

VBN Threaded Control Ball Valves and Actuators

SPECIFICATION DATA

APPLICATION

The VBN2 2-Way Control Ball Valves and VBN3 3-Way Control Ball Valves control hot and chilled water with glycol solutions up to 50% in heating, ventilating, and air conditioning (HVAC) systems to provide two-position or modulating functions. These control ball valves can be ordered alone or with spring return or non-spring return actuators.

VBN2, VBN3



FEATURES

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Equal percentage flow characteristic.
- Reduced B port C_V for constant loop flow.
- Choice of factory-installed actuation: floating, modulating (2-10 V), spring return or non-spring return 2-Position, Spring Return Modulating/Floating.
- Field configurable for normally open or normally closed fail-safe position.
- Removable manual operating handle to control valve during installation or in an event of power failure.
- Actuator can be mounted on the valve in any of four orientations.
- Field-serviceable stem assembly.
- Wide range of C_V choices from 0.33 to 266.

- Nickel-chrome plated brass or 316 stainless steel ball and stem.
- Valve installs in a globe valve “T” pattern, no extra elbows or piping required.
- Mixing or Diverting control for 3-way valves.
- ANSI Class IV seat leakage specification (0.01% of C_V) for 3-way A port and ANSI Class III seat leakage specification (0.1% of C_V) for 3-way B port.

SPECIFICATIONS

Valve Type: Control Ball Valve

Body Pattern: 2-way, 3-way

Connection Type: Female NPT

Controlled Fluid: Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.

Leakage Rating: ANSI Class IV (0.01% of C_V maximum) for 3-way A port and ANSI Class III seat leakage specification (0.1% of C_V) for 3-way B port

Maximum Safe Operating Rating: 360 psi (2482 kPa)

Fluid Temperature Range: -22°F to +250°F (-30°C to +121°F)

Materials:

Body: Brass

Ball and Stem:

Two-way: Nickel-chrome plated brass or 316 Stainless Steel.

Three-way: Nickel-chrome plated brass.

Seat: Teflon® seals with EPDM O-rings

Flow Control Insert: Noryl®

Body Style:

2-way ball valve, straight-through flow, full or reduced port using patented flow control insert.

3-way ball valve, A-B-AB flow, full or reduced port using patented flow control insert.

Internal NPT connections.

Body Pressure Rating (maximum):

360 psi (2482 kPa) at 250°F (121°C).

Medium Temperature Range:

-22 to +250°F (-30 to +121°C).



VBN THREADED CONTROL BALL VALVES AND ACTUATORS

Flow Characteristics:

2-way: Equal Percentage with flow control insert.
 3-way: Port A to AB: Equal Percentage.
 Port B to AB: Linear.

Approvals/Standards:

Valves: ANSI Class IV close-off/leakage (maximum 0.01% of C_v let by)
 Actuators: See literature for the given actuator.

Compatible Actuators:

Minimum Torque Required:
 35 lb-in. (4 Nm) up to 3 in. (≤DN80)
 27 lb-in. (3 Nm) up to 1-1/4 in. (≤DN32)
 Fail Safe: MSXX05*
 Non-Fail Safe: MVN* and MNXX05*

* These actuators are available as factory installed assemblies. See Table 1 for all available options.

Table 1. VBN Model Selection Table.

Model Selection: Ball Valve							Actuator Adapter	Actuator	Fail Position	Accessories
Valve	Fitting	Body/Flow Type	Size	C _v	Trim					
VB - ball valve								MVN613A0000***	Leave blank = Fail in place	C1 1 m cable 3R NEMA Enclosure
N- Female NPT threaded								MVN613L0000***		
2 - 2-way								MVN643A0000***		
3 - 3-way								MVN643L0000***		
A---1/2 (DN15)								MVN713A0000***		
B---3/4 (DN20)								MVN713L0000***		
C---1 (DN25)								MN6105A1011		
D---1-1/4 (DN32)								MN6105A1201		
E---1-1/2 (DN40)								MN7505A2001		
F---2 (DN50)								MN7505A2209		
G---2-1/2 (DN65)								MS7505A2030		
H---3 (DN80)								MS8105A1030		
xxx.xx - C _v Designator								MS4105A1030		
See Tables 4 and 5.								MS4105A1130		
P - Plated Brass								MS8105A1130		
S - Stainless Steel (VBN2 only)								MS7505A2130		
A* - Standard Base										
L** - Low Profile										
X - MN/MS DCA Actuator Bracket										
VB	N	2	A	004.70	P	A	+	MVN613A0000	+	C1

Example part number: **VBN2A004.70PA+MVN613A0000+C1**
 * Standard base provides clearance between valve and actuator for insulation.
 ** Low profile enables installation of valve and actuator in tight spaces.
 *** Only compatible with valves 1-1/4" or smaller.

Table 2. Actuator Control Description.

Actuator	Control
MVN613A0000	Floating, Two-position (SPDT or SPST) (90 sec. timing), 24 V, Fail in Place
MVN613L0000	
MVN643A0000	Floating, Two-position (SPDT) Fast Acting (30 sec. timing), 24 V, Fail in Place
MVN643L0000	
MVN713A0000	Modulating, 24 V, Fail in Place
MVN713L0000	
MN6105A1011	Floating, Two-position (SPDT), 24 V, Fail in Place
MN6105A1201	Floating, Two Position (SPDT), 24 V, Fail in Place with end switches
MN7505A2001	Modulating, 24 V, Fail in Place
MN7505A2209	Modulating, 24 V, Fail in Place with end switches
MS7505A2030	Modulating, Floating, Two-position (SPDT), 24 V, Fail Safe
MS7505A2130	Modulating, Floating, Two Position (SPDT), 24 V, Fail Safe with end switches
MS8105A1030	Two-Position (SPST), 24 V, Fail Safe
MS8105A1130	Two Position (SPST), 24 V, Fail Safe with end switches
MS4105A1030	Two Position (SPST), 120 V, Fail Safe
MS4105A1130	Two Position (SPST), 120 V, Fail Safe with end switches

Table 3. Control Ball Valve Short Order Codes ½” – 3”.

Model Selection: Ball Valve						Actuator	Fail Position	Accessories			
Valve	Body Flow Type	Valve Size	CV	Trim	Actuator Adapter						
VBN - Control Ball Valve						0 - No Actuator (valve only) 1 - 24 Vac, Floating/2-Pos., 90 sec. (MVN613, Fail in place) ^{***} 2 - 24 Vac, Floating/2-Pos., 30 sec. (MVN643, Fail in place) ^{***} 3 - 24 Vac, Modulating 0(2)-10 Vdc (MVN713, Fail in place) ^{***} 4 - 24 Vac, Floating/2-Position (MN6105, Fail in place) 5 - 24 Vac, Mod. 0(2)-10 Vdc (MN7505, Fail in place) 6 - 24 Vac, Mod. 0(2)-10 Vdc/Floating (MS7505, Fail safe) 7 - 24 Vac, 2-Position (MS8105, Fail safe) 8 - 100-250 Vac, 2-Position (MS4105, Fail safe) 9 - 100-250 Vac, 2-Pos. w/ end switches (MS4105, Fail safe) A - 24 Vac, 2-Position w/ end switches (MS8105, Fail safe) B - 24 Vac, Mod 0(2)-10 Vdc/Floating w/ end switches (MS7505, Fail safe) C - 24 Vac, Floating/2-Position w/ end switches (MN 6105, Fail in place) D - 24 Vac, Mod. 0(2)-10Vdc w/ end switches (MN7505, Fail in place)	0 - No Actuator or Fail in Place (FIP) 1 - Fail Safe Open (FSO) VBN2 only 2 - Fail Safe Closed (FSC) VBN2 only 3 - Fail Safe A to AB Open (FSA) VBN3 only 4 - Fail Safe B to AB Open (FSB) VBN3 only	00 - None 01 - C1 - 1 m Cable 02 - 3R - NEMA enclosure			
2 - 2-way											
3 - 3-way											
A ---1/2 (DN15) B --- 3/4 (DN20) C --- 1 (DN25) D --- 1-1/4 (DN32) E --- 1-1/2 (DN40) F --- 2 (DN50) G --- 2-1/2 (DN65) H --- 3 (DN80)											
C _v Designator. Options range from B-2. See Tables 4 and 5.											
P - Nickel Chrome Plated Brass S - 316 Stainless Steel (VBN2 only)											
A * - Standard Base L ** - Low Profile X - MN/MS DCA Actuator Bracket											
VBN	2	A	B	P	A				1	0	00

Example part number: **VBN2ABPA1000**

* Standard base provides clearance between valve and actuator for insulation.

** Low profile enables installation of valve and actuator in tight spaces.

*** Only compatible with valves 1-1/4” or smaller.

Table 4. C_v Designator for Two-Way VBN Ball Valves.

Valve Body	Size	B	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	1	2
VBN2A	1/2"	0.38	0.68	1.3	2.0	2.6	4.7	8.0	11.7*										
VBN2B	3/4"	0.31	0.63	1.2		2.5	4.3	7.4	10.1	14.7*	29*								
VBN2C	1"						4.4	9.0		15.3	26	44*	54*						
VBN2D	1-1/4"						4.4	8.3	14.9	25	37	41*			102*				
VBN2E	1-1/2"									23	30	41		74				172*	
VBN2F	2"											42	57	71	100	108*		210	266*
VBN2G	2-1/2"											45	55	72	101		162	202*	
VBN2H	3"											49	63	82		124	145*		

* Denotes full port valve (with no insert). Provides linear flow control.

Table 5. C_v Designator for Three-Way VBN Ball Valves.

Valve Body	Size	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
VBN3A	1/2"	0.33	0.59		1.0	2.4		4.3	8.0							
VBN3B	3/4"		0.40	0.66	1.3	2.4	3.8		7.0	11.0*						
VBN3C	1"		0.40	0.65	1.3	2.3	3.5	4.5	8.6	14.9	22	31				
VBN3D	1-1/4"							4.1	8.7	12.7	19.4*	27	34*			
VBN3E	1-1/2"							4.0	8.3	13.4	24	32*		61		
VBN3F	2"										24		38	57	83	109
VBN3G	2-1/2"												38		74	100*

* Denotes full port valve (with no insert). Provides linear flow control.

MVN Actuator



APPLICATION

MVN 3Nm (27 lb-in.) Control Valve Actuator is used with the VBN2 2-way and the VBN3 3-way Control Ball Valves to control hot and chilled water with glycol solutions up to 50% in heating, ventilating, and air conditioning (HVAC) systems to provide two-position or modulating functions.

FEATURES

- **Non-spring Return**
- **Floating and modulating**
- **Space saving, click-on installation – no tool required**
- **Extendable position indicator for easy commissioning**
- **Available with or without cable**
- **Compatible with control ball valves from 1/2 to 1-1/4 inches.**
- **Actuator can be mounted on the valve in any of four positions.**

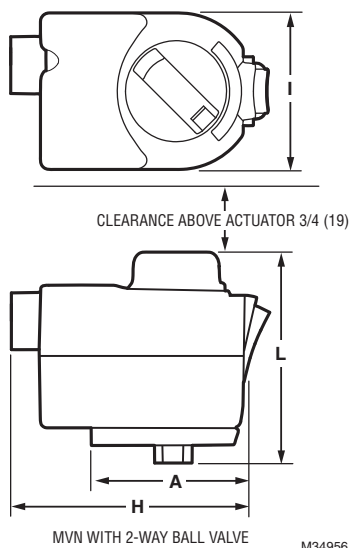


Fig. 1. MVN with 2-way ball valve. See Table 4.

SPECIFICATIONS

Actuator Type: Valve

Rotational Stroke: 90° ±3°.

Fail Safe Mode: Non-spring return, Fail in place

Torque: 27 lb-in. (3 Nm).

External Auxiliary Switches Available: No

Supply Voltage: 24 Vac +20%, -15%, 24 Vdc

Power Consumption: 5 VA- Modulating; 1.5 VA - Floating;
6 VA - Fast Acting SPDT

Environmental Rating: NEMA2

Frequency: 50 Hz; 60 Hz

Mounting: Click-on installation – no tool required

Noise Rating at 1m (Maximum): 35 dB(A) max at 1 m
[50 dB (A) for MVN643].

Materials: Plenum rated plastic housing

Operating Humidity Range (% RH):
5 to 95% RH, non-condensing

Ambient Temperature Range: -4°F to 131°F
(-20°C to 55°C)

Storage Temperature Range: -40°F to 176°F
(-40°C to 80°C)

Weight: See Table 7 (2-way) and Table 8 (3-way)

Dimensions: See Fig. 4-6, Table 7 (2-way) and
Table 8 (3-way).

Timing: 90 sec. for MVN613 and MVN713; 30 sec. for
MVN643

Electrical Connections: Field wiring 18 to 20 AWG to
screw terminals, located under the removable access
cover.

Humidity Ratings: 5% to 95% RH non-condensing.

Design Life (at Rated Voltage):
60,000 cycles; 1 cycle = 0°...90°...0°

Cable Specification:
18 AWG, Plenum Rated, 300 V, 10 A, 3 ft. length from end
of access cover.

Environmental Protection Ratings: IP40.

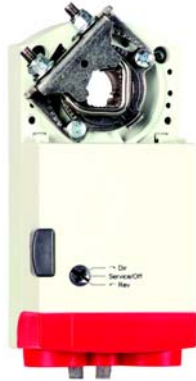
Approvals: UL/cUL; UL60730

Table 6. Actuators and Accessories

Actuator	Description	Accessory
MVN613A0000	Floating control ball valve actuator	C1- 1 meter cable
MVN613L0000	Floating control ball valve actuator	
MVN643A0000	Fast acting SPDT control ball valve actuator	
MVN643L0000	Fast acting SPDT control ball valve actuator	
MVN713A0000	Modulating control ball valve actuator	
MVN713L0000	Modulating control ball valve actuator	

To order actuator with accessories order actuator part number + accessory. For example: MVN613A0000 + C1

Non-Spring Return Direct Coupled Actuator



APPLICATION

This non-spring return direct-coupled damper actuator provides modulating or floating/2-position control for: air dampers, air handlers, ventilation flaps, louvers, and reliable control for air damper applications with up to 10 sq. ft./ 44lb.-in. (5 Nm) and 20 sq. ft./88 lb.-in. (10 Nm) (seal-less damper blades; air friction-dependent).

FEATURES:

- **Declutch for manual adjustment**
- **Adjustable mechanical end limits**
- **Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections**
- **Models available with 3 foot 18 AWG color-coded cable**
- **Mountable in any orientation**
- **Function selection switch for selecting modulating (MN7505) or floating/2-position control (MN6105)**

SPECIFICATIONS

Actuator Type: Damper; Valve

Rotational Stroke: 95° ±3 degrees

Fail Safe Mode: Non-spring return, Fail in place

Torque: 44 lb.-in. (5 Nm)

External Auxiliary Switches Available: No

Environmental Rating: NEMA2

Frequency: 50 Hz; 60 Hz

Manual operation: Declutch mechanism

Mounting: Direct coupled

Maximum Noise Rating, Driving (dBA @ 1m): 35

Rotation to Open: By switch

Rotational Stroke Adjustment: Dual Integral Adj. Stops (3 degree increments)

Compatible Damper Shafts:

1/4 to 1/2 in. square or 3/8 to 5/8 in. round
(6 to 13 mm square or 8 to 16 mm round)

Shaft Adapter Type: U-bolt clamp

Supply Voltage: 24 Vac +20%, -15%, 24 Vdc

Power Consumption: 5 VA

Materials: Plenum rated plastic housing

Ingress Protection Rating: IP54

Operating Humidity Range (% RH):

5 to 95% RH, non-condensing

Ambient Temperature Range: -5°F to +140°F

(-20°C to +60° C)

Storage Temperature Range: -22°F to +176°F

(-30°C to +80°C)

Weight: 1 lb (0.45 kg)

Includes: Mounting bracket, screws, shaft adapter, water-tight strain-relief cable fittings

Comments: Integral 1/2 in. NPSM conduit connection.

Approvals:

CE: 89/336/ECC, 73/23/EEC

C-Tick: N314

Underwriters Laboratories, Inc.: UL873, Plenum Rated

Canadian Underwriters Laboratories, Inc.:

cUL C22.2 No. 24-93

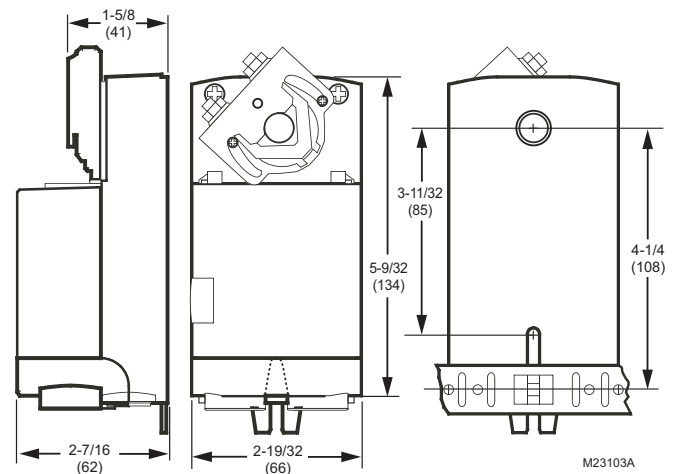


Fig. 2. Non-spring return direct coupled actuator dimensions diagram.

Spring Return Direct Coupled Actuator



APPLICATION

MS4105, MS7405, MS7505, and MS8105 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating, and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

FEATURES

- **Brushless DC submotor with electronic stall protection on all models**
- **Self-centering shaft adaptor (shaft coupling) for wide range of shaft sizes**
- **Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections.**
- **Models available with 3 foot 18 AWG color-coded cable**
- **Durable plastic housing with built-in mechanical end limits**
- **Spring return direction field selectable**
- **Shaft position indicator and scale**
- **UL (cUL) listed and CE compliant**
- **All models are plenum rated per UL873**

SPECIFICATIONS

Actuator Type: Damper; Valve

Rotational Stroke: 95 ±3 degrees

Fail Safe Mode: Spring Return

Torque: 44 lb-in. (5 Nm)

Spring Return Torque: 44 lb-in. (5 Nm)

Spring Return Direction: By orientation

External Auxiliary Switches Available: No

Environmental Rating: NEMA2

Frequency: 50 Hz; 60 Hz

Mounting: Direct Coupled

Maximum Noise Rating, Holding (dBA @ 1m):
20 (no audible noise)

Maximum Noise Rating, Driving (dBA @ 1m): 50

Rotation to Open: By switch

Supply Voltage: 24 Vac +20%, -15%, 24 Vdc

Power Consumption: 5 VA

Rotational Stroke Adjustment: Mechanically limited 5 degree increments

Compatible Damper Shafts:
1/4 to 1/2 in. square or 3/8 to 5/8 in. round
(6 to 13 mm square or 9 to 16 mm round)

Shaft Adapter Type: Self-centering clamping

Materials: Plenum rated plastic housing

Operating Humidity Range (% RH):
5 to 95% RH, non-condensing

Ambient Temperature Range: -40°F to +149°F
(-40°C to +65°C) for two-position actuators only

Storage Temperature Range: -40°F to +150°F
(-40°C to +65°C)

Weight: 3.5 lb. (1.6 kg)

Includes: Mounting bracket, self-centering shaft adapter

Approvals:

CE: EMC 2004/108/EC; Certification Low Voltage Directive 2006/95/EC; IEC 60730-1 and Part 2-14
C-Tick: N314
Underwriters Laboratories, Inc.: UL873
Canadian Underwriters Laboratories, Inc.: cUL C22.2 No. 24-93

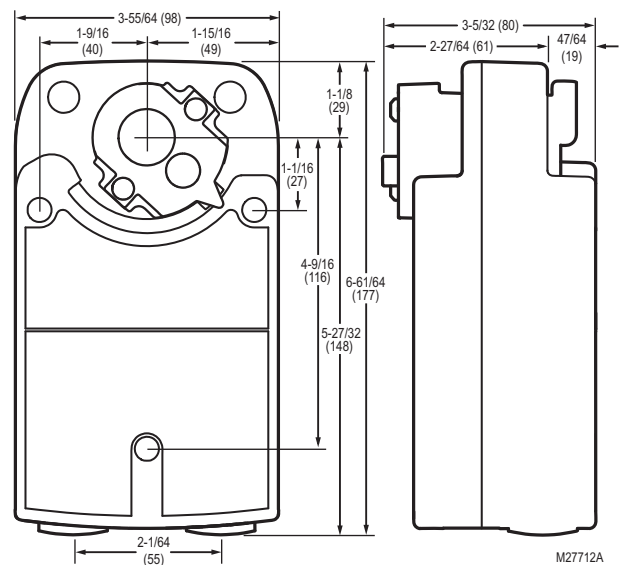


Fig. 3. Spring return direct coupled actuator dimensions diagram.

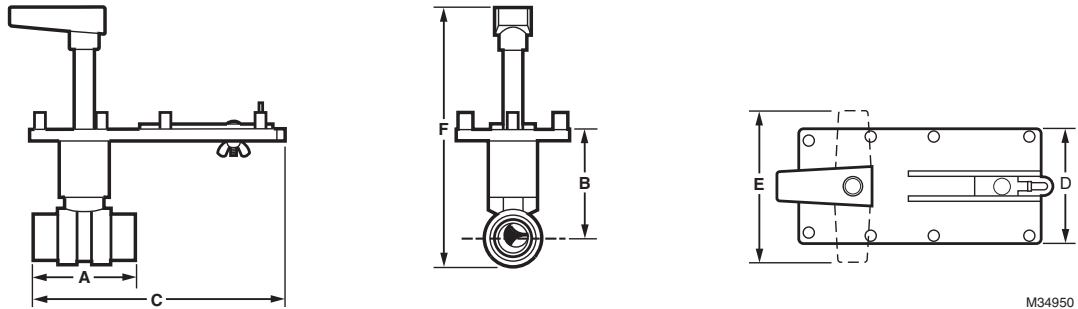


Fig. 4. 2-way ball valve dimensions for models with MN and MS actuators. See Table 7.

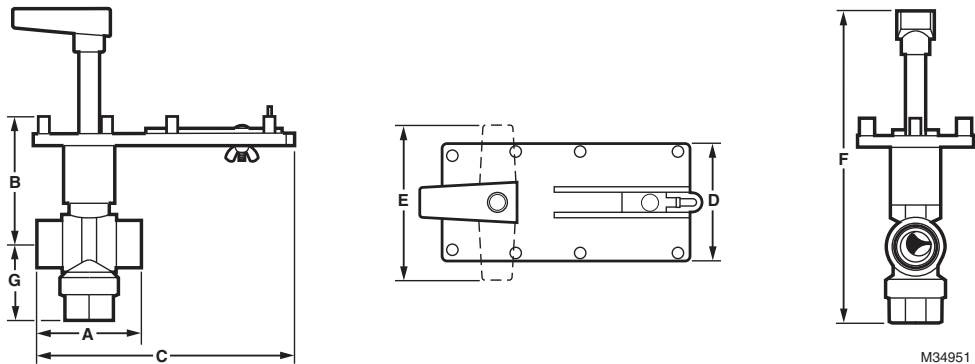


Fig. 5. 3-way ball valve dimensions for models with MN and MS actuators. See Table 8.

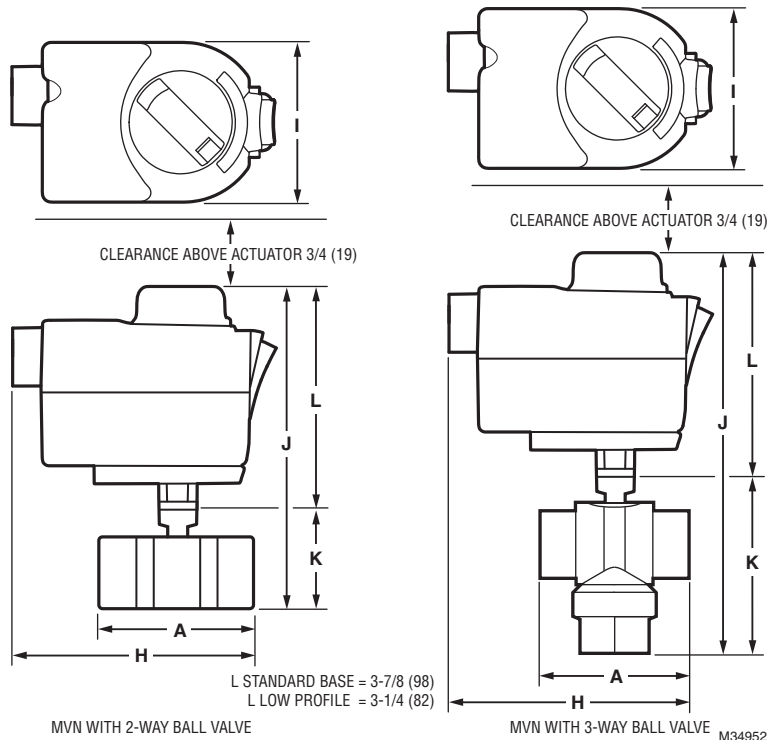


Fig. 6. MVN actuator with 2-way and 3-way ball valve dimensions in inches (millimeters). See Table 7 and Table 8.

Table 7. VBN2 dimensions in inches (millimeters).

Pipe Size			C _v Designators	MVN, MN, AND MS ACTUATORS WITH 2-WAY BALL VALVE Dimensions in in. (mm)											Weight (valve only) lbs.	Replacement Stem Assembly**		
In.	(DN)	Code		A	B	C	D	E	Fms ^a	Fmn ^b	H	I	J (w/std)	J (w/low)			K	
1/2	15	VBN2A	0.38, 0.68, 1.30, 2.00, 2.60, 4.70, 8.00, 11.70*	2-3/8 (60)	3-7/16 (87)	6-5/8 (168)	3 (76)	4 (102)	8-1/8 (206)	6-7/8 (175)	4-9/16 (116)	2-3/16 (71)	5-7/16 (139)	4-13/16 (123)	1-5/8 (41)	1	5112-19 5112-22 (SS)	
3/4	20	VBN2B	0.31, 0.63, 1.20, 2.50, 4.30, 7.40, 14.70*	2-3/8 (60)	3-7/16 (87)	6-7/16 (164)	3 (76)	4 (102)	8-1/8 (206)	6-7/8 (175)			5-7/16 (139)	4-13/16 (123)	1-5/8 (41)	1		
			10.10, 29.00*	2-5/8 (67)	3-11/16 (94)	6-1/2 (165)	3 (76)	4 (102)	8-5/16 (211)	7-1/16 (180)			5-5/8 (143)	5 (127)	1-13/16 (45)	1		
1	25	VBN2C	9.00	3-3/4 (95)	3-11/16 (94)	7-1/16 (179)	3 (76)	4 (102)	8-5/16 (211)	7-1/16 (180)			5-5/8 (143)	5 (127)	1-13/16 (45)	1		5112-20 5112-23 (SS)
			4.40, 15.30, 26.00, 44.00, 54.00*	3-1/16 (77)	3-15/16 (100)	6-3/4 (171)	3 (76)	4 (102)	8-11/16 (221)	7-7/16 (189)			6 (152)	5-3/8 (137)	2-3/16 (55)	1.4		
1-1/4	32	VBN2D	4.40, 8.30, 14.90, 25.00, 41.00*	3 (76)	3-15/16 (100)	6-11/16 (170)	3 (76)	4 (102)	8-11/16 (221)	7-7/16 (189)			6 (152)	5-3/8 (137)	2-1/8 (54)	1.4		
			37.00, 102.00*	3-5/8 (92)	4-7/16 (113)	7 (178)	3 (76)	4 (102)	9-1/16 (231)	7-13/16 (198)			6-3/8 (162)	5-3/4 (146)	2-9/16 (64)	2.4		
1-1/2	40	VBN2E	23.00, 30.00, 74.00*	3-7/16 (87)	3-15/16 (100)	6-15/16 (176)	3 (76)	4 (102)	9-1/16 (231)	7-13/16 (198)						2.4	5112-21 5112-24 (SS)	
			41.00, 172.00*	4-1/16 (103)	5-3/16 (132)	7-1/16 (179)	3 (76)	4 (102)	8-7/8 (225)	7-5/8 (194)						3.2		
2	50	VBN2F	42.00, 108.00*	4 (101)	3-3/4 (95)	7-3/16 (183)	3 (76)	4 (102)	8-7/8 (225)	7-5/8 (194)						3.2		
			57.00, 71.00, 100.00, 210.00, 266.00*	4-15/16 (125)	4-1/16 (103)	7-7/16 (188)	3 (76)	4 (102)	10-1/2 (267)	9-1/4 (235)				5				
2-1/2	65	VBN2G	45.00, 55.00, 72.00, 101.00, 162.00, 202.00*	5-5/16 (135)	4-1/16 (103)	7-9/16 (192)	3 (76)	4 (102)	10-1/2 (267)	9-1/4 (235)				5.5				
3	80	VBN2H	49.00, 63.00, 82.00, 124.00, 145.00*	5 (127)	5-7/8 (149)	7-11/16 (196)	3 (76)	4 (102)	10-11/16 (271)	9-7/16 (240)				5.9				

^a For models using the MS direct coupled actuator.

^b For models using the MN direct coupled actuator.

* Indicates full port valve: no flow characterizing insert.

** Replacement stems available in brass or stainless steel--use accordingly to valve part number.

Table 8. VBN3 dimensions in inches (millimeters).

Pipe Size			CV Designators	MVN, MN, AND MS ACTUATORS WITH 3-WAY BALL VALVE													Weight (valve only) lbs.	Replacement Stem Assembly
In.	(DN)	Code		Dimensions in in. (mm)														
			A	B	C	D	E	Fms ^a	Fmn ^b	G	H	I	J (w/ std)	J (w/ low)	K			
1/2	15	VBN3A	0.33, 0.59, 1.00, 2.40, 4.30, 8.00	3-1/2 (89)	3-5/16 (84)	7 (178)	3 (76)	4 (102)	9-3/8 (238)	8-1/8 (206)	2-3/8 (60)			6-11/16 (170)	6-1/16 (154)	2-7/8 (72)	2.4	5112-19
3/4	20	VBN3B	0.40, 0.66, 1.30, 2.40, 3.80, 7.00, 11.00*	2-13/16 (71)	3-5/16 (84)	6-1/2 (165)	3 (76)	4 (102)	8-13/16 (224)	7-9/16 (192)	2 (51)			6-1/8 (156)	5-1/2 (140)	2-5/16 (58)	2	
1	25	VBN3C	0.40, 0.65, 1.30, 2.30, 3.50	3-13/16 (97)	3-5/16 (84)	7-5/16 (185)	3 (76)	4 (102)	9-1/2 (241)	8-1/4 (210)	2-3/4 (70)	4-9/16 (116)	2-13/16 (71)	6-13/16 (173)	6-3/16 (157)	3 (75)	2.8	5112-20
			8.60, 22.00	3 (76)	3-13/16 (97)	6-13/16 (173)	3 (76)	4 (102)	9-13/16 (249)	8-9/16 (217)	2-5/8 (67)			7-1/8 (181)	6-1/2 (165)	3-5/16 (83)	2.6	
			4.50, 14.90, 31.00	4-5/16 (114)	4 (102)	7-13/16 (198)	3 (76)	4 (102)	10-13/16 (275)	9-9/16 (243)	3-1/4 (83)			8-1/8 (206)	7-1/2 (191)	4-5/16 (109)	3.3	
1-1/4	32	VBN3D	4.10, 8.70, 19.40*	3 (76)	3-13/16 (97)	6-13/16 (173)	3 (76)	4 (102)	9-13/16 (249)	8-9/16 (217)	2-1/2 (64)			7-1/8 (181)	6-1/2 (165)	3-5/16 (83)	2.5	5112-20
			12.70, 27.00, 34.00*	3-5/8 (91)	4 (102)	7-5/16 (185)	3 (76)	4 (102)	10-5/16 (262)	9-1/16 (230)	2-3/4 (70)	7-5/8 (194)	7 (178)	3-13/16 (96)	2.8			
1-1/2	40	VBN3E	4.00, 8.30, 13.40, 32.00*	4-5/16 (114)	4 (102)	7-13/16 (198)	3 (76)	4 (102)	10-13/16 (275)	9-9/16 (243)	3-1/4 (83)						3.3	5112-21
			24.00, 61.00	4 (102)	4-1/2 (114)	7-5/16 (185)	3 (76)	4 (102)	11 (279)	9-3/4 (248)	3-1/4 (83)						3.3	
2	50	VBN3F	24.00, 38.00, 57.00	4 (102)	4-1/2 (114)	7-5/16 (185)	3 (76)	4 (102)	11 (279)	9-3/4 (248)	3-1/4 (83)						3.3	5112-21
			83.00, 109.00	5 (127)	5-13/16 (147)	7-13/16 (198)	3 (76)	4 (102)	12-5/16 (313)	11-1/16 (281)	3-3/4 (95)						3.8	
2-1/2	65	VBN3G	38.00, 74.00, 100.00	5 (127)	5-13/16 (147)	7-13/16 (198)	3 (76)	4 (102)	12-5/16 (313)	11-1/16 (281)	3-3/4 (95)						3.8	

^a For models using the MS direct coupled actuator.
^b For models using the MN direct coupled actuator.
* Indicates full A-port: no flow characterizing insert.

Rangeability

Rangeability is a measure of a valve's controllability. It is a measured property and is expressed as the ratio of a valve's maximum flow rate to its minimum controllable flow rate.

Table 9. 2-way available C_v and Rangeability.

VBN2A	C_v	0.38	0.68	1.30	2.00	2.30	4.70	8.00	11.70	
	Rangeability	41	17	52	*	321	159	390	251	
VBN2B	C_v	0.31	0.63	1.20	2.50	4.30	7.40	10.10	14.70	29.00
	Rangeability	41	17	52	321	159	*	390	251	1503
VBN2C	C_v	4.40	9.00	15.30	26.00	44.00	54.00			
	Rangeability	159	390	1040	484	1263	1207			
VBN2D	C_v	4.40	8.30	14.90	25.00	37.00	41.00	102.00		
	Rangeability	159	390	1040	*	484	1207	1263		
VBN2E	C_v	23.00	30.00	41.00	74.00	172.00				
	Rangeability	484	*	603	1263	558				
VBN2F	C_v	42.00	57.00	71.00	100.00	108.00	210.00	266.00		
	Rangeability	603	*	287	*	558	750	877		
VBN2G	C_v	45.00	55.00	72.00	101.00	162.00	202.00			
	Rangeability	250	*	287	558	750	877			
VBN2H	C_v	49.00	63.00	82.00	124.00	145.00				
	Rangeability	250	287	558	750	877				

Effective C_v

For effective C_vs for Honeywell control ball valves when used with pipe reducers, refer to Tables 10 and 11.

Table 10. Effective C_vs Using Pipe Reducers (Two-way).

Valve Size (in.)	Effective C _v ^a									
	Pipe Size (NPT)									
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"
1/2"	0.38	0.38	0.38	0.38						
	0.68	0.68	0.68	0.68						
	1.3	1.3	1.3	1.3						
	2.0	2.0	1.9	1.9						
	2.6	2.5	2.5	2.4						
	4.7	4.3	4.1	3.9						
	8.0	6.5	5.7	5.4						
	11.7	7.9	6.7	6.2						
3/4"	0.31	0.31	0.31	0.31						
	0.63	0.63	0.63	0.63						
	1.2	1.2	1.2	1.2						
	2.5	2.5	2.5	2.5						
	4.3	4.3	4.2	4.2						
	7.4	7.2	6.4	6.8						
	10.1	9.6	9.1	8.8						
	14.7	7.1	6.5	6.2						
29	21.1	17.1	15.4							
1"		4.4	4.4	4.4	4.4	4.4	4.3			
		9.0	8.9	8.8	8.7	8.6	8.6			
		15.3	14.9	14.4	13.8	13.5	13.4			
		26	24	22	20	19	19			
		44	37	31	26	24	23			
		54	42	34	28	26	25			
1-1/4"			4.4	4.4	4.4	4.4	4.4	4.4		
			8.3	8.3	8.2	8.2	8.2	8.1		
			14.9	14.8	14.5	14.3	14.2	14.0		
			25	25	23	22	22	22		
			37	35	31	30	29	28		
1-1/2"					23	22	22	22	22	21
					30	29	28	28	27	27
					41	39	37	36	35	34
					74	64	56	52	48	47
					172	101	77	67	60	57
2"						42	41	41	40	40
						57	56	54	52	51
						71	69	65	62	61
						100	94	87	79	72
						108	100	92	83	79
						210	165	135	111	102
2-1/2"							45	44	43	42
							55	53	51	50
							72	67	63	61
							101	88	80	76
							162	119	101	94
3"								49	46	45
								63	57	55
								82	69	67
								124	90	85
								145	97	91

^a Multiply the C_v value by 0.865 to get the capacity in k_vs, if S.I. (metric) units are required.

Table 11. Effective C_vs Using Pipe Reducers (Three-way)

Valve Size (in.)	Effective C _v ^a									
	Pipe Size (NPT)									
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"
1/2"	0.33	0.33	0.30	0.30						
	0.59	0.59	0.60	0.60						
	1.0	1.0	1.0	1.0						
	2.4	2.4	2.3	2.3						
	4.3	4.3	4.0	3.8						
8.0	8.0	7.9	5.7							
3/4"		0.40	0.40	0.40	0.40					
		0.66	0.66	0.66	0.66					
		1.3	1.3	1.3	1.3					
		2.4	2.4	2.4	2.4					
		3.8	3.8	3.7	3.7					
	11.0	10.4	9.78	9.4						
1"		0.40	0.40	0.40	0.40	0.40	0.40	0.40		
		0.65	0.65	0.65	0.65	0.65	0.65	0.65		
		1.3	1.3	1.3	1.3	1.3	1.3	1.3		
		2.3	2.3	2.3	2.3	2.3	2.3	2.3		
		3.5	3.5	3.5	3.5	3.5	3.5	3.5		
		4.5	4.5	4.5	4.5	4.5	4.4	4.4		
		8.6	8.6	8.5	8.4	8.3	8.2	8.2		
		14.9	14.9	14.6	14.1	13.5	13.3	13.1		
		22	22	21	20	18.0	18.0	17.0		
	31	31	28	25	22	21	21			
1-1/4"				4.1	4.0	4.0	4.0	4.0	4.0	
				7.7	7.7	7.6	7.6	7.6	7.6	
				8.7	8.6	8.6	8.5	8.5	8.5	
				12.7	12.6	12.4	12.3	12.2	12.2	
				19	19	19	18.1	17.9	17.6	
				27	26	25	24	23	23	
1-1/2"						4.0	4.0	4.0	4.0	
						8.3	8.2	8.2	8.2	
						13.4	13.3	13.2	13.2	
						24	23	23	22	22
						32	31	30	29	27
						61	55	50	47	44
2"							24	24	24	24
							38	38	37	37
							57	56	54	52
							83	70	75	70
							109	101	92	83
2-1/2"								38	37	37
								74	68	65
								100	87	79

^a Multiply the C_v value by 0.865 to get the capacity in k_vs, if S.I. (metric) units are required.

Application Notes

IMPORTANT

Valve sizing is important for correct system operation. Undersized valves do not have sufficient capacity at maximum load. Oversized valves do not have sufficient authority over the load in modulating applications.

Oversized valves can cause excessive cycling and the seat and ball can be damaged because of the restricted opening.

Proper Use

These valves are only for use in cold, warm, and hot water systems. Not suitable for oil, combustible gases, or steam. They are designed for a medium temperature range of from 35 to 250°F, at a maximum pressure of 360 psig VBN valves are to be operated with the appropriate Honeywell direct coupled actuators only.

Water should be properly filtered, treated and conditioned according to local conditions and the recommendations of the boiler or chiller manufacturers. The installation of a strainers and filters is recommended.

IMPORTANT

The presence of excessive iron oxide (red rust) in the system voids the valve warranty.

Required Operating Torque

Both Honeywell non-spring return MVN and spring return low torque direct coupled actuators can be utilized with the VBN2 and VBN3 valves. VB valves use a patented seat design that reduces the torque needed from the actuator.

Table 12. Close-off, Differential Pressure Ratings.

Valve Type	Valve Size (in.)	Close-off Pressure Rating (psid)
2-way	1/2, 3/4	130
	1, 1-1/4, 1-1/2, 2, 2-1/2, 3	100
3-way	1/2, 3/4, 1	50
	1-1/4, 1-1/2, 2, 2-1/2	40

NOTE: 3-way close-off ratings apply to 3-way valves with the B port plugged

Flow Characteristics, Fig. 7, 8

The VBN2 Two-Way Ball Valves have:

- an equal percentage flow characteristic with characterized flow control insert.
- a linear flow characteristic with full port balls.

The VBN3 Three-Way Ball Valves have:

- between ports A and AB: an equal percentage flow characteristic.
- between ports B and AB: a linear flow characteristic at 20% reduced C_v .

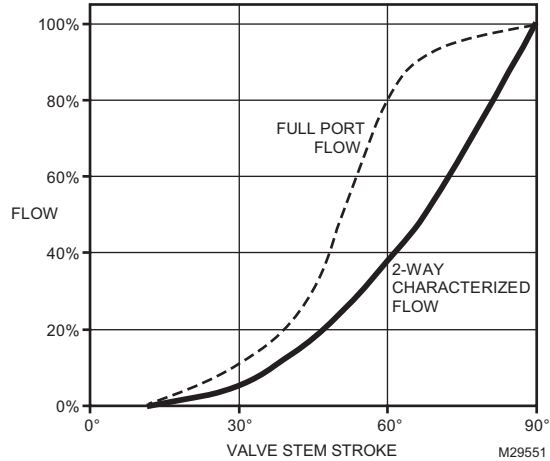


Fig. 7. Typical characterized VBN2 flow.

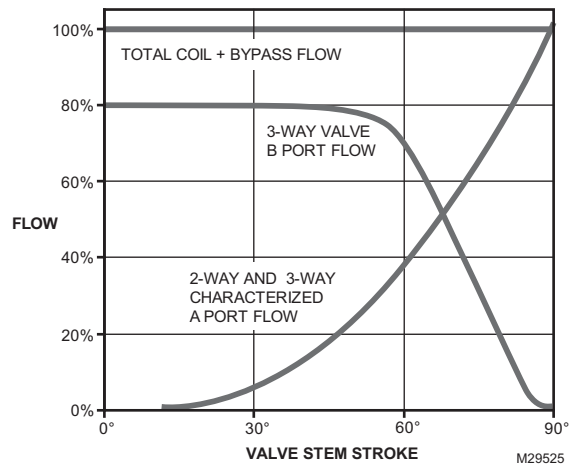


Fig. 8. Typical characterized VBN3 flow.

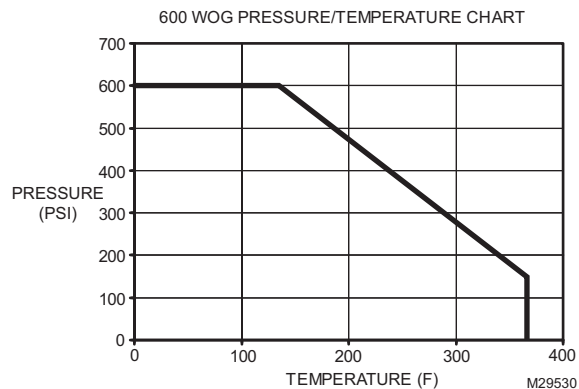


Fig. 9. Pressure derating curve.
The valve body is rated for WOG (water, oil, and gas), but the valve with its internal components are only rated for water and not for oil or gas.

Cavitation Limits

To prevent cavitation (the formation and collapse of steam bubbles), a conservative rule-of-thumb is to limit the pressure drop across the control valve to:

$$\Delta P < 1/2 \times (\text{absolute head pressure (psia)} - \text{water vapor pressure (psia)})$$

Water vapor pressure increases with fluid temperature, reducing the allowable pressure drop, but even chilled water can cavitate with sufficient pressure differential.

Typical pressure drop across a control valve is in the range of 3 to 5 psid. Two-position valves will typically show 0.5 psid pressure drop. Design coil flow should be limited by a balancing valve.

TYPICAL SPECIFICATIONS

Valve Actuator

Direct coupled actuator shall accept analog modulating [(O)2-10 Vdc], floating (tri-state), or two-position signal as indicated in the control sequence. Actuators shall be by Honeywell. Actuator shall provide minimum torque required for full valve shutoff position. Wiring terminals shall be provided for installation to control signal and power wiring.

Actuator shall be available with housing suitable for outdoor installation.

Accessories Identification tags shall be available for all valves; tags shall be indelibly marked with C_v , model number, and tag location.

Ball Valve

Valve housing shall consist of forged brass rated at no less than 360 psi at 250°F. Standard valve ball shall consist of chemically nickel-plated brass. Manufacturer shall be able to provide optional 316 stainless steel ball and stem for 2-way valves. Valve shall have a blow-out proof stem with two EPDM O-rings with minimum 600 psi rating. Valve stem assembly shall be of a pack-less design and be field-replaceable without removing the valve body from the piping. Manufacturer shall be able to provide glass-filled polymer ball insert to make flow control equal percentage. Valves shall be Honeywell. The 2-way valves shall have EPDM O-rings behind ball seals to allow for a minimum close-off pressure of 100 psi with actuator which provides 35 lb-in. torque for 1/2 to 3 in. sizes. Valve shall be available with a minimum of 53 unique C_v values. Valve shall be available with threaded (FNPT) end connections. The 3-way valves shall be installed in a "T" configuration with actuator perpendicular to shaft. Valve shall not require elbows of any kind. The 3-way valves shall have EPDM O-rings behind ball seals to allow for a minimum close-off pressure of 40 psi with an actuator that provides 35 lb-in. torque for 1/2 to 2-1/2 in. sizes. The 3-way valves must be available in both mixing and diverting configurations and shall be available with a minimum of 42 unique C_v values. Valve shall be available with threaded (FNPT) end connections.

Table 13. Actuator Accessories and Replacement Parts.

Part Number	Description	MVN613A0000	MVN613L0000	MVN643A0000	MVN643L0000	MVN713A0000	MVN713L0000	MN Non-Fail-Safe Direct Couple Actuators	MS Fail-Safe Direct Couple Actuators
5112-3R	Weather Enclosure Assembly							x	x
MVNAAA	Replacement Valve Adaptor	x		x		x			
MVNAAL	Replacement Valve Adaptor, Low Profile		x		x		x		
MVNAC7131	Replacement Cable with Terminal 1m, Modulation (RED, BLACK, WHITE)					x	x		
MVNAC6131	Replacement Cable with Terminal 1m, Floating (RED, BLACK, WHITE)	x	x	x	x				
MVNAT3	Replacement Screw type Terminal Block, Pluggable	x	x	x	x	x	x		
5112-11	Replacement actuator bracket							x	x
205860	Minimum position Potentiometer							x	x
32006306-001	Resistor Kit (500 ohm); converts 4-20 mA signal to 2-10 Vdc							x	x
Q7002B1009	Universal Interface Module							x	x
STRN-SCSA	Self-centering Shaft Adapter								x
32000085-001	Strain Relief Fitting (10 pack)							x	
AT120A1004	120 to 24 Vac Transformer (20 VA)	x	x	x	x	x	x	x	x
AT140A1000	120 to 24 Vac Transformer (40 VA)	x	x	x	x	x	x	x	x
STRN-STRNRLF	Stain Relief Fitting (10 pack)								x

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