Pneumatic Actuator has a die cast aluminum housing and a piston type, synthetic rubber diaphragm that provides a constant effective area throughout the valve travel. The actuator assembly can be removed or repositioned by loosening a single set screw without disturbing the rest of the valve assembly.

Two models of V-3000 Series Pneumatic Actuators are available. The exposed model (V-3000-1) is factory assembled to the valve and is designed for installation in a protected location. The enclosed model (V-3000-2) is available separately for field installation and is designed for applications where the actuator might be subjected to tampering.

A V-9502 Pneumatic Valve Positioner can be ordered separately or factory mounted for use on the exposed model only, in applications where sequential operation is desired or additional positioning power is necessary. The V-9502 is a precision volume amplifier relay device designed to operate a valve actuator in applications requiring stable, accurate control. The positioner provides maximum positioning power for fast response to control signals or to eliminate spring shift effects. When used with the 4R Actuator, the V-9502 operating span and starting point are fully adjustable for sequencing applications.

4R Pneumatic Actuator

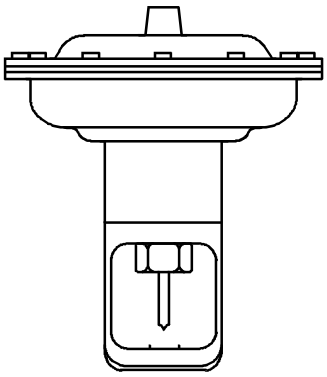


Figure 8: 4R Pneumatic Actuator

Bronze cage trim valves in sizes 1-1/2 and 2 inch come equipped with a 4R actuator, and can be optionally equipped with a factory mounted V-9502 Pneumatic Valve Positioner or EPP-1000 Electro-Pneumatic Positioner.

These spring and diaphragm actuators are equipped with a molded synthetic rubber reinforced diaphragm and an encapsulated spring design. The actuator must be removed and replaced as a complete unit. The actuator can be easily removed to perform inline servicing to all parts of the valve.

The optional Electro-Pneumatic Positioner (EPP-1000) provides accurate electronic positioning control of pneumatic valve actuators. The EPP-1000 requires 20 to 30 VAC and 20 psig (140 kPa) power supplies, and accepts 0 to 10 volt, 4 to 20 mA, and 135 ohm slidewire input control signals. The output is a pneumatic signal to the actuator, which can be selected as direct or reverse acting. Upon loss of power, the EPP-1000 will default to its zero pressure position, allowing the actuator to return to its normal state.

Table 1: Accessories (Order Separately)

Description	Code Number
Valve Position Indicator for V-3000-1, Exposed Style Pneumatically Actuated Valves	V-3000-10
Enclosed V-3000 Actuator for Field Mounting	V-3000-2
Valve Position Indicator for 4R Actuator	V-5252-100
Electro-Pneumatic Positioner for 4R Actuator without Feedback Actuator with Feedback	EPP-1000-12 EPP-1000-22
Thermal Insulator Kit for VA-805x Series Electric Actuators Only	VA-8000-101
Valve Position Indicator for Electrically Actuated Valves with VA-805x Series Actuators Only	VA-8000-102
Auxiliary Interface Board for Use with Electrically Actuated Valves Used in Conjunction with a DSC-8500	VA-8000-104
Valve Positioner for Field Mounting to a V-3000-1 Exposed Style Pneumatically Actuated Valve	V-9502-15
Valve Positioner Kit for Field Mounting to a 4R Pneumatically Actuated Valve	V-9502-23
Valve Positioner Springs	See Table 5.
Spring Compression Tool	JC 5389

Additional models of the EPP-1000 are available for field installation (not factory installed; must be ordered separately) with a separate 5000 ohm feedback potentiometer which can be used to provide position information to a controller or other devices.

For operation with pneumatic or electro-pneumatic positioners, refer to the *V-9502* or *EPP-1000 Product Bulletins.*

Table 2: Maximum Closeoff Pressure for Pneumatically Actuated Normally Open Valves

Valve Size (in.)	Maximum Cv (Kv) Factor	Maximum Closeoff Pressure* psig (kPa)	Spring Range psig (kPa)	Actuator Style**	Positioner Style	Connections	Code Number
3/4	8.6 (7.4)	80 (560)	9 to 13 (63 to 91)	V-3000-1 (Exposed)	--	NPT (Internal)	V-3754-1008
		158 (1106)	3 to 6 (21 to 42)		--	NPT (Internal)	V-3754-1022
		158 (1106)	3 to 6 (21 to 42)		V-9502	NPT (Internal)	V-3754-1026
		158 (1106)	3 to 6 (21 to 42)		--	Union Sweat	V-3754-4001
1	13.9 (11.9)	47 (329)	9 to 13 (63 to 91)	V-3000-1 (Exposed)	--	NPT (Internal)	V-3754-1010
		94 (658)	3 to 6 (21 to 42)		--	NPT (Internal)	V-3754-1023
		94 (658)	3 to 6 (21 to 42)		V-9502	NPT (Internal)	V-3754-1027
		94 (658)	3 to 6 (21 to 42)		--	Union Sweat	V-3754-4002
1-1/2	27.5 (23.6)	44 (308)	3 to 6 (21 to 42)	V-3000-1 (Exposed)	--	NPT (Internal)	V-3754-1028
		22 (154)	9 to 13 (63 to 91)		--		V-3754-1029
		44 (308)	3 to 6 (21 to 42)		V-9502		V-3754-1030
		130 (910)	2 to 5 (14 to 35)	4R	--		V-5254-1
		130 (910)	2 to 5 (14 to 35)		V-9502		V-5254-2
		63 (441)	9 to 13 (63 to 91)		--		V-5254-3
		130 (910)	2 to 5 (14 to 35)		EPP-1000		V-5254-11
2	41 (35.1)	76 (532)	2 to 5 (14 to 35)	4R	--	NPT (Internal)	V-5254-4
		76 (532)	2 to 5 (14 to 35)		V-9502		V-5254-5
		36 (252)	9 to 13 (63 to 91)		--		V-5254-6
		76 (532)	2 to 5 (14 to 35)		EPP-1000		V-5254-12

* Maximum closeoff pressures listed are for 20 psig (140 kPa) supply pressure to diaphragm for normally open and 0 psig (0 kPa) supply pressure to diaphragm for normally closed valves.

** Minimum effective diaphragm area: 4R = 20 $in.^2$, V-3000-1 = 8 $in.^2$

Table 3: Maximum Closeoff Pressure for Pneumatically Actuated Normally Closed Valves

Valve Size (in.)	Maximum Cv (Kv) Factor	Maximum Closeoff Pressure* psig (kPa)	Spring Range psig (kPa)	Actuator Style**	Positioner Style	Connections	Code Number
3/4	8.6 (7.4)	111 (777)	9 to 13 (63 to 91)	V-3000-1 (Exposed)	--	NPT (Internal)	V-3974-1004
			9 to 13 (63 to 91)		V-9502	NPT (Internal)	V-3974-1010
			9 to 13 (63 to 91)		--	Union Sweat	V-3974-4001
1	13.9 (11.9)	64 (448)	9 to 13 (63 to 91)	V-3000-1 (Exposed)	--	NPT (Internal)	V-3974-1005
			9 to 13 (63 to 91)		V-9502	NPT (Internal)	V-3974-1011
			9 to 13 (63 to 91)		--	Union Sweat	V-3974-4002
1-1/2	27.5 (23.6)	29 (203)	9 to 13 (63 to 91)	V-3000-1 (Exposed)	--	NPT (Internal)	V-3974-1012
			9 to 13 (63 to 91)		V-9502		V-3974-1013
		93 (651)	9 to 13 (63 to 91)	4R	--		V-5464-1
			9 to 13 (63 to 91)		V-9502		V-5464-2
			9 to 13 (63 to 91)		EPP-1000		V-5464-11
2	41 (35.1)	54 (378)	9 to 13 (63 to 91)	4R	--	NPT (Internal)	V-5464-3
			9 to 13 (63 to 91)		V-9502		V-5464-4
			9 to 13 (63 to 91)		EPP-1000		V-5464-12

* Maximum closeoff pressures listed are for 20 psig (140 kPa) supply pressure to diaphragm for normally open and 0 psig (0 kPa) supply pressure to diaphragm for normally closed valves.

** Minimum effective diaphragm area: 4R = 20 $in.^2$, V-3000-1 = 8 $in.^2$

Table 4: Maximum Closeoff Pressure for Pneumatically Actuated Mixing Valves

Valve Size (in.)	Maximum Cv (Kv) Factor	Maximum Closeoff Pressure* N.C./N.O. psig (kPa)	Spring Range psig (kPa)	Actuator Style**	Positioner Style	Connections	Code Number
3/4	8.6 (7.4)	49/135 (343/945)	4 to 8 (28 to 56)	V-3000-1 (Exposed)	--	NPT (Internal)	V-4324-1005
		111/80 (777/560))	9 to 13 (63 to 91)		--	NPT (Internal)	V-4324-1006
		111/80 (777/560)	9 to 13 (63 to 91)		V-9502	NPT (Internal)	V-4324-1013
		49/135 (343/245)	4 to 8 (28 to 56)		--	Union Sweat	V-4324-4001
		111/80 (777/560)	9 to 13 (63 to 91)		--		V-4324-4003
1	13.9 (11.9)	28/81 (196/567)	4 to 8 (28 to 56)	V-3000-1 (Exposed)	--	NPT (Internal)	V-4324-1007
		64/47 (448/329)	9 to 13 (63 to 91)		V-9502		V-4324-1008
		64/47 (448/329)	9 to 13 (63 to 91)		--		V-4324-1014
		28/81 (196/567)	4 to 8 (28 to 56)		--	Union Sweat	V-4324-4002
		64/47 (448/329)	9 to 13 (63 to 91)		--		V-4324-4004
1-1/2	27.5 (23.6)	13/38 (91/266)	4 to 8 (28 to 56)	V-3000-1 (Exposed)	V-9502	NPT (Internal)	V-4324-1015
		29/22 (203/154)	9 to 13 (63 to 91)		--		V-4324-1016
		29/22 (203/154)	9 to 13 (63 to 91)		V-9502		V-4324-1017
		41/106 (287/742)	4 to 8 (28 to 56)	4R	--		V-5844-1
		93/63 (651/441)	9 to 13 (63 to 91)		--		V-5844-2
		93/63 (651/441)	9 to 13 (63 to 91)		V-9502		V-5844-3
		93/63 (651/441)	9 to 13 (63 to 91)		EPP-1000		V-5844-11

Continued on next page . . .

* Maximum closeoff pressures listed are for 20 psig (140 kPa) supply pressure to diaphragm for normally open and 0 psig (0 kPa) supply pressure to diaphragm for normally closed valves.

** Minimum effective diaphragm area: 4R = 20 $in.^2$, V-3000-1 = 8 $in.^2$

Valve Size (in.) (Cont.)	Maximum Cv (Kv) Factor	Maximum Closeoff Pressure* N.C./N.O. psig (kPa)	Spring Range psig (kPa)	Actuator Style**	Positioner Style	Connections	Code Number
2	41 (35.1)	24/62 (168/434)	4 to 8 (28 to 56)	4R	--	NPT (Internal)	V-5844-4
		54/36 (378/252)	9 to 13 (63 to 91)		--		V-5844-5
		54/36 (378/252)	9 to 13 (63 to 91)		V-9502		V-5844-6
		54/36 (378/252)	9 to 13 (63 to 91)		EPP-1000		V-5844-12

* Maximum closeoff pressures listed are for 20 psig (140 kPa) supply pressure to diaphragm for normally open and 0 psig (0 kPa) supply pressure to diaphragm for normally closed valves.

** Minimum effective diaphragm area: 4R = 20 $in.^2$, V-3000-1 = 8 $in.^2$

Spring Shift Graphs

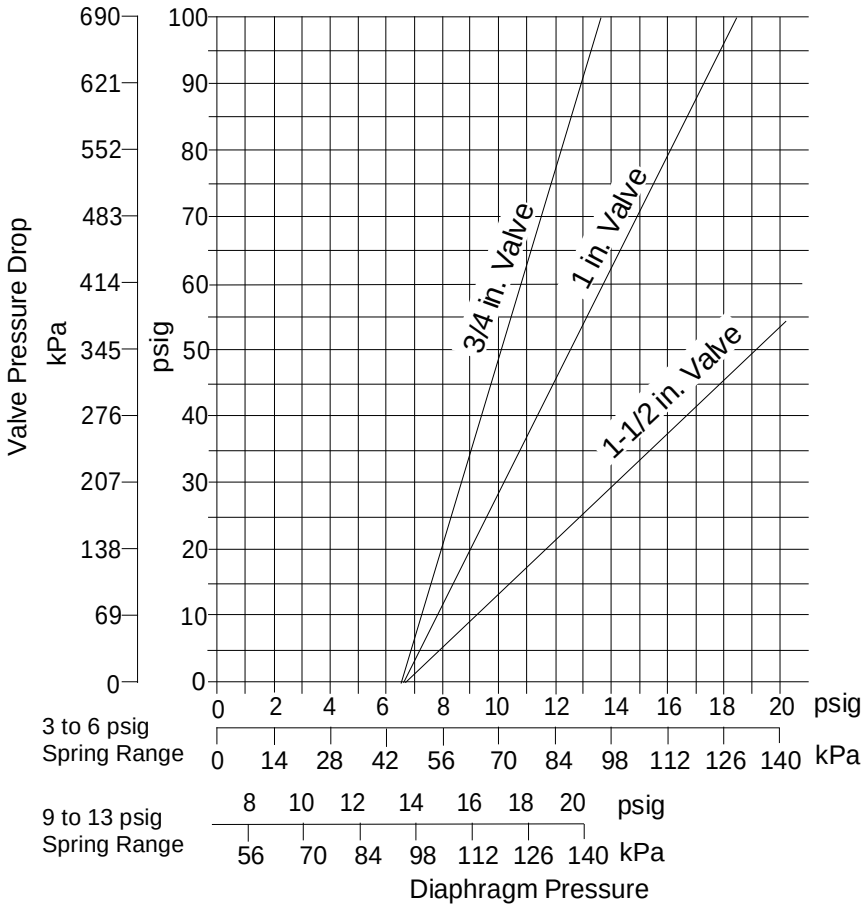


Figure 9: V-3754 Two Way N.O. Valve with V-3000-1 Pneumatic Actuator

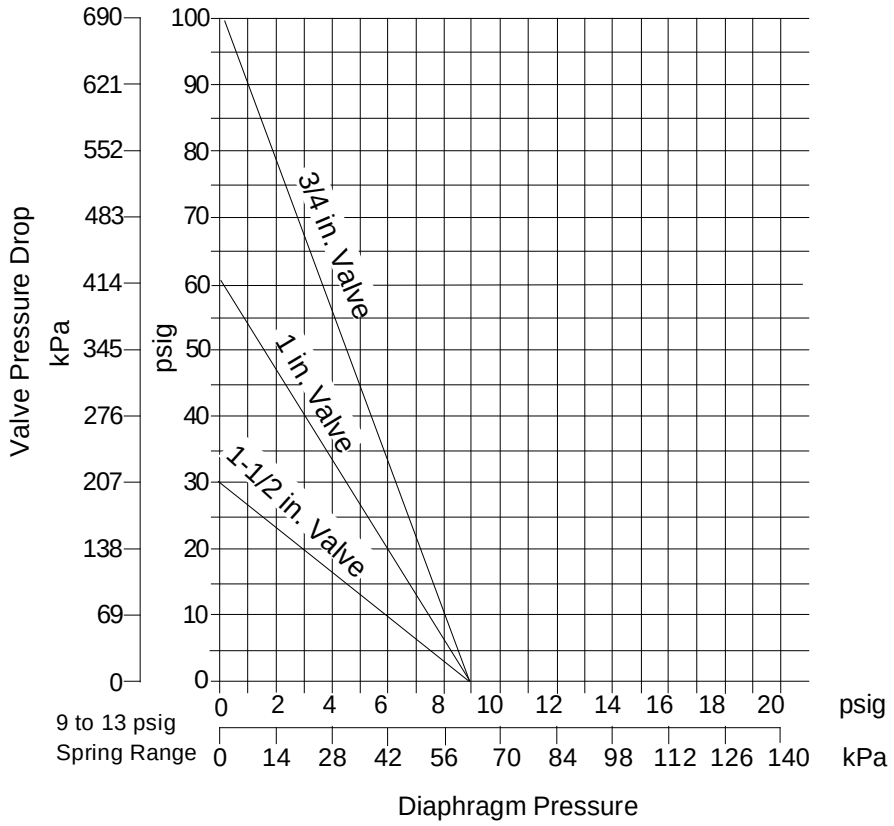


Figure 10: V-3974 Two Way N.C. Valve with V-3000-1 Pneumatic Actuator

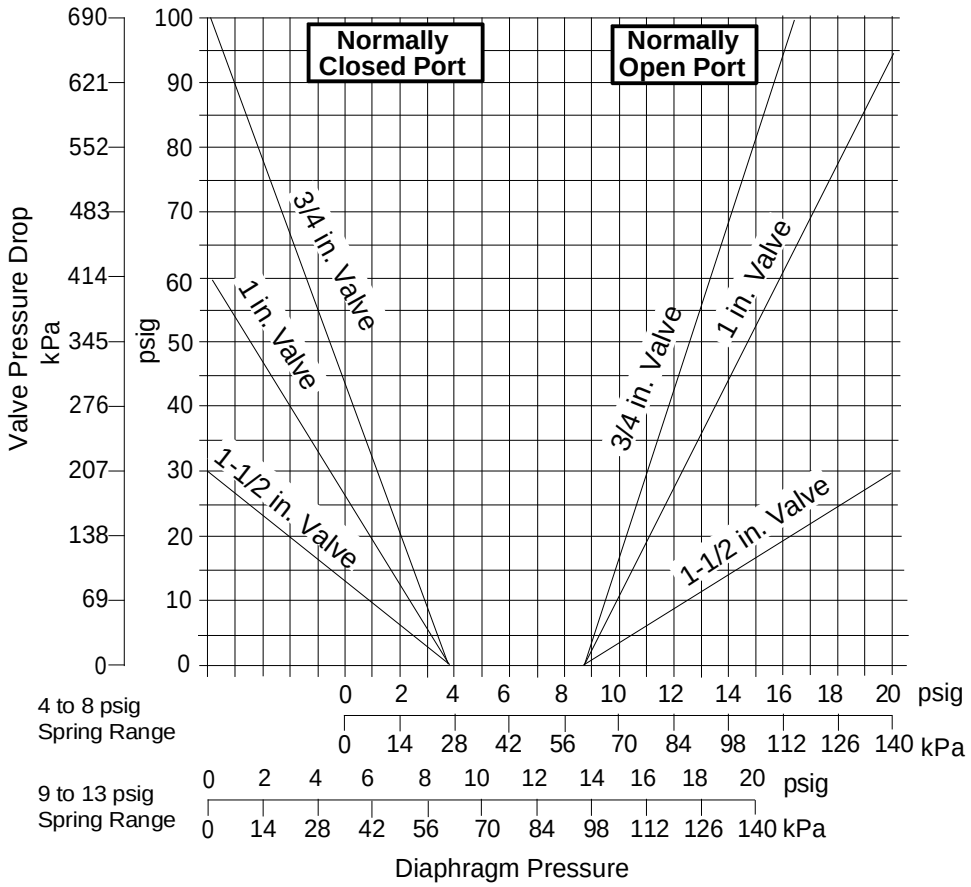


Figure 11: V-4324 Three Way Mixing Valve with V-3000-1 Pneumatic Actuator

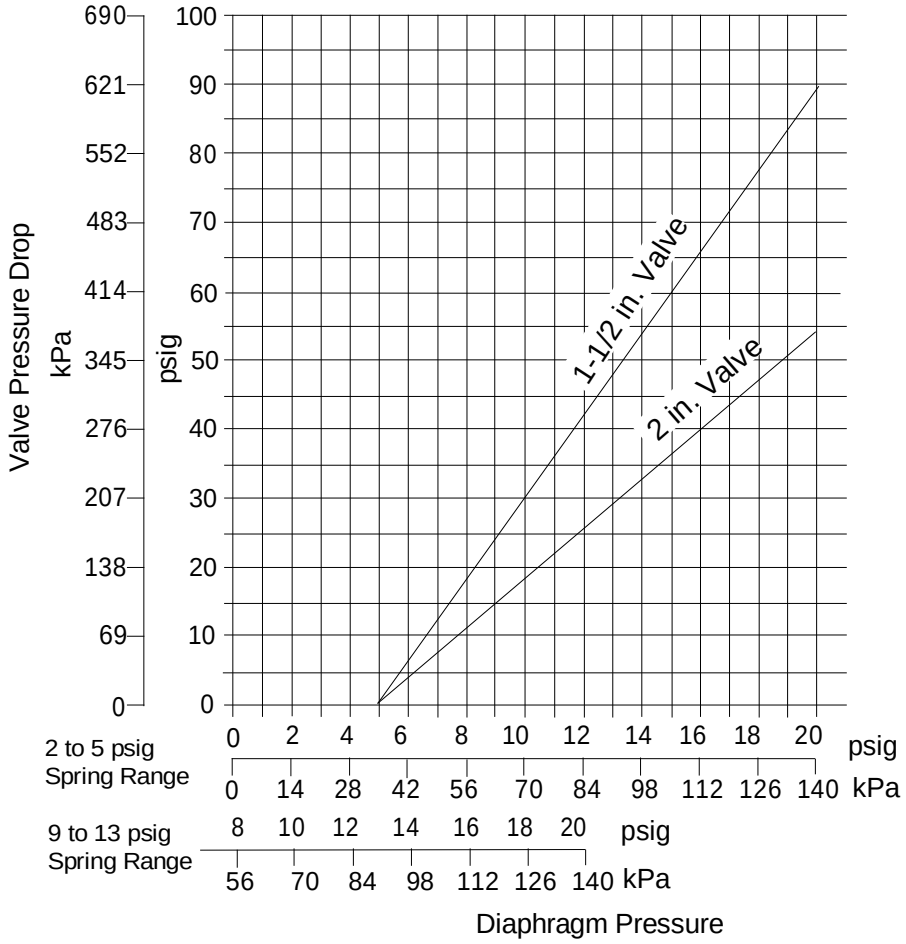


Figure 12: V-5254 Two Way N.O. Valve with 4R Pneumatic Actuator

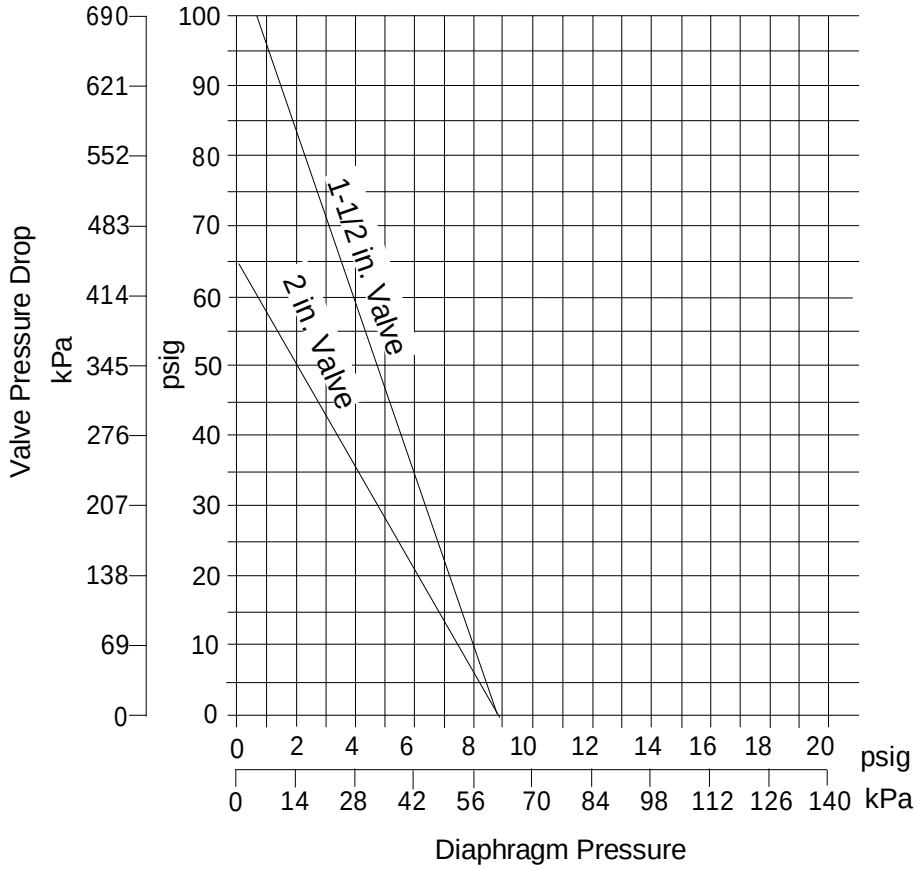


Figure 13: V-5464 Two Way N.C. Valve with 4R Pneumatic Actuator

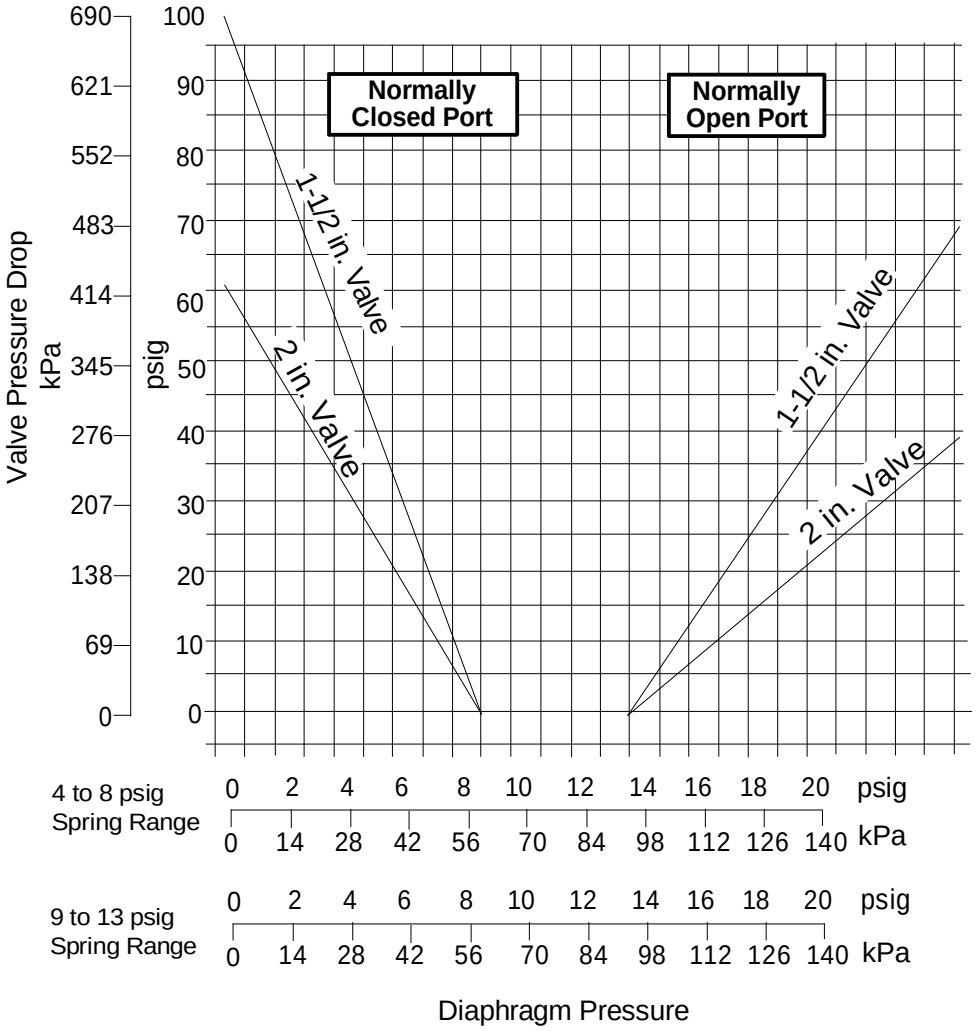


Figure 14: V-5844 Three Way Mixing Valve with 4R Pneumatic Actuator

Table 5: Valve Positioner Springs

Actuator Style	Valve Series	Body Style	Valve Size (in.)	Valve Stroke (in.)	Positioner Spring Code Number	Spring Span psi (kPa)
V-3000-1 (Exposed)	V-3754	Normally Open	3/4	1/2	V-9502-19	12 (84)
	V-3974	Normally Closed			V-9502-20	5 (35)
	V-4324	Three Way Mixing			V-9502-100*	3.6 (25)
	V-3754	Normally Open	1 and 1-1/2	3/4	V-9502-101	7 (49)
	V-3974	Normally Closed			V-9502-100*	5.1 (36)
	V-4324	Three Way Mixing			V-9502-101	10.6 (7.4)
4R	V-5254	Normally Open	1-1/2 and 2		V-510-103	Adjustable 3 to 13 psi (21 to 91)
	V-5464	Normally Closed				
	V-5844	Three Way Mixing				

* The V-3754, V-3974, and V-4324 Series Valves with a factory mounted V-9502 Positioner include a V-9502-100 Positioner Spring.

Electric Actuator Selection

Direct Mount Electric Actuators

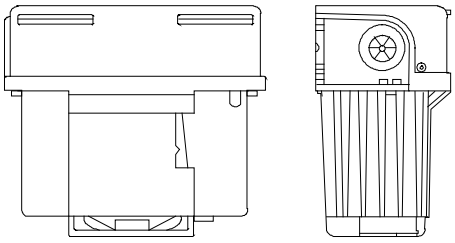


Figure 15: VA-805x Series

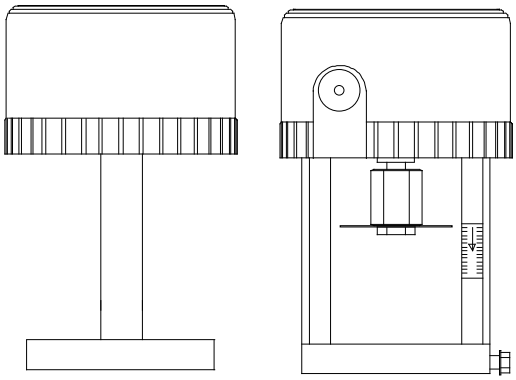


Figure 16: VA-715x Series

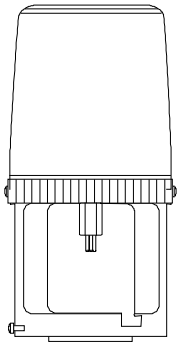


Figure 17: VA-720x Series

The VA-805x-1 (50 lb seating force), VA-715x-1001 (90 lb seating force), and VA-720x-1001 (210 lb seating force) Series Electric Actuators are synchronous motor-driven, non-spring return actuators that feature a force sensing mechanism that assures the rated seating force.

The VA-8050-1, VA-7150-1001, and VA-7200-1001 Series Actuators accept floating/incremental control and require a three wire, 24 VAC control signal from a controller.

The VA-8051-1 accepts floating/incremental control with a three wire, 24 VAC control signal. For DSC-8500 applications, a VA-8000-104 Auxiliary Interface Board (ordered separately) is required.

The VA-8051-1 includes a 3400 ohm position feedback potentiometer for remote position indication to meters or as a position feedback to a controller.

The VA-7153-1001 and VA-7203-1001 accept floating/incremental control with a three wire, 24 VAC control signal. The actuator includes a 2000 ohm position feedback potentiometer for remote position indication to meters or as a position feedback to a controller.

The VA-8052-1, VA-7152-1001, and VA-7202-1001 provide proportional control and require a two wire, 0 to 10 VDC control signal and 24 VAC power.

All body types are available with factory assembled electric actuators except as follows:

The VA-8050 and VA-8051 are available only with push-down-to-close valve bodies (VB-3754) or mixing valve bodies (VB-4324). The VA-8052 is available only with push-down-to-open valve bodies (VB-3974) or mixing valve bodies (VB-4324).

The AV-805x Series Valve is available as a complete factory assembled valve and actuator when the appropriate AV-805x-valve assembly code number is specified (refer to Table 11). The VA-715x and VA-720x Series Actuators are available factory assembled to valves, refer to the “VBC” features and options code number scheme shown in Figure 19.

Remote Mount Electric Actuators (Linkage Required)

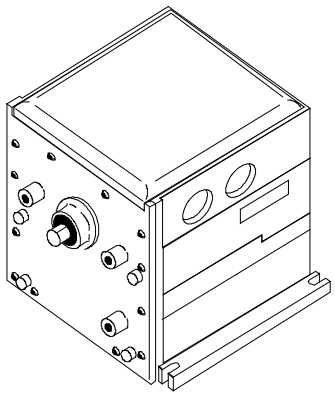


Figure 18: M100 Series Electric Motor Actuator

The M100 Series Electric Motor Actuator is a rotary actuator used to position several types of valves in HVAC and industrial applications. Through a Y20EBD-x valve linkage kit, the rotary motion of the M100 Series Motor Actuator is converted to a linear movement. The linkage kit includes an overtravel spring, which determines the maximum seating pressure in conjunction with actuator selection.

The M100 Series Electric Motor Actuators are available in five basic torque ratings:

- M110 25 in·lb (2.8 N·m)
- M120 35 in·lb (4.0 N·m)
- M130 50 in·lb (5.7 N·m)
- M140 75 in·lb (8.5 N·m)
- M150 150 in·lb (17 N·m)

The M120, M140, and M150 are non-spring return actuators which will hold their position when de-energized. The M110 and M130 are spring return actuators that will return the valve to its normal operating position when the power is disconnected. The spring return is a heavy duty spring mechanism that returns the motor actuator shaft to its zero mechanical position against its rated torque. A brake mechanism will keep the return spring from driving the motor actuator towards its return position during normal reversible operations. The gear train and motor are housed in an oil filled compartment for long life.

The M100 provides the appropriate interface for a variety of electronic controllers through selection of plug-in electronic boards. The M100 Series Actuator is compatible with all Johnson Controls controllers and can provide proportional action on-off (incremental) potentiometer, and Metasys®, as well as control by direct digital input from C500 or Metasys Zone Bus controllers. The M100 Series Actuator requires a 24 VAC, 50/60 Hz power supply, but transformer options are available.

The actuator can be mounted for stem up or stem down operation, push-down-to-close, push-down-to-open, pull-up-to-close, or pull-up-to-open. On three way valves, the seating force can be applied on both the up and the down stroke.

Table 6: M100 Series Actuators with Valve Linkage Cross Reference

Actuator	Type	Linkage	Seating Force (lb)
M110	Spring Return	Y20EBD-5	40
M120	Non-Spring Return	Y20EBD-1 Y20EBD-6	75 100
M130	Spring Return	Y20EBD-1 Y20EBD-6	75 100
M140	Non-Spring Return	Y20EBD-2	150
M150	Non-Spring Return	Y20EBD-3 Y20EBD-4	270 179

Factory assembly of M100 Series Actuators to cage trim valves is available using the Q99 ordering codes numbers listed in Table 7.

Table 7: Valve Assembly Code Numbers

Assembly Code Number	Valve Style/Action
Q99ADN-1	Two Way Valves, Stem Down
Q99ADN-3	Three Way Valves, Stem Down
Q99AUP-1	Two Way Valves, Stem Up
Q99AUP-3	Three Way Valves, Stem Up

An example of the factory ordering procedure is listed below (the order must be given in this sequence for factory assembly):

Table 8: Proper Sequence for Factory Ordering

Item	Description	Code Number
1	Assembly Code	Q99AUP-1*
2	3/4 in. Valve Body	VB-3754-4
3	M100 Actuator	M110AAB-1*
4	Linkage	Y20EBD-5

* The M110 will return the valve to the stem up position when all power is disconnected.

Table 9: Maximum Closeoff Pressures psig (kPa) for Electrically Actuated Two Way Normally Open Valves

Valve Size (in.)	3/4	1	1-1/4*	1-1/2	2
Maximum Cv (Kv) Factor	**8.6 (7.4)**	**13.9 (11.9)**	**13.9 (11.9)**	**27.5 (23.6)**	**41 (35.1)**
VA-805x/AV-805x*	71 (497)	43 (301)	43 (301)	20 (140)	--
VA-715x/VBC	127 (889)	77 (539)	77 (539)	36 (252)	21 (147)
VA-720x/VBC	--	--	--	84 (588)	49 (343)
M110 with Y20EBD-5 Linkage	57 (399)	34 (238)	34 (238)	16 (112)	9 (63)
M120/M130 with Y20EBD-1 Linkage	106 (742)	64 (448)	64 (448)	30 (210)	17 (119)
M120/M130 with Y20EBD-6 Linkage	142 (994)	85 (595)	85 (595)	40 (280)	23 (161)
M140 with Y20EBD-2 Linkage	212 (1484)	128 (896)	128 (896)	60 (420)	35 (245)
M150 with Y20EBD-3 Linkage	345 (2415)	231 (1617)	231 (1617)	109 (763)	63 (441)
M150 with Y20EBD-4 Linkage	253 (1771)	153 (1071)	153 (1071)	72 (504)	42 (294)
Valve Body Code Number	**VB-3754-4**	**VB-3754-5**	**VB-3754-8**	**VB-3754-6**	**VB-3754-7**

* The 1-1/4 in. valve is not available with factory mounted VA-805x Series Electric Actuators.

Table 10: Maximum Closeoff Pressures psig (kPa) for Electrically Actuated Two Way Normally Closed Valves

Valve Size (in.)	3/4	1	1-1/2	2
Maximum Cv (Kv) Factor	**8.6 (7.4)**	**13.9 (11.9)**	**27.5 (23.6)**	**41 (35.1)**
VA-805x/AV-805x	76 (532)	45 (315)	21 (147)	--
VA-715x/VBC	137 (959)	80 (560)	37 (259)	21 (147)
VA-720x/VBC	--	--	86 (602)	49 (343)
M110 with Y20EBD-5 Linkage	61 (427)	36 (252)	16 (112)	9 (63)
M120/M130 with Y20EBD-1 Linkage	114 (798)	67 (469)	31 (217)	18 (126)
M120/M130 with Y20EBD-6 Linkage	152 (1064)	89 (623)	41 (287)	24 (168)
M140 with Y20EBD-2 Linkage	228 (1596)	134 (938)	62 (434)	35 (245)
M150 with Y20EBD-3 Linkage	345 (2415)	241 (1687)	111 (777)	64 (448)
M150 with Y20EBD-4 Linkage	272 (1904)	160 (1120)	73 (511)	42 (294)
Valve Body Code Number	**VB-3974-4**	**VB-3974-5**	**VB-3974-6**	**VB-3974-7**

Table 11: Maximum Closeoff Pressures psig (kPa) for Electrically Actuated Three Way Mixing Valves

Valve Size (in.)	3/4	1	1-1/4*	1-1/2	2
Maximum Cv (Kv) Factor	**8.6 (7.4)**	**13.9 (11.9)**	**13.9 (11.9)**	**27.5 (23.6)**	**41 (35.1)**
VA-805x/AV-805x N.C./N.O.*	76/71 (532/497)	45/43 (315/301)	45/43 (315/301)	21/20 (147/140)	--
VA-715x/VBC N.C./N.O.	137/127 (959/889)	80/77 (560/539)	80/77 (560/539)	37/36 (259/252)	21/21 (147/147)
VA-720x/VBC N.C./N.O.	--	--	--	86/104 (602/728)	49/49 (343/343)
M110 with Y20EBD-5 Linkage N.C./N.O.	61/57 (427/399)	36/34 (252/238)	36/34 (252/238)	16/16 (112/112)	9/9 (63/63)
M120/M130 with Y20EBD-1 Linkage N.C./N.O.	114/106 (798/742)	67/64 (469/448)	67/64 (469/448)	31/30 (217/210)	18/17 (126/119)
M120/M130 with Y20EBD-6 Linkage N.C./N.O.	152/142 (1064/994)	89/85 (623/595)	89/85 (623/595)	41/40 (287/280)	24/23 (168/161)
M140 with Y20EBD-2 Linkage N.C./N.O.	228/212 (1596/1484)	134/128 (938/896)	134/128 (938/896)	62/60 (434/420)	35/35 (245/245)
M150 with Y20EBD-3 Linkage N.C./N.O.	345/345 (2415/2415)	241/231 (1687/1617)	241/231 (1687/1617)	111/109 (777/763)	64/63 (448/441)
M150 with Y20EBD-4 Linkage N.C./N.O.	272/253 (1904/1771)	160/153 (1120/1071)	160/153 (1120/1071)	73/72 (511/504)	42/42 (294/294)
Valve Body Code Number	**VB-4324-4**	**VB-4324-5**	**VB-4324-8**	**VB-4324-6**	**VB-4324-7**

***** The 1-1/4 in. valve is not available with factory mounted VA-805x Series Electric Actuators.

Table 12: Electrically Actuated 3/4 to 2 in. Cage Trim Valves Factory Assembled Actuator/Valve Combinations (in.)

Assembled Actuator/ Valve Code Number	Valve Body	Actuator	Valve Size (in.)	Maximum Cv (Kv) Factor
AV-8050-1004	VB-3754-4	VA-8050 Floating/Incremental	3/4	8.6 (7.4)
AV-8050-1005	VB-3754-5		1	13.9 (11.9)
AV-8050-1006	VB-3754-6		1-1/2	27.5 (23.6)
AV-8050-1013	VB-4324-4		3/4	8.6 (7.4)
AV-8050-1014	VB-4324-5		1	13.9 (11.9)
AV-8050-1015	VB-4324-6		1-1/2	27.5 (23.6)
AV-8051-1004	VB-3754-4	VA-8051 Floating/Incremental with Feedback	3/4	8.6 (7.4)
AV-8051-1005	VB-3754-5		1	13.9 (11.9)
AV-8051-1006	VB-3754-6		1-1/2	27.5 (23.6)
AV-8051-1013	VB-4324-4		3/4	8.6 (7.4)
AV-8051-1014	VB-4324-5		1	13.9 (11.9)
AV-8051-1015	VB-4324-6		1-1/2	27.5 (23.6)
AV-8052-1021	VB-3974-4	VA-8052 Proportional	3/4	8.6 (7.4)
AV-8052-1022	VB-3974-5		1	13.9 (11.9)
AV-8052-1023	VB-3974-6		1-1/2	27.5 (23.6)
AV-8052-1013	VB-4324-4		3/4	8.6 (7.4)
AV-8052-1014	VB-4324-5		1	13.9 (11.9)
AV-8052-1015	VB-4324-6		1-1/2	27.5 (23.6

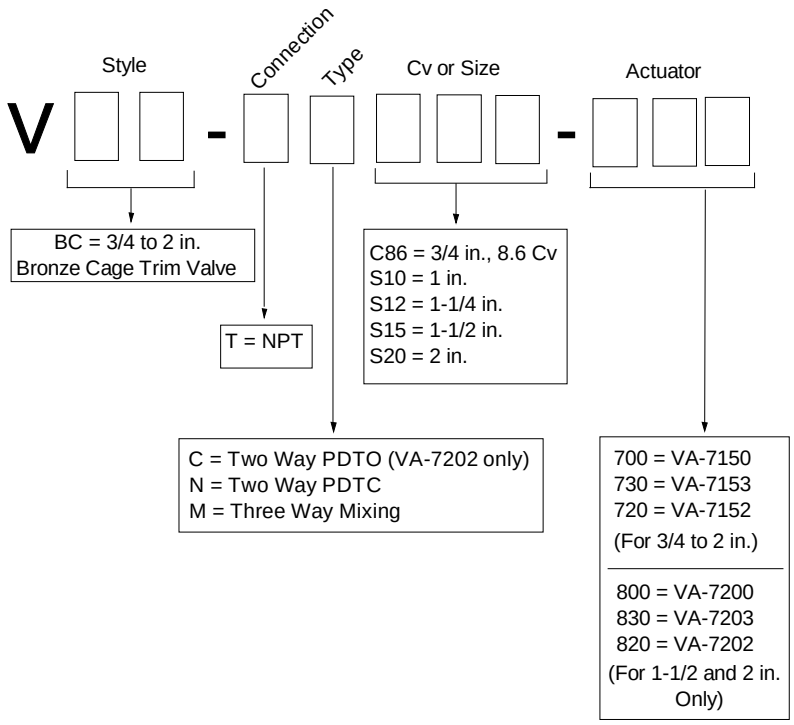


Figure 19: Cage Trim Valves with Factory Mounted VA-715x and VA-720x Series Actuators Features and Options Template

Operation

Pneumatic Actuation

Signal air pressure from a pneumatic controller is applied to the diaphragm of the actuator, which moves the piston against the forces of the internal spring and the fluids. The piston will move the valve plug to modulate at a position where the diaphragm pressure and the spring force balance against the fluid forces. These fluid forces will cause the operating range to shift from the nominal spring range, refer to the *Spring Shift Graph* section in this bulletin for more information. Reducing the air pressure to the diaphragm of the actuator allows the spring to reposition the valve plug.

Electric Actuated Valves

The VA-8050-1, VA-8051-1, VA-7150-1001, VA-7153-1001, VA-7200-1001, and VA-7203-1001 actuated valves operate on a three wire 24 VAC floating control signal from a compatible controller.

The controller sends the 24 VAC signal to the up or down terminal depending on the desired movement of the valve. This signal causes the motor to rotate in the proper direction to move the valve stem and plug assembly up or down. When the controller stops sending a signal, the valve stem and plug assembly remains in place.

When the controller closes the valve, the rated shutoff force will build up. When the controller signals the valve to move in the opposite direction, the shutoff force will be reduced and the valve will modulate.

On VA-8051-1, VA-7153-1001, and VA-7203-1001 actuated valves, an internal position feedback potentiometer is connected to output terminals.

Proportional-Electric Actuated Valves

The VA-8052-1, VA-7202-1001, and VA-7152-1001 actuated valves operate on 24 VAC power and a 0 to 10 VDC control signal from a compatible controller. The controller sends a voltage signal (typically 0 to 10 VDC) to the COM (common) and IN (input) terminals on the actuator, corresponding to the desired position of the valve.

This signal is compared to the actual valve position via the integral feedback potentiometer. The internal circuit then causes the motor to rotate in the proper direction and move the valve stem and plug assembly to the position called for by the input signal.

When the controller closes the valve, the rated shutoff force builds up. The actuator maintains the shutoff force even if power to the controller is lost. When the controller signals the valve to move in the opposite direction, the shutoff force is reduced and the valve modulates.

M100 Series Actuator

The actuator and linkage can be mounted for stem up or stem down operation, push-down-to-close, or push-down-to-open. On three way valves, the seating force can be applied on both the up and the down stroke.

The M100 Series actuated valve operates with 24 VAC, and is available with ON-OFF/floating/ incremental control action or proportional control action models.

The controller sends a signal to the actuator dependent on the desired movement of the valve. This signal causes the motor to rotate in the proper direction and, through the rack and pinion, drive the valve stem and plug assembly up or down. When the controller stops sending a signal, the valve stem and plug assembly remains in place. When the controller closes the valve, it applies the linkage spring load to the valve stem at the actuator's end of travel. On three way valves, the preset spring load is applied at both ends of travel. On loss of power, the spring return actuator will return to its normal position.

A rack and pinion drive mechanism provides the linear movement. The rack assembly contains a spring that, when compressed by overtravel of the actuator, will maintain valve close off to rated values. The actuator has an adjustable travel limit that provides the desired overtravel.

Installation

It is recommended that these valves be mounted in an upright position in a conveniently accessible location. Sufficient clearance must be allowed for actuator and trim removal. These valves must be piped with the flow in the direction indicated by the arrow so that the plug seats against the flow.

When used with V-3000 Series Pneumatic Actuators, field adjustments for accurate sequencing with other valves can be made to compensate for spring shift. Turning the lower spring seat counterclockwise (when looking down on the actuator) will raise the diaphragm pressure required to move the valve; turning it clockwise will lower the setting. For additional information on spring range shift with lower spring plate, refer to *the Engineering Data Book, Section Va, Valve Actuators*. The spring adjustment ratio for V-3000 Series Actuators used on cage trim valves is provided in Table 13.

Table 13: Spring Adjustment Ratios

Actuator Style	Spring Size psig (kPa)*	Adjustment Ratio**
V-3000	3 to 6 (21 to 42)	0.53
	4 to 8 (28 to 56)	0.71
	9 to 13 (63 to 91)	0.71

* The spring range is specified by the diaphragm pressure at the top and bottom of the stroke.

** The adjustment ratio is the changes in diaphragm pressure (psig) per turn of the lower spring seat.

Note: The spring assemblies for pneumatic 4R actuators cannot be adjusted.

Dimensions

Table 14: V-3754/V-3974 with V-3000-1 Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E	F
3/4	3-5/8 (92)	1-25/32 (45)	1-3/8 (35)	1-31/32 (50)	6-3/8 (162)	3-5/8 (92)
1	4-7/8 (124)	2-1/32 (52)	1-5/8 (41)	2-11/64 (55)	6-7/8 (175)	3-5/8 (92)
1-1/2	6-23/32 (171)	3-1/32 (77)	2-5/16 (59)	3-3/16 (81)	8-9/16 (217)	3-5/8 (92)

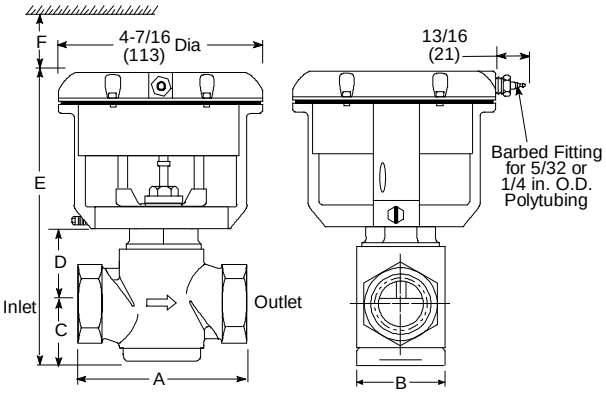


Figure 20: V-3754/V-3974 Two Way NPT Valve with V-3000-1 Actuator

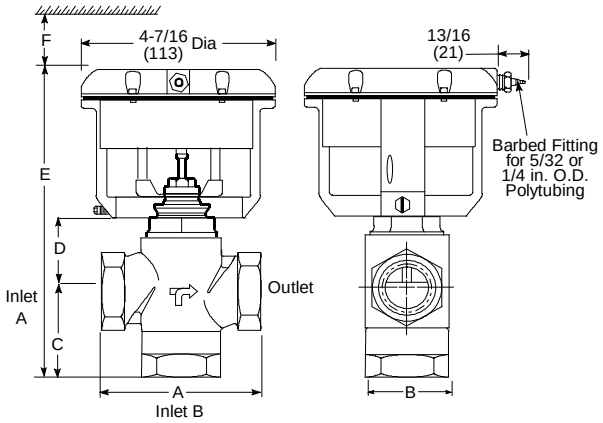


Figure 21: V-4324 Three Way NPT Valve with V-3000-1 Actuator

Table 15: V-4324 with V-3000-1 Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E	F
3/4	3-5/8 (92)	1-25/32 (45)	2-5/32 (55)	5 (127)	7-5/32 (182)	3-5/8 (92)
1	4-7/8 (124)	2-1/32 (52)	2-5/8 (67)	5-1/4 (133)	7-7/8 (200)	3-5/8 (92)
1-1/2	6-23/32 (171)	3-1/32 (77)	3-1/8 (79)	6-1/4 (159)	9-3/8 (238)	3-5/8 (92)

Table 16: V-3754/V-3974 with V-3000-1 Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E	F
3/4	5-3/8 (137)	1-25/32 (45)	1-3/8 (35)	1-31/32 (50)	6-3/8 (162)	3-5/8 (92)
1	6-55/64 (174)	2-1/32 (52)	1-5/8 (41)	2-3/16 (56)	6-7/8 (174)	3-5/8 (92)

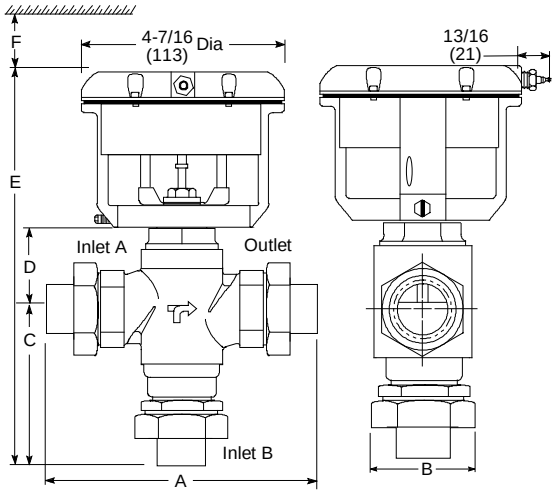


Figure 22: V-3754/V-3974 Two Way Valve with Union Sweat End Connections and V-3000-1 Actuator

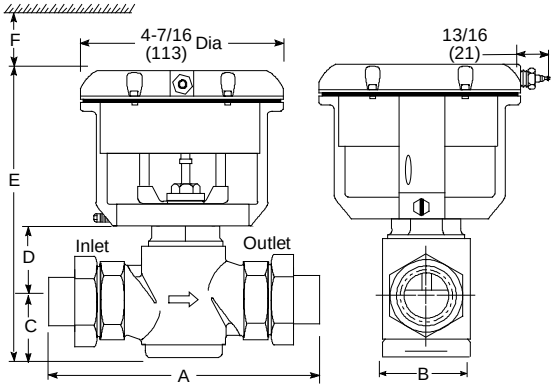


Figure 23: V-4324 Three Way Valve with Union Sweat End Connections

Table 17: V-4324 with V-3000-1 Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E	F
3/4	5-3/8 (137)	2-5/16 (59)	1-3/8 (35)	1-31/32 (50)	5-3/4 (146)	3-5/8 (92)
1	6-55/64 (174)	2-23/32 (69)	1-5/8 (41)	2-3/16 (56)	6-3/16 (157)	3-5/8 (92)

Table 18: V-5254/V-5464 with 4R Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E	F
1-1/2	6-23/32 (171)	3-1/32 (77)	2-5/16 (59)	3-3/16 (81)	14-9/16 (370)	2 (51)
2	7-3/4 (197)	3-1/32 (77)	2-23/32 (69)	3-3/16 (81)	15-3/8 (391)	2 (51)

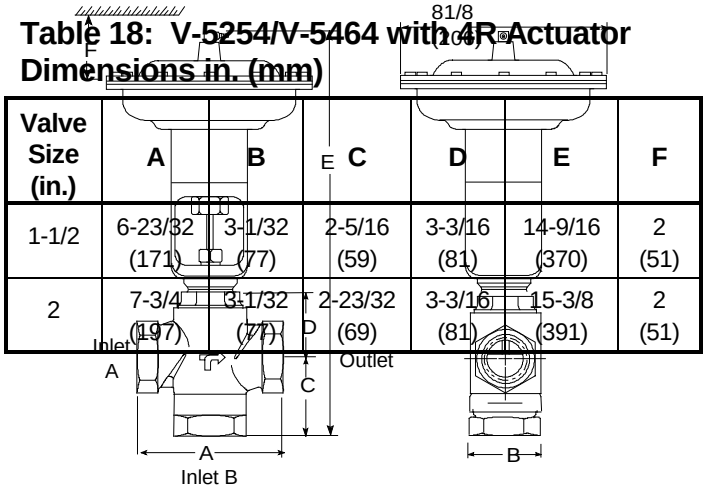


Figure 24: V-5254/V-5464 Two Way NPT Valve with 4R Actuator

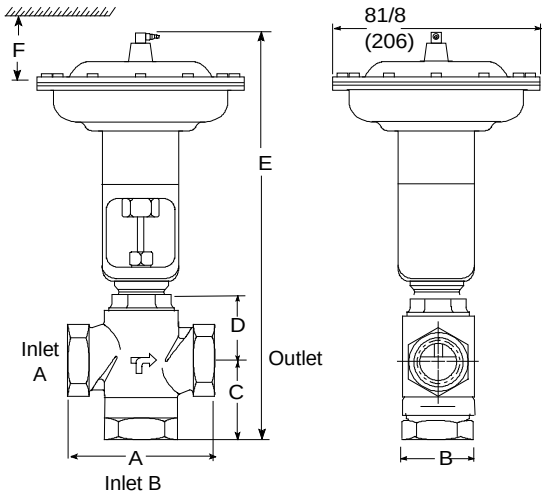


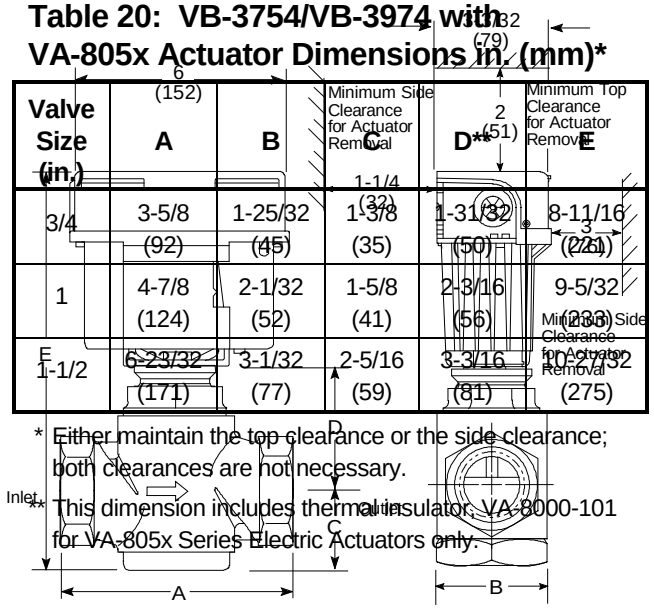
Figure 25: V-5844 Three Way NPT Valve with 4R Actuator

Table 19: V-5844 with 4R Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E	F
1-1/2	6-23/32 (171)	3-1/32 (77)	3-1/8 (79)	3-3/16 (81)	15-1/2 (394)	2 (51)
2	7-3/4 (197)	3-1/32 (77)	3-15/32 (88)	3-3/16 (81)	16-1/8 (410)	2 (51)

Table 20: VB-3754/VB-3974 with VA-805x Actuator Dimensions in. (mm)*

Valve Size (in.)	A	B	C	D**	E
3/4	3-5/8 (92)	1-25/32 (45)	1-3/8 (35)	1-31/32 (50)	8-11/16 (221)
1	4-7/8 (124)	2-1/32 (52)	1-5/8 (41)	2-3/16 (56)	9-5/32 (233)
1-1/2	6-23/32 (171)	3-1/32 (77)	2-5/16 (59)	3-3/16 (81)	10-27/32 (275)



* Either maintain the top clearance or the side clearance; both clearances are not necessary.

** This dimension includes thermal insulator, VA-8000-101 for VA-805x Series Electric Actuators only.

Figure 26: VB-3754/VB-3974 Two Way NPT Valve with VA-805x Actuator

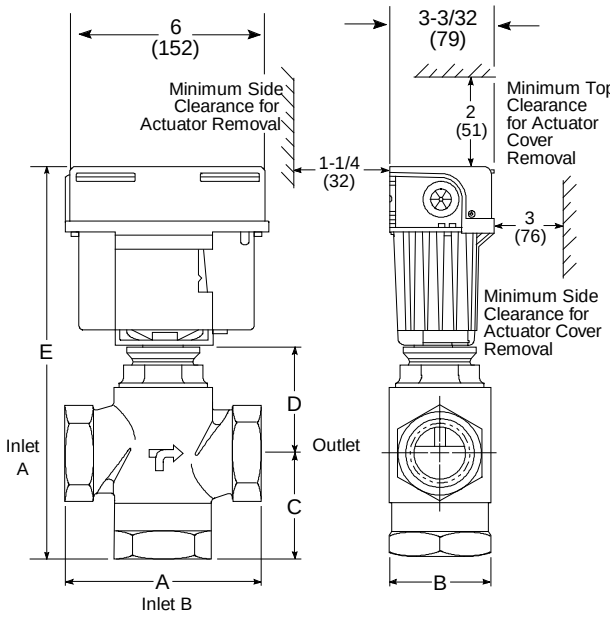


Figure 27: VB-4324 Three Way NPT Valve with VA-805x Actuator

Table 21: VB-4324 with VA-805x Actuator Dimensions in. (mm)*

Valve Size (in.)	A	B	C	D**	E
3/4	3-5/8 (92)	1-25/32 (45)	2-5/32 (55)	1-31/32 (50)	9-15/32 (241)
1	4-7/8 (124)	2-1/32 (52)	2-5/8 (67)	2-3/16 (56)	10-5/32 (258)
1-1/2	6-23/32 (171)	3-1/32 (77)	3-1/8 (79)	3-3/16 (81)	11-21/32 (296)

* Either maintain the top clearance or the side clearance; both clearances are not necessary.

** This dimension includes thermal insulator, VA-8000-101 for VA-805x Series Electric Actuators only.

Table 22: VB-3754/VB-3974 with VA-715x Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E
3/4	3-23/64 (85)	1-25/32 (45)	1-23/64 (35)	1-31/32 (50)	8-63/64 (228)
1	4-57/64 (124)	2-1/32 (52)	1-39/64 (41)	2-11/64 (55)	9-7/16 (240)
1-1/4	5-9/32 (134)	2-1/32 (52)	1-5/8 (41)	2-3/16 (56)	9-15/32 (241)
1-1/2	6-23/32 (171)	3-1/32 (77)	2-5/16 (59)	3-3/16 (81)	11-5/32 (283)
2	7-3/4 (197)	3-5/8 (92)	2-11/16 (68)	3-1/2 (89)	11-27/32 (301)

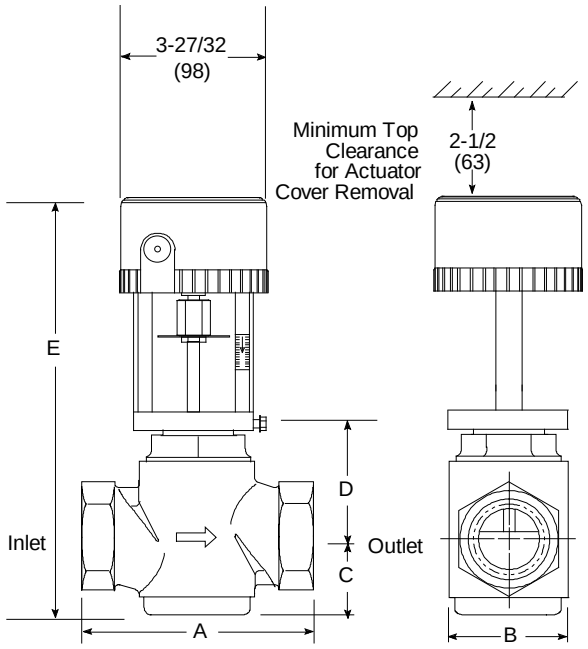


Figure 28: VB-3754/VB-3974 Two Way NPT Valve with VA-715x Actuator

Figure 29: VB-4324 Three Way NPT Valve with VA-715x Actuator

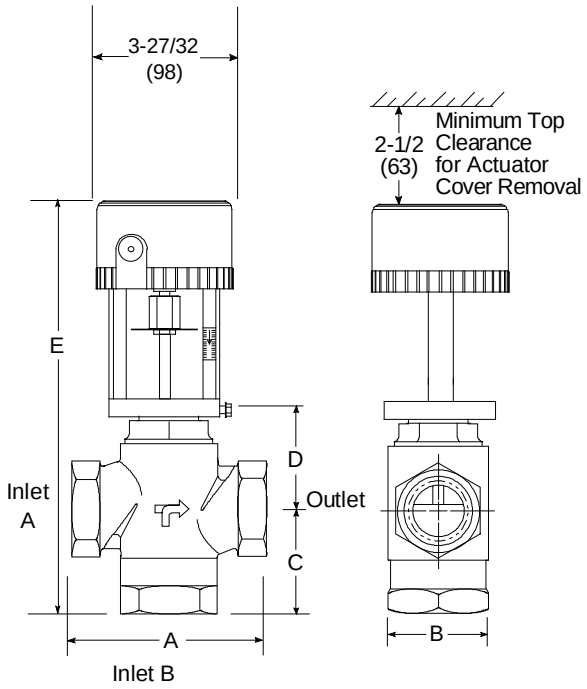


Table 23: VB-4324 with VA-715x Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E
3/4	3-23/64 (85)	1-25/32 (45)	2-5/32 (55)	1-31/32 (50)	9-25/32 (248)
1	4-57/64 (124)	2-1/32 (52)	2-39/64 (66)	2-11/64 (55)	10-7/16 (265)
1-1/4	5-9/32 (134)	2-1/32 (52)	2-7/8 (73)	2-3/16 (56)	10-23/32 (272)
1-1/2	6-23/32 (171)	3-1/32 (77)	3-1/8 (79)	3-3/16 (81)	11-31/32 (304)
2	7-3/4 (197)	3-5/8 (92)	3-1/2 (89)	3-1/2 (89)	12-21/32 (321)

Table 24: VB-3754/VB-3974 with VA-720x Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E
1-1/2	6-11/64 (157)	3-1/32 (77)	2-9/32 (58)	3-13/64 (81)	12-27/32 (326)
2	7-3/4 (197)	3-5/8 (92)	2-11/16 (68)	3-31/64 (89)	13-17/32 (344)

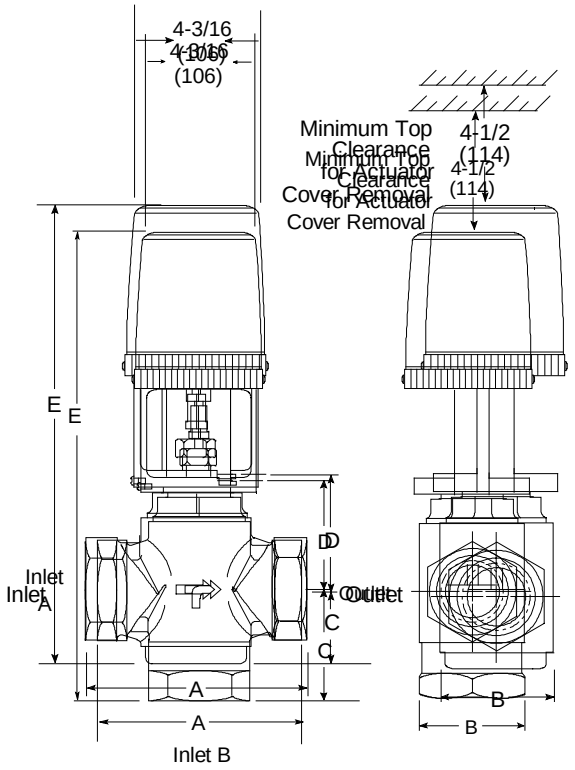


Figure 30: VB-3754/VB-3974 Two Way NPT Valve with VA-720x Actuator

Table 25: VB-4324 with VA-720x Actuator Dimensions in. (mm)

Valve Size (in.)	A	B	C	D	E
1-1/2	6-23/32 (151)	3-1/32 (77)	3-1/4 (83)	3-13/64 (81)	13-13/16 (351)
2	7-3/4 (197)	3-1/32 (77)	3-15/32 (88)	3-31/64 (88)	14-5/16 (364)

Figure 31: VB-4324 Three Way NPT Valve with VA-720x Actuator

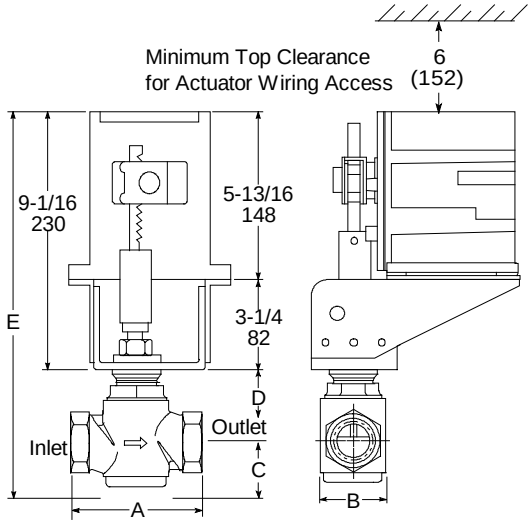


Figure 32: VB-3754/VB-3974 Two Way NPT Valve with M100 Actuator

Table 26: VB-3754/VB-3974 with M100 Actuator Dimensions in. (mm)*

Valve Size (in.)	A	B	C	D	E
3/4	3-5/8 (92)	1-25/32 (45)	2-5/32 (55)	1-31/32 (50)	12-13/32 (315)
1	4-7/8 (124)	2-1/32 (52)	2-5/8 (67)	2-3/16 (56)	12-7/8 (327)
1-1/4	5-9/32 (134)	2-1/32 (52)	1-5/8 (41)	2-3/16 (56)	12-7/8 (327)
1-1/2	6-23/32 (171)	3-1/32 (77)	3-1/8 (79)	3-3/16 (81)	14-9/16 (370)
2	7-3/4 (197)	3-1/32 (77)	2-23/32 (69)	3-15/32 (88)	15-1/4 (387)

* The face of one of the actuators must remain clear of obstructions to accommodate possible servicing.

Table 27: VB-4324 with M100 Actuator Dimensions in. (mm)*

Valve Size (in.)	A	B	C	D	E
3/4	3-5/8 (92)	1-25/32 (45)	2-5/32 (55)	1-31/32 (50)	13-3/16 (335)
1	4-7/8 (124)	2-1/32 (52)	2-5/8 (67)	2-3/16 (56)	13-7/8 (352)
1-1/4	5-9/32 (134)	2-1/32 (52)	2-7/8 (73)	2-3/16 (56)	14-1/8 (359)
1-1/2	6-23/32 (171)	3-1/32 (77)	3-1/8 (79)	3-3/16 (81)	15-3/8 (391)
2	7-3/4 (197)	3-1/32 (77)	2-23/32 (69)	3-15/32 (88)	16 (406)

* The face of one of the actuators must remain clear of obstructions to accommodate possible servicing.

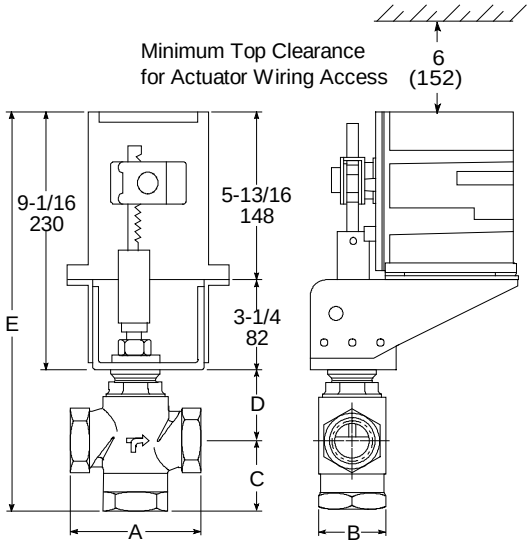


Figure 33: VB-4324 Three Way NPT Valve with M100 Actuator

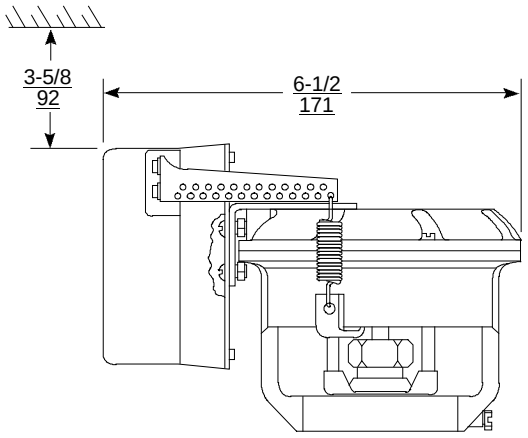


Figure 34: V-9502 Positioner Mounted on V-3000-1 Pneumatic Actuator

Repair Information

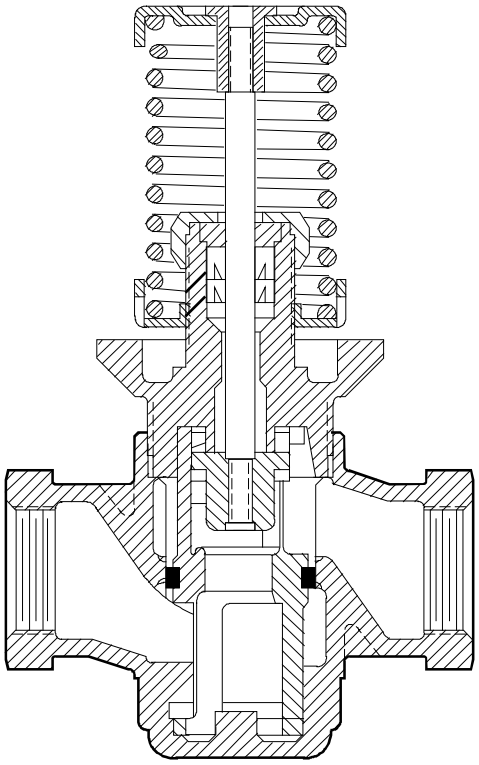


Figure 35: Valve Component Identification

Table 28: Repair Parts -- V-3754 with Actuator and VB-3754 without Actuator

Item	Code Number	Description
Spring Kits*	V-3754-6008	Spring Kit, 9-13 psig, 3/4 in. stroke for V-3754, V-3974, and V-4324 (1 and 1-1/2) Valve with V-3000-1 or V-3000-2 Actuator.
	V-3754-6009	Spring Kit, 9-13 psig, 1/2 in. stroke for V-3011, V-3020, V-3212, V-3752, V-3755, V-3970, V-4322 (1-1/2 and 2), V-3974, V-3966, V-6139 (1/2), and V-3754, V-3974, V-4324 (1/2 and 3/4) Valve with V-3000-1 or V-3000-2 Actuator.
	V-3754-6010	Spring Kit, 3-6 psig, 1/2 in. stroke for V-3011, V-3020, V-3752, V-3755, V-4510, V-5250 (1-1/2 and 2), V-3754 (1/2 and 3/4), and V-3766 (1/2) Valve with V-3000-1 or V-3000-2 Actuator.
	V-3754-6011	Spring Kit, 3-6 psig, 3/4 in. stroke for V-3754 (1 and 1-1/2) Valve with V-3000-1 or V-3000-2 Actuator.
Reconditioning Kits**	V-3754-6001	Recondition Kit, .75 in. NO Cage Trim Valve, Cv=8.6
	V-3754-6003	Recondition Kit, .5 in. NO Cage Trim Valve, Cv=.2
	V-3754-6004	Recondition Kit, .5 in. NO Cage Trim Valve, Cv=.4
	V-3754-6005	Recondition Kit, .5 in. NO Cage Trim Valve, Cv=1.2
	V-3754-6006	Recondition Kit, .5 in. NO Cage Trim Valve, Cv=2.2
	V-3754-6007	Recondition Kit, .5 in. NO Cage Trim Valve, Cv=4.4
Packing Kits	V-9999-608***	Ring Pack Packing Kits: Single Pack
	V-9999-610***	10 Pack (Contains enough materials to repack 10 valves)
	V-9999-630****	50 Pack (Contains U-cups and O-rings **only** to repack 50 valves

* Spring kits contain: spring, upper and lower spring plates, stem extension, lock screw, and instructions.

** Reconditioning kits contain: cage, O-ring, plug/disc, stem, bonnet, ring pack, guide, packing nut, spacer, grease, adhesive, and instructions.

*** Packing kits contain: O-rings, crocus cloth, assembly tool, gland nut liner, guide, extractor/installer, ring pack assembly, follower, grease, and instructions.

**** Silicone grease is not included in this kit; order V-9999-606 separately.



CAUTION: Springs are under compression. A spring compression tool, JC 5389, is required to remove springs.

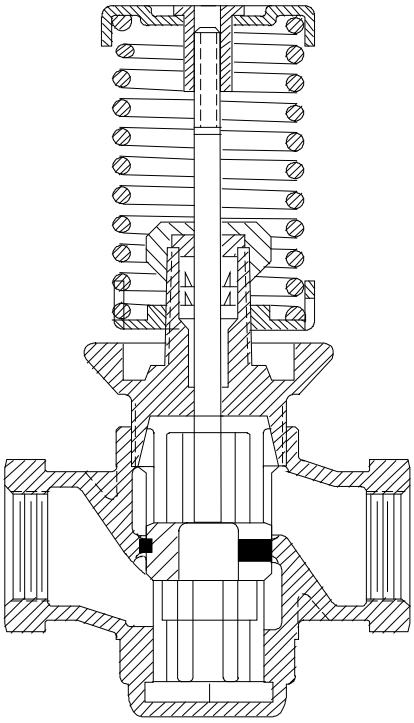


Figure 36: Valve Component Identification

Table 29: Repair Parts -- V-3974 with Actuator and VB-3974 without Actuator

Item	Code Number	Description
Spring Kits*	V-3974-6008	Spring Kit, 4-8 psig, 1/2 in. stroke for V-3212, V-3970, V-4322 (1-1/2 and 2) and V-3774, V-4324 (1/2 and 3/4) Valve with V-3000-1 or V-3000-2 Actuator.
	V-3974-6009	Spring Kit, 4-8 psig, 3/4 in. stroke for V-3974 (1) and V-4324 (1 and 1-1/2) Valve with V-3000-1 or V-3000-2 Actuator.
Reconditioning Kits**	V-3974-6001	Recondition Kit, .75 in. NC Cage Trim Valve, Cv=8.6
	V-3974-6003	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=.2
	V-3974-6004	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=.4
	V-3974-6005	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=1.2
	V-3974-6006	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=2.2
	V-3974-6007	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=4.4
Packing Kits	V-9999-608***	Ring Pack Packing Kits: Single Pack
	V-9999-610***	10 Pack (Contains enough materials to repack 10 valves)
	V-9999-630****	50 Pack (Contains U-cups and O-rings **only** to repack 50 valves

* Spring kits contain: spring, upper and lower spring plates, stem extension, lock screw, and instructions.

** Reconditioning kits contain: cage, O-ring, plug/disc, stem, bonnet, ring pack, guide, packing nut, spacer, grease, adhesive, and instructions.

*** Packing kits contain: O-rings, crocus cloth, assembly tool, gland nut liner, guide, extractor/installer, ring pack assembly, follower, grease, and instructions.

**** Silicone grease is not included in this kit; order V-9999-606 separately.



CAUTION: Springs are under compression. A spring compression tool, JC 5389, is required to remove springs.

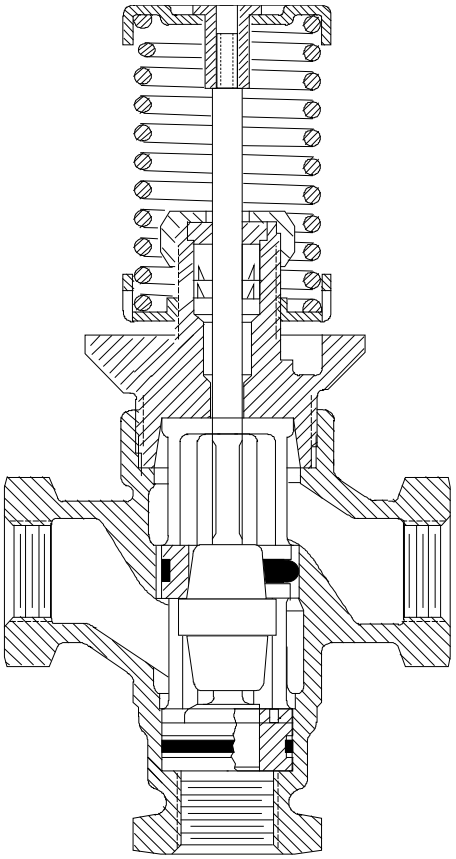


Figure 37: Valve Component Identification

Table 30: Repair Parts--V-4324 with Actuator and VB-4324 without Actuator

Item	Code Number	Description
Spring Kits*	V-3974-6008	Spring Kit, 4-8 psig, 1/2 in. stroke for V-3212, V-3970, V-4322 (1-1/2 and 2) and V-3774, V-4324 (1/2 and 3/4) Valve with V-3000-1 or V-3000-2 Actuator.
	V-3974-6009	Spring Kit, 4-8 psig, 3/4 in. stroke for V-3974 (1) and V-4324 (1 and 1-1/2) Valve with V-3000-1 or V-3000-2 Actuator.
Reconditioning Kits**	V-3974-6001	Recondition Kit, .75 in. NC Cage Trim Valve, Cv=8.6
	V-3974-6003	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=.2
	V-3974-6004	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=.4
	V-3974-6005	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=1.2
	V-3974-6006	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=2.2
	V-3974-6007	Recondition Kit, .5 in. NC Cage Trim Valve, Cv=4.4
Packing Kits	V-9999-608***	Ring Pack Packing Kits: Single Pack
	V-9999-610***	10 Pack (Contains enough materials to repack 10 valves)
	V-9999-630****	50 Pack (Contains U-cups and O-rings **only** to repack 50 valves

* Spring kits contain: spring, upper and lower spring plates, stem extension, lock screw, and instructions.

** Reconditioning kits contain: cage, O-ring, plug/disc, stem, bonnet, ring pack, guide, packing nut, spacer, grease, adhesive, and instructions.

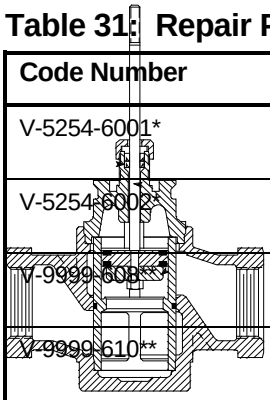
*** Packing kits contain: O-rings, crocus cloth, assembly tool, gland nut liner, guide, extractor/installer, ring pack assembly, follower, grease, and instructions.

**** Silicone grease is not included in this kit; order V-9999-606 separately.



CAUTION: Springs are under compression. A spring compression tool, JC 5389, is required to remove springs.

Table 31: Repair Parts--V-5254



Code Number	Description
V-5254-6001*	Recondition Kit, 1.5 in. NO Cage Trim Valve Cv=27.5
V-5254-6002*	Recondition Kit, 2.0 in. NO Cage Trim Valve Cv=41
V-9999-608**	Ring Pack Packing Kits: Single Pack
V-9999-610**	10 Pack (Contains enough materials to repack 10 valves)
V-9999-630***	50 Pack (Contains U-cups and O-rings **only** to repack 50 valves

Table 32: Repair Parts--V-5464

Code Number	Description
V-5464-6001*	Recondition Kit, 1.5 in. NC Cage Trim Valve Cv=27.5
V-5464-6002*	Recondition Kit, 2.0 in. NC Cage Trim Valve Cv=41
V-9999-608**	Ring Pack Packing Kits: Single Pack
V-9999-610**	10 Pack (Contains enough materials to repack 10 valves)
V-9999-630***	50 Pack (Contains U-cups and O-rings **only** to repack 50 valves

* Reconditioning kits contain: cage, o-ring, plug/disc, stem, bonnet, ring pack, guide, packing nut, spacer, grease, adhesive, and instructions.

** Packing kits contain: O-rings, crocus cloth, assembly tool, gland nut liner, guide, extractor/installer, ring pack assembly, follower, grease, and instructions

*** Silicone grease is not included in this kit; order V-9999-606 separately.

Figure 38: V-5254 Internal View

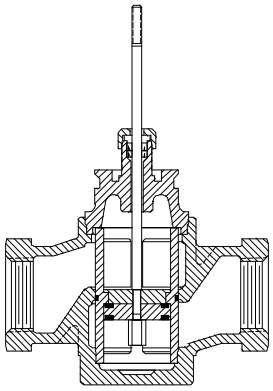


Figure 39: V-5464 Internal View

Table 33: Repair Parts--V-5844

Code Number	Description
V-5844-6001*	Recondition Kit, 1.5 in. Mix Cage Trim Valve Cv=27.5
V-5844-6002*	Recondition Kit, 2.0 in. Mix Cage Trim Valve Cv=41
V-9999-608**	Ring Pack Packing Kits: Single Pack
V-9999-610**	10-Pack (Contains enough materials to repack 10 valves)
V-9999-630***	50-Pack (Contains U-cups and O-rings **only** to repack 50 valves

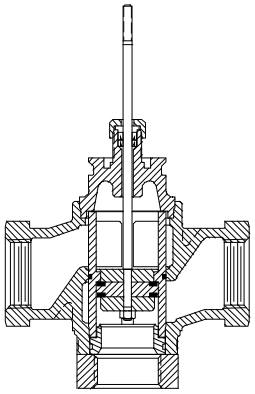


Figure 40: V-5844 Internal View

Table 34: Complete Actuator

Description	Spring Range psig(kPa)	Actuator Style	Code Number
Actuator: Includes	2 to 5 (14 to 42)	4R	V-5252-621
Yoke and Spring Capsule	4 to 8 (28 to 56)	4R	V-5252-665
(Assembled)	9 to 13 (63 to 91)	4R	V-5252-622
Diaphragm Only			V-4710-602

Note: For other actuator repair parts, refer to the appropriate product bulletin.

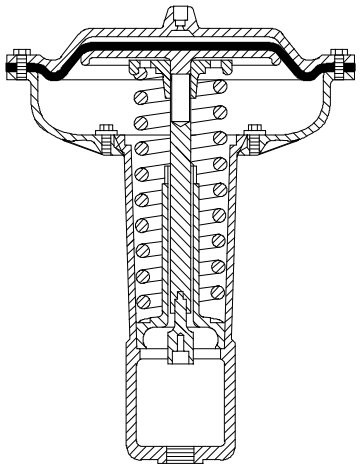


Figure 41: Internal View of Actuator

* Reconditioning kits contain: cage, o-ring, plug/disc, stem, bonnet, ring pack, guide, packing nut, spacer, grease, adhesive, and instructions.

** Packing kits contain: O-rings, crocus cloth, assembly tool, gland nut liner, guide, extractor/installer, ring pack assembly, follower, grease, and instructions

*** Silicone grease is not included in this kit; order V-9999-606 separately.

List of Valid Code Numbers

Threaded (N.O.)
V-3000-1

V-3754-1008 V-3754-1027
V-3754-1010 V-3754-1028
V-3754-1022 V-3754-1029
V-3754-1023 V-3754-1030
V-3754-1026

Union Sweat (N.O.)
V-3000-1

V-3754-4001 V-3754-4002

Threaded (N.C.)
V-3000-1

V-3974-1004 V-3974-1011
V-3974-1005 V-3974-1012
V-3974-1010 V-3974-1013

Union Sweat (N.C.)
V-3000-1

V-3974-4001 V-3974-4002

Threaded (Mixing)
V-3000-1

V-4324-1005 V-4324-1014
V-4324-1006 V-4324-1015
V-4324-1007 V-4324-1016
V-4324-1008 V-4324-1017
V-4324-1013

Union Sweat (Mixing)
V-3000-1

V-4324-4001 V-4324-4003
V-4324-4002 V-4324-4004

Threaded (PDTC)
No Actuator

VB-3754-4 VB-3754-7
VB-3754-5 VB-3754-8
VB-3754-6

Threaded (PDTO)
No Actuator

VB-3974-4 VB-3974-6
VB-3974-5 VB-3974-7

Threaded (Mixing)
No Actuator

VB-4324-4 VB-4324-7
VB-4324-5 VB-4324-8
VB-4324-6

Threaded (N.O.)
V-5000 (Size 4R)

V-5254-1 V-5254-4
V-5254-2 V-5254-5
V-5254-3 V-5254-6
V-5254-11 V-5254-12

Threaded (N.C.)
4R

V-5464-1 V-5464-3
V-5464-2 V-5464-4
V-5464-11 V-5464-12

Threaded (Mixing)
4R

V-5844-1 V-5844-4
V-5844-2 V-5844-5
V-5844-3 V-5844-6
V-5844-11 V-5844-12

Threaded (PDTC)
VA-8050 (Floating)

AV-8050-1004 AV-8050-1005
AV-8050-1006

Threaded (Mixing)
VA-8050 (Floating)

AV-8050-1013 AV-8050-1014
AV-8050-1015

Threaded (PDTC)
VA-8051 (Floating + Feedback)

AV-8051-1004 AV-8051-1006
AV-8051-1005

Threaded (Mixing)
VA-8051 (Floating + Feedback)

AV-8051-1013 AV-8051-1015
AV-8051-1014

Threaded (Mixing)
VA-8052 (Proportional)

AV-8052-1013 AV-8052-1015
AV-8052-1014

Threaded (PDTO)
VA-8052 (Proportional)

AV-8052-1021 AV-8052-1023
AV-8052-1022

Threaded (PDTC)
VA-715x Series

VBC-TNC86-700
VBC-TNC86-730
VBC-TNC86-720
VBC-TNS10-700
VBC-TNS10-730
VBC-TNS10-720
VBC-TNS12-700
VBC-TNS12-730
VBC-TNS12-720
VBC-TNS15-700
VBC-TNS15-730
VBC-TNS15-720
VBC-TNS20-700
VBC-TNS20-730
VBC-TNS20-720

Threaded (Mixing)
VA-715x Series

VBC-TMC86-700
VBC-TMC86-730
VBC-TMC86-720
VBC-TMS10-700
VBC-TMS10-730
VBC-TMS10-720
VBC-TMS12-700
VBC-TMS12-730
VBC-TMS12-720
VBC-TMS15-700
VBC-TMS15-730
VBC-TMS15-720
VBC-TMS20-700
VBC-TMS20-730
VBC-TMS20-720

Threaded (PDTC) VA-720x Series	Threaded (PDTO) VA-720x-Series	Threaded (Mixing) VA-720x Series
VBC-TNS15-800	VBC-TCS15-820	VBC-TMS15-800
VBC-TNS20-800	VBC-TCS20-820	VBC-TMS20-800
VBC-TNS15-820		VBC-TMS15-820
VBC-TNS20-820		VBC-TMS20-820
VBC-TNS15-830		VBC-TMS15-830
VBC-TNS20-830		VBC-TMS20-830

Specifications

Product	VBC Series Valves
Service	Steam, Hot Water, Cold Water, and Glycol Solutions
Models	V-3754: N.O., Two Way; V-3974: N.C., Two Way; V-4324: Three Way Mixing; V-5254: N.O., Two Way; V-5464: N.C., Two Way; V-5844: Three Way Mixing VB-3754: Push-Down-To-Close, Two Way; VB-3974: Push-Down-To-Open, Two Way; VB-4324: Three Way Mixing
Valve Body Size and Styles	3/4, 1, 1-1/2, and 2 in. Threaded Connections 3/4 and 1 in. Union Sweat Ends; 1-1/4 in. NPT Available on VB Valves
Actuator Sizing/ Maximum Closeoff Pressures	See Table 2 for Pneumatic Actuators and Table 9 for Electric Actuators.
Valve Stroke	3/4 in. Valve: 1/2 in. Stroke; 1 to 2 in. Valves : 3/4 in. Stroke
Valve Body Pressure/ Temperature Rating	Meets Requirements of ANSI B16.15, Class 250
Valve Assembly Maximum Allowable Pressure/Temperature	Steam: 35 psig (245 kPa) Saturated Water: 400 psig (2800 kPa) up to 150°F (66°C), Decreasing to 345 psig (2515 kPa) at 281°F (140°C)
Flow Characteristics	Equal Percentage
Flow Coefficients (Cv)	See Tables 2, 3, 4, 9, 10, 11 and 12.
Maximum Seat Leakage	0.01% of Maximum Rated Valve Capacity per ANSI/FCI 70-2, Class IV
Dimensions	See Tables 14 to 27.
Rangeability*	3/4 in.: 40 to 1; 1 and 1-1/4 in.: 44 to 1; 1-1/2 in.: 50 to 1; 2 in.: 60 to 1
Materials	Cage: Cast Bronze Including Integral Seat Stem: Stainless Steel Plug: Brass with Molded and Bonded Composition Disc Body: Cast Bronze with Natural Finish Packing: Self-Adjusting EPDM (Ethylene Propylene Diene Monomer) Ring Pack U-cups

Continued on next page . . .

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

Note: For electric actuator specifications, refer to the appropriate electric actuator product bulletin.

Specifications (Cont.)

Ambient Temperature	-10 to 150°F (-23 to 66°C), Subject to Actuator Limits	
Fluid Operating Temperature Limits	35 to 281°F (2 to 138°C) Steam Insulator Included in Factory Assembly of VA-8050 Actuator to Valve.	
Maximum Recommended Fluid Differential Pressure for Valve Sizing	35 psi (245 kPa)	
Storage Temperature Limits	-10 to 150°F (-23 to 66°C)	
Spring Ranges	Included in Tables 2 through 4	
Pneumatic Actuator Materials	Body:	V-3000-1, Die Cast Aluminum; 4R Yoke and Diaphragm Castings, Cast Aluminum
	Diaphragm:	V-3000-1, Molded Synthetic Rubber; 4R: Molded Reinforced Synthetic Rubber
Control Air Connection	1/8 in. NPT Barbed Fitting for 5/32 or 1/4 in. O.D. Polytubing	
Maximum Control Pressure	30 psi (210 kPa) without Pilot; 25 psi (175 kPa) with Pilot	
Accessories	Included in Table 1	

Note: For electric actuator specifications, refer to the appropriate electric actuator product bulletin.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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Printed in U.S.A.