VCB30 Series

2-Way & 3-Way Non–Spring Return Characterized Ball Valves

General

The VCB30 Series electric rotary-motion actuator-driven characterized ball valves are designed specifically for the HVAC market and are ideal for all automatic temperature control applications using chilled or hot water.

These high-quality actuator-driven ball valves combine the performance of globe valves with the economy of ball valves - providing the best of both worlds. The VCB30 Series ball valves are equipped with a characterized constricted channel at the valve inlet in which choked flow is used to control the flow rate of water. This characterized constricted channel design provides very high rangeability and excellent equal percentage flow characteristics.

The VCB30 Series ball valves are equipped with non-spring return electric rotary-motion actuators of 3-wire on-off/floating or proportional control actions. The 3-wire on-off/floating actuators are available with 24, 120 or 230 V 50/60 Hz power supply while proportional actuators are available with 24 V 50/60 Hz power supply only.

The electric rotary actuators feature simplified mounting of the actuator to a direct-couple bracket. The result is a very low profile unit with flexibility of mounting as well as fast and easy maintenance. All actuators include a manual override lever for manually positioning the valve when the actuator is not powered.

Features and Benefits

Characterized Constricted Channel

- Establishes a flow coefficient (Cv) similar to globe valves, eliminating the need for pipe size correction tables when sizing valves
- Provides superior rangeability and equal percentage flow characteristics

Low Torque

- Facilitates the use of smaller, less expensive direct-mount rotary-motion actuators
- Extends valve and actuator service life

Input Signal Interruption Protection (Proportional Models Only)

- Returns valve to full closed position in DA setting and full open position in RA setting when there is no input signal
- Microcomputer for valve stroke self calibration
- Field selectable 0-10/2-10 VDC or 0-20/4-20 mA input signal

Optional Auxiliary Switches (On-Off/Floating Models Only)

The on-off/floating valves are available as an option with two built-in auxiliary switches that allow setting at 0º and 90º positions.

Feedback Signal (Proportional Models Only)

The proportional valves are provided with 0-10 VDC position feedback signal.

Direct Action (DA) or Reverse Action (RA) Dip Switch Setting (Proportional Models Only)

DA is set for counter-clockwise (CCW) rotation when input signal increases and for clockwise (CW) rotation when input signal decreases. The rotation is vice versa for RA setting.

Dip Switch Settings for Different Input Control Signals (Proportional Models Only)
Choice of 0-10 VDC, 2-10 VDC, 0-20 mA or 4-20 mA input signal can be achieved by setting switches 1 and 3 of the JP1 dip switches.

Input Signal Interruption Protection (Proportional Models Only)

When there is no input signal or input signal is open-circuited, the valve will return to its full closed or full open position, depending on whether the actuator is set for DA or RA action. The switch "2" setting of the JP1 dip switches determines the DA or RA action. While full closed position (0º) is for DA setting, full open position (90º) is for RA setting. The factory setting is DA.

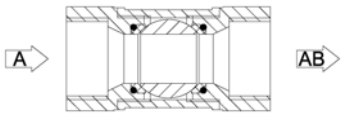
Specifications

Product Model Numbers	Refer to Tables 1 and 2	
Valve Body Pressure Rating	25 bar (360 PSI), meets or exceeds pressure and temperature ratings of PN25, equivalent to ANSI Class 250	
Body Sizes	15 to 150 mm (1/2" to 6")	
End Connections	Female BSP tapered for 15 through 50 mm sizes	
	DIN standard flanges for 65 through 150 mm sizes (ANSI standard optional)	
Fluid Temperature Limits	2º to 94ºC (36º to 200ºF) at 360 PSI	
Service	Chilled and Hot Water, up to 50% glycol solutions	
Flow Characteristic	Equal percentage (Linear on bypass port of 3-way valve)	
Seat Leakage	0.01% of Kv, meets ANSI Class IV	
Stroke	90º	
Maximum Close-off Pressures	Refer to Tables on Page 4	
Construction Materials	Threaded Body	Cast 304 stainless steel
	Flanged Body	Cast Iron HT250
	Ball	304 stainless steel
	Stem	304 stainless steel
	O-rings	NBR
	Seat	PTFE with 5% graphite
Non-Spring Return Rotary Actuators	Power Supply	24, 120 or 230 V 50/60 Hz for 3-wire on-off/floating models 24 V 50/60 Hz only for proportional models
	Power Consumption	5 VA maximum for 03 and 04 actuators
		5.5 VA maximum for 25 actuators
		10 VA maximum for 65 actuators
	Input Signals	3-wire on-off/floating; Field selectable 0-10 VDC, 2-10 VDC, 0-20 mA or 4-20 mA
	Input Impedances	Proportional models: 200,000 Ω for 0-10/2-10 VDC input 500 Ω for 0-20/4-20 mA input
	Feedback Signal	Proportional models only: 0-10 VDC for 90º span, maximum 1 mA
	Auxiliary Switches	3-wire floating models only: 2 x SPST switches for end of travel position indication
	Running Time	30/25 s at 50/60 Hz for 03 actuators
		50/42 s at 50/60 Hz for 04 actuators
		120/100 s at 50/60 Hz for 05 and 06 actuators
	Protection Class	IP54
	Agency Approval	CE Mark Compliant
	Ambient Conditions	Operating: -5 to 50ºC (23 to 122ºF); 0-95% RH, non-condensing Storage: -30 to 70ºC (-22 to 158ºF); 0-95% RH, non-condensing

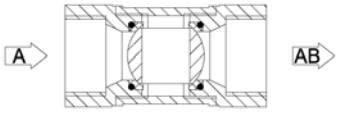
The performance specifications above are nominal and subject to tolerances and application variables of generally acceptable industry standards. The manufacturer shall not be liable for damages resulting from misapplication or misuse of its products.

Flow Directions

2-way Threaded Valves

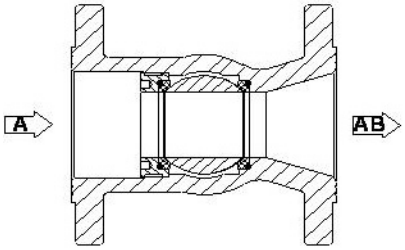


A to AB Open

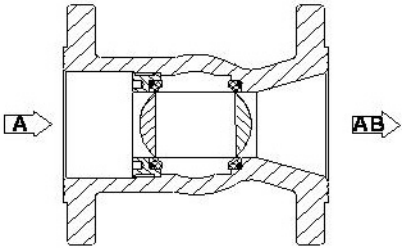


A to AB Closed

2-way Flanged Valves



A to AB Open

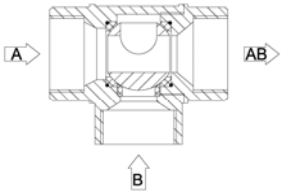


A to AB Closed

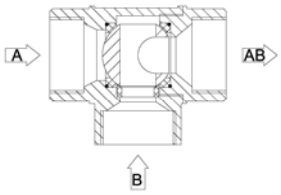
2-way valve must be installed on return side of coil.

3-way Threaded Valves

Mixing Application

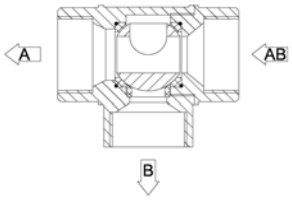


A to AB Open

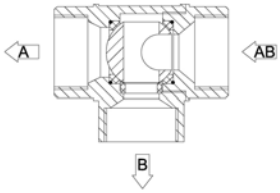


A to AB Closed

Diverting Application



AB to A Open



AB to A Closed

Notes: All 3-way valves are assembled with ball ports labeled as A, B and AB and shipped as standard with
For 3-Wire On-Off/Floating Actuator
A closed to AB at 0º clockwise or rotate counter-clockwise to open.

For 0(2)-10 VDC/4(0)-20 mA Actuator
With DA Setting
A closed to AB at 0 (2) VDC or 4 (0) mA.

Mixing Applications
Fluid enters through two inlets (A, B) and exits through one outlet (AB).

A is service port.
B is bypass port.

Diverting Applications
Fluid enters through one inlet (AB) and exits through two outlets (A, B). Bypass port Kv: 50% of Port A for full-port valve and 70% of Port A for characterized valve.

A is service port.
B is bypass port.

Table 1 - Threaded Characterized Ball Valve Selection Table

Connection		Valve Body	Connection	Pipe	Ball	Actuator	Flow Coefficient		Close-off ΔP	
Inches	mm	Model Number		Threads	Material	Model Number	Cv	Kv	PSI	kPa
1/2	15	VCB30-x015004pm0	x: 2 = 2-way 3 = 3-way	p: B = BSP Tapered N = NPT	m: 2 = Stainless Steel (standard)	SBAyy3za or SBAyy4z0 Where SBA = Ball Valve Actuator Actuator Type yy = 03 for 15 to 25 mm yy = 04 for 32 to 50 mm Input Signal Type 3 = 3-Wire Floating 4 = Proportional Supply Voltage z: A = 24 VAC B = 120 VAC U = 230 VAC Options a = 0 = None a = 2, with 2 x SPST auxiliary switches	4.7	4.0	85	600
		●VCB30-x015014pm0					14.0	12.0		
3/4	20	VCB30-x020007pm0					7.4	6.3		
		●VCB30-x020017pm0					17.5	15.0		
1	25	VCB30-x025011pm0					11.7	10.0		
		●VCB30-x025025pm0					25.7	22.0		
1-1/4	32	VCB30-x032018pm0					18.7	16.0		
		●VCB30-x032038pm0					36.3	31.0		
1-1/2	40	VCB30-x040029pm0					29.3	25.0		
		●VCB30-x040038pm0					38.6	33.0		
2	50	VCB30-x050046pm0					46.8	40.0		
		●VCB30-x050058pm0					58.5	50		

● Full port without characterized opening

Table 2 - Flanged Ball Valve Selection Table

Connection		Valve Body	Pipe	Ball	Actuator	Flow Coefficient		Close-off ΔP	
Inches	mm	Model Number	Flanges	Material	Model Number	Cv	Kv	PSI	kPa
2-1/2	65	VCB30-2065075fm0	f: A = ANSI Flanges (Optional) D = DIN Flanges (Standard)	m: 1 = Brass (Optional) 2 = Stainless Steel (standard)	SBAyy3za Or SBAyy4z0 Where SBA = Ball Valve Actuator Actuator Type yy = 25 for 65 to 100 mm yy = 65 for 125 to 150 mm Input Signal Type 3 = 3-Wire Floating 4 = Proportional Supply Voltage z: A = 24 VAC B = 120 VAC U = 230 VAC Proportional models available with 24 VAC only Options a = 0 = None a = 2, with 2 x SPST auxiliary switches	75	64	85	600
		●VCB30-2065150fm0				150	128		
3	80	VCB30-2080119fm0				119	102		
		●VCB30-2080159fm0				159	136		
4	100	VCB30-209186fm0				190	163		
		●VCB30-209254fm0				255	218		
5	125	VCB30-210234fm0				306	260		
		●VCB30-210319fm0				320	274		
6	150	VCB30-211271fm0				487	416		
		●VCB30-211373fm0				593	507		

***** 3-way configuration not available in flanged valves
● Full port without characterized opening

Valve Selection Examples:

Example 1: 25 mm Valve, 2-way, Cv=11.7, NPT Threads, Stainless Ball, 3-Wire Floating, 230 VAC
= VCB30-2025011N20+SBA033U0

Example 2: 50 mm Valve, 3-way, Cv=46.8, BSP Threads, Stainless Steel Ball, Proportional, 24 VAC
= VCB30-3050046B20+SBA044A0

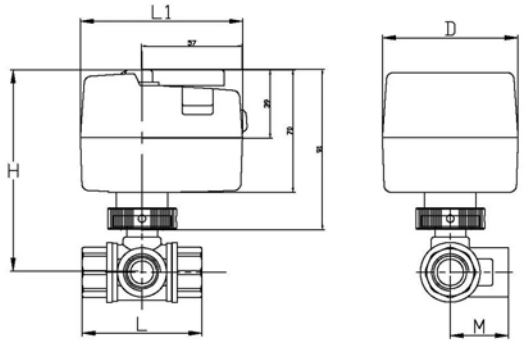
Example 3: 80 mm Valve, 2-way, Cv=119, DIN Flanged, Stainless Steel Ball, 3-Wire Floating, 24 VAC
= VCB30-2080119D20+SBA053A0

Dimensions and Weights

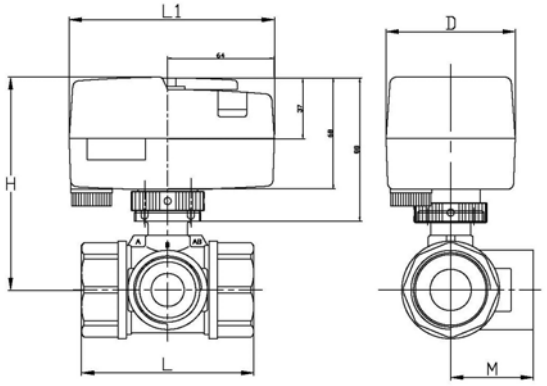
THREADED BALL VALVES

Connection		Max. Pipe Thread Size mm	H		L				M		L1		D		Weight*			
					2-way		3-way								2-way		3-way	
Inches	mm		Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Lb.	kg	Lb.	kg
1/2	15	13	4-17/32	115	2-11/16	68	2-11/16	68	1-5/16	33	3-5/8	92	3-1/32	77	1.82	0.83	1.96	0.89
3/4	20	13	4-17/32	115	2-11/16	68	2-11/16	68	1-3/8	35	3-5/8	92	3-1/32	77	1.86	0.86	2.18	0.99
1	25	17	4-23/32	120	3-5/16	84	3-5/16	84	1-23/32	44	3-5/8	92	3-1/32	77	2.42	1.1	2.73	1.24
1-1/4	32	19	5-5/32	131	3-7/8	98	4-3/32	98	2	50	4-27/32	123	3-1/16	78	2.64	1.2	4.14	1.88
1-1/2	40	19	5-5/32	131	4-1/8	105	4-3/8	105	2	50	4-27/32	123	3-1/16	78	4.02	1.83	4.62	2.1
2	50	29	5-5/16	135	4-13/16	122	5-27/32	123	2-7/16	62	4-27/32	123	3-1/16	78	4.99	2.27	7.41	3.37

* Weight includes mounting bracket and actuator



15 to 25 mm Ball Valves

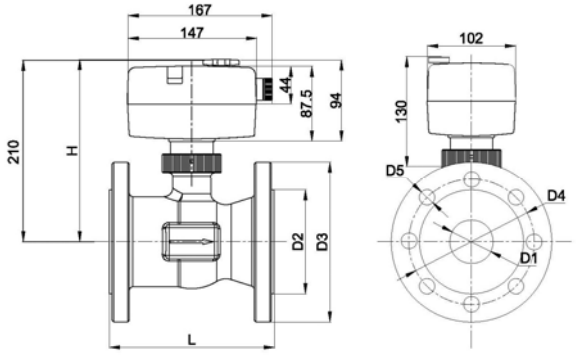


32 to 50 mm Ball Valves

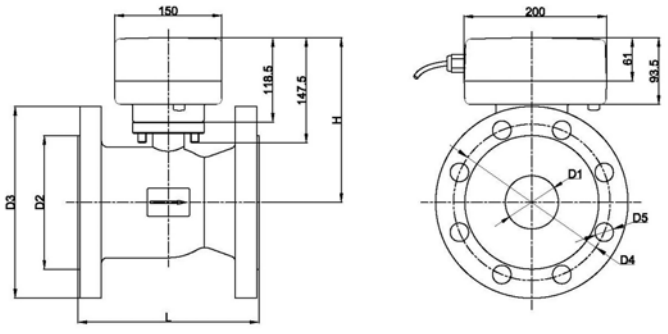
FLANGED BALL VALVES

Connection		L		H		D1		D2		D3		D4		Bolt		No. of Bolt Holes	Weight*	
Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Thread	Φ (D5) mm		Lb.	kg
2-1/2	65	7-1/2	190	3-7/8	98	3-1/4	82	4-3/4	120	7-1/4	185	5-3/4	145	M16	18	8	32.55	14.5
3	80	7-1/2	190	3-7/8	98	3-1/4	82	5-3/8	136	7-7/8	200	6-1/4	160	M16	18	8	34.97	15.9
4	100	9	230	4-1/4	108	4	102	6-3/8	162	9-1/4	235	7-15/32	190	M20	23	8	47.55	21.6
5	125	10	254	4-1/2	118	5	125	7-1/4	188	10-5/8	270	8-5/8	220	M24	26	8	67.76	30.8
6	150	10-1/2	267	5-1/4	133	6	154	8-1/2	215	11-7/8	300	10	250	M24	26	8	89.66	40.8

* Weight includes mounting bracket and actuator



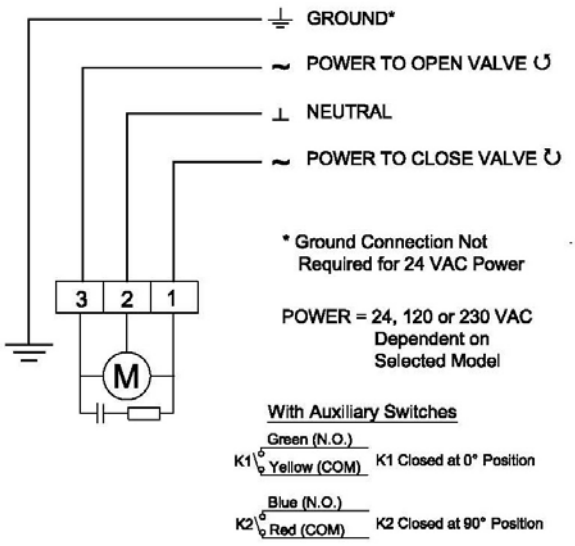
65 to 100 mm Ball Valves



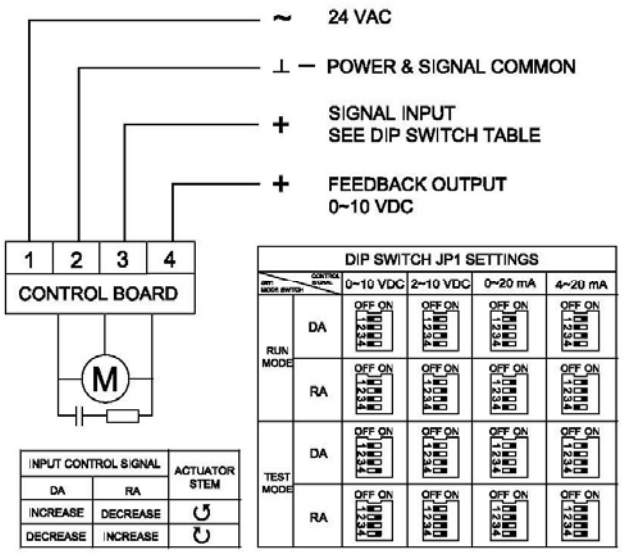
125 to 150 mm Ball Valves

Wiring Diagrams

For 3-Wire On-Off/Floating Actuators



For Proportional Actuators



INPUT CONTROL SIGNAL		ACTUATOR STEM
DA	RA	
INCREASE	DECREASE	↺
DECREASE	INCREASE	↻

DIP SWITCH JP1 SETTINGS

		0~10 VDC	2~10 VDC	0~20 mA	4~20 mA
RUN MODE	DA				
	RA				
TEST MODE	DA				
	RA				

Valve Stroke Self Calibration

Test Mode
After power is turned on, set all dip switches of JP1 according to the above table. Firstly, set switch 4 of JP1 to “ON” position. Press STUDY/REPOSITION momentary switch SW1 once and power LED will start flickering. Actuator stem starts opening the valve until reaching its maximum stroke. When the gear chain is blocked, the actuator stem will start reversing its rotation until the valve is fully closed and the gear train is blocked again. The power LED becomes steady indicating that the test mode is finished and over. The valve stroke calibration data will be kept in the actuator’s microcomputer memory and no further recalibration is required when power is turned on again.

After the test, place switch 4 to “OFF” position to put the actuator back into run mode. Note that if the switch 4 is not placed back to its “OFF” position during the test mode, the valve assembly will still operate normally but the actuator will go through the test mode every time when power is turned on.

Run Mode
Every time when power is turned on, the power LED lights up steadily indicating that the actuator is now ready to act in accordance with the input signal.

Change of Operating Mode
If operating mode needs to be changed, change the dip switch positions of JP1 as desired and new settings will be confirmed after the STUDY/ REPOSITION switch SW1 is pressed once. There is no need to turn the power off for this process to take place.

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