

BV-3pc. Forged Carbon Body

Series 41

Ball Valve, 3-Piece, NPT

Electric 120 VAC - NEMA 4

Description

The BV forged carbon body Series 41 NEMA 4 electric assemblies are available in two-way configurations. Assemblies are complete with valve and carbon steel mounting kit mounted with a non-spring return actuator. All components are mounted, tested and calibrated before shipment. These two-way assemblies are rated for outdoor applications.

Operation

Three-piece forged carbon steel ball valves have stainless trim and 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 contains 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 worm gear and segment are permanently lubricated and will not back drive
- 2 year limited warranty

Valve Performance

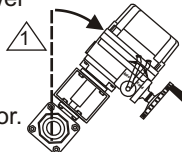
- Three-piece construction, forged steel body with stainless trim
- ISO mounting platform for high cycle automation with extended mounting bracket for heat dissipation
- Maintenance-free "live" loaded stem seal reduces stem leakage and automatically compensates for stem wear
- Secondary (back up) seal is provided by a Viton O-ring
- Blow-out proof stem, prevents removal of stem when valve is in service
- 20% carbon, 5% graphite filled Teflon seats, that are metal encapsulated to prevent cold-flowing under adverse temperature, pressure or modulating conditions
- Double graphite body seals are capable of withstanding the heat of a fire, seals keep their integrity in severe service applications
- Valve body is rated per above pressure/temp chart
- 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

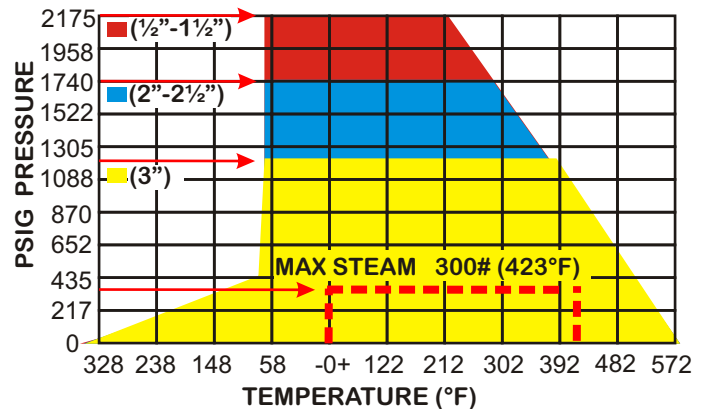
NOTE: Preferred Installation for Steam Service

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.

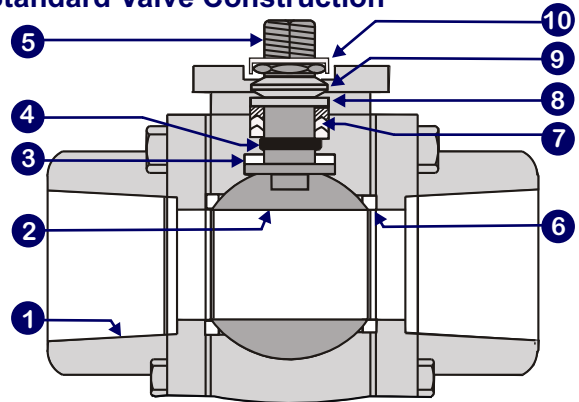


Pressure Temperature

water, oil, or gas rating



Standard Valve Construction



Item	Description	Materials	Item	Description	Materials
1	Body	Forged Carbon	6	Ball Seat	20% Carbon 5% Graphite
2	Ball	Stainless	7	Bushing & Packing	Graphite
3	Stem Seal	PTFE	8	Gland	Stainless
4	O-Ring	Viton	9	Belleville Washer	Stainless
5	Stem	Stainless	10	Adjusting Nut & Locking Saddle	Stainless

Full Port

The BV carbon steel Series 41 assemblies incorporates several design features for improved performance in HVAC / industrial applications. Valves 1/2" - 2" are pressure rated to ANSI Class 900. The valve body is constructed of forged steel and meets shell and seat tests ANSI/ASME B16.34 and API 598. Female NPT connections, FNPT meet the intent of ANSI B1.20.1. The large diameter ball has an increased bore opening for maximum flow capacity. The PTFE Seats are filled with carbon and graphite and are held in place by grooves cast in the valve body that fully encapsulate the seats to eliminate cold flowing under adverse temperature and pressure. The double graphite body seals ensures sealing integrity between the three-piece body components even after extreme heat or fire conditions.

The control advantages when using the three-piece forged steel ball valve 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 saturated steam rating of 300#, provide an ideal valve for temperature control in building automation systems or industrial applications.



Three-Piece Body Design

The forged steel ball valve is especially suited for use in piping systems where line breaks are required and where total entry into the line is necessary. The center section can be taken out by removing the body bolts from the housing, this allows the seats and seals to be replaced quickly and easily without removing the threaded end connections. 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

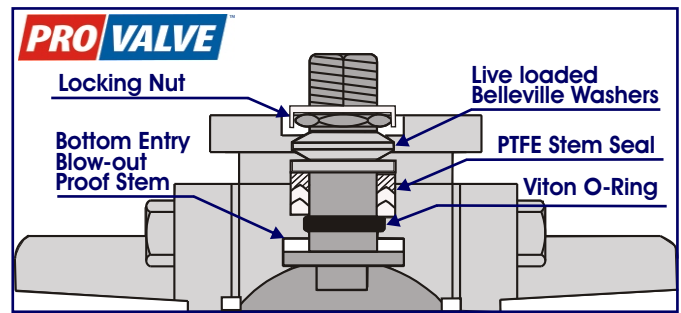
A round hole seat cooperating with a round hole bore in a valve ball typically achieves a equal percent flow characteristic. The like movements of the stem at any point of the flow range will change the existing flow in equal increments.

Quality Control

Series 41 non-spring return actuators are low-profile, durable and lightweight in design. One basic foot print accommodates the entire size range from 1/2" - 2". 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
- ◆ Torque switches standard on each actuator



Operating Conditions

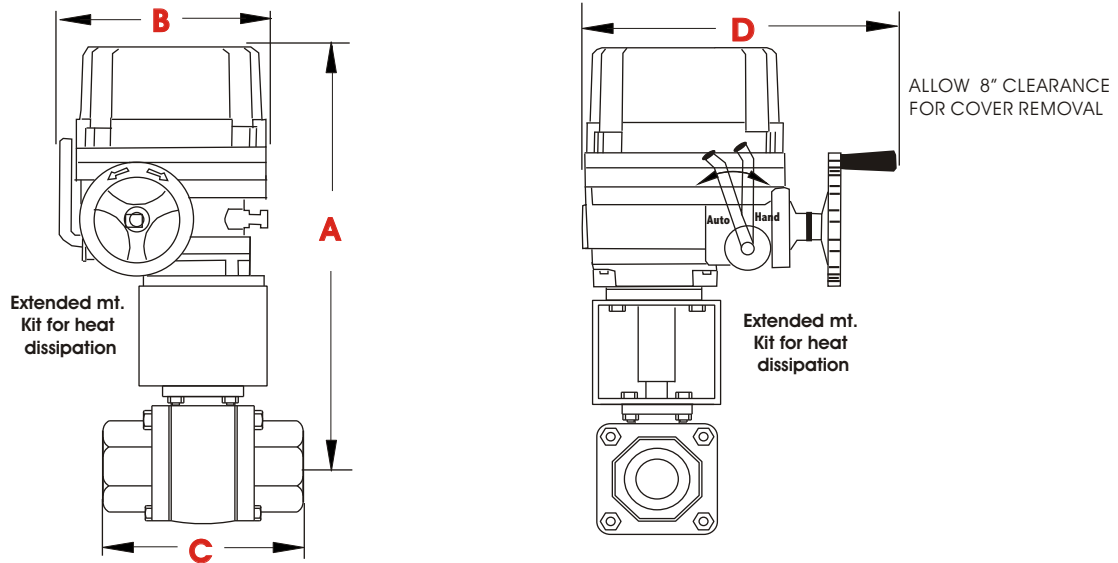
- Temp Range: (see pressure/temp chart front page)
- Maximum Close Off: 1000 psi
- Water, Oil or Gas, WOG Body Rating
- ANSI 900# Pressure Rating
- Saturated Steam Rating 300 psi Maximum
- Chilled or Hot Water, Glycol up to 50%
- Bi-directional Close Off - ANSI Class 6



Model 700

Dimensional Data

Two-Way



Sizes 1/2" - 2"

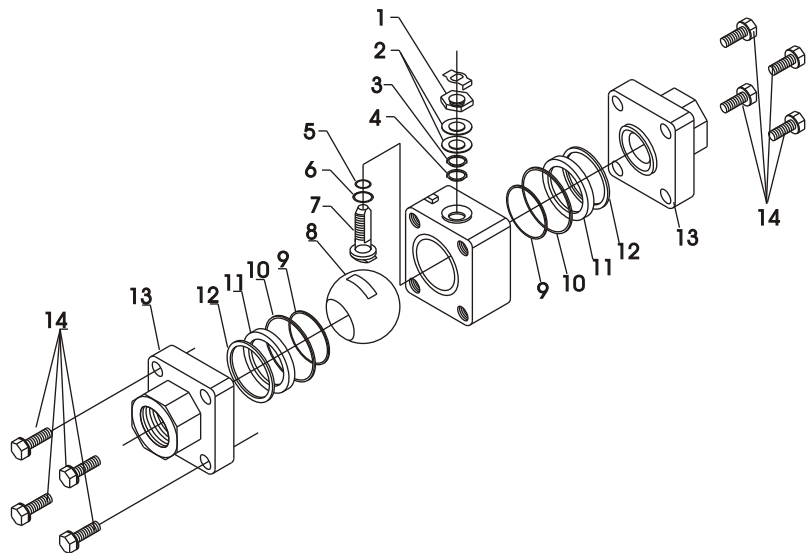
Standard Assembly, Forged Carbon Body Stainless Trim, 120 VAC, NEMA 4 Actuator, On/Off Modulating Service Change Last O to E in Model #, Accessories See Page 4

C _v	Assembly Specification		Close off psi	Model Number	Wt. lb	Amp draw		Speed 90° On/Off Mod. (sec.)	41 Series operator		Assembly Dimensions inch For mm multiply: Inch X 25.4 = (mm)			
	Size In	DN				On/Off	Mod.		On/off	Mod.	A	B	C	D
12	1/2"	15	1000	BV21X3F41O	19	1.7	1.7	21	700-01	700-01	17 ³ / ₄ "	13 ¹ / ₃ "	3 ¹ / ₄ "	9"
30	3/4"	20	1000	BV22X3F41O	21	1.7	1.7	21	700-01	700-01	18"	13 ¹ / ₃ "	4"	9"
45	1"	25	1000	BV23X3F41O	23	1.7	1.7	21	700-01	700-01	18 ¹ / ₂ "	13 ¹ / ₃ "	4 ⁷ / ₁₆ "	9"
78	1 ¹ / ₄ "	32	1000	BV24X3F41O	26	1.7	1.7	21	700-01	700-01	18 ³ / ₄ "	13 ¹ / ₃ "	4 ¹³ / ₁₆ "	9"
115	1 ¹ / ₂ "	38	1000	BV25X3F41O	29	1.7	1.7	21	700-01	700-01	19 ¹ / ₄ "	13 ¹ / ₃ "	5 ¹⁹ / ₃₂ "	9"
265	2"	50	1000	BV26X3F41O	42	1.7	1.7	21	700-01	700-01	19 ¹ / ₂ "	13 ¹ / ₃ "	5 ¹⁹ / ₃₂ "	9"

NOTE: Wiring Diagrams Under "Electrical Section" Series 41 Tagged With Operator Number
All valves Full Port

Part NO.	Part Name	Material
1	Locking Nut	C.S. Zinc plated
2	Spring Washer	S.S. 302
3	Gland Follower	S.S. 316
4	Packing Ring	Graphite
5	Stem O-Ring	Viton
6	Thrust Washer	Reinforced PTFE
7	Antistatic Stem	S.S. 316
8	Ball	S.S. 316
9	Body Seal	Reinforced PTFE
10	Body Seal	Graphite
11	Seats (PTFE filled)	20% C. 5% Graphite
12	Seat Ring	Reinforced PTFE
13	End Connection	ASTM A105
14	Body Bolts	ASTM A193 B7M
15	Stop Washer	S.S. 316

Stainless Bodies Available



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
22	1/2"	15	12	17	21	24	27	29	32	34	36	38
30	3/4"	20	30	42	52	60	67	73	79	85	90	95
45	1"	25	45	64	78	90	101	110	119	127	135	142
78	1-1/4"	32	78	110	135	156	174	191	206	221	234	247
115	1-1/2"	38	115	163	199	230	257	282	304	325	345	364
265	2"	50	265	375	459	530	593	649	701	750	795	838

If valve is equal to line size GPM=C_v x √Δp which is expressed in the above table, if valve is smaller than line size, GPM= C_v x √Δp

Saturated Steam Capacity Sizing Table in Pounds Per Hour

Inlet pressure	75#		100#		125#		150#		175#		200#		225#		250#		275#		300#	
	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=7.5	42% of P1 ΔP=38	10% of P1 ΔP=10	42% of P1 ΔP=48	10% of P1 ΔP=12.5	42% of P1 ΔP=59	10% of P1 ΔP=15	42% of P1 ΔP=69	10% of P1 ΔP=17.5	42% of P1 ΔP=80	10% of P1 ΔP=20	42% of P1 ΔP=90	10% of P1 ΔP=22.5	42% of P1 ΔP=101	10% of P1 ΔP=25	42% of P1 ΔP=111	10% of P1 ΔP=27.5	42% of P1 ΔP=122	10% of P1 ΔP=30	42% of P1 ΔP=132
12	894	1594	1165	2038	1435	2482	1706	2926	1976	3371	2246	3815	2517	4259	2787	4703	3057	5147	3327	5592
30	2235	3984	2912	5095	3589	6206	4265	7316	4941	8427	5616	9537	6292	10648	6967	11758	7642	12869	8318	13979
45	3352	5977	4368	7643	5383	9308	6397	10974	7411	12640	8424	14306	9437	15971	10451	17637	11463	19303	12476	20969
78	5810	10360	7572	13247	9331	16134	11088	19022	12846	21909	14602	24796	16358	27684	18114	30571	19870	33458	21626	36346
115	8566	15274	11163	19531	13757	23788	16348	28045	18939	32302	21529	36559	24118	40816	26707	45073	29296	49329	31884	53586
265	19739	35196	25724	45006	31700	54815	37672	64625	43642	74434	49610	84244	55576	94053	61542	103863	67507	113672	73472	123482

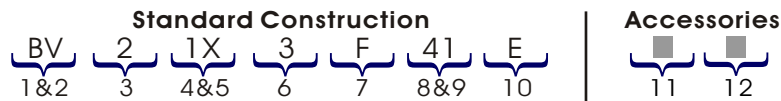
When sizing steam valves, different pressure drops are used depending on if the control valve is on/off or modulating. All inlet pressure columns have two sub columns. The left sub column is for on/off control and the right sub column is for modulating control. For on/off control, always use a minimum 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.

Adjusted C_v for Piping Geometry

Size	C _v	Line Size								
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	
1/2"	15	12	12	8.09	6.72	—	—	—	—	—
3/4"	20	30	—	30	21.7	17.4	15.6	—	—	—
1"	25	45	—	—	45	37.5	31.4	26.3	—	—
1-1/4"	32	78	—	—	—	78	66	48.8	46.1	—
1-1/2"	38	115	—	—	—	—	115	85	72	64
2"	50	265	—	—	—	—	—	265	189	146

Corrected C_v = C_v x Fp factor

Assembly Number



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

#	ITEM	CODE	DESCRIPTION	#	ITEM	CODE	DESCRIPTION
1 & 2	Series	BV	Ball Valve	7	Construction	F	Forged Steel Body / SS Trim
3	Assembly	2	2-Way Configuration	8 & 9	Actuator	41	Non-Spring 120 VAC
4 & 5	Size	1X 4X 2X 5X 3X 6X	1/2" = 1X 1 1/4" = 4X 3/4" = 2X 1 1/2" = 5X 1" = 3X 2" = 6X	10	Controls	O E	On/Off Modulating 0-10/4-20 Input
6	Valve Type	3	NPT 3-Piece Full Port	11 & 12	Accessories	F	Feedback