



# Features and Benefits



#### **BENEFIT OF THE BELIMO CHARACTERIZING DISC**

- Equal percentage flow characteristic.
- Excellent control stability assured with the characterizing disc.
- $C_v$  values equal to  $C_v$  values of globe values the same size.
- The need for multiple pipe reduction is usually eliminated.
- Better control prevents "hunting" of the control loop, increasing life span of actuator and valve.

EQUAL PERCENTAGE VALVE CHARACTERISTIC

In order to ensure good stability of control, it is essential for a control valve to have an equal percentage characteristic. This type of characteristic produces a linear variation in thermal output according to the amount of opening of the valve (also known as the system characteristic). Under normal testing conditions a conventional ball valve exhibits an S-shaped characteristic. When it is installed in a real system, however, this characteristic is seriously deformed because, compared with its nominal size, a ball valve possesses an extremely high flow coefficient. Whether used with or without pipe reducers or a reduced bore, they do not normally allow stable regulation of the thermal capacity.

Belimo's unique Characterized Control Valve™ (CCV) is very different. A special characterizing disc inside the valve gives it an equal percentage characteristic which is comparable with that of a globe valve of the same nominal size. The flow (the C<sub>V</sub> value) is reduced to the required value by a combination of the hole in the ball and the shaped aperture in the disc. The increase in flow as the valve is opened is very slow and controlled.

This produces better part-load behavior and improved stability of control while also optimizing energy consumption.

#### FEATURES

- Thermal isolating adapter between flange and actuator.
- Easy direct coupling of actuator with a single screw.
- Perpendicular mounting flange and square drive head eliminate lateral forces on the stem.
- Blow-out proof stem with thrust-bearing Teflon<sup>®</sup> disc and double O-ring design for long service life.\*
- Non-corroding chrome-plated brass or stainless ball.

 $^{*}$  Designed for service life of over 100,000 full cycles. Teflon^{ $^{\odot}}$  and Tefzel^{ $^{\odot}}$  are both registered trademarks of Dupont.



- Vent holes reduce condensation build-up.
- Forged brass valve body no pin-hole leaks.
- Characterizing disc made of Tefzel<sup>®</sup> known for excellent strength and chemical resistance.
- Teflon<sup>®</sup> seats with O-rings provide constant seating force against the ball and reduce torque requirement.
- Actuator can be mounted in four different positions.

### Feature / Benefits Characterized Control Valves™ (CCV)



#### **COORDINATED MOTORIZED OPERATION**

The optimum functionality of the Belimo CCV is assured by properly coordinating its actuation with MFT. Specially developed rotary actuators provide the necessary precision for modulating, floating-point, and on/off methods of control.

All CCVs are supplied with the appropriate rotary actuator to provide the close-off and operation desired.

#### **OPTIMIZED FOR CONTROL**

The Belimo CCV marries known technology with an innovative development – the unique characterizing disc.

The marriage of CCV and MFT technologies has produced a range of valuable features which surpass the capabilities of globe valves at a very attractive price level:

- An equal-percentage valve characteristic
- Unlike a globe valve, no sudden change in inlet flow upon opening
- Excellent stability of control
- C<sub>v</sub> values comparable with those of globe valves of the same size or larger
- Higher close-off ratings than standard globe valves
- 100% tight shut-off on two-way valves means NO leak-by unlike globe valves that have ANSI IV shutoff (leakage rate of 0.01% of the C<sub>v</sub> rating)
- Three-way valve can be piped in mixing or diverting application

B2 Series	Two-way
B3 Series	Three-way Mixing/Diverting
B6 Series	Two-way Flanged
	½" to 3"
Service:	Chilled/hot water, 60% glycol
C <sub>v</sub> Range	0.3-240
Material:	Stainless trim or Brass trim
Control:	On/Off, Floating, 2-10 VDC
	Multi-Function Technology®
	Spring Return or Non-Spring Return

## Flow Characteristics of Conventional Ball Valves versus BELIMO CHARACTERIZED CONTROL VALVES







Desirable Equal Percent Flow and resulting heat output is achieved with linear results



#### 2-Way Valve Flow Rate for Water Applications (Gallons Per Minute, GPM)

Cv		DN	2-Way				Pres	sure Drop /	Across the	Valve			
Maximum Rating	Inches	mm	CCV	1 psi	2 psi	3 psi	4 psi	5 psi	6 psi	7 psi	8 psi	9 psi	10 psi
0.3	1⁄2"	15	B207(B)	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.9
0.46	1⁄2"	15	B208(B)	0.5	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
0.8	1⁄2"	15	B209(B)	0.8	1.1	1.4	1.6	1.8	2.0	2.1	2.3	2.4	2.5
1.2	1⁄2"	15	B210(B)	1.2	1.7	2.1	2.4	2.8	2.9	3.2	3.4	3.6	3.8
1.9	1⁄2"	15	B211(B)	1.9	2.7	3.3	3.8	4.2	4.7	5.0	5.4	5.7	6.0
3	1⁄2"	15	B212(B)	3.0	4.2	5.2	6.0	6.8	7.3	7.9	8.5	9.0	9.5
4.7	1⁄2"	15	B213(B)	4.7	6.6	8.1	9.4	11	12	12	13	14	15
7.4	1⁄2"	15	B214(B)	7.4	10	13	15	17	18	20	21	22	23
10	1⁄2"	15	B215(B)*	10	14	17	20	22	24	26	28	30	32
4.7	3⁄4"	20	B217(B)	4.7	6.6	8.1	9.4	11	12	12	13	14	15
7.4	3⁄4"	20	B218(B)	7.4	10	13	15	17	18	20	21	22	23
10	3⁄4"	20	B219(B)	10	14	17	20	22	24	26	28	30	32
24	3⁄4"	20	B220(B)*	24	34	42	48	54	59	63	68	72	76
7.4	1"	25	B222	7.4	10	13	15	17	18	20	21	22	23
10	1"	25	B223	10	14	17	20	22	24	26	28	30	32
19	1"	25	B224	19	27	33	38	42	47	50	54	57	60
30	1"	25	B225*	30	42	52	60	67	73	79	85	90	95
10	1¼"	32	B229	10	14	17	20	22	24	26	28	30	32
19	1¼"	32	B230*	19	27	33	38	42	47	50	54	57	60
25	1¼"	32	B231	25	35	43	50	56	61	66	71	75	79
37	1¼"	32	B232*	37	52	64	74	83	91	98	105	111	117
19	1½""	40	B238	19	27	33	38	42	47	50	54	57	60
29	1½"	40	B239	29	41	50	58	65	71	77	82	87	92
37	1½"	40	B240*	37	52	64	74	83	91	98	105	111	117
29	2"	50	B248	29	41	50	58	65	71	77	82	87	92
46	2"	50	B249	46	65	80	92	103	113	122	130	138	145
57	2"	50	B250*	57	81	99	114	127	140	151	161	171	180
65	2"	50	B251	65	92	113	130	145	159	170	194	195	206
85	2"	50	B252	85	120	147	170	190	208	225	240	255	269
120	2"	50	B253	120	170	208	240	268	294	318	339	360	380
240	2"	50	B254*	240	339	416	480	537	588	635	679	720	759
60	21/2"	65	B261	60	85	104	120	134	147	159	170	180	190
75	2½"	65	B262	75	106	130	150	168	194	198	212	225	237
110	21/2"	65	B263	110	156	191	220	246	269	291	311	330	348
150	21/2"	65	B264	150	212	260	300	335	367	397	424	450	474
210	21/2"	65	B265*	210	297	364	420	470	514	556	594	630	664
70	3"	80	B277	70	99	121	140	157	172	185	198	210	221
130	3"	80	B278	130	194	225	260	290	318	344	368	390	411
170	3"	80	B280*	170	240	294	340	380	416	450	481	510	538
60	21/2"	65	B661	60	85	104	120	134	147	159	170	180	190
75	21/2"	65	B662	75	106	130	150	168	194	198	212	225	237
110	21/2"	65	B663	110	156	191	220	246	269	291	311	330	348
150	21/5"	65	B664	150	212	260	300	335	367	397	424	450	474
210	21/2"	65	B665*	210	297	364	420	470	514	556	594	630	664
70	3"	80	B677	70	ga	121	140	157	172	185	108	210	221
130	3"	80	B678	130	194	225	260	290	318	344	368	390	411
170	2"	80	B680*	170	2/10	20/	3/10	380	416	450	481	510	528
73	21/6"	65	B6250S-070	73	103	126	1/5	150	175	187	205	212	223
11	21/2	65	B6250S-110	110	156	101	220	2//	266	282	205	312	320
11	2"	80	B6300S-110	110	156	101	220	2//	266	202	290	312	320
	0	00	1000000-110	110	100	131	220	244	200	202	230	012	020

 $\begin{array}{l} GPM = C_v \; x \; \sqrt{\Delta p} \\ ^* Models \; with \; no \; characterizing \; disc. \end{array}$ 

The influence of the pipe geometry due to reduced flow is negligible for all valves 57 C<sub>v</sub> and below with characterizing discs.

## **Sizing/Selection** Characterized Control Valves™ (CCV)



#### 3-Way Valve Flow Rate for Water Applications (Gallons Per Minute, GPM)

Cv		DN	3-Way				Pres	sure Drop /	Across the V	/alve			
Maximum Rating	Inches	mm	CCV	1 psi	2 psi	3 psi	4 psi	5 psi	6 psi	7 psi	8 psi	9 psi	10 psi
0.3	1⁄2"	15	B307(B)	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.9
0.46	1⁄2"	15	B308(B)	0.5	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
0.8	1⁄2"	15	B309(B)	0.8	1.1	1.4	1.6	1.8	2.0	2.1	2.3	2.4	2.5
1.2	1⁄2"	15	B310(B)	1.2	1.7	2.1	2.4	2.8	2.9	3.2	3.4	3.6	3.8
1.9	1⁄2"	15	B311(B)	1.9	2.7	3.3	3.8	4.2	4.7	5.0	5.4	5.7	6.0
3	1⁄2"	15	B312(B)	3.0	4.2	5.2	6.0	6.8	7.3	7.9	8.5	9.0	9.5
4.7	1⁄2"	15	B313(B)	4.7	6.6	8.1	9.4	11	12	12	13	14	15
10	1⁄2"	15	B315(B)*	10	14	17	20	22	24	26	28	30	32
4.7	3⁄4"	20	B317(B)	4.7	6.6	8.1	9.4	11	12	12	13	14	15
7.4	3⁄4"	20	B318(B)	7.4	10	13	15	17	18	20	21	22	23
24	3⁄4"	20	B320(B)*	24	34	42	48	54	59	63	68	72	76
7.4	1"	25	B322	7.4	10	13	15	17	18	20	21	22	23
10	1"	25	B323	10	14	17	20	22	24	26	28	30	32
30	1"	25	B325*	30	42	52	60	67	73	79	85	90	95
10	1¼"	32	B329	10	14	17	20	22	25	27	28	30	32
19	1¼"	32	B330	19	27	33	38	43	47	50	54	57	60
25	1¼"	32	B331	25	35	43	50	56	61	66	71	75	79
19	1½"	40	B338	19	27	33	38	43	47	50	54	57	60
29	1½"	40	B339	29	41	50	58	65	71	77	82	87	92
37	1½"	40	B340	37	52	64	74	83	91	98	105	111	117
46	1½"	40	B341	46	65	80	92	103	113	122	130	138	146
29	2"	50	B347	29	41	50	58	65	71	77	82	87	92
37	2"	50	B348	37	52	64	74	83	91	98	105	111	117
46	2"	50	B349	46	65	80	92	103	113	122	130	138	146
57	2"	50	B350	57	81	99	114	128	140	151	161	171	180
68	2"	50	B351	68	96	118	136	152	167	180	192	204	215
83	2"	50	B352	83	117	144	166	186	204	220	235	249	263

GPM =  $C_v \times \sqrt{\Delta p}$  \* = Models with no characterizing disc. The influence of the pipe geometry due to reduced flow is negligible for all valves 83 C<sub>v</sub> and below with characterizing discs.



#### SET-UP

		2-WAY VALVE		3-WAY	VALVE
		SPECIFY UPO	N ORDERING	SPECIFY UPO	IN ORDERING
	TR24-3-T US TR24-3 US On/Off or Floating Point Actuators	Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.		Power to pin 2 will drive valve CCW. Power to pin 3 will drive valve CW.	
PRING RETURN in Last Position	TR24-SR-T US TR24-SR US Proportional Type Actuators	NC: Closed A to AB, will open as voltage increases.	NO: Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator.)	NC: Closed A to AB, will open as voltage increases.	NO: Open A to AB, will close as voltage increases. (Can be chosen with switch inside terminal block of actuator.)
NON-SI Stays	LRB24 (-3), MFT, SR LRX24 (-3), MFT, SR ARB24 (-3), MFT, SR ARX24 (-3), MFT, SR Floating Point or Proportional Type Actuators	Power to pin 2 will drive valve CW. Power to pin 3 will drive valve CCW. The above will function when the directional switch is in the "1" position, to reverse select the "0" position.	NO: Open A to AB, will close as voltage increases or power applied. (Can be chosen with CW/CCW switch.)	Power to pin 2 will drive valve CW. Power to pin 3 will drive valve CCW. The above will function when the directional switch is in the "1" position, to reverse select the "0" position.	NO: Open A to AB, will close as voltage increases or power applied. (Can be chosen with CW/CCW switch.)
	TFX24 US LF24 US AF24 US	NO/FO Valve: Open A to AB will drive closed. Spring Action: Will spring open A to AB upon power loss.	NC/FC Valve: Closed A to AB will drive open. Spring Action: Will spring closed A to AB upon power loss.	NO/FO Valve: Open A to AB will drive closed. Spring Action: Will spring open A to AB upon power loss.	NC/FC Valve: Closed A to AB will drive open. Spring Action: Will spring closed A to AB upon power loss.
SPRING RETURN Note Fail Position	TF (-3), MFT, SR LF (-3), MFT, SR AF (-3), MFT, SR Floating Point or Proportional Type Actuators	NC/FO Valve: Closed A to AB will drive open. Spring Action: Will spring open A to AB upon power loss.	NC/FC or NO/FC Valve: Closed A to AB or Open A to AB. (Can be chosen with CW/CCW switch.) Spring Action: Will spring closed A to AB upon power loss.	NC/FO Valve: Closed A to AB will drive open Spring Action: Will spring open A to AB upon power loss.	NC/FC or NO/FC Valve: Closed A to AB or Open A to AB. (Can be chosen with CW/CCW switch.) Spring Action: Will spring closed A to AB upon power loss.
			NO/FO Valve: Open A to AB Spring Action: Will spring open A to AB upon power loss. (NO action can be chosen with CW/CCW switch.)		NO/FO Valve: Open A to AB Spring Action: Will spring open A to AB upon power loss. (NO action can be chosen with CW/CCW switch.)

#### **GENERAL WIRING INSTRUCTIONS**

**WARNING** The wiring technician must be trained and experienced with electronic circuits. Disconnect power supply before attempting any wiring connections or changes. Make all connections in accordance with wiring diagrams and follow all applicable local and national codes. Provide disconnect and overload protection as required. Use copper, twisted pair, conductors only. If using electrical conduit, the attachment to the actuator must be made with flexible conduit.

**Always read the controller manufacturer's installation literature carefully before making any connections.** Follow all instructions in this literature. If you have any questions, contact the controller manufacturer and/or Belimo.

#### Transformer(s)

Belimo actuators require a 24 VAC class 2 transformer and draws a maximum of 10 VA per actuator. The actuator enclosure cannot be opened in the field, there are no parts or components to be replaced or repaired.

- EMC directive: 89/336/EEC
- Software class A: Mode of operation type 1
- Low voltage directive: 73/23/EEC

**CAUTION** It is good practice to power electronic or digital controllers from a separate power transformer than that used for actuators or other end devices. The power supply design in our actuators and other end devices use half wave rectification. Some controllers use full wave rectification. When these two different types of power supplies are connected to the same power transformer and the DC commons are connected together, a short circuit is created across one of the diodes in the full wave power supply, damaging the controller. Only use a single power transformer to power the controller and actuator if you know the controller power supply uses half wave rectification.



#### **FLOW PATTERNS**



#### **INCORRECT PIPING**

The A-port must be piped to the coil to maintain proper control.



WARNING! Do Not Pipe in this manner! Note Valve Porting! The A-port must be piped to the coil! Not the B-port!

Flow is not possible from A to B. If AB-port is not piped as the common port, the valve must be re-piped. It is good practice to install a balancing valve in the bypass line. These valves are intended for closed loop systems. Do not install in an open loop system or in an application that is open to atmospheric pressure.

#### **OPERATION/INSTALLATION – CORRECT PIPING**

2-way valves should be installed with the disc upstream. If installed with disc downstream, flow curve will be deeper. If installed "backwards" it is NOT necessary to remove and change. No damage or control problems will occur.



3-WAY VALVES MUST BE PIPED CORRECTLY. They can be mixing or diverting. Mixing is the preferred piping arrangement.

The BELIMO Characterized Control Valve is a CONTROL valve, not a manual valve adapted for actuation. The control port is the A-port. It is similar to the globe valve in that the middle port is the B or bypass port. The common port AB is on the main opposite the A-port. These diagrams are for typical applications only. Consult engineering specification and drawings for particular circumstances.

#### **REDUCED B-PORT FLOW**

Note: The B-port flow of the 3-way CCV is lower than that of the A-port. In most applications this is beneficial since the reduced flow compensates for the inexistent pressure drop across the coil in the bypass mode. Therefore, proper sizing is important to avoid flow noise in particular when the system is designed with constant speed pumps. Please refer to our valve sizing and selection guidelines.

The flow velocity in the pipe upstream and downstream of the valve should be considered as well. The typical HVAC design maximum flow is 4 to 8 ft/s to avoid noise issues.

Also, the pipe reduction factor must be considered and can be found on pages 3 and 4. Pipe reducers decrease the  $C_V$  value of a valve and consequently increase the pressure drop across the valve, a situation that could lead to noise or a lower than designed flow.





B2	09	В	LRX	24	-MFT	
Valve B2 = 2-way B3 = 3-way B6 = 2-way Flanged	<b>Valve Size</b> 07-80 = ½"-3"	<b>Trim Material</b> B = Brass Blank = Stainless Steel Trim	Actuator Type Non-Spring Return TR LRB LRX ARB ARX LRQ NRQ Spring Return TF LF	<b>Power Supply</b> 24 = 24 VAC/DC 120 = 120 VAC* 230 = 230 VAC	<b>Control</b> Blank = On/Off, Floating -3 = Floating Point -SR = 2-10 VDC -MFT = Multi-Function Technology -MFT95 = 0-135 Ω	-T = Terminal Strip -S = Built-in Auxiliary Switch N4 = NEMA 4X, UL Type 4X, IP 66/67 Enclosure

AF...

#### **ORDERING EXAMPLE**



Complete Ordering Example: B209B+LRX24-MFT+NO+A01 5

\*TF, LR and AR Series has 100 to 240 VAC nominal power supply.

## B2 Series, 2-Way, Characterized Control Valve Chrome Plated Brass Ball and Brass Stem







#### Application

This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable flow.

Technical Data	
Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage
Action	90° rotation
Sizes	1/2", 3/4"
Type of end fitting	NPT female ends
Materials:	
Body	forged brass, nickel plated
Ball	chrome plated brass
Stem	nickel plated brass
Seats	PTFE
Characterizing disc	Tefzel®
Packing	2 EPDM O-rings, lubricated
Pressure rating	600 psi per EN 12266-1:2003
Media temp. range	0°F to 212°F [-18°C to 100°C]
Close off pressure	200 psi
Maximum differential	30 psi for typical applications
pressure ( $\Delta P$ )	
Leakage	0% for A to AB
C <sub>v</sub> rating	A-port: see product chart for values

	Valve Nor	ninal Size	Туре	5	Suitable	Actuators	S
Cv	Inches	DN [mm]	2-way NPT	Non-S	Spring	Spr	ing
0.3	1⁄2	15	B207B				
0.46	1/2	15	B208B				
0.8	1⁄2	15	B209B				
1.2	1/2	15	B210B				
1.9	1⁄2	15	B211B				
3	1/2	15	B212B			ies	ies
4.7	1⁄2	15	B213B		Ser	Ser	Ser
7.4	1/2	15	B214B		Е	Ë	5
10	1⁄2	15	B215B*				
4.7	3⁄4	20	B217B				
7.4	3⁄4	20	B218B				
10	3⁄4	20	B219B				
24	3⁄4	20	B220B*				

\*Models without characterizing disc

Tefzel<sup>®</sup> is a registered trademark of DuPont

#### Dimensions



	Valve No	minal Size	Dimensions (Inches [mm])			
Valve Body	Inches	DN [mm]	Α	В		
B207B-B211B	1⁄2"	15	2.41" [61.1]	1.39" [35.2]		
B212B-B215B	1⁄2"	15	2.38" [60.4]	1.72" [43.7]		
B217B-B220B	3⁄4"	20	2.73" [69.3]	1.81" [45.9]		

#### Flow Patterns



800-543-9038 USA

## B2 Series, 2-Way, Characterized Control Valve Stainless Steel Ball and Stem







#### Application

This valve is typically used in air handling units on heating or cooling coils, and fan coil unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV box re-heat coils and bypass loops. This valve is suitable for use in a hydronic system with variable flow.

Technical Data	
Service	chilled or hot water, 60% glycol
Flow characteristic	A-port equal percentage
Action	90° rotation
Sizes	1⁄2", 3⁄4", 1", 11⁄4", 11⁄2", 2", 21⁄2", 3"
Type of end fitting	NPT female ends
Materials:	
Body	forged brass, nickel plated
Ball	stainless steel
Stem	stainless steel
Seats	PTFE
Characterizing disc	Tefzel®
Packing	2 EPDM O-rings, lubricated
Body Pressure rating	
600 psi*	1⁄2" - 11⁄4" (B230)
400 psi*	1¼" (B231) - 3"
Media temp. range	0°F to 212°F [-18°C to 100°C]
Close off pressure	
200 psi	½" - 2" (B250)
100 psi	2" (B251) - 3"
Maximum differential	30 psi for typical applications
pressure ( $\Delta P$ )	
Leakage	0% for A to AB
C <sub>v</sub> rating	A-port: see product chart for values
Tefzel® is a registered trademark of	DuPont

\*Per EN 12266-1:2003

#### Dimensions



1			
B	-		
		-	
		-	
-		A	

	Valve Nor	ninal Size	Dimensions (Inches [mm])				
Valve Body	Inches	DN [mm]	Α	В			
B207-B211	1⁄2"	15	2.41" [61.1]	1.39" [35.2]			
B212-B215	1⁄2"	15	2.38" [60.4]	1.72" [43.7]			
B217-B220	3⁄4"	20	2.73" [69.3]	1.81" [45.9]			
B222-B225	1"	25	3.09" [78.4]	1.81" [45.9]			
B229-B230	1¼"	32	3.72" [94.6]	1.81" [45.9]			
B231-B232	1¼"	32	3.72" [94.6]	1.98" [50.4]			
B238-B240	1½	40	3.88" [98.5]	1.98" [50.4]			
B248-B250	2"	50	4.21" [107.0]	2.21" [56.2]			
B251-B254	2"	50	4.93" [125.2]	2.68" [68.0]			
B261-B265	21⁄2"	65	5.55" [140.9]	2.68" [68.0]			
B277-B280	3"	80	5.82" [147.9]	2.68" [68.0]			

	Valve Nor	ninal Size	Туре		Sui	table	Actuat	tors	
Cv	Inches	DN [mm]	2-Way NPT	No	n-Spr	ing		Spring	g
0.3	1⁄2	15	B207						
0.46	1⁄2	15	B208						
0.8	1⁄2	15	B209						
1.2	1⁄2	15	B210						
1.9	1⁄2	15	B211			ies			
3	1/2	15	B212			Ser	'ies		
4.7	1/2	15	B213			N4	Ser		
7.4	1/2	15	B214				Ħ		
10	1⁄2	15	B215*		ries	N		'ies	
4.7	3⁄4	20	B217		Sei			Sei	
7.4	3⁄4	20	B218		Ľ			5	
10	3⁄4	20	B219						
24	3⁄4	20	B220*						
7.4	1	25	B222						
10	1	25	B223						
19	1	25	B224						
30	1	25	B225*						
10	11⁄4	32	B229						
19	1¼	32	B230*						
25	11⁄4	32	B231						
37	1¼	32	B232*						
19	1½	40	B238						
29	1½	40	B239						
37	1½	40	B240*						
29	2	50	B248						
46	2	50	B249						
57	2	50	B250*			S			
65	2	50	B251		es	erie			es
85	2	50	B252		eri	4 S			eri
120	2	50	B253		BS	Ż			ъ S
240	2	50	B254*		•	ÅR.			-
60	21⁄2	65	B261						
75	21⁄2	65	B262						
110	21/2	65	B263						
150	21⁄2	65	B264						
210	21/2	65	B265*						
70	3	80	B277						
130	3	80	B278						
170	3	80	B280*						

\*Models without characterizing disc

#### **Flow Patterns**





800-543-9038 USA

2WayValve-B207-B220



## Characterized Control Valve Product Range Overview B2.., B3.., B6.., 2-way, 3-way, Stainless Steel Ball and Stem

V     Lots     PM     Yeary     Yeary     Prove (P)     Non-Second (P)     N		Valve Nominal Size		Туре			Suitable Actuators								H
0.3 9.4 15 82070 8070 9 -   0.46 9.4 15 82068 8008 - 0   12 9.4 15 82068 8008 - 0   13 9.4 15 82088 8108 - 0   14 9.4 15 82108 0.318 - 0   15 82168 1 - 0 0.4 15 82168 -   10 9.4 15 82168 - - 0 - 0   10 9.4 15 82169 1 - -   10 9.4 20 82178 - -   10 14 25 8224 - -   10 1 25 824 - -   10 1 25 824 - -   10 1 25 823 - -   10 1 25 824 - -   11 14 82 829 823 -   11 14 14 82 823 -   15 14 14	Cv	Inches	DN [mm]	2-way NPT	3-way NPT	2-way Flange	Ν	lon-Spri Return	ng		Spring Return		NEMA 4X		
046     15     100(8)     000(8)        15     15     870(6)     320(6)         15     15     870(6)     821(8)         17     15     15     821(8)     813(8)         17     15     821(8)     813(8)          17     15     821(8)     813(8)          17     44     20     821(8)     131(8)         17     44     20     821(8)     131(8)         17     44     20     821(8)     131(8)         18     1     25     122     132         19     1     25     823     1         19     1     22     822     132          10     14     22     823     1     <	0.3	1⁄2	15	B207(B)	B307(B)	-									
0.8   16   20.09   20.09   20.09	0.46	1/2	15	B208(B)	B308(B)	-									
12   94   15   870(8)   370(8)   -     13   94   15   821(8)   331(8)   -   9     47   74   15   821(8)   313(8)   -   9     47   74   15   821(8)   313(8)   -   9     47   74   15   821(8)   313(8)   -   9     47   74   46   20   827(8)   313(8)   -   9     47   4   20   827(8)   313(8)   -   -   9   10   9   10   9   10   9   10   9   10   9   10   9   10   10   20   823(8)   -   -   9   10   14   28   823   -   -   -   -   10   14   28   823   -   -   -   10   14   28   823   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -	0.8	1/2	15	B209(B)	B309(B)	-									
19   14   15   811(8)   11(8)<	1.2	1/2	15	B210(B)	B310(B)	-									CCV
3     4/2     1/5     872.09     873.09     -     0       47     5/6     1/5     821.89     873.09     -     -     0     0     4/7     5/6     1/7	1.9	1/2	15	B211(B)	B311(B)	-									
47   44   15   8213(8)   8313(8)   -   984     47   44   15   8214(9)   -   984     47   44   20   8218(9)   8315(9)   -     47   44   20   8218(9)   8315(9)   -     47   44   20   8218(9)   8317(8)   -     47   44   20   8218(9)   8317(8)   -     47   44   20   8218(9)   8317(8)   -     47   44   20   8218(9)   8317(8)   -     47   1   25   822   832   -     74   1   25   822   833   -     19   1   25   822   833   -     19   14   32   822   833   -     19   14   32   823   833   -     19   14   40   823   833   -     19   14   40   824   834   -     11   4	3	1⁄2	15	B212(B)	B312(B)	-				ŝ					
7.4     9.5     15     87.400     16     87.400     7-0     87.400     7-0     87.400     87.700     7-0     87.700     7-0     87.700     7-0     87.700     7-0     87.700     7-0     87.700     7-0     87.700     7-0     87.700     7-0     87.700     7-0     87.700     7-0     87.700     7-00     87.700     7-00     87.700     7-00     87.700     7-00     87.700     7-00     87.700     7-00     87.700     7-00     87.700     7-00     87.700     7-00	4.7	1⁄2	15	B213(B)	B313(B)	-	Seri			Serie					Characteristic
10     13     215 (8)<	7.4	1⁄2	15	B214(B)		-	Ë			Ë					
4.7     4.9     20     27.7(6)     27.7(6)     -       7.4     4.4     20     28.18(8)     63.16(8)     -     -       7.4     4.4     20     28.18(8)     63.16(8)     -     -       7.4     4.4     20     28.20(8)     -     -     -       7.4     4.4     20     28.20(8)     -	10	1⁄2	15	B215(B)*	B315(B)*	-					ss		es	Applications Water-side control of heat	ing and cooling systems, for AHUs,
7.4     9.4     2.0     82.18(P)     81.9(P)     0     -     1     1     1     2     30.0     82.9(P)     0     -     0     34.9     200     82.9(P)     0 <th0< th=""></th0<>	4.7	3⁄4	20	B217(B)	B317(B)	-		Seri			Serie		Seri	re-heat coils, fan coil units	s, unit ventilators and heat pumps.
10   14   20   8219(9)      24   14   20   820(9)   830(9)      7.4   1   2.5   8222   8322      10   1   2.5   8222   8323      19   1   2.5   8224   3.2      10   14   2.5   8225   832.5      10   14   2.5   822.6   3.3      10   14   3.2   82.3   3.30      19   14/4   3.2   82.3   83.30      19   14/4   3.2   82.3   83.30      29   11/4   4.0   82.38   83.8      29   11/4   4.0   82.38   3.30      37   11/4   4.0   82.38   3.33      37   12/4   4.0   82.48   3.4      37   2   5.0   82.49   3.34      37   2   <	7.4	3⁄4	20	B218(B)	B318(B)	-		Ľ			5		NR	Mode of Operation	Makes in an ended have note in
24     94     20     8208/8     8208/8	10	3⁄4	20	B219(B)		-								actuator. The actuators a	e controlled by a standard voltage
7.4   1   2.5   B222   B322	24	3⁄4	20	B220(B)*	B320(B)*	-								for on/off control or a pro	portional signal or 3-point control
10   11   25   823   823      19   11   25   825   825   825   825   825   825   926   9     10   14   25   825   825   9      19   14   32   825   833      19   145   32   8230   833      19   146   32   8230   833      25   146   32   8230   1-      37   147   32   8230   1-      37   149   40   8230   3      37   149   40   8230   3      37   149   40   8230   3      37   2   50   8248   3      37   2   50   8248   3      37   2   50   8248        37   2   50   8248 <td>7.4</td> <td>1</td> <td>25</td> <td>B222</td> <td>B322</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>dictated by the control sy</td> <td>stem.</td>	7.4	1	25	B222	B322	-								dictated by the control sy	stem.
11   25   B24   0   -     30   1   25   B25   B25   -     30   14   32   B25   B25   -     10   114   32   B29   B329   -     11   114   32   B29   B30   -     115   114   32   B29   B33   -     116   114   32   B29   B33   -     117   32   B29   B33   -   -     118   140   828   B338   -   -     119   114   40   B298   B33   -   -     111   40   B249   B34   -   -   -     111   40   B249   B34   -   -   -     111   40   B249   B34   -   -   -     111   40   B34   -   -   -   -   -     112   50   B249   B34   -   -   -   -<	10	1	25	B223	B323	-								Product Features	
30   1   2.6   82.2*   83.25*	19	1	25	B224		-								by the integral characteriz	racteristic of the flow is ensured
114   32   829   839      19   114   32   820'   830      25   114   32   820'   830      37   114   32   823'   830      37   114   32   822'   0   0      37   114   30   822'   0   0      37   114'   40   823'   833       37   115'   40   823'   833       37   115'   40   840'        46   11''   40''   834''        57'   2   50   826''   830''       65'   2   50   825''        70''''''''''''''''''''''''''''''''''''	30	1	25	B225*	B325*	-								provides linear heating or	cooling output from the coil
19     1%     32     820'     830        25     1%     32     821'     831        37     1%     32     822'         37     1%     40     8239     833        37     1%     40     8239     833        37     1%     40     8239     833        37     1%     40     8239     833        37     1%     40     8240'     840        37     1%     40     8240'     840'        37     1%     40     824'         40     2     50     824'         57     2     50     825'         58     2     50     825'         510     2     50     825'         52'     2	10	11⁄4	32	B229	B329	-								Actuator Specificatio	
114   32   8231   8331      37   114   32   8232*       19   114   32   8232*       19   114   40   8238   8338      29   114   40   8239   8338      37   114   40   8239   8338      37   114   40   8239   8338      37   114   40   8248   8340      29   2   50   8248   8347      37   12   50   8249   8349      37   2   50   8251       56   2   50   8251       68   2   50   8252       709   61   812    826      120   2   50   8254       120   2   50 <t< td=""><td>19</td><td>11⁄4</td><td>32</td><td>B230*</td><td>B330</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Control type</td><td>On/Off, Floating Point, 2-10 VDC,</td></t<>	19	11⁄4	32	B230*	B330	-								Control type	On/Off, Floating Point, 2-10 VDC,
37     114     32     823*     I        19     116     40     823     833        29     116     40     823     833        37     116     40     823     833        37     116     40     823     833        37     116     40     823     833        37     116     40     823     833        37     116     40     834         37     2     50     824     834        46     2     50     8250     830        57     2     50     8250     850        68     2     50     8251         120     2     50     8253         120     2     50     8254         120     2     50 <td>25</td> <td>11⁄4</td> <td>32</td> <td>B231</td> <td>B331</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Multi-Function Technology (MFT</td>	25	11⁄4	32	B231	B331	-									Multi-Function Technology (MFT
19     1%     40     8238     8338        29     1%     40     8239     8339        37     1%     40     8239     8340        46     1%     40     8240     6340        29     2     50     8248         37     2     50     8248         46     2     50     8248         57     2     50     8249         56     2     50     8250     8350        56     2     50     8251         57     2     50     8252         58     2     50     8252         50     8252       861        100     2     50     8252         110     2     50 <td>37</td> <td>11⁄4</td> <td>32</td> <td>B232*</td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Manual override</td> <td>IR, LR, AR, and AF series</td>	37	11⁄4	32	B232*		-								Manual override	IR, LR, AR, and AF series
29     1%     40     8239     8339        37     1%     40     8240     8340        46     1%     40     8249     8348        37     2     50     8248     8347        37     2     50     8248     8347        37     2     50     8249     8349        37     2     50     8251         36     2     50     8251         37     2     50     8251         383     2     50     8251         365     2     50     8252         370     2     50     8253         371/2     2     50     8254         370     2½     65     8261         390/9     10700000000000000	19	1½	40	B238	B338	-									conduit fitting or covered screw
37     11%     40     8240*     8340        46     11%     400     8341	29	1½	40	B239	B339	-									terminal strip
46     11½     40     8341        29     2     50     8248     8347        37     2     50     8248     8347        37     2     50     8248     8347        46     2     50     8249     8349        57     2     50     8250     6-        58     2     50     8251         68     2     50     852         68     2     50     852         70     2     50     852         83     2     50     852         801     521     50     852         810     1216     50     852         824     50     8254          8010     70     75     524	37	1½	40	B240*	B340	-								Valve Specifications	chilled or hot water 60% alvcol
29     2     50     B248     B347        37     2     50     B348        46     2     50     B249     B349        57     2     50     B250     B350        58     2     50     B251     0        68     2     50     B251     0        58     2     50     B252         68     2     50     B252         58     2     50     B252         60     2     50     B252         70     2     50     B252         800/     B254          100     2     50     B254         1010     2½     65     B261     1        1100     2½     65     B264     1 <td>46</td> <td>1½</td> <td>40</td> <td></td> <td>B341</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Flow characteristic</td> <td>A-port equal percentage</td>	46	1½	40		B341	-								Flow characteristic	A-port equal percentage
37     2     50     Weight Base	29	2	50	B248	B347	-									B-port modified for constant
46     2     50     8249     8349        57     2     50     8250*     8350        68     2     50     8250*     8350        68     2     50     8251         68     2     50     851         68     2     50     852         100     2     50     852         120     2     50     8252         120     2     50     8253         120     2     50     8254         120     2     50     8261         120     2     50     8261         120     2     50     8261     8661        120     2½     65     8262         120     2½     65 <td>37</td> <td>2</td> <td>50</td> <td></td> <td>B348</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Action</td> <td>max 90° rotation</td>	37	2	50		B348	-								Action	max 90° rotation
57     2     50     B250*     B350        66     2     50     B251        68     2     50     B251        68     2     50     B251        78     2     50     B252         70     2     50     B252         70     2     50     B253         70     2     50     B254         70     2     50     B254         70     2     50     B254         70     2     50     B261      B661       70     2     65     B262     66     B663     B6250-707       710     2     65     B263     B663     B6250-107     B663     B6250-107       710     2     65     B264     G664     B667     B663     B6250-107	46	2	50	B249	B349	-								Sizes	1⁄2" - 3"
65     2     50     8251        68     2     50     8551        83     2     50     8552        85     2     50     8252        100     2     50     8253        66     2.2     50     8252        100     2.4     50     8253        67     2.40     2.5     8254        60     2.4//     65     8261        70     2.4//     65     8261      8661       70     2.4//     65     8261     6663     865205-070       75     2.4//     65     8263     6663     865205-110       710     2.4///     65     8263     6663     8663-       702     2.4///     65     8263     6663-     8663-       700     2.4///     65     8263     6663-       700     3     80<	57	2	50	B250*	B350	-								Type of end fitting ½" - 3"	NPT female ends
68     2     50      B351      Presure Allower Allo	65	2	50	B251		-								21⁄2" - 3"	ANSI 125 flange pattern
83     2     50     M     835     -     50     855     2     50     855     -     50     855     -     50     852     -     50     852     -     50     852     -     50     853     2     50     853     2     50     853     60     -     50     823     -     -     50     51     823     -     -     50     50     823     -     -     50     50     824     -     -     50     50     50     50     50     77     73     21/2     65     8262     663     663     663     663     663     663     663     663     663     663     665     7     7     7     7     65     8264     7     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8663     8	68	2	50		B351	-			ies			ies		Materials Body	forged brass, nickel plated
85     2     50     8252     -       120     2     50     8253     -       240     2     50     8254     -       60     2½     65     8261     8661       70     2½     65     8261     8661       70     2½     65     8262     8662       710     2½     65     8262     8662       70     2½     65     8263     8663       86250S-010     8663     8663     86250S-1010       110     2½     65     8264     8664       210     2½     65     8264     8664       110     3     80     8277     867       110     3     80     8277     867       110     3     80     8278     8678       110     3     80     8278     8678       110     3     80     8278     8678       1100     3     80     8278<	83	2	50		B352	-			R Sei			F Sei	ries	Ball	stainless steel
120   2   50   B253   -   -   [BXXB - inckel plated brass]     240   2   50   B254*   -   -     60   2½   65   B261   B661   -     70   2½   65   B262   B662   -   -     710   2½   65   B262   B662   -   -     110   2½   65   B263   B663   B6250-5110   B663     110   2½   65   B264   B664   B665*     110   2½   65   B265*   B665*     110   3   80   B277   B67   B663     110   3   80   B277   B67   B67     110   3   80   B278   B678     1100   3   80	85	2	50	B252		-			A			A	R Se	Stem	stainless steel
240   2   50   B254*   -     60   2½   65   B261   B661     70   2½   65   B262   B6250-070     75   2½   65   B262   B662     100   2½   65   B262   B663,     110   2½   65   B264   B663,     110   3   80   B277   B673     110   3   80   B278   B673     110   3   80   B278   B678     110   3   80   B283*   B678     110   3   80   B283*   B678     110   3   80   B283* <t< td=""><td>120</td><td>2</td><td>50</td><td>B253</td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td>A</td><td>Seats</td><td>[BXXXB - nickel plated brass] PTFE</td></t<>	120	2	50	B253		-							A	Seats	[BXXXB - nickel plated brass] PTFE
60     2½     65     B261     B661       70     2½     65     30     3     B620S-070       75     2½     65     B262     B662       110     2½     65     B263     B663, B6250S-010       150     2½     65     B264     B664       100     2½     65     B264     B663, B6250S-110       150     2½     65     B264     B664       210     2½     65     B265*     B665*       70     3     80     B277     B67     B678       110     3     80     B278     B678       110     3     80     B278     B678       110     3     80     B280*     B678	240	2	50	B254*		-								Characterizing disc	TEFZEL®
70     2½     65	60	21⁄2	65	B261		B661								Packing	2 EPDM O-rings, lubricated
75     2½     65     B62     B662       110     2½     65     B263     B663, B6250S-110       150     2½     65     B264     B664       210     2½     65     B264     B663       210     2½     65     B264     B663       210     2½     65     B264     B665*       70     3     80     B277     B677       110     3     80     B278     B678       110     3     80     B278     B678       110     3     80     B278     B678       110     3     80     B280*     B678       110     3     80     B280*     B678	70	21⁄2	65			B6250S-070								Pressure rating	2-way 3-way
110     2½     65     B263     B663, B6250S-110       150     2½     65     B264     B664       210     2½     65     B265*     B665*       70     3     80     B277     B670       110     3     800     B278     B678       110     3     80     B278     B678       110     3     800     B280*     B680*	75	21⁄2	65	B262		B662								400 psi	1¼" (B231) - 3" 1¼" - 3"
150   2½   65   B264   B664     210   2½   65   B265*   B665*     70   3   80   B277   B677     110   3   80   B278   B6300S-110     130   3   80   B278   B678     170   3   80   B278   B678     170   3   80   B280*   B680*	110	2½	65	B263		B663, B6250S-110								Media temp range Close-off pressure	0°F to 212°F     [-18°C to 100°C]       2-way     3-way
210     2½     65     B265*     B665*       70     3     80     B277     B677       110     3     80     B677       130     3     80     B278     B678       170     3     80     B278     B678       170     3     80     B280*     B680*	150	21⁄2	65	B264		B664								200 psi 100 psi	½″ - 2″ (B250) ½″ - 2″ 2″ (B251) - 3″, B6
70     3     80     B277     B677       110     3     80      B6300S-110       130     3     80     B278     B678       170     3     80     B280*     B680*	210	21⁄2	65	B265*		B665*								Maximum differential	
110 3 80 B6300S-110   130 3 80 B278 B678   170 3 80 B280* B680*	70	3	80	B277		B677								pressure (∆P)	30 psi, 58 psi (B6250/300) 0% for A to AB
130 3 80 B278 B678   170 3 80 B280* B680*	110	3	80			B6300S-110									< 2.0% for B to AB
170     3     80     B280*     B680*     B port: 70% of A to AB C <sub>V</sub>	130	3	80	B278		B678								C <sub>V</sub> rating	A port: see product chart above for values
	170	3	80	B280*		B680*									B port: 70% of A to AB Cv

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