Characterized Port Two Way and Three Way Ball Valves

Description:
The Characterized Port Two-way Ball Valves are coupled with our Type A actuators to provide equal percentage flow control.

The Characterized Port Three-way Ball Valves are coupled with our Type A actuators to provide equal percentage flow control in either mixing or diverting applications.

The ball valves are 1/4-turn rotary control valves and are available in 1/2-inch to 2-inch line sizes.

Features:

- ANSI 250/600 WOG valve body rating.
- Two-Way Ball Valves: 200 psi close-off with ANSI Class IV leakage for all sizes and actuators.
- Three-Way Ball Valves: Close off up to 200 psi with ANSI Class IV leakage for all sizes and actuators.
- Three-Way Ball Valves: May be used as either mixing or diverting valves.
- Available with chrome-plated brass ball and brass stem or stainless steel ball and stem.
- Blow-out proof stem withstands high pressure.
- Universal mounting plate.
- Actuator and plate can be rotated (90 degree increments).
- Standoffs provide a thermal barrier between the actuator and the mounting plate.
- Handle for visual indication or manual override depending on the actuator. See chart Part Numbers and Cv Ratings Charts.

Application:
Ball valves can control hot or chilled water and up to 50% water-glycol solution in air handling units, convectors, fan coil units, unit conditioners, radiators, and reheat coils. Three-way ball valves can be piped for either mixing or diverting applications.

Typical Specifications:

Ball valves shall have female NPT type fittings and shall be 1/2-inch to 2-inch (15 mm to 50-mm sizes. The valves shall have a forged brass body; chrome-plated brass ball with brass stem or stainless steel ball and stem; and EPDM O-ring seals. Valves shall contain glass-filled PTFE ball valve seals and/or flow characterizers to provide an equal percentage control characteristic. In non-full port valves the flow characterizer should be an integral part of the ball assembly. Ball valves shall utilize a 90-degree rotation for control. They shall provide automated flow control of hot or chilled water and up to 50% water-glycol solution for HVAC control applications.

Specifications:

Valve body rating	ANSI 250/600 WOG
Static pressure:	360 psi (2482 kpa)
Media temperature	
Two-way:	35°F to 250°F (2°C to 121°C)
Three-way 1/2" to 1-1/4":	35°F to 250°F (2°C to 121°C)
Three-way 1-1/2" to 2":	35°F to 230°F (2°C to 110°C)
Maximum operating	
Differential pressure	60 psi (414 kpa) for 1/2" - 1-1/2" valves
	35 psi (345 kpa) for 2" valves
Controlled medium	Water, water-glycol solutions to 50%
Body	Brass: ASTM B283
Ball	Chrome-plated brass or stainless steel
Ball seals	Glass filled PTFE with EPDM O-rings
Flow characterizer	Glass filled PTFE
End connections	Female NPT
Stem	Brass or stainless steel
Stem seals	EPDM O-rings
Angle of rotation	0° to 90°
Close-off rating	200 psi (ANSI Class IV)
Dimensions and service envelope	See Pages CP BV-5&6

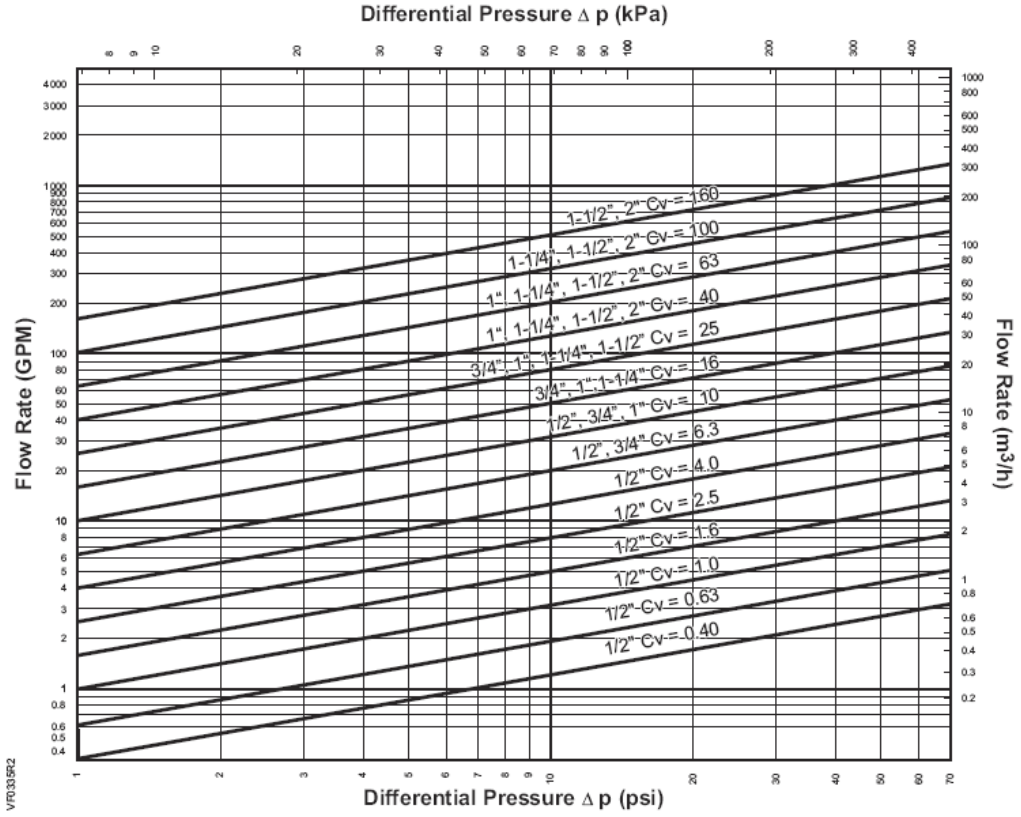


Figure 1.

Part Numbers and Cv ratings —Two-Way Ball Valves

Two-Way Size (In.)	Cv	Close off	Chrome Part No.	SS Trim Part No.	Type A Non-Spring Return Motors (Actuator Type)		Type A Spring Return Motors (Actuator Type)	
					EN44	EN88	ES20	ES62†
1/2"	0.4	200 PSI	2-050-0.4-CP	2-050-0.4-CP-SBS	•		•	•
1/2"	0.63		2-050-0.63-CP	2-050-0.63-CP-SBS	•		•	•
1/2"	1.0		2-050-1.0-CP	2-050-1.0-CP-SBS	•		•	•
1/2"	1.6		2-050-1.6-CP	2-050-1.6-CP-SBS	•		•	•
1/2"	2.5		2-050-2.5-CP	2-050-2.5-CP-SBS	•		•	•
1/2"	4.0		2-050-4.0-CP	2-050-4.0-CP-SBS	•		•	•
1/2"	6.3		2-050-6.3-CP	2-050-6.3-CP-SBS	•		•	•
1/2"	10		2-050-10-CP*	2-050-10-CP-SBS	•		•	•
3/4"	6.3		2-075-6.3-CP	2-075-6.3-CP-SBS	•		•	•
3/4"	10		2-075-10-CP	2-075-10-CP-SBS	•		•	•
3/4"	16		2-075-16-CP	2-075-16-CP-SBS	•		•	•
3/4"	25		2-075-25-CP*	2-075-25-CP-SBS*	•		•	•
1"	10		2-100-10-CP	2-100-10-CP-SBS	•			•
1"	16		2-100-16-CP	2-100-16-CP-SBS	•			•
1"	25		2-100-25-CP	2-100-25-CP-SBS	•			•
1"	40		2-100-40-CP	2-100-40-CP-SBS	•			•
1"	63		2-100-63-CP*	2-100-63-CP-SBS*	•			•
1-1/4"	16		2-125-16-CP	2-125-16-CP-SBS	•			•
1-1/4"	25		2-125-25-CP	2-125-25-CP-SBS	•			•
1-1/4"	40		2-125-40-CP	2-125-40-CP-SBS	•			•
1-1/4"	63		2-125-63-CP	2-125-63-CP-SBS	•			•
1-1/4"	100		2-125-100-CP*	2-125-100-CP-SBS*	•			•
1-1/2"	25		2-150-25-CP	2-150-25-CP-SBS		•		•
1-1/2"	40		2-150-40-CP	2-150-40-CP-SBS		•		•
1-1/2"	63		2-150-63-CP	2-150-63-CP-SBS		•		•
1-1/2"	100		2-150-100-CP	2-150-100-CP-SBS		•		•
1-1/2"	160		2-150-160-CP*	2-150-160-CP-SBS*		•		•
2"	40		2-200-40-CP	2-200-40-CP-SBS		•		•
2"	63		2-200-63-CP	2-200-63-CP-SBS		•		•
2"	100		2-200-100-CP*	2-200-100-CP-SBS*		•		•
2"	160		2-200-160-CP*	2-200-160-CP-SBS*		•		•

Part Numbers and Cv ratings —Three-Way Ball Valves

Three-Way Size (In.)	Cv	Close off	Chrome Part No.	SS Trim Part No.	Type A Non-Spring Return (Actuator Type)		Type A Spring Return (Actuator Type)
					EN44	EN88	ES62†
1/2"	0.4	200 PSI	3-050-0.4-CP	3-050-0.4-CP-SBS	•		•
1/2"	0.63		3-050-0.63-CP	3-050-0.63-CP-SBS	•		•
1/2"	1.0		3-050-1.0-CP	3-050-1.0-CP-SBS	•		•
1/2"	1.6		3-050-1.6-CP	3-050-1.6-CP-SBS	•		•
1/2"	2.5		3-050-2.5-CP	3-050-2.5-CP-SBS	•		•
1/2"	4.0		3-050-4.0-CP	3-050-4.0-CP-SBS	•		•
1/2"	6.3		3-050-6.3-CP	3-050-6.3-CP-SBS	•		•
1/2"	10		3-050-10-CP*	3-050-10-CP-SBS*	•		•
3/4"	6.3		3-075-6.3-CP	3-075-6.3-CP-SBS	•		•
3/4"	10		3-075-10-CP	3-075-10-CP-SBS	•		•
3/4"	16		3-075-16-CP*	3-075-16-CP-SBS*	•		•
1"	10		3-100-10-CP	3-100-10-CP-SBS	•		•
1"	16		3-100-16-CP	3-100-16-CP-SBS	•		•
1"	25		3-100-25-CP*	3-100-25-CP-SBS*	•		•
1-1/4"	16		3-125-16-CP	3-125-16-CP-SBS	•		•
1-1/4"	25		3-125-25-CP	3-125-25-CP-SBS	•		•
1-1/4"	40		3-125-40-CP*	3-125-40-CP-SBS*	•		•
1-1/2"	25		3-150-25-CP	3-150-25-CP-SBS		•	•
1-1/2"	40		3-150-40-CP	3-150-40-CP-SBS		•	•
1-1/2"	63		3-150-63-CP*	3-150-63-CP-SBS*		•	•
2"	40		3-200-40-CP	3-200-40-CP-SBS		•	•
2"	63		3-200-63-CP	3-200-63-CP-SBS		•	•
2"	100		3-200-100-CP*	3-200-100-CP-SBS*		•	•

*** Denotes a full-port valve without flow characterizer**
† Indicates actuator features a manual override key

Operation:

The parabolic shape of the flow characterizer orifice on two-way ball valves and the parabolic shape of the control port (A – AB) flow characterizer orifice on three-way ball valves (Figure 2) provides a slowly opening valve. Equal movements of the valve stem, at any point of the flow range, change the existing flow an equal percentage regardless of the existing flow. The ball valve equal percentage flow characteristic (Figure 3) mirrors the flow characteristic of a coil, resulting in linear heat transfer.

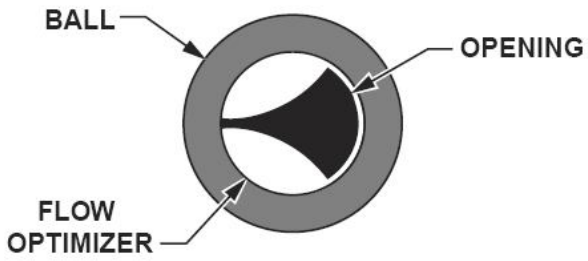


Figure 2. Ball Valve Flow Characterizer.

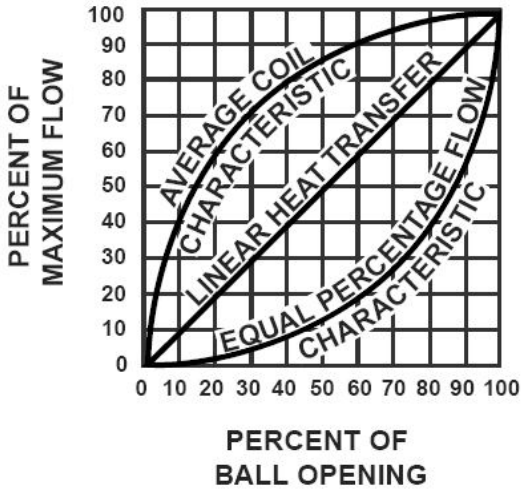
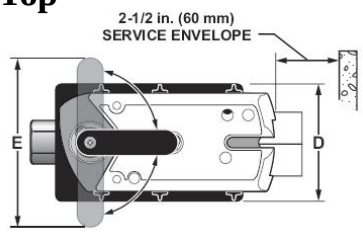
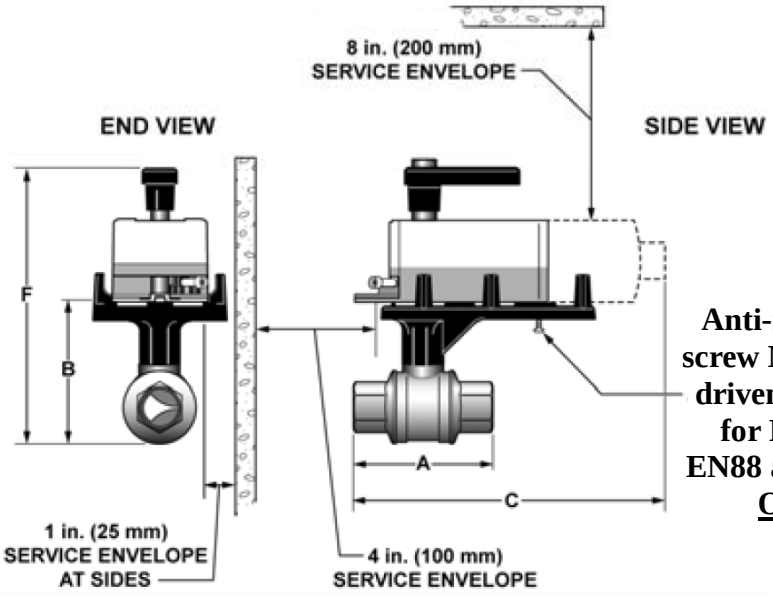


Figure 3. Ball Valve Equal Percentage Flow Control.

Dimensions—Two-Way Ball Valves and Actuator Dimensions

Top





Anti-rotation screw MUST be driven in fully for EN44 / EN88 actuators <u>Only</u>

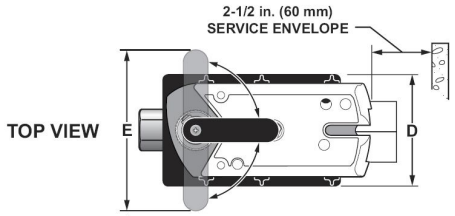
Notes:

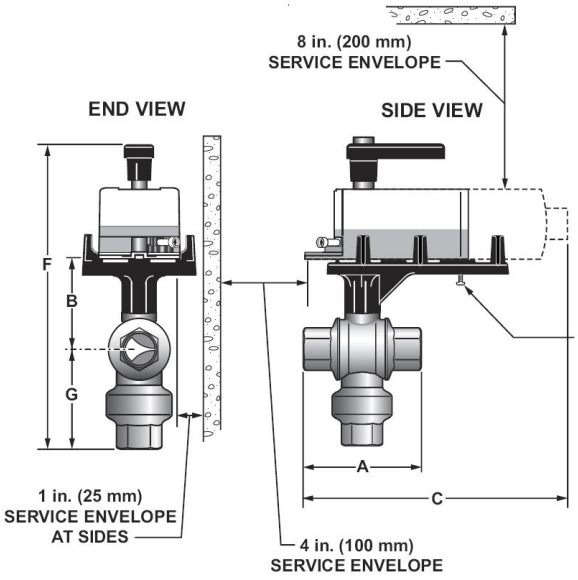
- All dimensions are in inches (mm) and weights are in pounds.
- Dimension D, Depth, is 3.7 inches (94.5 mm)
- Dimension E, Handle/Indicator, is 5.3 inches (135.9 mm).

Line Size Inch (Mm)	Cv Range	A Length	C Length *	C Length *	C Length*	F Height	Weight (kg)
1/2 (15)	0.4 to 10.0	2-7/16 (61)	6-11/16 (170)	6 (153)	-	7-5/8 (193)	.50 (.23)
3/4 (20)	6.3 to 25	2-3/4 (70)		6 (153)	-	8 (204)	.78 (.35)
1 (25)	10	3 (77)		-	8-3/8 (213)	8 (204)	.97 (.44)
	16	3-1/4 (82)		-	8-3/8 (213)	8-5/15 (212)	1.75 (79)
	40, 63						1.19 (54)
	25	3-7/8 (98)	7 (178)	-	8-11/16 (221)	8-13/16 (223)	1.19 (.54)
1-1/4 (32)	16	3-3/8(86)	6-11/16 (170)	-	8-7/16 (214)	8-3/8 (213)	1.41 (.64)
	25 to 100	3-11/16 (94)	6-15/16 (176)	-	8-11/16 (221)	8-13/16 (223)	1.81 (.82)
1-1/2 (40)	25, 63	3-5/8 (92)		-	8-7/16 (214)	8-13/16 (223)	1.19 (.54)
	40, 100, 160	3-15/16 (100)	7-1/16 (180)	-	8-3/4 (223)	9-1/4 (235)	2.50 (1.13)
2 (50)	40, 100	4 (102)		-		9-3/8 (238)	2.53 (1.14)
	63	4-5/8 (118)	7-1/2 (190)	-	9-1/8 (223)	10-1/16 (255)	4.66 (2.11)
	160			-			4.69 (2.13)

*Dimension C is the maximum length, measured from actuator, end fitting, or mounting plate, whichever extends the furthest.

Dimensions—Three-Way Ball Valves and Actuator Dimensions





- **Dimension "D", Depth, is 3.7 inches(94.5 mm).**
- **Dimension "E", Handle/Indicator, is 5.3 inches (135.9 mm).**

Anti-Rotation Screw Must be Driven in Fully for EN44/EN88 Actuators <u>Only</u>

Dimensions and Service Envelope.

Line Size Inches (mm)	Product Number	A Length	C Length * Actuators EN44 & EN88	C Length * Actuators ES62	B Height In. (mm)	G Height In. (mm)	F Height In. (mm)	Weight Lbs. (kg)
1/2 (15)	3-050-0.4-CP (-SBS) Through 3-050-10-CP (-SBS)	2-9/16 (65)	6-11/16 (170)	8-3/8 (213)	3-1/4 (83)	1-3/8 (35)	8-5/8 (219)	1.50 (0.68)
3/4 (20)	3-075-6.3-CP (-SBS)	2-3/4 (70)	6-11/16 (170)	8-3/8 (213)	3-1/4 (83)	1-3/8 (35)	8-5/8 (219)	1.60 (0.73)
	3-075-10-CP (-SBS) 3-075-16-CP (-SBS)	3-1/8 (79)				1-11/16 (43)		2.20 (1.00)
1 (25)	3-100-10-CP (-SBS)	3-1/4 (83)	6-11/16 (170)	8-3/8 (213)	3-3/4 (95)	1-11/16 (43)	9-1/8 (232)	2.37 (1.08)
	3-100-16-CP (-SBS) 3-100-25-CP (-SBS)	3-13/16 (77)	6-15/16 (176)	8-5/8 (219)	4 (102)	2 (51)	9-5/8 (244)	2.74 (1.24)
1-1/4 (32)	3-125-16-CP (-SBS) 3-125-25-CP (-SBS)	3-5/8 (92)	6-7/8 (174)	8-9/16 (217)	4 (102)	2-1/8 (54)	9-3/4 (248)	3.50 (1.59)
	3-125-40-CP (-SBS)	3-15/16 (100)	7 (178)	8-11/16 (221)	4 (102)	2-5/16 (59)	10-1/4 (260)	4.30 (1.95))
1-1/2 (40)	3-150-25-CP (-SBS) 3-150-40-CP (-SBS)	3-15/16 (100)	7 (178)	8-11/16 (221)	4 (102)	2-5/16 (59)	10-1/4 (260)	3.90 (1.76)
	3-150-63-CP (-SBS)	4-5/8 (117)	7-1/4 (184)	8-3/4 (222)	4-1/2 (114)	2-13/16 (71)	11 (279)	7.83 (17.16)
2 (50)	3-200-40-CP (-SBS)	4-5/8 (117)	7-1/4 (184)	8-3/4 (222)	4-1/2 (114)	2-7/8 (73)	10-3/8 (264)	6.70 (3.04)
	3-200-63-CP (-SBS) 3-200-100-CP (-SBS)			9-1/16 (230)	5-3/4 (146)		11-3/16 (284)	

- **Dimension C is maximum length, measured from the actuator, end fitting, or mounting plate, whichever extends the furthest.**
- **Fail safe three-way A-AB Open; B-AB Closed—Standard from the factory. Can be reversed for diverting applications.**

Two-Way Full-Port (No Flow Characterizer) Ball Valve Product Numbers and Flow Coefficients.

Use this Table to determine the effective Cv when using a two-way full-port ball valve where the ball size and the line sizes differ.

Valve Line Size in Inches (mm)	Valve Product Number	Effective (Installed) Cv (Kvs)										
		Supply Line Size in Inches (mm)										
		1/2 (13)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (38)	2 (51)	2-1/2 (63)	3 (76)	4 (102)	5 (127)	6 (152)
1/2 (15)	2-050-10-CP 2-050-10-CP-SBS	10.00 (8.62)	6.94 (5.93)	6.19 (5.29)	—	—	—	—	—	—	—	—
3/4 (20)	2-075-25-CP 2-075-25-CP-SBS	—	25.00 (21.55)	18.66 (15.95)	15.35 (13.12)	—	—	—	—	—	—	—
1 (25)	2-100-63-CP 2-100-63-CP-SBS	—	—	63.00 (54.31)	39.78 (34.00)	33.56 (28.69)	—	—	—	—	—	—
1-1/4 (32)	2-125-100-CP 2-125-100-CP-SBS	—	—	—	100.00 (86.21)	69.19 (59.13)	51.45 (43.98)	—	—	—	—	—
1-1/2 (40)	2-150-63-CP 2-150-63-CP-SBS	—	—	—	—	63.00 (54.31)	55.34 (47.30)	51.00 (43.59)	—	—	—	—
	2-150-160-CP 2-150-160-CP-SBS	—	—	—	—	160.00 (137.93)	93.80 (80.17)	76.34 (65.25)	—	—	—	—
2 (50)	2-200-100-CP 2-200-100-CP-SBS	—	—	—	—	—	100.00 (86.21)	94.30 (80.60)	86.12 (73.61)	—	—	—

= Valve may be oversized. = Optimal valve size. = Valve may be undersized

Three-Way Full-Port (No Flow Optimizer) Ball Valve Product Numbers and Flow Coefficients.

Use this Table to determine the effective Cv when using a three-way full-port ball valve where the ball size and the lines size differ.

Valve Line Size in Inches (mm)	Valve Product Number	Effective (Installed) Cv (Kvs)										
		Supply Line Size in Inches (mm)										
		1/2 (13)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (38)	2 (51)	2-1/2 (63)	3 (76)	4 (102)	5 (127)	6 (152)
1/2 (15)	3-050-10-CP 3-050-10-CP-SBS	10.00 (8.62)	6.94 (5.93)	6.19 (5.29)	--	--	--	--	--	--	--	--
3/4 (20)	3-075-16-CP 3-075-16-CP-SBS	--	16.00 (13.79)	13.9 (11.98)	12.4 (10.69)	--	--	--	--	--	--	--
1 (25)	3-100-25-CP 3-100-25-CP-SBS	--	--	25.00 (21.55)	22.5 (19.40)	21.2 (18.27)	--	--	--	--	--	--
1-1/4 (32)	3-125-40-CP 3-125-40-CP-SBS	--	--	--	40.00 (34.48)	36.9 (31.81)	33.3 (28.70)	--	--	--	--	--
1-1/2 (40)	3-150-63-CP 3-150-63-CP-SBS	--	--	--	--	63.00 (54.31)	55.3 (47.67)	51.00 (43.96)	--	--	--	--
2 (50)	3-200-100-CP 3-200-100-CP-SBS	--	--	--	--	--	100 (86.21)	94.3 (81.29)	86.1 (74.23)	--	--	--

= Valve may be oversized. = Optimal valve size. = Valve may be undersized.

Note: Use GPM to confirm proper sizing.

How to Select the Part Number

Commercial Electronic Actuator:

E N 88 C 2 -S

Power Type	
E	Electric

Option	
-S	Auxiliary Switch(es)
-CA	Conduit Adapter w/6' Wires

Voltage	
1	120V
2	24V

Fail Mode	
N	Non-Spring Return
S	Spring Return

Torque	
Type A	
Non-Spring	
44	44 in-lb
88	88 in-lb
Spring	
20	20 in-lb
62	62 in-lb

Control Signal	
A	On/Off
B	0-10 V, 0-20 mA with dropping resistor 2-10V, 4-20 mA with dropping resistor (ES20B2)
C	Tri-state

Characterized Port Ball Valve:

2 - 150 - 40 - CP - SBS

Ports	
2	2-Way
3	3-Way

Size	
050	1/2"
075	3/4"
100	1"
125	1-1/4"
150	1-1/2"
200	2"

Cv
0.4
.63
1.0
1.6
2.5
4.0
6.3
10
25
40
63
100
160

Series	
CP	Characterized Port

Optional Trim	
SBS	Stainless Ball and Stem

Assembly Part No: Actuator Part No. / Valve Part No.

i.e. EN88C2 / 2-150-40-CP-SBS

Note: Some combinations are not available.