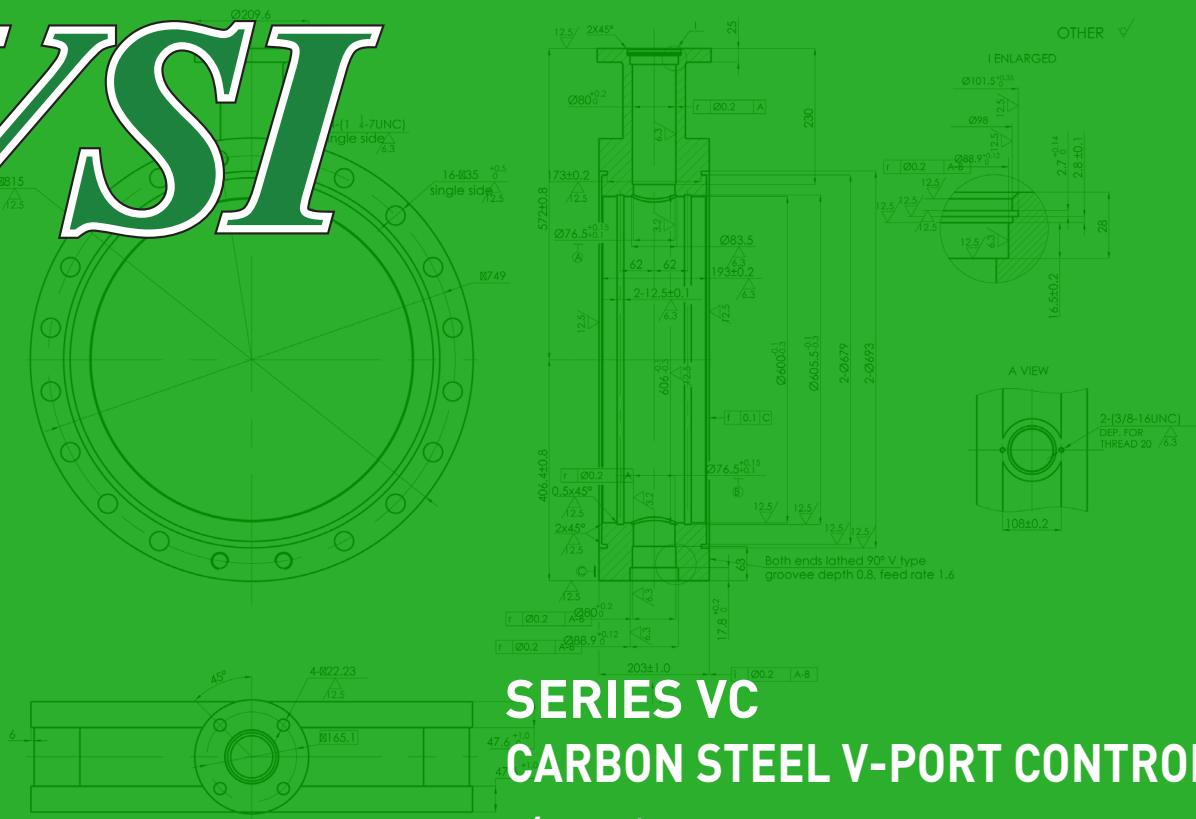


# VSI



## SERIES VC CARBON STEEL V-PORT CONTROL VALVES 1/2" - 1 1/2"



# Series VC

Carbon Steel V-Port  
Control Valves



## THE HVAC STANDARD OF CHOICE

Creating comfortable and efficient building environments begins with a consistent and controllable HVAC system. The 200psi close off of the VSI Series VC ball valve gives them the ability to handle the toughest service in facilities such as schools and universities, medical facilities, office buildings, and other commercial properties. The Series VC is suitable for the following service and more:

- Steam to 30psi
- Chilled Water
- Hot Water
- Up to 50% Glycol solution



## DESIGNED TO LAST

The fully machined metal ball of the VSI Series VC is simple but rugged and reliable. There are no plastic inserts to melt or loosen and no clips to induce flow disturbances and its resulting vibration and noise. Compare the VSI Series VC to the competition and the robust differences are evident:



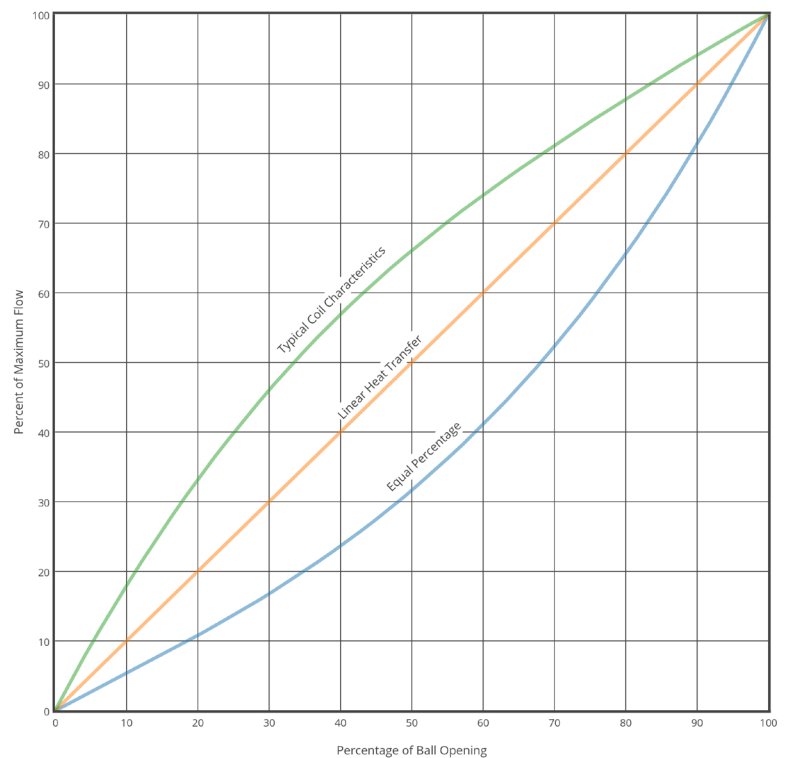
VSI Series VC



Competitors

## EQUAL PERCENTAGE FLOW

The equal percentage flow in the VSI Series VC Ball valve is optimized to cover the vast majority of control systems in use today; opening the valve any certain percentage will cause the same percentage increase in flow no matter what the initial position. This equal percentage flow mirrors the typical quick opening characteristic of coils in heat transfer applications, resulting in a linear heat output to the valves shaft percentage



The "concave" nature of the valve characteristics counteracts the "convex" nature of the coil. The net result is that heat output becomes proportional to the stem position. This characteristic lends itself to straightforward implementation for modulating proportional control of heating and cooling coils and other coil based heat exchangers. This flow type is present on most globe control valves making the Series VC a great upgrade and retro-fit solution for systems with aging globe control valves

## FEATURES AND BENEFITS

### TOP FLANGE

Integrated top flange for the mounting of a wide range of actuators, levers, and gear operators

### MULTIPLE STEM SEALS

The stem is sealed by two separate o-rings and an integral seal in the seat to ensure absolutely no external leakage for the life of the valve.

### FLOW INDICATOR

A flow indicator is permanently machined into the stem to ensure proper field installation

### BLOWOUT PROOF

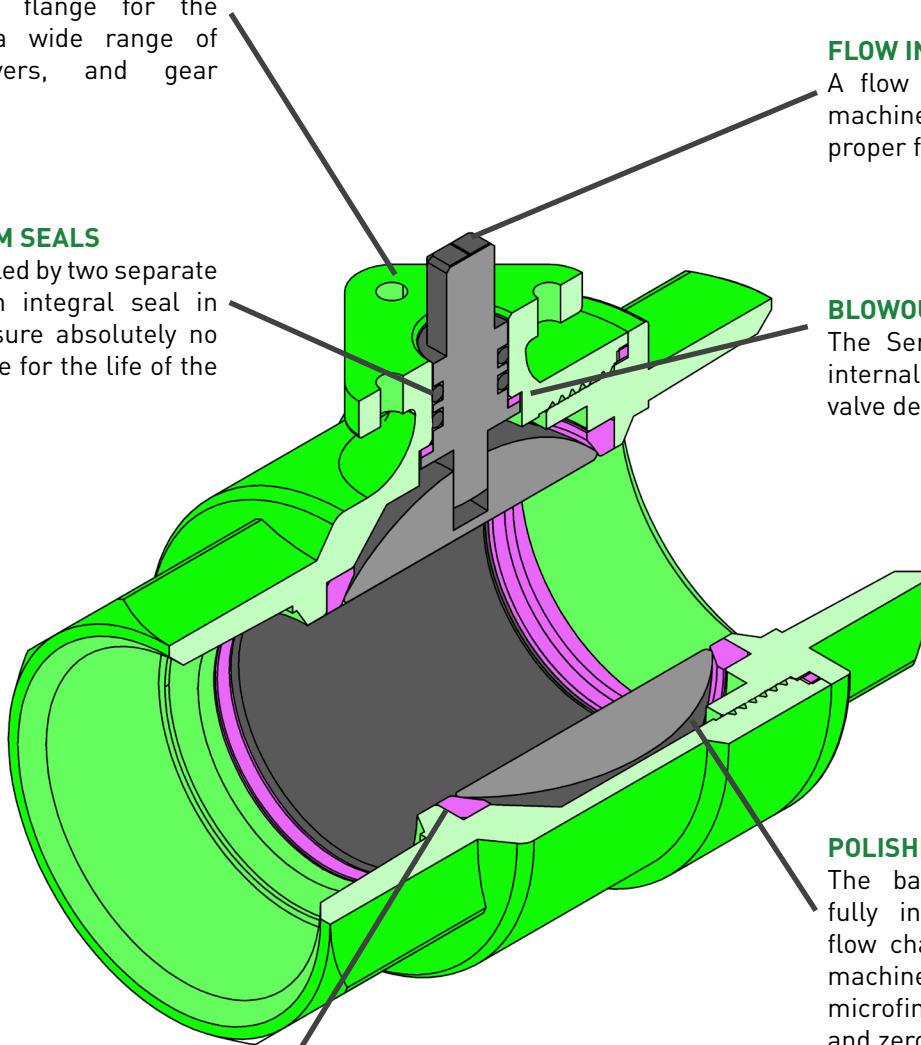
The Series VC stem is retained internally to form a blowout proof valve design.

### POLISHED BALL

The ball of the Series VC is fully investment cast with the flow characterization. It is then machined and polished to a microfinish to ensure low torque and zero corrosion

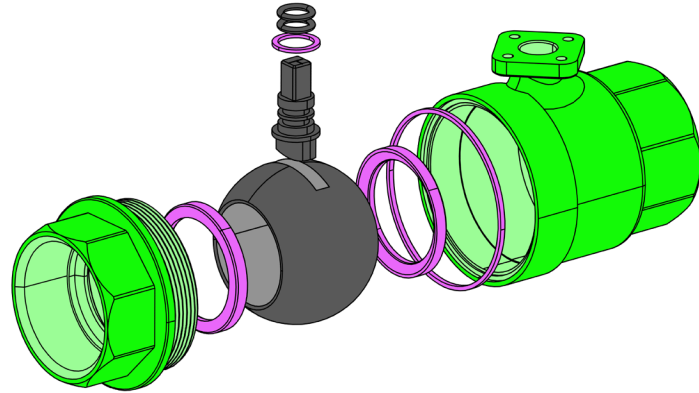
### DUAL SEAT DESIGN

The symmetric valve body featuring dual seats and floating ball is of a bi-directional design

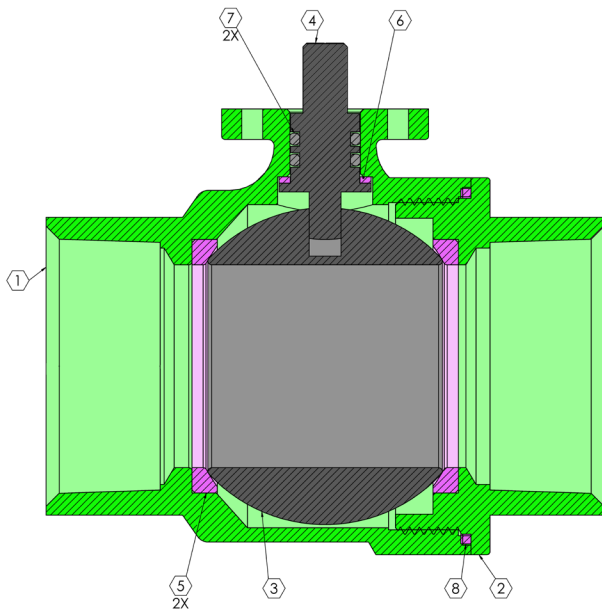


### DESIGN STANDARDS

Size Range	1/2" to 1-1/2"
Connections	National Pipe Thread (NPT) ANSI/ASME 1.20.1
Body Rating	600 WOG (1.5" : 400WOG)
Leakage	ANSI FCI 70-2 Class VI
Shutoff	Maximum Allowable 200psig CWP
Temperature	-10°F to 300°F Maximum Allowable 30psig Steam (274°F)
Flow	Modified Equal Percentage Characteristics 300:1 Turn Down Ratio
Ball Rotation	90 degrees, clockwise close



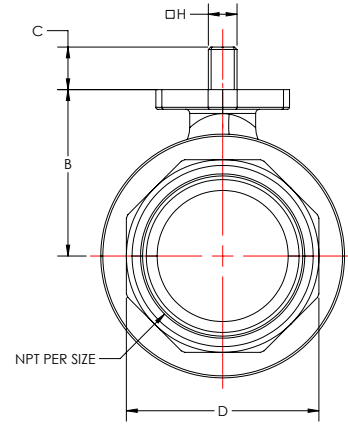
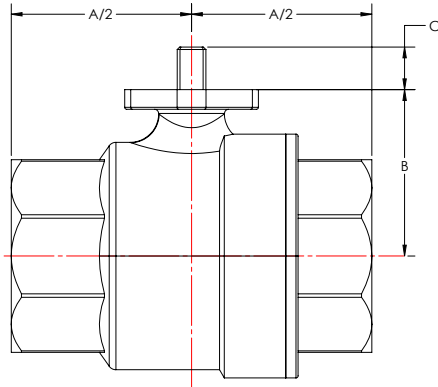
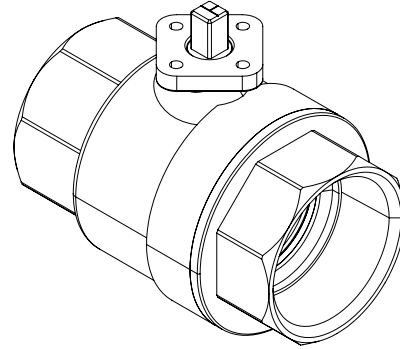
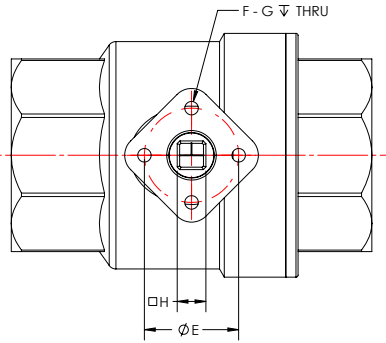
### MATERIALS OF CONSTRUCTION



Item	Description	Materials Available	Standard
1	Body Section 1	Carbon Steel <sup>(1)</sup>	ASTM A216 WCB
2	Body Section 2	Carbon Steel <sup>(1)</sup>	ASTM A216 WCB
3	Ball	Stainless 316	ASTM A351 CF8M
4	Stem	Stainless 316	ASTM A276 316
5	Seats	TFM	3M Dyneon™ 7193
6	Stem Bushing	PTFE	Commercial
7	O-Rings	AFLAS	Commercial
8	Body Seal	PTFE	Commercial
NS	Tag	Stainless	UV Screen Printed

1. Black Oxide coated per MIL-DTL-13924

## VALVE DIMENSIONS



### IMPERIAL

SIZE	PORT	A	B	C	D	E	F	G	H	WEIGHT (LBS)
1/2"	0.59	2.26	1.06	0.39	1.00	0.91	4	M4-0.7	0.276	0.5
3/4"	0.79	2.52	1.20	0.39	1.25	0.91	4	M4-0.7	0.276	0.8
1"	0.98	3.02	1.38	0.39	1.54	0.91	4	M4-0.7	0.276	1.1
1-1/4"	1.26	3.46	1.59	0.39	1.85	0.91	4	M4-0.7	0.276	1.6
1-1/2"	1.57	4.04	1.86	0.39	2.17	0.91	4	M4-0.7	0.276	2.3

### METRIC

SIZE	PORT	A	B	C	D	E	F	G	H	WEIGHT (KG)
1/2"	15	57.4	25.9	10	25.4	23	4	M4-0.7	7	0.22
3/4"	20	64.6	30.2	10	31.8	23	4	M4-0.7	7	0.36
1"	25	77	33.7	10	39	23	4	M4-0.7	7	0.50
1-1/4"	32	88	40.6	10	47	23	4	M4-0.7	7	0.73
1-1/2"	40	103.1	47.0	10	55	23	4	M4-0.7	7	1.04



### FLOW COEFFICIENTS

SIZE	PART NUMBER	VALVE FLOW COEFFICIENT (Cv)									
		VALVE ROTATION IN DEGREES									
		10°	20°	30°	40°	50°	60°	70°	75°	80°	90°
1/2"	VC-050-000	-	0.04	0.24	0.34	0.43	0.57	0.76	0.85	0.94	<b>1.04</b>
	VC-050-001	-	-	0.03	0.15	0.37	0.62	0.90	1.07	1.25	<b>1.67</b>
	VC-050-002	-	0.01	0.08	0.27	0.49	0.78	1.20	1.49	1.81	<b>2.33</b>
	VC-050-003	0.01	0.07	0.18	0.40	0.64	0.93	1.43	1.82	2.26	<b>3.61</b>
	VC-050-004	0.02	0.27	0.68	1.11	1.58	2.26	3.32	4.05	4.87	<b>7.00</b>
	VC-050-100*										
3/4"	VC-075-000	0.01	0.06	0.16	0.35	0.57	0.95	1.60	2.08	2.62	<b>4.00</b>
	VC-075-001	0.03	0.10	0.25	0.57	0.95	1.57	2.65	3.44	4.34	<b>6.63</b>
	VC-075-002	0.08	0.39	0.81	1.37	2.25	3.54	5.67	7.19	8.91	<b>11.66</b>
	VC-075-003	0.15	0.58	1.65	2.60	4.11	6.56	10.63	12.71	14.63	<b>19.69</b>
	VC-075-100*										
1"	VC-100-000	0.02	0.15	0.43	0.74	1.17	1.84	2.93	3.70	4.59	<b>7.00</b>
	VC-100-001	0.04	0.24	0.66	1.15	1.82	2.87	4.58	5.79	7.18	<b>10.87</b>
	VC-100-002	0.05	0.38	1.04	1.79	2.85	4.50	7.16	9.06	11.24	<b>17.00</b>
	VC-100-003	0.09	0.56	1.53	2.64	4.19	6.61	10.53	13.33	16.52	<b>25.00</b>
	VC-100-100*										
1 1/4"	VC-125-000	0.05	0.62	2.02	3.68	5.52	7.67	10.50	12.41	14.58	<b>20.69</b>
	VC-125-001	0.36	0.92	2.07	4.19	7.71	13.06	20.71	25.65	31.12	<b>44.81</b>
	VC-125-002	0.65	1.43	3.11	6.36	11.75	19.71	30.57	37.28	44.57	<b>61.81</b>
	VC-125-003	0.61	2.58	6.02	11.20	18.54	28.58	42.03	50.47	59.72	<b>82.64</b>
	VC-125-100*										
1 1/2"	VC-150-000	0.37	0.95	2.14	4.33	7.67	13.31	21.39	26.50	32.15	<b>46.3</b>
	VC-150-001	0.81	1.76	3.82	7.84	14.49	24.30	37.69	45.96	54.95	<b>76.2</b>
	VC-150-002	1.17	2.55	5.55	11.38	21.04	35.30	54.76	66.77	79.83	<b>110.7</b>
	VC-150-100*										

\* FULL ROUND PORT

- Flow Coefficient Cv is defined as the flow in gallons/minute of water (SG=1) at 60F resulting in a 1 PSI pressure drop across the valve
- Flow data is measured using Schedule 40 pipe at nominal pipe velocities of 10-20 ft/sec
- Extreme flow velocities may result in cavitation, noise, and reduced life cycle



## FLOW DATA

### FLOWRATE (GPM) AT DIFFERENTIAL PRESSURE (PSI) ACROSS FULL OPEN VALVE

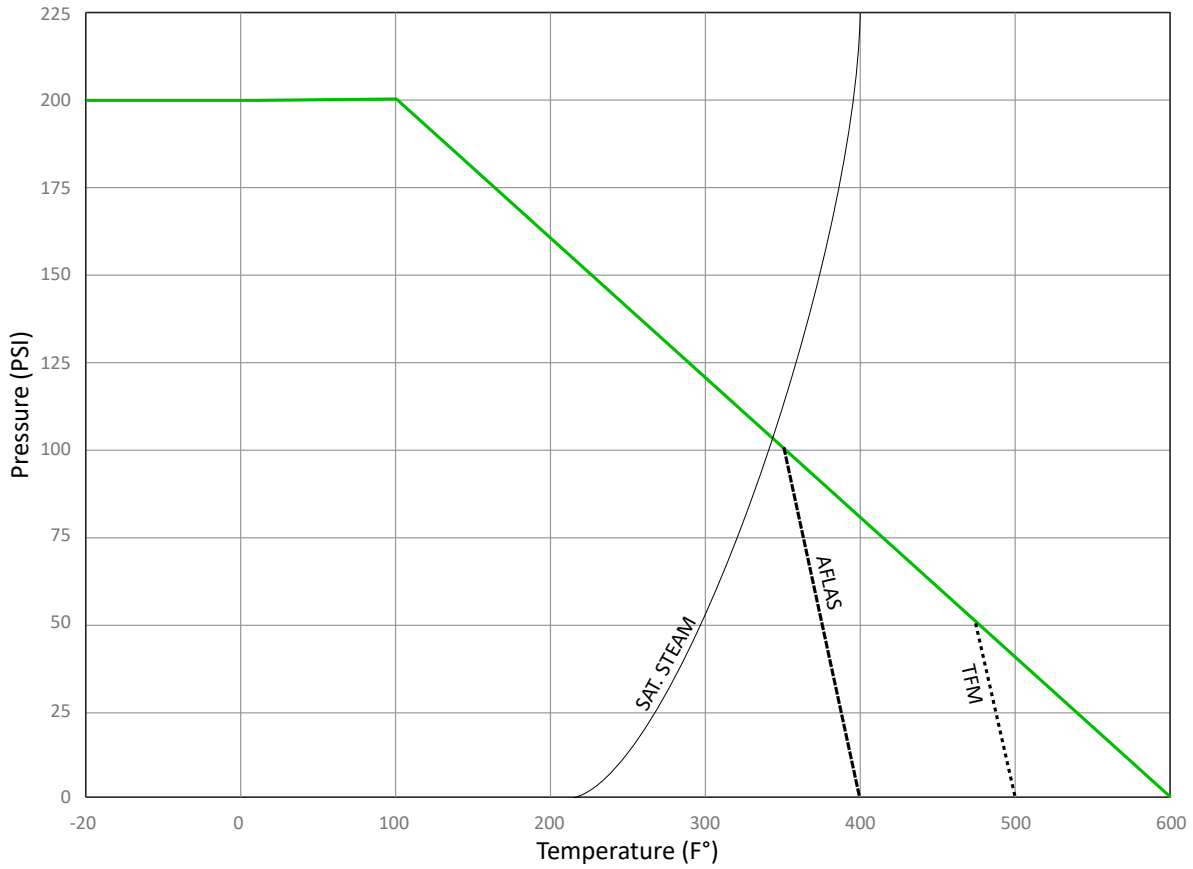
SIZE	PART NUMBER	RECOMMENDED MODULATING SIZING RANGE										
		0.5 PSI	Cv 1 PSI	2 PSI	2.5 PSI	3 PSI	3.5 PSI	4 PSI	4.5 PSI	5 PSI	7.5 PSI	10 PSI
1/2"	VC-050-000	0.7	<b>1.04</b>	1.5	1.6	1.8	1.9	2.1	2.2	2.3	2.8	3.3
	VC-050-001	1.2	<b>1.67</b>	2.4	2.6	2.9	3.1	3.3	3.5	3.7	4.6	5.3
	VC-050-002	1.6	<b>2.33</b>	3.3	3.7	4.0	4.4	4.7	4.9	5.2	6.4	7.4
	VC-050-003	2.6	<b>3.61</b>	5.1	5.7	6.3	6.8	7.2	7.7	8.1	9.9	11.4
	VC-050-004	4.9	<b>7.00</b>	9.9	11.1	12.1	13.1	14.0	14.8	15.7	19.2	22.1
	VC-050-100*	7.1	<b>10</b>	14	16	17	19	20	21	22	278	32
3/4"	VC-075-000	2.8	<b>4.00</b>	5.7	6.3	6.9	7.5	8.0	8.5	8.9	11.0	12.6
	VC-075-001	4.7	<b>6.63</b>	9.4	10.5	11.5	12.4	13.3	14.1	14.8	18.2	21.0
	VC-075-002	8.2	<b>11.66</b>	16.5	18.4	20.2	21.8	23.3	24.7	26.1	31.9	36.9
	VC-075-003	13.9	<b>19.69</b>	27.8	31.1	34.1	36.8	39.4	41.8	44.0	53.9	62.3
	VC-075-100*	17.0	<b>24</b>	34	38	42	45	48	51	54	66	76
1"	VC-100-000	4.9	<b>7.00</b>	9.9	11.1	12.1	13.1	14.0	14.8	15.7	19.2	22.1
	VC-100-001	7.7	<b>10.87</b>	15.4	17.2	18.8	20.3	21.7	23.1	24.3	29.8	34.4
	VC-100-002	12.0	<b>17.00</b>	24.0	26.9	29.4	31.8	34.0	36.1	38.0	46.6	53.8
	VC-100-003	17.7	<b>25.00</b>	35.4	39.5	43.3	46.8	50.0	53.0	55.9	68.5	79.1
	VC-100-100*	31	<b>44</b>	62	70	76	82	88	93	98	120	139
1 1/4"	VC-125-000	14.6	<b>20.69</b>	29.3	32.7	35.8	38.7	41.4	43.9	46.3	56.7	65.4
	VC-125-001	31.7	<b>44.81</b>	63.4	70.9	77.6	83.8	89.6	95.1	100.2	122.7	141.7
	VC-125-002	43.7	<b>61.81</b>	87.4	97.7	107.1	115.6	123.6	131.1	138.2	169.3	195.5
	VC-125-003	58.4	<b>82.64</b>	116.9	130.7	143.1	154.6	165.3	175.3	184.8	226.3	261.3
	VC-125-100*	66	<b>93</b>	132	147	161	174	186	197	208	255	294
1 1/2"	VC-150-000	31.0	<b>46.3</b>	61.9	69.3	75.9	81.9	87.6	92.9	97.9	120.0	138.5
	VC-150-001	51.3	<b>76.2</b>	102.7	114.8	125.7	135.8	145.2	154.0	162.3	198.8	229.6
	VC-150-002	78.3	<b>110.7</b>	156.6	175	191.7	207.1	221.4	234.8	247.5	303.2	350.1
	VC-150-100*	109.6	<b>155</b>	219	245	268	290	310	329	347	424	490

\* FULL ROUND PORT

- Flow Coefficient Cv is defined as the flow in gallons/minute of water (SG=1) at 60F resulting in a 1 PSI pressure drop across the valve
- Flow data is measured using Schedule 40 pipe at nominal pipe velocities of 10-20 ft/sec
- Extreme flow velocities may result in cavitation, noise, and reduced life cycle



## PRESSURE/TEMPERATURE RATINGS CHART



PAGE 8

## VALVE TORQUES

SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"
Torque At 200PSIG (in/lbs)	12	32	42	50	60
Closeoff(PSIG) with 35inlb Actuator	200	200	75	NA	NA

No safety factor included. Torques are with water as operating fluid, dry media may require a higher safety factor.





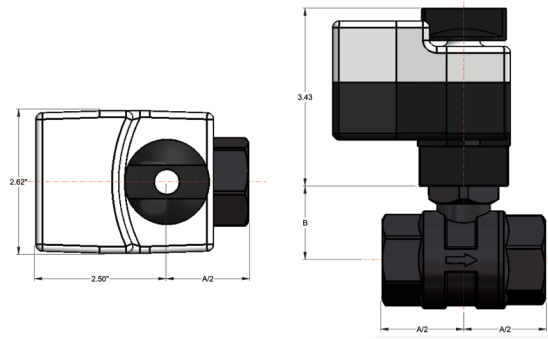
## ACTUATOR CLOSE-OFF SIZING

Valve Size			1/2"	3/4"	1"	1-1/4"	1-1/2"
Actuator Model	Actuator Torque (inlbs)	Diagram Num.	Maximum Close-Off Pressure (PSI)				
VSI Electric Actuators 24, 120, or 220 VAC							
1005-XL	442	4	200	200	200	200	200
1005S-XL	442	4	200	200	200	200	200
VSI Double Acting Pneumatic							
C-45DA	115	5	200	200	200	200	200
VSI Spring Return Pneumatic							
C-63SR	121	5	200	200	200	200	200
Belimo Floating/2 Position Non-Spring Return							
TR24-3	18	1	200	75	-	-	-
LMB24-3	45	2/3	200	200	200	100	-
NMB24-3	90	2/3	-	-	200	200	200
Belimo 2 Position Spring Return							
TFB24	22	2/3	200	100	-	-	-
LF24	35	2/3	200	200	75	-	-
NFB24	90	2/3	-	-	200	200	200
Belimo Modulating Non-Spring Return							
TR24-SR	18	1	200	75	-	-	-
LMB24-SR	45	2/3	200	200	200	100	-
NMB24-SR	90	2/3	-	-	200	200	200
Belimo Modulating Spring Return							
TFB24-SR	22	2/3	200	100	-	-	-
LF24-SR	35	2/3	200	200	75	-	-
NFB24-SR	90	2/3	-	-	200	200	200
Siemens Floating or Modulating Non-Spring Return							
GDE	44	2/3	200	200	200	100	-
GLB	88	2/3	-	-	-	200	200
Siemens 2 Position or Modulating Spring Return							
G0D	20	2/3	200	75	-	-	-
GMA	62	2/3	-	200	200	200	200
GCA	160	2/3	-	-	-	200	200
Johnson Controls Floating or Modulating Non-Spring Return							
M9102	18	2/3	200	75	-	-	-
M9104	35	2/3	200	200	75	-	-
M9106	53	2/3	-	-	200	200	100
M9108	70	2/3	-	-	-	200	200
M9109	80	2/3	-	-	-	-	200
Johnson Controls 2 Position or Modulating Spring Return							
M9203	27	2/3	200	150	-	-	-
M9208	70	2/3	-	-	200	200	200

\*Actuator sizing is representative only, contact VSI for specialty applications

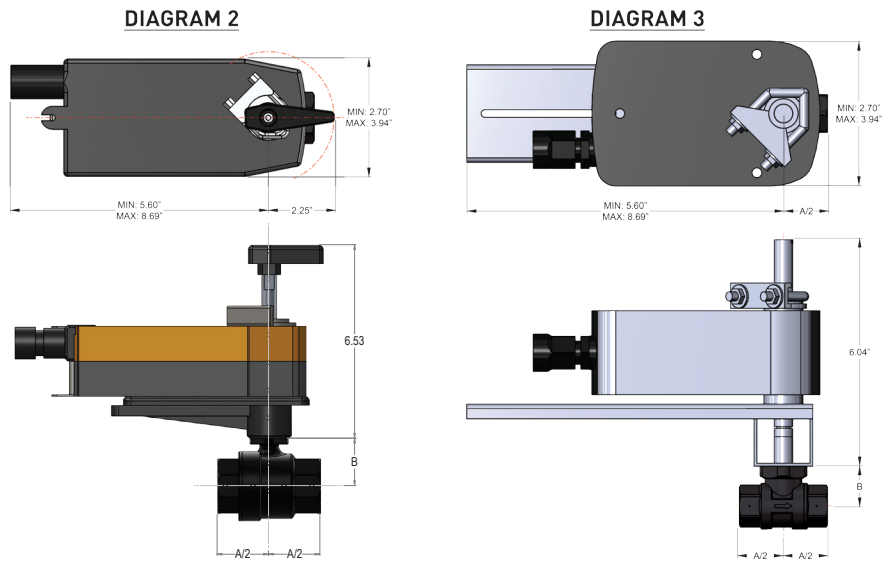


### DIAGRAM 1



SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"
A	2.26	2.52	3.02	3.46	4.04
B	1.06	1.20	1.38	1.59	1.86

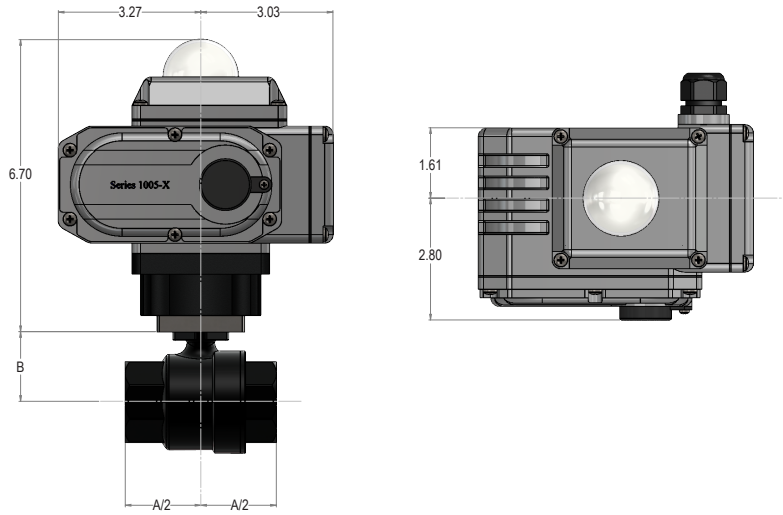
### DIAGRAM 2 AND 3



SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"
A	2.26	2.52	3.02	3.46	4.04
B	1.06	1.20	1.38	1.59	1.86

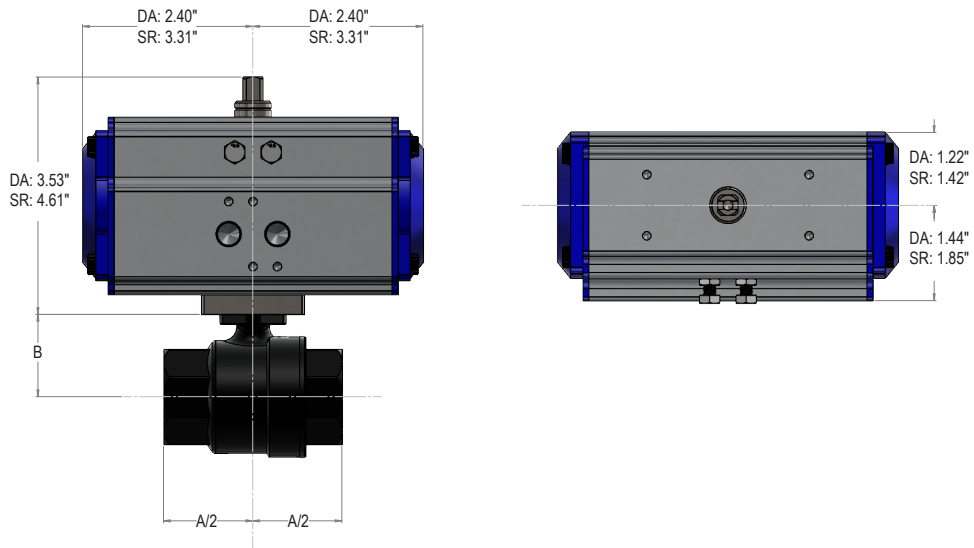
Dimensions vary based on actuator selection, see actuator data sheet for detailed dimensions

## DIAGRAM 4



SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"
A	2.26	2.52	3.02	3.46	4.04
B	1.06	1.20	1.38	1.59	1.86

## DIAGRAM 5



SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"
A	2.26	2.52	3.02	3.46	4.04
B	1.06	1.20	1.38	1.59	1.86



## SAMPLE SPECIFICATION

### 1. Carbon Steel V-Port Control Valves

1.1. This specification covers the design, manufacture, and testing of carbon steel threaded V-port type control ball valves 1/2-inch (15 mm) to 1-1/2-inch (40mm) under shell pressures of up to 600 psig (4,137 kPa).

### 2. CONNECTIONS

2.1. Valves shall be equipped with NPT connections conforming to ANSI B1.20.1.

### 3. MARKINGS

3.1. Each valve shall be marked with the manufacturer's name and valve size cast into the body of the valve.

3.2. Valves shall be equipped with a tag identifying the size, the model designation, the pressure rating, the seat material, and a unique traceable serial number in addition to manufacturer's name and contact information.

### 4. DESIGN

4.1. Ball valves for control shall be the two-piece threaded connection type with a full port diameter or a characterize ball for flow control.

4.2. Valve stem shall be blow-out proof, feature a PTFE bushing, and at minimum two o-ring seals.

4.3. Valves for flow control service shall be supplied with modified equal percentage flow characterization. Flow characterization shall be directly cast into the metallic ball. Plastic inserts retained by friction, adhesive, or clips are not acceptable.

4.4. Ball valves shall have a 600 WOG rating for valves up to and including 1-1/4" and 400 WOG for 1-1/2" and larger valves for the valve body. All sizes shall be rated to 200psig with zero-leakage to ANSI/FCI 70-2 Class VI. Valves that are not rated Class VI zero-leakage will not be accepted.

4.5. Valves shall be rated to minimum 300°F for use in 30psi absolute maximum steam pressure.

4.6. The valves shall be equipped with a mounting area so that lever, gearbox, pneumatic, hydraulic, or electric actuators may be installed as required by application.

### 5. MATERIALS

5.1. The body shall be constructed of accurately machined Carbon Steel bodies conforming to ASTM A216 WCB

5.2. The ball shall be made of Stainless Steel 316 conforming to ASTM A351 CF8M that is ground and polished.

5.3. The seats shall be made of TFM suitable for use in steam applications.

5.4. The body seals and bushing shall be made of virgin PTFE

5.5. The stem o-rings shall be of AFLAS

### 6. MANUFACTURER

6.1. Carbon steel v-port control valves shall be VSI Series VC as manufactured by Valve Solutions, Inc., Alpharetta, GA USA or approved equal

6.2. All valves shall be warranted by manufacturer for a minimum of 12 months.

## WARRANTY

This limited warranty applies in the United States to products manufactured by VSI, LLC. VSI, LLC. warrants the product purchased from it or its authorized reseller to be free from defects in material and workmanship under normal use during the one year warranty period from the date of its purchase. Other products not manufactured by VSI, LLC. which are provided as part of an assembly may carry additional warranties from that manufacturer or supplier.

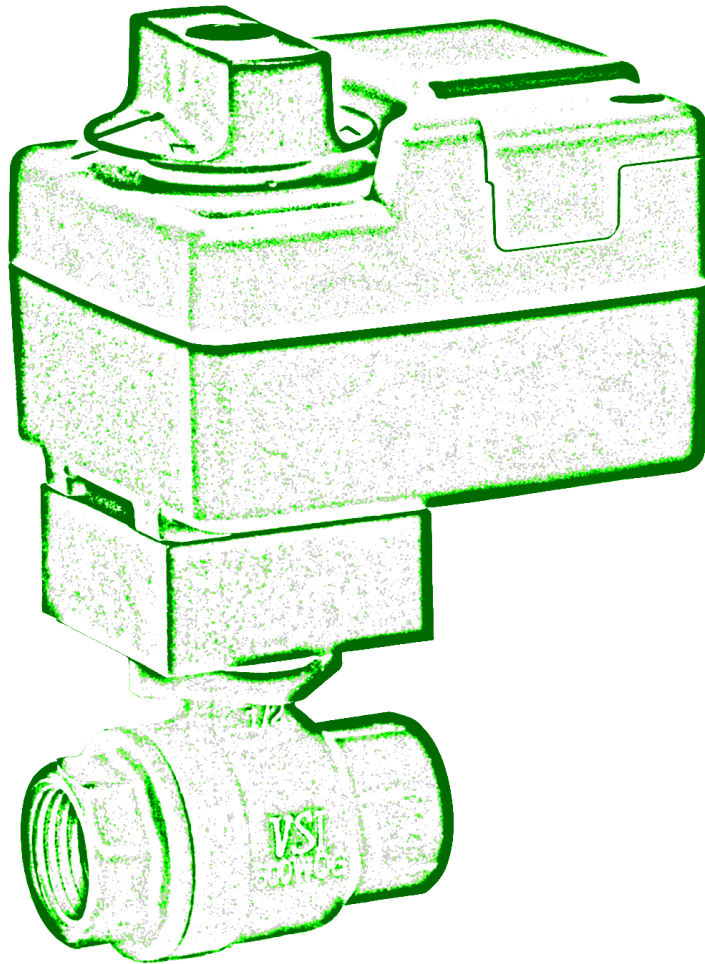
During the warranty period, VSI, LLC. will repair or replace defective parts of the product, or, at VSI, LLC. sole option, issue a credit for the original purchase price of the product. Repaired or replaced product will be warranted hereunder only for the remaining portion of the original warranty period. All exchanged products under this Limited Warranty will become the property of VSI, LLC. A proper Return Material Authorization (RMA) number will have to be obtained for all products to be returned under this Limited Warranty. Any claim under this Limited Warranty must include a description of the problem encountered and any relevant information that may assist VSI, LLC. in the replication or resolution of the problem.

This Limited Warranty is transferable during its term to the end user of the product. Any transfer shall not extend or alter the terms of this Limited Warranty.

This Limited Warranty extends only to products purchased from VSI, LLC. or its authorized reseller and does not extend to any product that has been damaged or rendered defective as a result of (a) modification, repair, alteration or improper installation by any person other than VSI, LLC. or its authorized representative; (b) unreasonable or improper use or storage, use beyond rated conditions, operation other than per VSI, LLC. or the manufacturer's instructions, or being otherwise subjected to improper maintenance, negligence or accident; or (c) any use of the product after purchaser has knowledge of any defect in the product.

**The warranties provided above are in lieu of and exclude all other warranties, statutory, express or implied, including without limitation any warranty or merchantability or fitness for a particular purpose. VSI, LLC. expressly disclaims all warranties not stated in this limited warranty. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty.**

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