

VFB30 Series

BACnet MS/TP Networking Flow Balancing Control Valves

**Features and Benefits**

BACnet MS/TP networking capability

- Supports local flow limit setpoint operation only on BACnet MS/TP communication failure
- Displays off/on status of system operation
- Displays instantaneous flow value
- Field selectable RS-485 communication port baud rate setting: 9,600, 19,200, 38,400 or 76,800 bps
- Choice of local or remote flow limit setpoint
- Displays the size of control valve in service
- Displays local limit setpoint value
- Adjusts and displays remote flow limit setpoint value

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

Local Flow Display

- Local LCD display of maximum flow rate setting for easy field adjustment and lower balancing labor
- Local LCD 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 NFBV Series networking electric rotary-motion actuator-driven characterized control ball valves are BACnet Master-Slave/Token-Passing (MS/TP) networked devices designed in strict accordance with ASHRAE standard 135-2010 and are native BACnet devices.

The technologically advanced NFBV Series networking valves feature a BACnet MS/TP communication capability that enables remote monitoring and configuration for efficient flow balancing control. Its integral propeller-type flow control is designed specifically for terminal equipment such as fan coils and air handlers in HVAC system and is ideal for all automatic temperature control applications using chilled or hot water.

In addition to flow limit control, the control valve is also used to modulate flow to the terminal equipment under the command of a 3-wire floating controller or a SPDT relay.

The 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 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 NFBV 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 NFBV Series valves are equipped with non-spring return electric rotary-motion actuators of modulating control actions, integrated with a BACnet MS/TP interface module. 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 NFBV Series valves assure that all terminal equipment will perform as specified and HVAC system will operate under accurately and dynamically balanced conditions. Terminal equipment with NFBV Series 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		
Materials of construction	Ball valve Body	Threaded valves: forged 304 stainless steel	
		Flanged valves: Cast iron HT250	
	Ball	304 Stainless steel	
	Stem	304 Stainless steel	
	O-rings	NBR	
	Seat	PTFE with 5% graphite	
	<u>Flow sensor:</u>		
	Impeller	Glass-fiber reinforced nylon (FRPA6)6	
	Impeller shaft	Tungsten alloy	
	Impeller bracket	Poly-phenylene (PPS)	
Shaft bearing	Jewel bearing		
Non-Spring Return Rotary Actuators with Integral Flow Control	Model numbers	NFBVA043A0	For 20 to 50 mm valve bodies
		NFBVA053A0	For 65 to 100 mm valve bodies
		NFBVA063A0	For 125 to 150 mm valve bodies
	Power supply	24 V 50/60 Hz only	
	Power consumption and torque	5 VA maximum, 6 Nm for SFA043A0 7 VA maximum, 25 Nm for SFA053A0 10 VA maximum, 65 Nm for SFA063A0	
	Input signal and input impedance	3-wire floating, 250 Ω nominal	
	Control precision	±5% of full scale	
	Stroke time	60 s at 50 Hz for SFA043A0 (120 s optional) 120 s at 50 Hz for SFA053A0 and SFA063A0	
	Rotating angle range	90° < angle ≤ 95°	
	Electrical connections	Colored wire leads	
Protection class	IP54		
BACnet MS/TP Interface Module	Power supply	15 VDC ±5% from main board	
	RS-485 Communication speed	Choice of 9,600, 19,200, 38,400 or 76,800 bps; factory set at 38,400 bps	
	BACnet MS/TP Network guideline	Maximum 32 devices and maximum 1,000 m per segment; maximum two segments per network trunk with one repeater; maximum 64 devices per network trunk; only one segment allowed at 76,800 bps baud rate.	
	MAC address range	1 to 127 via on-board jumpers	
	BACnet instant ID setting	Via derived network addressing (DNA) or software setup procedure	
	Valve size setting	Via on-board DIP switches	
	Analog input/output signal voltage range	0-10 VDC	
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 - NFBV Series BACnet MS/TP Networking Flow Balancing Control with 2-way Characterized Ball Valve Model Number Selection Table

Connection		Valve Body	Pipe	Ball	Options	Actuator	Flow Coefficient		Flow Control Range	Close-off Pressure ΔP	
Inches	mm	Model Number	Connection	Material			Model Number	Cv	Kv	m ³ /h	PSI
3/4	20	VFB30-020B2x	B = BSP and D = DIN flanges are Standard	2 = stainless steel is standard	x: 0 = None	NFBVAyy3A0 Where NFBVA = NFBVA Series flow balancing valve actuator <u>Input signal type</u> 3 = 3-wire floating <u>Actuator type</u> yy = 04 for 20 to 50 mm yy = 05 for 65 to 80 mm yy = 06 for 100 to 150 mm <u>Supply voltage</u> A = 24 VAC only <u>Options</u> 0 = None	7.4	6.3	0.5~5.0	85	600
1	25	VFB30-025B2x					11.7	10	1.0~10.0		
1-1/4	32	VFB30-032B2x					18.7	16	3.0~16.0		
1-1/2	40	VFB30-040B2x					29.3	25	5.0~25.0		
2	50	VFB30-050B2x					46.8	40	8.0~40.0		
2-1/2	65	VFB30-065D2x					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					304	260	52.0~260.0		
6	150	VFB30-150D2x	487	416	83.0~416.0						

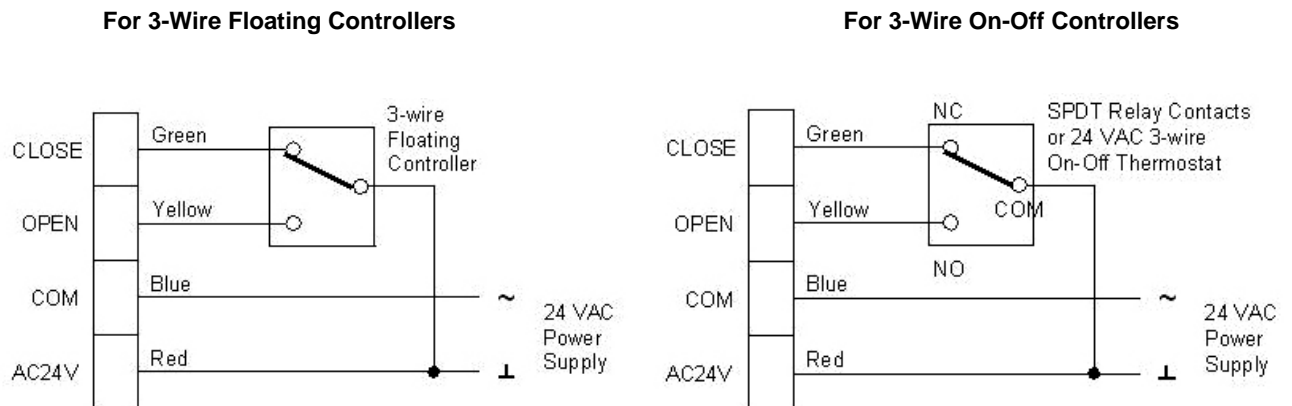
Ordering Instruction

To order, specify both the valve body and actuator model numbers for factory mounting. 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 + NFBV043A0

Figure 1: Wiring Diagrams



BACnet MS/TP Interface Module

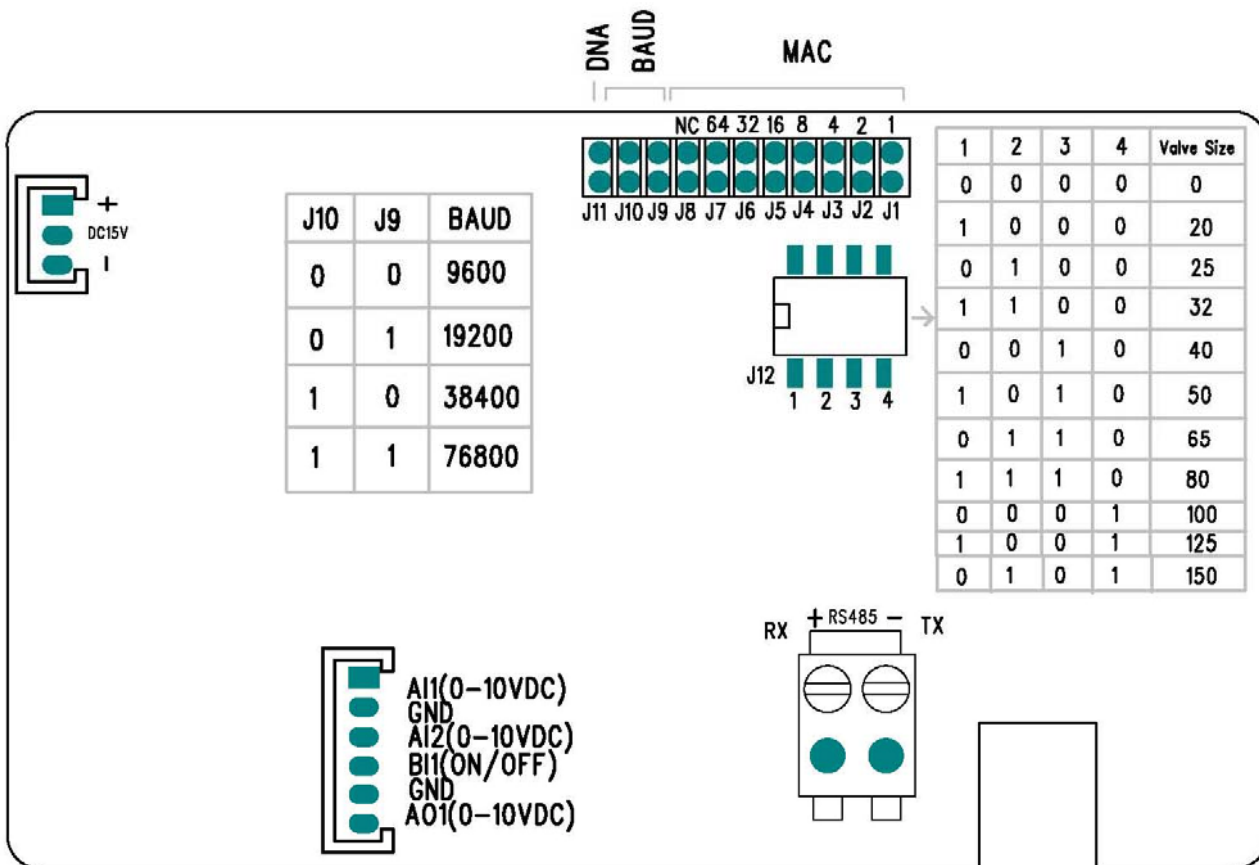
The BACnet MS/TP interface module integrated in the valve actuator provides interface between the flow balancing control valve and BACnet automation system with

- 1 binary input, 2 analog input, 1 binary value, 1 analog output and 1 analog value points
- 1 RS-485 communication port
- On-board baud rate setting jumpers
- On-board MAC address setting jumpers
- On-board derived network address (DNA) setting jumper
- On-board selection of control valve size DIP switches

Remote Operation Notes

- The valve flow limit can be set either remotely by the workstation operator or locally in the field
- Choice of remote or local flow limit setting can be activated at the operator workstation
- When actual flow is below the remote flow limit setpoint, the temperature controller output will modulate the ball valve according to temperature of the controlled environment
- When the actual flow exceeds the remote flow limit setpoint, the temperature controller output will be overridden and valve position will be maintained by the remote flow limit setpoint

Settings of Jumpers and DIP Switches

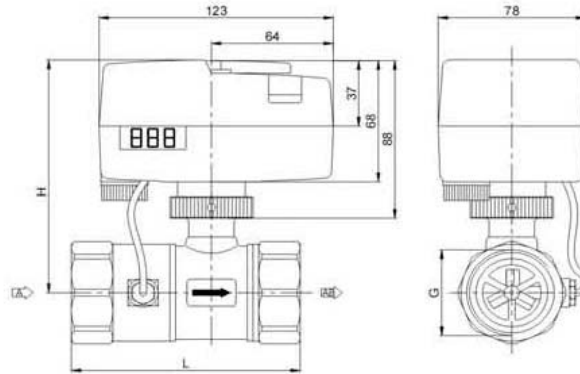


Dimensions and Weights

THREADED BALL VALVES

Connection		Max. Pipe Thread Size mm	Flow Control Range (m ³ /h)	L		H		G		Weight* kg
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	4-3/4	119	1	25	1.2
1-1/4	32	19	3~16	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

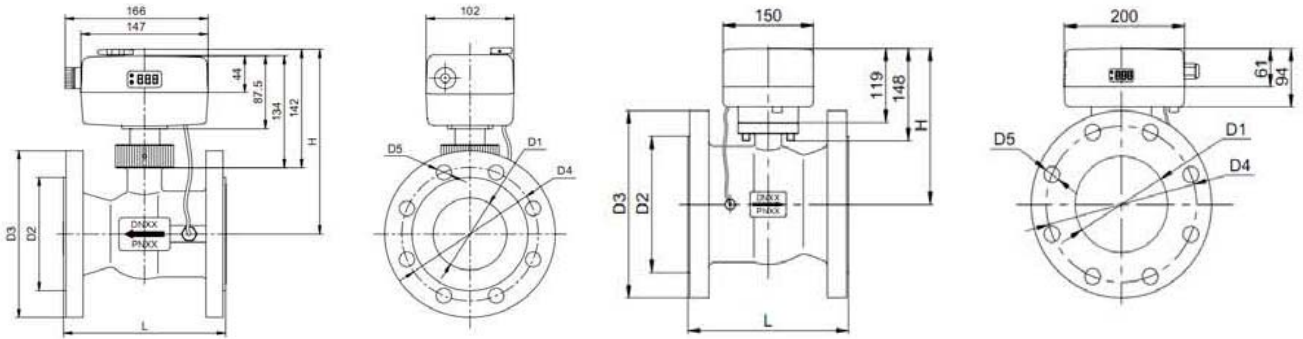


20 to 50 mm

FLANGED BALL VALVES

Connection		Flow Control Range (m ³ /h)	L		H		D1		D2		D3		D4		D5		No. of Bolt Holes	Weight* kg
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 100 mm

125 to 150 mm

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

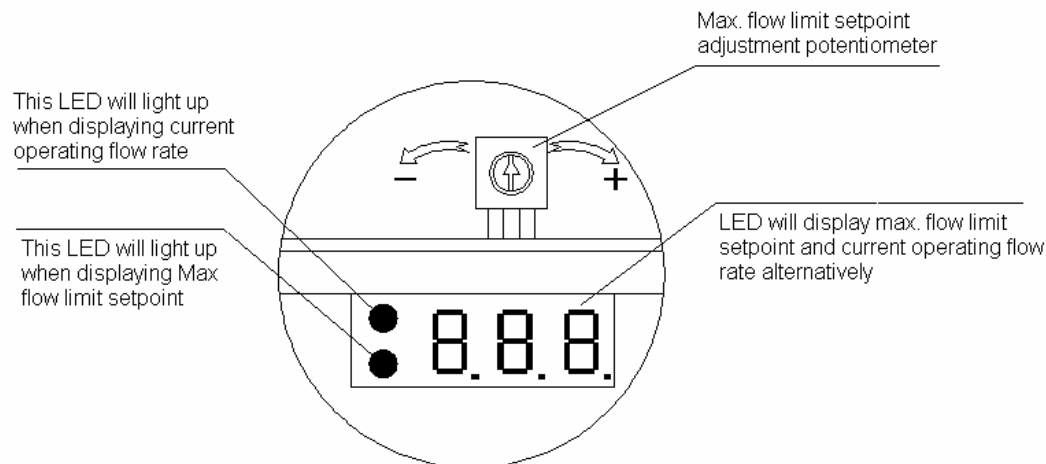
Always install Y-trap type filter in front of the flow balancing valve or terminal equipment.

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.

Local Operation Notes

- 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.
- 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 allowable flow rates as stated in Flow Control Range of Table 1.



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