BV-F Flanged ANSI 150# RP

Series 41

Ball Valve, Flanged Reduced Port (150# Steam) Electric 120 VAC - NEMA 4

Description

The BV Series NEMA 4 electronic assemblies are available in two-way configurations. Assemblies are complete with a reduced port valve and carbon steel mounting kit that is 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

Reduced port 150# flanged end valve assemblies are powered by 120 VAC, NEMA4 electronic actuators and controlled by on/off or modulating commands. On/Off actuators except a 120 VAC power supply that feeds the motor and drives the valve 90 degrees until the limit switch is tripped. The tripped switch shuts the motor down and the actuator holds the valves 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 valve ball 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
- Reversing extended duty motors for continuous operation
- Controls available are on/off or modulating (0-10 VDC or 4-20 ma)
- Manual override capabilities standard on each actuator
- Precision machined hardened alloy gearing is permanently lubricated for high efficiency and smooth energy transfer
- Visual position indicator that confirms valve travel
- Heater and thermostat installed in all actuators
- Operating temperature -40°F to +140°F
- Compact design provides maximum torque output relative to small actuator enclosure
- Hardened steel male output drive shaft
- Agency approved listings CSA, UL and ISO
- 2 year limited warranty

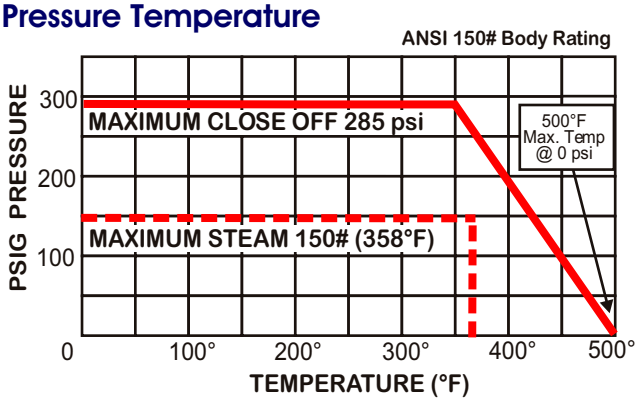
Valve Performance

- 150# ANSI flanged Reduced port design, unibody construction
- PTFE V-ring packing is used in the shaft area for low sealing force requirement and excellent leak control
- Pressure equalization at the top of the ball with special seat design, balances line pressure and body cavity pressure
- Encapsulated graphite body seal maintains leak free seal between end plug, seat and ball
- Blow out proof stem prevents removal of stem when valve is in service
- Glass filled Teflon seats for extended pressure and temperature
- Valve body is ANSI rated 150# for 285 psi pressure maximum
- Valve close off is 285 psi maximum bi-directional
- True floating ball design lowers torque, ensures positive close off
- 1 year limited warranty

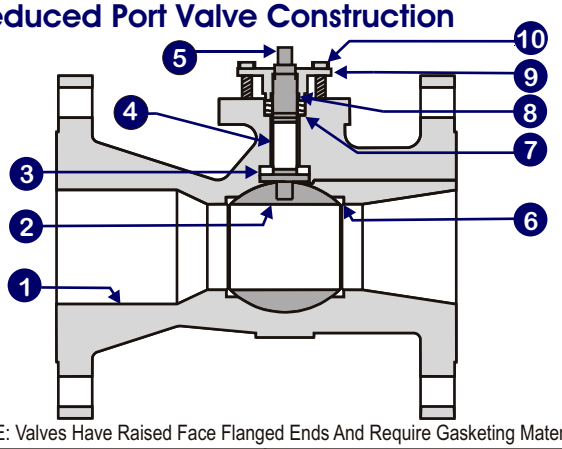
Assembly Default

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

Pressure Temperature



Reduced Port Valve Construction



NOTE: Valves Have Raised Face Flanged Ends And Require Gasketing Material

Item	Description	Materials	Item	Description	Materials
1	Body	Carbon	6	Ball Seat	Glass Filled PTFE
2	Ball	Stainless	7	Stem Packing	Virgin PTFE
3	Stem Seal	Glass Filled PTFE	8	Gland Bushing	Virgin PTFE
4	Stem Bearing	Glass Filled PTFE	9	Gland	Stainless
5	Stem	Stainless	10	Gland Bolts	ASTM A193 B8

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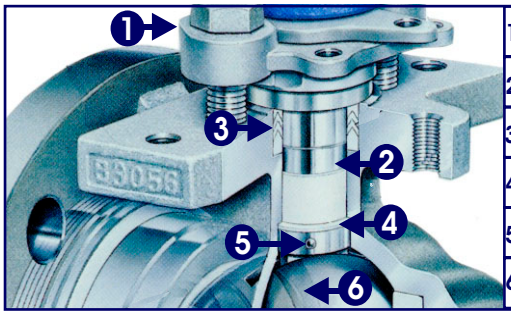
Reduced Port

The BV Series reduced port flanged end ball valve incorporates several features for improved performance in HVAC/Industrial applications. Valves comply with ANSI B16.5 standards for end to end dimensions and flanged end bolting requirements. The valve body construction is cast one piece carbon or stainless and meets design standards of MSS-SP-72. Testing and inspections are performed throughout the valve production process including pressure testing in conformance to API 598 to assure integrity of the shell and seals. The smaller ball diameter has less frictional surface area which allows for lower torques and smaller actuators for more economical automation. The PTFE seats are glass filled and are held in place by grooves cast in the valve body that fully encapsulate the seats and eliminate cold flowing under adverse pressure and temperature. A graphite body seal ensures sealing integrity between end plug, seat and ball.

The control advantages for using the reduced port 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 150#, provide an ideal valve for temperature control in building automation systems or process piping systems.

Floating Ball Design

The reduced port flanged ball valves offer downstream sealing, and bi-directional flow. This is obtained by allowing pressure to pass by the upstream seat through relief slots, and the ball being floated downstream to affect bubble - tight close off. The benefit is lower friction, less operating torque, smaller actuator and longer service life.



PTFE Packing Material

PTFE is the primary material used for packing because of the relatively low sealing force requirement, excellent emission control and good chemical and thermal resistance.

Anti-Static Device

Internal parts that are insulated from the valve body by seats and seals made of nonconductive materials may build up a static electric charge. To ensure electrical continuity between the stem, ball and the body flange, valves feature a anti-static device as an integral part of the valves construction.

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.

Operating Conditions

- Temperature Range -20°F to +500°F (@ 0 psi)
- 285 psi Maximum Close Off
- ANSI 150# Body Rating
- Steam Rating 150 psi Maximum
- Chilled or Hot Water, Glycol up to 50%
- Bi-directional Close Off - ANSI Class 6

Quality Control

Series 41 non-spring return actuators are low-profile, durable and lightweight in design. Three basic standardized foot prints accommodate the entire size range from ½"- 6". 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 spur, worm and planetary 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
- Dual ½"conduit connections for power and signal wires
- Enclosure are made from high strength sand castings that are polyester powder coated for protection of impacts and chemical attack
- Actuators contain heaters and thermostats for dissipation of condensation
- Precision transmission made of alloy gearing is quiet an efficient
- Capacitors are sealed and rated for peak voltage for extended service

Dimensional Data

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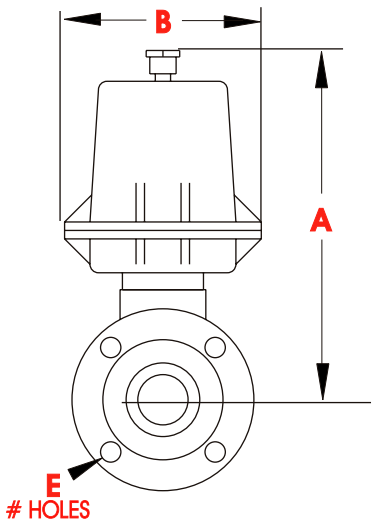
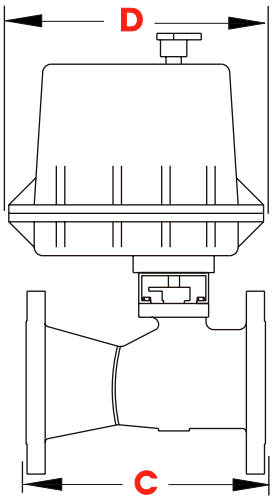
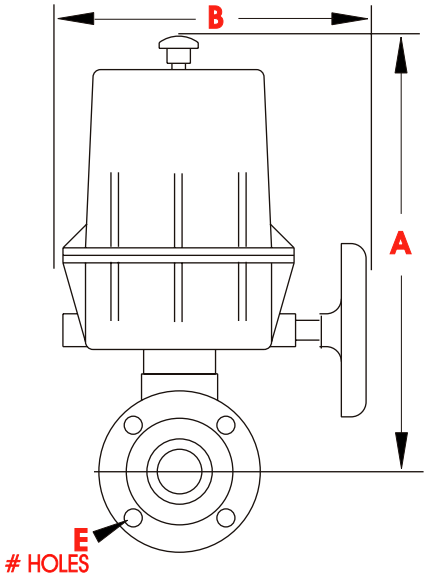
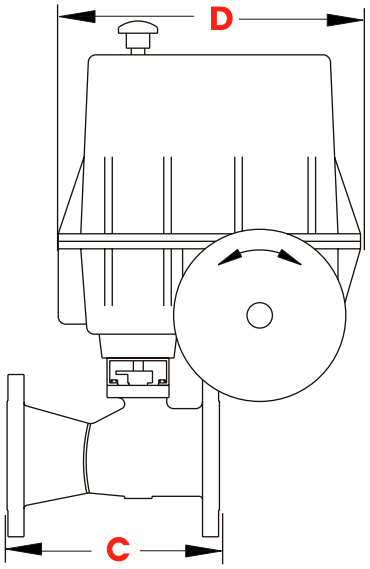
BV-F Series 41 Non-Spring Return, ANSI 150# Regular Port





Sizes ½"- 4"





Size 6"

Standard Assembly, 150# Carbon Body Stainless Trim, Regular Port, 120 VAC, NEMA 4 Actuator, On/Off Modulating Service Change Last O to E in Model #, All Stainless change C to A in Part #, Accessories See Page 4

Assembly Specification						Wt.	Amp draw	Speed 90° (sec.)		41 Series operator		Assembly Dimensions inch (For mm multiply: Inch X 25.4=(mm))				
C_v	Size		Close off psi	Model Number			On/Off Mod.									
	In	DN				lb		On/Off	Mod.	On/off	Mod.	A	B	C	D	E
9	1/2"	15	285	BV21ZRC41O		16	.56	15	30	310-15	310-30	11 5/8"	6 1/4"	4 1/4"	8 1/4"	4
15	3/4"	20	285	BV22ZRC41O		17	.56	15	30	310-15	310-30	11 5/8"	6 1/4"	4 5/8"	8 1/4"	4
28	1"	25	285	BV23ZRC41O		21	.56	15	30	310-15	310-30	12"	6 1/4"	5"	8 1/4"	4
108	1 1/2"	38	285	BV24ZRC41O		25	.56	15	30	310-15	310-30	12 1/2"	6 1/4"	6 1/2"	8 1/4"	4
158	2"	50	285	BV202RC41O		32	.56	15	15	310-15	310-30	13"	6 1/4"	7"	8 1/4"	4
337	3"	85	285	BV203RC41O		51	.56	30	30	310-30	310-30	15"	6 1/4"	8"	8 1/4"	4
489	4"	100	285	BV204RC41O		65	.35	30	30	500-30	500-30	17 1/2"	7 3/4"	9"	9 3/4"	8
973	6"	150	285	BV206RC41O		174	3.15	30	30	810-30	810-30	24 3/4"	13 1/2"	10 1/2"	14"	8

NOTE: Wiring Under "Electrical Section" Series 41, Tagged with Operator Model Number.

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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
9	1/2"	15	9	13	16	18	20	22	24	25	27	28
15	3/4"	20	15	21	26	30	34	37	40	42	45	47
28	1"	25	28	40	48	56	63	69	74	79	84	89
108	1-1/2"	40	108	153	187	216	241	265	286	305	324	342
158	2"	50	158	223	274	316	353	387	418	447	474	500
337	3"	80	337	477	584	674	754	825	892	953	1011	1066
489	4"	100	489	692	847	978	1093	1198	1294	1383	1467	1546
973	6"	150	973	1376	1685	1946	2176	2383	2574	2752	2919	3077

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

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	42% 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
9	176	393	302	596	426	796	548	995	670	1195	792	1395	914	1595	1036	1795	1158	1995	1279	2195
15	293	656	503	993	709	1326	914	1659	1117	1992	1321	2325	1524	2659	1727	2992	1930	3325	2132	3658
28	546	1224	940	1853	1324	2475	1705	3097	2086	3719	2465	4341	2844	4963	3223	5585	3602	6206	3980	6828
108	2107	4722	3624	7148	5106	9547	6578	11945	8045	14344	9509	16743	10971	19142	12432	21540	13893	23939	15353	26338
158	3083	6908	5302	10457	7471	13967	9623	17476	11769	20985	13911	24494	16050	28003	18188	31513	20325	35022	22461	38531
337	6575	14734	11308	22305	15934	29790	20526	37274	25103	44759	29671	52244	34234	59729	38794	67214	43352	74698	47908	82183
489	9541	21380	16408	32365	23121	43226	29784	54087	36425	64947	43053	75808	49675	86669	56292	97530	62905	108390	69516	119251
973	18985	42541	32648	64399	46006	86010	59264	107620	72477	129231	85667	150841	98842	172451	112007	194062	125167	215672	138322	237283

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 then 15 psig steam, it is best to use 80% of gauge inlet pressure. For higher pressure steam greater then 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								
In	DN		1/2"	3/4"	1"	11/2"	2"	3"	4"	6"	8"
1/2"	15	9	9	6.96	6.03	—	—	—	—	—	—
3/4"	20	15	—	15	13.5	11.6	10.9	—	—	—	—
1"	25	28	—	—	28	23.6	21.2	19.6	—	—	—
1-1/2"	40	108	—	—	—	108	82	60.5	—	—	—
2"	50	158	—	—	—	—	158	117	100	90	—
3"	65	337	—	—	—	—	—	337	280	221	203
4"	80	489	—	—	—	—	—	—	489	401	356
6"	100	973	—	—	—	—	—	—	—	973	875

Corrected Cvc = Cv x Fp factor

Assembly Number

Standard Construction | **Accessories**

BV	2	1Z	R	A	41	E		
1&2	3	4&5	6	7	8&9	10	11	12

Ball Valve Assembly, 2-Way, ½" Reduced Port150# Flanged Ends, All Stainless Body and Ball, 120 VAC NEMA 4 Actuator, Non-Spring Return, Modulating 0-10 VDC input

#	ITEM	CODE	DESCRIPTION
1 & 2	Series	BV	Ball Valve
3	Assembly	2	2-Way Configuration
4 & 5	Size	1Z | 02 2Z | 03 3Z | 04 4Z | 06	½"=1Z | 2"=02 ¾"=2Z | 3"=03 1"=3Z | 4"=04 1½"=4Z | 6"=06
6	Valve Type	R	Flanged 150# Reduced Port

#	ITEM	CODE	DESCRIPTION
7	Construction	C A	Carbon Body Stainless Trim All Stainless
8 & 9	Actuator	41	Non-Spring 120 VAC
10	Controls	O E	On/Off Modulating 0-10 VDC 4-20 ma
11 & 12	Accessories	A F H	Auxiliary Switch 2-SPDT Feedback Handwheel

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