

VFB30 Series

20 to 150 mm 2-Way Automatic Flow Balancing Control Ball Valves



Features and Benefits

Employs Flow Sensor to Limit Maximum Flow

- Provides flow balancing function with simple commissioning procedures as compared to pressure-type balancing valve.
- Improved balanced system with less pump power for direct return system
- To set flow limit without flow resistance calculation at each branch off

One-Piece Design

- Propeller-type water flow sensor and modulating control ball valve are integrated together as one piece for easy and economical field installation.
- Provides high precision and equal percentage characteristics

Flow Display

- Local LED display of maximum flow rate setting for easy field adjustment and lower balancing labor
- Local LED display of current operating flow rates with analog signal output for remote monitoring

Characterized Opening

- 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

General

The VFB30 Series electric rotary-motion actuator-driven characterized ball valves integrated with propeller-type flow control are designed specifically for terminal equipment such as fan coils and air handlers in HVAC system and are ideal for all automatic temperature control applications using chilled or hot water.

In addition to flow limit control, the control ball valve is also used to modulate flow to the terminal equipment under the command of a 3-wire on-off/floating controller or a SPDT relay for 3-wire on-off/floating models or a 0-10 VDC controller for 0-10 VDC input models.

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 VFB30 Series automatic flow balancing control ball valves are equipped with a propeller-type flow measuring device to provide a flow control signal to the controller integrated in the ball valve actuator. The ball valve will be positioned to its optimum operating position according to the control signal from the field controller until the preset flow limit is reached and then the preset flow rate limit will be maintained. The VFB30 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 VFB30 Series automatic flow balancing control ball valves are equipped with non-spring return electric rotary-motion actuators of 3-wire floating or 0-10 VDC control actions. Standard power supply is 24V 50/60Hz and all actuators come with a manual override lever for manually positioning the valve when the actuator is not powered.

The VFB30 Series automatic flow balancing control ball valves assure that all terminal equipment will perform as specified and HVAC system will operate under accurately and dynamically balanced conditions. Terminal equipment with VFB30 Series automatic flow balancing control ball valves will not exceed design flow even after modifications or additions to the system.

Specifications

Valve body model numbers	Refer to Table 1		
Valve body pressure rating	25 bar (360 PSI), meets or exceeds pressure and temperature ratings of PN25, equivalent to ANSI Class 250		
Body sizes	20 to 150 mm (3/4" to 6")		
End connections	Female BSP tapered for 20 to 50 mm DIN standard flanges for 65 to 150 mm		
Fluid temperature limits	2° to 80°C (36° to 176°F)		
Service	Chilled and hot water, up to 50% glycol solutions		
Flow characteristic	Equal percentage		
Seat leakage	0.01% of Kv, meets ANSI Class IV		
Stroke	90°		
Maximum close-off pressure	600 kPa (85 PSI)		
Materials of construction	Ball valve Body	Threaded valves: forged brass	
		Flanged valves: Cast iron HT250	
	Ball	Stainless steel 304	
	Stem	Stainless steel 304	
	O-rings	NBR	
	Seat	PTFE with 5% graphite	
	<u>Flow sensor:</u>		
	Impeller	Glass-fiber reinforced nylon (FRPA66)	
	Impeller shaft	Tungsten alloy	
	Impeller bracket	Polyphenylene (PPS)	
	Shaft bearing	Jewel bearing	
	Non-spring return rotary-motion actuators with integral flow control	Model numbers	SPA043A0
		SPA053A0	For 65 to 80 mm valve bodies, 3-wire on-off/floating
		SPA063A0	For 100 to 150 mm valve bodies, 3-wire on-off/floating
		SPA044A0	For 20 to 50 mm valve bodies, 0-10 VDC input
		SPA054A0	For 65 to 80 mm valve bodies, 0-10 VDC input
		SPA064A0	For 100 to 150 mm valve bodies, 0-10 VDC input
	Power supply	24 V 50/60 Hz only	
	Power consumption and torque	5 VA maximum, 6 Nm for SPA04_A0 7 VA maximum, 25 Nm for SPA05_A0 10 VA maximum, 65 Nm for SPA06_A0	
	Input signal and input impedance	Floating: 3-wire on-off (250 Ω) Proportional: 0-10 VDC (100 KΩ)	
	Feedback signal	Proportional: 0-10 VDC corresponding to 0-90° range Models only 0-10 VDC corresponding to actual flow rate	
	Stroke time	60 s at 50 Hz for SPA04_A0 (120 s optional) 120 s at 50 Hz for SPA05_A0 and SPA06_A0	
	Rotating angle range	0° ≤ angle ≤ 90°	
	Electrical connections	Colored wire leads	
	Protection class	IP54	
	Agency approval	CE Mark compliant	
	Ambient conditions	Operating: -5 to 50°C (23 to 122°F); 0-95% RH, non-condensing Storage: -30 to 70°C (-22 to 158°F); 0-95% RH, non-condensin	

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

Table 1 - Automatic Flow Balancing Control with 2-way Characterized Ball Valve Model Number Selection Table

Connection		Valve Body Model Number	Pipe Connection	Ball Material	Options	Actuator Model Number	Flow Coefficient		Flow Limit Range	Close-off Pressure ΔP	
Inches	mm						Cv	Kv		PSI	kPa
3/4	20	VFB30-020B2x	B= BSP and D = DIN flanges are Standard	2 = stainless steel is standard	x: 0 = none	SPAyyzAx	7.4	6.3	0.5~5.0	85	600
1	25	VFB30-025B2x				Where SPA = SPA Series flow balancing valve actuator	11.7	10	1.0~10.0		
1-1/4	32	VFB30-032B2x				<u>Actuator type (yy)</u> yy = 04 for 20 to 50 mm yy = 05 for 65 to 80 mm yy = 06 for 100 to 150 mm	18.7	16	3.2~16.0		
1-1/2	40	VFB30-040B2x				<u>Input signal type (z)</u> z = 3 = 3-wire on-off/floating z = 4 = 0-10 VDC proportional	29.3	25	5.0~25.0		
2	50	VFB30-050B2x				<u>Supply voltage</u> A = 24 VAC only	46.8	40	8.0~40.0		
2-1/2	65	VFB30-065D2x				<u>Options (x)</u> x = 0 = none	75	64	12.0~64.0		
3	80	VFB30-080D2x					119	102	20.0~102.0		
4	100	VFB30-100D2x					190	163	32.0~163.0		
5	125	VFB30-125D2x					306	260	52.0~260.0		
6	150	VFB30-150D2x					487	416	83.0~416.0		

Ordering Instruction

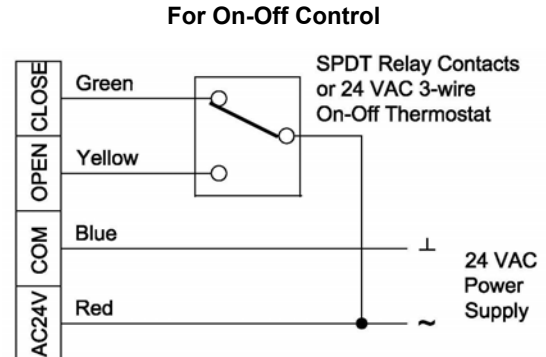
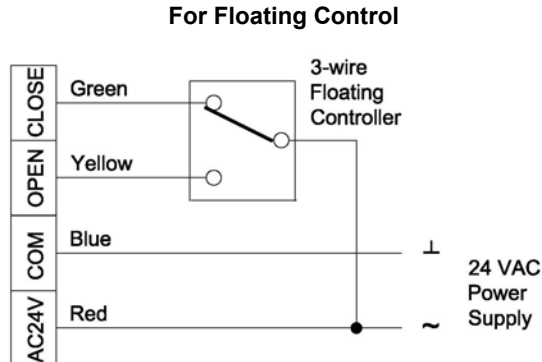
To order, specify both the valve body and actuator model numbers, factory mounting required. Preset flow limit can also be requested on ordering.

Flow Balancing Control Ball Valve Selection Example:

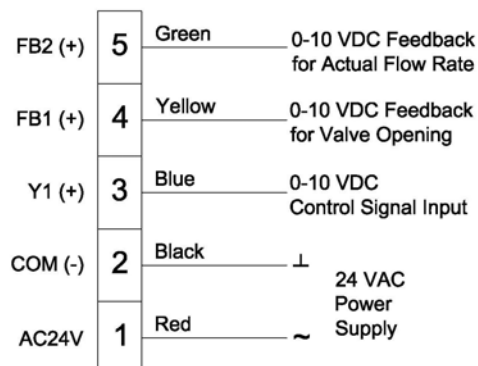
Example 1: 25 mm valve, 2-way, Cv=11.7, BSP threads, stainless steel ball, 3-wire floating input, 24 VAC
= VFB30-025B20 + SPA043A0

Figure 1: Wiring Diagrams

With 3-Wire Floating Actuators



With 0-10 VDC Actuators

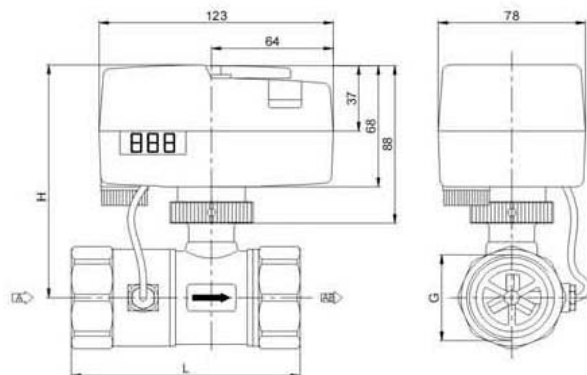


Dimensions and Weights

THREADED BALL VALVES

Connection		Max. Pipe Thread Size mm	Flow Control Range (m ³ /h)	L		H		G		Weight*
Inches	mm			Inches	mm	Inches	mm	Inches	mm	
3/4	20	15	0.5~5.0	3-3/4	95	4-1/2	114	3/4	20	0.96
1	25	17	1~10	4-1/8	105	4-11/16	119	1	25	1.2
1-1/4	32	19	3.2~16	5	125	5	128	1-1/4	32	1.2
1-1/2	40	19	5~25	5	125	5	128	1-1/2	40	1.83
2	50	22	8~40	5-1/16	144	5-3/16	132	2	50	2.27

* Weight includes mounting bracket and actuator

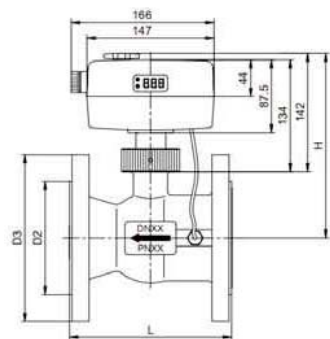


20 to 50 mm

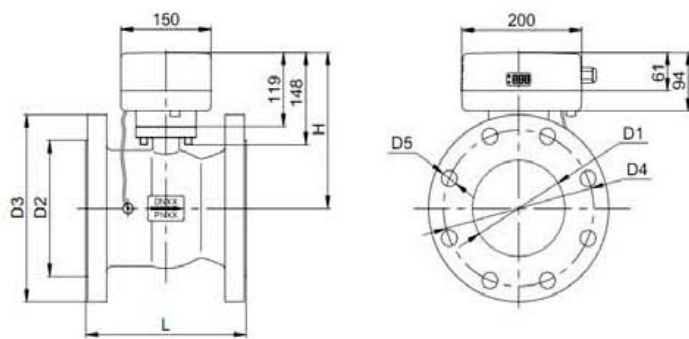
FLANGED BALL VALVES

Connection		Flow Control Range (m ³ /h)	L		H		D1		D2		D3		D4		D5		No. of Bolt Holes	Weight*
Inches	mm		Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm		
2-1/2	65	12~64	7-1/2	190	8-3/4	222	3-1/4	82	4-3/4	120	7-1/4	185	5-3/4	145	23/32	18	8	14.5
3	80	20~102	7-1/2	190	8-3/4	222	3-1/4	82	5-3/8	136	7-7/8	200	6-1/4	160	23/32	18	8	15.9
4	100	32~163	9	230	9-1/8	232	4	102	6-3/8	162	9-1/4	235	7-1/2	190	15/16	23	8	21.6
5	125	52~260	10	254	9-1/8	232	5	125	7-1/4	188	10-5/8	270	8-5/8	220	1-1/32	26	8	30.8
6	150	83~416	10-1/2	267	5-1/4	250	6	154	8-1/2	215	11-7/8	300	10	250	1-1/32	26	8	40.8

* Weight includes mounting bracket and actuator



65 to 80 mm



100 to 150 mm

Flow Rate Settings for Various Valve Sizes

3-Wire Floating Actuators

JP2 DIP Switch Settings (Factory Set)				LED Display	Valve Size	Flow Limit Range (m³/h)
Switch 1	Switch 2	Switch 3	Switch 4			
0	0	0	0	H00	DN20	0.5~5.0
1	0	0	0	H01	DN25	1.0~10
0	1	0	0	H02	DN32	3.0~16
1	1	0	0	H03	DN40	5.0~25
0	0	1	0	H04	DN50	8.0~40
0	0	0	0	H05	DN65	12~64
1	0	0	0	H06	DN80	20~102
0	1	0	0	H07	DN100	32~163
1	1	0	0	H08	DN125	52~260
0	0	1	0	H09	DN150	83~416

0-10 VDC Proportional Actuators

JP2 DIP Switch Settings (Factory Set)			LED Display	Valve Size	Flow Limit Range (m³/h)
Switch 1	Switch 2	Switch 3			
0	1	1	A01	DN20	0.5~5.0
1	0	1	A02	DN25	1.0~10
0	0	1	A03	DN32	3.0~16
1	1	0	A04	DN40	5.0~25
0	1	0	A05	DN50	8.0~40
0	1	1	A06	DN65	12~64
1	0	1	A07	DN80	20~102
0	0	1	A08	DN100	32~163
1	1	0	A09	DN125	52~260
0	1	0	A10	DN150	83~416

Piping and Installation Notes

The preferred location for the flow balancing valves is the return side of the terminal equipment, which is recommended by ASHRAE and many engineers because it will:

- Minimize air entrapment
- Reduce noise problems
- Decrease the possibility of valve cavitations

Always install Y-trap type filter in front of the flow balancing valve or terminal equipment.

If and when the flow balancing valve is used on headers, install it

at the discharge side of the water pumps to avoid cavitations caused by low pressure bubbles.

Install the flow balancing valve on a straight pipe run of at least 5 pipe diameters on each side from nearest elbow or other pipe restriction, as the flow detector in the valve is sensitive to flow turbulence.

Always readjust the flow balancing valves when the number of pipe branches or loops has changed or when additional HVAC equipment are added to the system.

Operation Notes

- JP2 DIP switch is factory set according to water pipe size. Always check for proper setting before applying power to the actuator.
- LED will show the current operating flow rate and maximum flow limit setting alternatively. When the upper LED is lit, the reading will represent Maximum flow rate set point and when the lower LED is lit, the reading will represent current operating flow rate.
- Maximum flow limit set point can be changed by adjusting the potentiometer provided above the LED. The LED will display the maximum flow limit set point adjustment when the potentiometer is being adjusted and the LED display will return to normal operation automatically when adjustment is completed. Make sure that the flow limit setpoint setting is within the operating range of the JP2 DIP switch setting.
- When branches or terminal equipment are added or removed from the system, it is recommended to reset the maximum flow limit of the flow balancing valve to assure optimal operation.
- When setting the flow limit set point, observe the minimum and maximum permissible flow rates as stated in Flow Control Range of Table 1.

