

BV-3pc. All Stainless

Series 41

Ball Valve, 3-Piece, NPT

Electric 120 VAC - NEMA 4

Description

The BV stainless body Series 41 NEMA 4 electric assemblies are available in two-way and three-way configurations. Assemblies are complete with a ball valve that is direct mounted with a non-spring return actuator. All components are mounted, tested and calibrated before shipment. These two-way and three-way assemblies are rated for outdoor applications

Operation

Three-piece all stainless steel ball valves are powered with NEMA 4, 120 VAC electric actuators and controlled by on/off or modulating commands. On/Off actuators accept a 120 VAC power supply that feeds the motor and drives the valve 90° until the limit switch is tripped. The tripped switch shuts the motor down and the actuator holds the valve position until power is applied again. Modulating actuators function like on/off actuators except the actuator is controlled by a servo card that responds to a 0-10 VDC or 4-20 MA signal. These input signals allow the actuator to accurately position the ball valve from full open to full close for maximum flow control.

Actuator Performance

- Housing protection NEMA 4 (outdoor applications) This rating is designated for weatherproof enclosures
- Power supply 120 VAC 50/60 Hz
- Controls available are on/off or modulating (0-10 VDC/ 4-20 MA)
- Single phase capacitor run motor with thermal overload protection
- Manual override capabilities standard on all actuators
- Precision machined hardened alloy gearing is permanently lubricated for high efficiency and smooth energy transfer
- Adjustable single pole double throw auxiliary switches standard
- Heater installed in all actuators to guard against condensation
- Operating temperatures -40°F to +140°F
- Visual position indicator confirms valve travel
- Compact design provides maximum torque output relative to small actuator enclosure
- Self locking gears are permanently lubricated and will not back drive
- 2 year limited warranty

Valve Performance

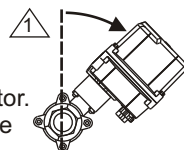
- 2-way full port, 3-way regular port are investment cast 316 stainless
- ISO extended mounting platform for high cycle automation and added clearance for insulation
- Maintenance-free "live" loaded stem seal reduces stem leakage and automatically compensates for stem wear
- Secondary (back up) seal is provided by a Viton O-ring
- Blow-out proof stem prevents removal of stem when valve is in service.
- RTFE seats and PTFE seals for max temperature of 420°F at 0 psi
- Body rating: 2-way 1000 psi, 3-Way 1/2"-1" 1000 psi, 1 1/4"-2" 800 psi
- 1 year limited warranty

Assembly Default

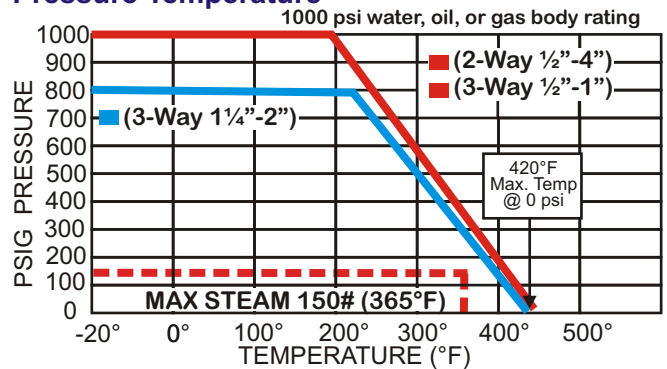
- 2-way valves with non-spring return modulating actuators will be closed at 0 vdc and fail in last position on loss of power

NOTE: Preferred Installation for Steam Service

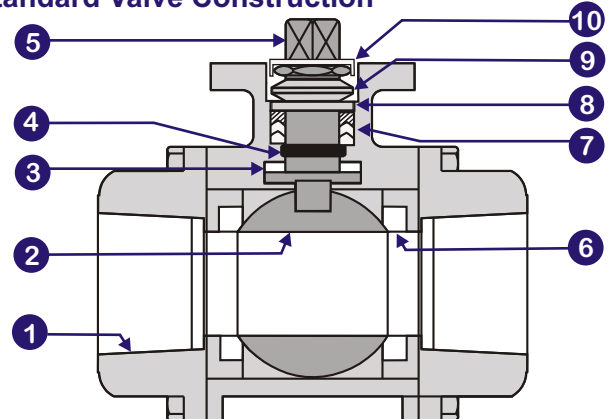
1 For steam applications the valve assembly must be mounted in piping at 45° angle. Do not allow radiant heat from boiler to reach the actuator. Mount kits are provided for steam service, please add for steam service in price book.



Pressure Temperature



Standard Valve Construction



Item	Description	Materials	Item	Description	Materials
1	Body	Stainless	6	Ball Seat	RTFE
2	Ball	Stainless	7	Bushing & Packing	PTFE
3	Stem Seal	PTFE	8	Gland	Stainless
4	O-Ring	Viton	9	Belleisle Washer	Stainless
5	Stem	Stainless	10	Adjusting Nut & Locking Saddle	Stainless

Construction

The BV stainless Series 41 assembly incorporates several design features for improved performance in HVAC / industrial applications. The valves body is investment cast stainless steel which improves dimensional control and reduced porosity. All 2-way and 3-way stainless valves meet shell and seat tests ANSI/ASME B16.34 and API 598. Female NPT connections, FNPT meet the intent of ANSI B1.20.1. The valves have a large diameter ball with an increased bore opening for maximum flow capacity. The 2-way valves have reinforced PTFE seats that are filled with 15% glass fiber fill and are held in place by grooves cast in the valve body that fully encapsulate the seats to eliminate cold flowing under adverse temperatures and pressures. The PTFE body seal ensures sealing integrity between the three-piece body components.

The control advantages when using the two-way and three-way all stainless steel ball valves in HVAC / industrial applications are the inherent equal percentage flow characteristics, low pressure loss, and bubble tight close off capabilities. These features along with the 2-way valves saturated steam rating of 150#, provide an ideal valve for temperature control in building automation systems or industrial applications.



Swing Out Body Design

The two-way valve bodies utilize a three-piece construction that is suited for use in piping systems where line breaks are required and where total entry into the line is necessary. The center section can swing out and the seats and seals can be replaced quickly and easily without disturbing the pipe alignment. Acting as both a valve and a union the three piece valve eliminates the need for a separate union.

Live Loaded High Performance Stem Seal

PTFE stem seal prevents debris from entering the stem area and acts as a lower bearing to maintain minimal run torques. A Viton O-ring eliminates stem leakage and ensures a long maintenance-free service life. Belleville washers make up the secondary seal and automatically compensate for stem wear during the life of the valve. Belleville washers or disc springs, exert a continuous load on the soft packing through the follower. When the valve is used in systems with frequent thermal cycling, the belleville washers accommodate dimensional shifts to maintain a tight seal.

Equal Percentage Flow Characteristics

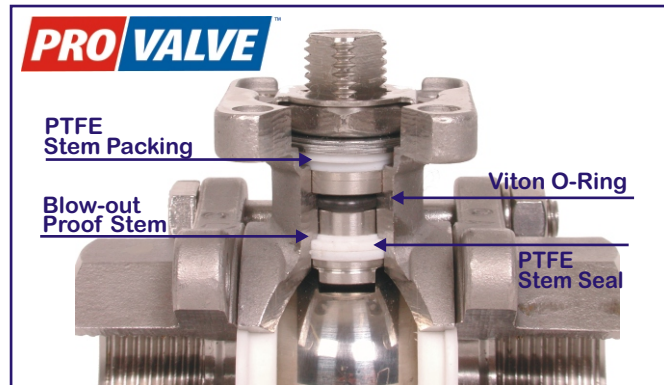
A round hole seat cooperating with a round hole bore in a valve ball typically achieves a equal percent flow characteristic. The like movements of the stem at any point of the flow range will change the existing flow in equal increments.

Quality Control

Series 41 non-spring return actuators are low-profile, durable and lightweight in design. Two basic foot print accommodates the entire size range from 1/2" - 4". Simplified wiring configurations allow for faster installations. Actuators contain high torque reversible electric motors with built in automatic resetting thermal overload protection. All models utilize a combination of alloy gearing in a reduction transmission system for smooth and efficient energy transfer.

Additional features include:

- ◆ Motors are custom built for high-torque and low current draw
- ◆ Standard built-in auxiliary switches, start span adjustable
- ◆ Enclosure certified NEMA 4 type
- ◆ Actuators contain heaters for dissipation of condensation
- ◆ Standard manual override on all models
- ◆ Capacitors are sealed and rated for peak voltage for extended Service



Operating Conditions

- Temp Range: (see pressure/temp chart front page)
- Close Off: (same as body rating below)
- Body Rating:
 - 2-Way 1000 psi WOG
 - 3-Way 1/4"-1" 1000 psi WOG, 1/4"-2" 800 psi WOG
- Saturated Steam Rating: 150 psi Maximum
- Chilled or Hot Water, Glycol up to 50%
- Bi-directional Close Off - ANSI Class 6
- 2-Way Full Port, 3-way Regular Port



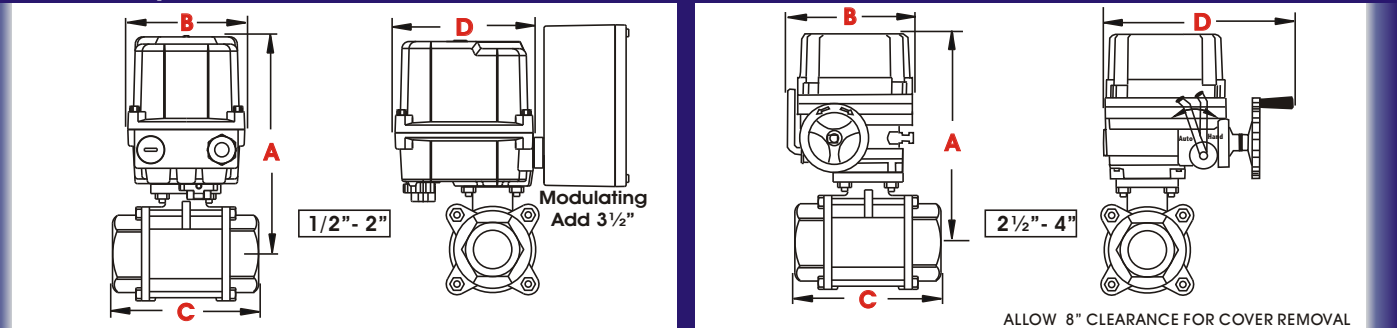
Model 600



Model 700

Dimensional Data

Two-Way

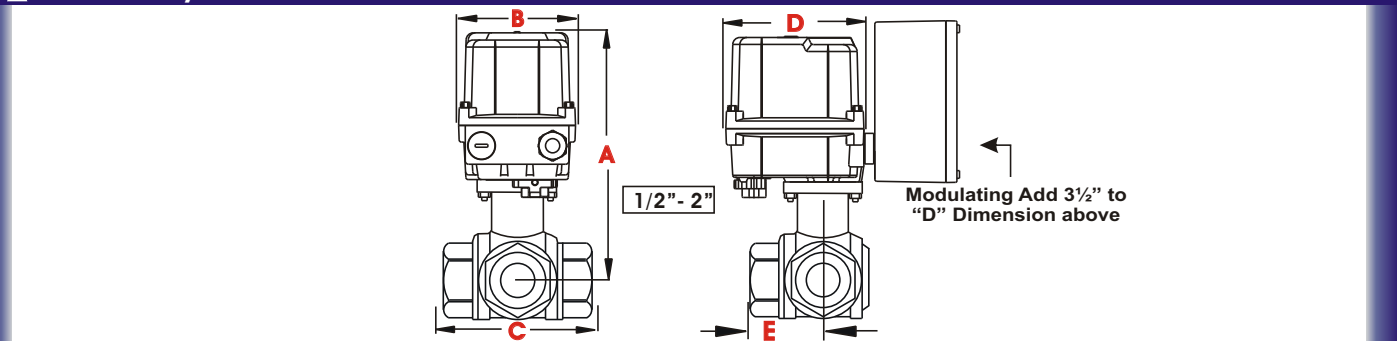


Standard Assembly, All Stainless 3-piece Valve, 120 VAC, NEMA 4 Actuator, On/Off Modulating Service Change Last O to E in Model #, Accessories See Page 4

C _v	Assembly Specification		Close off psi	Model Number	Wt. lb	Amp draw		Speed 90° (sec.)		41 Series operator		Assembly Dimensions inch			
	Size In	DN				On/Off	Mod.	On/Off	Mod.	On/off	Mod.	A	B	C	D
17	1/2"	15	1000	BV21X3A41O	8	0.4	0.5	12	12	600-02	600-02	7"	4 1/4"	3"	5"
34	3/4"	20	1000	BV22X3A41O	9	0.4	0.5	12	12	600-02	600-02	7"	4 1/4"	3 1/2"	5"
55	1"	25	1000	BV23X3A41O	10	0.4	0.5	12	12	600-02	600-02	7 3/8"	4 1/4"	3 7/8"	5"
80	1 1/4"	32	1000	BV24X3A41O	11	0.4	0.5	12	12	600-02	600-02	7 1/2"	4 1/4"	4 1/8"	5"
143	1 1/2"	38	1000	BV25X3A41O	13	0.4	0.5	12	12	600-02	600-02	8 1/4"	4 1/4"	4 3/4"	5"
245	2"	50	1000	BV26X3A41O	15	0.4	0.5	12	12	600-02	600-02	8 1/2"	4 1/4"	5 1/2"	5"
445	2 1/2"	65	1000	BV27X3A41O	50	1.7	1.7	21	21	700-01	700-01	14 1/2"	10 3/4"	7 1/4"	9"
580	3"	75	800	BV28X3A41O	59	1.7	1.7	21	21	700-01	700-01	15"	10 3/4"	8"	9"
850	4"	100	800	BV29X3A41O	80	1.7	1.7	21	21	700-01	700-01	15 1/2"	10 3/4"	9 1/2"	9"

NOTE: 1) Wiring Under "Electrical Section" Series 41, Tagged with Operator Model Number.
 2) STEAM Service :mount kits are provided for STEAM service, please add for steam service in price book (Add 4" to A dimension for mount kit)

Three-Way



Standard Assembly, All Stainless Valve, On/Off, 120 VAC T-Port Mixing or Diverting (For L-Port Diverting Please change T to L in Model#) Modulating Service Change Last O to E in Model #, Accessories See Page 4

C _v	Assembly Specification		Close off psi	Model Number	Wt. lb	Amp draw		Speed 90° (sec.)		41 Series operator		Assembly Dimensions inch				
	Size In	DN				On/Off	Mod.	On/Off	Mod.	On/off	Mod.	A	B	C	D	E
5	1/2"	15	1000	BVT1X2A41O	8	0.4	0.5	12	12	600-02	600-02	10 1/4"	4 1/4"	3"	5"	1 1/2"
10	3/4"	20	1000	BVT2X2A41O	9	0.4	0.5	12	12	600-02	600-02	10 1/2"	4 1/4"	3 3/8"	5"	1 3/16"
24	1"	25	1000	BVT3X2A41O	10	0.4	0.5	12	12	600-02	600-02	10 3/4"	4 1/4"	4"	5"	2"
36	1 1/4"	32	800	BVT4X2A41O	12	0.4	0.5	12	12	600-02	600-02	11"	4 1/4"	4 1/4"	5"	2 1/4"
55	1 1/2"	38	800	BVT5X2A41O	15	0.4	0.5	12	12	600-02	600-02	11 1/2"	4 1/4"	5"	5"	2 1/2"
80	2"	50	800	BVT6X2A41O	18	0.4	0.5	12	12	600-02	600-02	12"	4 1/4"	5 3/4"	5"	2 7/8"

NOTE: 1) Wiring Under "Electrical Section" Series 41, Tagged with Operator Model Number.
 2) STEAM Service :mount kits are provided for STEAM service, please add for steam service in price book (Add 4" to A dimension for mount kit)

Water Capacity Sizing Table in Gallons Per Minute, GPM



C _v	Size		Pressure Drop Across Valve									
	In	DN	1 psi	2 psi	3 psi	4 psi	5 psi	6 psi	7 psi	8 psi	9 psi	10 psi
17	1/2"	15	17	24	29	34	38	42	45	48	51	54
34	3/4"	20	34	48	59	68	76	83	90	96	102	108
55	1"	25	55	78	95	110	123	135	146	156	165	174
80	1-1/4"	32	80	113	139	160	179	196	212	226	240	253
143	1-1/2"	38	143	202	248	286	320	350	378	404	429	452
245	2"	50	245	346	424	490	548	600	648	693	735	775

If valve is equal to line size $GPM = C_v \times \sqrt{\Delta p}$ which is expressed in the above table, if valve is smaller than line size, $GPM = C_v \times \sqrt{\Delta p}$

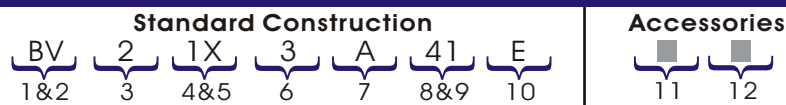
Saturated Steam Capacity Sizing Table in Pounds Per Hour

Inlet pressure	15#		30#		45#		60#		75#		90#		105#		120#		135#		150#	
	On/Off	Mod.	On/Off	Mod.	On/Off	Mod.	On/Off	Mod.	On/Off	Mod.	On/Off	Mod.	On/Off	Mod.	On/Off	Mod.	On/Off	Mod.	On/Off	Mod.
C _v	10% of P1 ΔP=1.5	80% of P1 ΔP=12	10% of P1 ΔP=3.0	42% of P1 ΔP=19	10% of P1 ΔP=4.5	42% of P1 ΔP=25	10% of P1 ΔP=6.0	42% of P1 ΔP=31	10% of P1 ΔP=7.5	42% of P1 ΔP=38	10% of P1 ΔP=9.0	42% of P1 ΔP=44	10% of P1 ΔP=10.5	42% of P1 ΔP=50	10% of P1 ΔP=12	42% of P1 ΔP=57	10% of P1 ΔP=13.5	42% of P1 ΔP=63	10% of P1 ΔP=15	42% of P1 ΔP=69
17	332	743	570	1125	804	1503	1035	1880	1266	2258	1497	2635	1727	3013	1957	3391	2187	3768	2417	4146
34	663	1487	1141	2250	1608	3005	2071	3761	2533	4516	2993	5271	3454	6026	3914	6781	4374	7536	4833	8291
55	1073	2405	1845	3640	2601	4862	3350	6083	4097	7305	4842	8526	5587	9748	6331	10970	7075	12191	7819	13413
80	1561	3498	2684	5295	3783	7072	4873	8849	5959	10625	7043	12402	8127	14179	9209	15956	10291	17733	11373	19509
143	2790	6252	4798	9465	6761	12641	8710	15817	10652	18993	12590	22169	14527	25345	16462	28521	18396	31697	20329	34873
245	4780	10712	8221	16216	11584	21657	14922	27099	18250	32540	21571	37982	24888	43423	28203	48865	31517	54306	34829	59747

When sizing steam valves, different pressure drops are used depending on if the control valve is on/off or modulating. All inlet pressure columns have two sub columns. The left sub column is for on/off control and the right sub column is for modulating control. For on/off control, always use a minimum of 10% of inlet pressure (psig). The modulating control pressure drop takes into account the compressibility of high or low pressure steam for precision control. For modulating with less than 15 psig steam, it is best to use 80% of gauge inlet pressure. For higher pressure steam greater than 15 psig, it is best to use 42% of the absolute inlet pressure. To size the steam valve, determine the inlet steam pressure. If it falls between two numbers select the larger of the two. Follow either the on/off or modulating sub columns down until you see the closest number to the required #/hr of steam. Again, if it falls between two numbers pick the larger of the two. Follow the row to the far left to obtain the C_v of the valve that will pass the desired #/hr of steam.

Three-way Flow Pattern / Default	Mixing T-Port	Diverting T-Port	Diverting L-Port
<p>All configurations are bi-directional close off. The mixing and diverting T-Port valves through port is equal percentage and the</p> <ul style="list-style-type: none"> T-Port Default <i>Non-Spring:</i> Assemblies are set up B to AB Open at 0 VDC and will fail in last position, on loss of power L-Port Default <i>Non-Spring:</i> Assemblies are set up AB to A open at 0 VDC and will fail in last position, on loss of power <p>Letters on Valve Body Indicate Flow Pattern</p>	<p>Position 1 (0-VDC)</p> <p>Position 2 (10-VDC)</p>	<p>Position 1 (0-VDC)</p> <p>Position 2 (10-VDC)</p>	<p>Position 1 (0-VDC)</p> <p>Position 2 (10-VDC)</p>
	Unless specified position of valve versus volts DC is set up as above		

Assembly Number



Ball Valve Assembly, 2-Way, 1/2" Full Port, NPT Ends 3-piece design, All Stainless Body and Ball, 120 VAC NEMA 4 Actuator, Non-Spring Return, Modulating 0-10 VDC or 4-20 MA input

#	ITEM	CODE	DESCRIPTION	#	ITEM	CODE	DESCRIPTION
1 & 2	Series	BV	Ball Valve	6	Valve Type	3	NPT Full Port (2-way)
3	Assembly	2 L T	2-Way Configuration 3-Way L-Port 3-Way T-Port	2		2	NPT Std. Port (3-way)
4 & 5	Size	1X 2X 3X 4X 5X	1/2" = 1X 1 1/4" = 4X 2 1/2" = 7X 3/4" = 2X 1 1/2" = 5X 3" = 8X 1" = 3X 2" = 6X 4" = 9X	7	Construction	A	All Stainless Construction
		6X 7X 8X 9X		8 & 9	Actuator	41	Non-Spring 120 VAC
				10	Controls	O E	On/Off Modulating 0-10 or 4-20
				11 & 12	Accessories	F S	Feedback Mount kit for steam service

1) Please Specify 3-way T-Port Mixing or T-Port Diverting.