VG1000 Series Forged Brass Ball Valves

VG1000 Series Ball Valves are designed to regulate the flow of hot or chilled water and low-pressure steam in response to the demand of a controller in Heating, Ventilating, and Air Conditioning (HVAC) systems. Available in sizes DN15 through DN50, this family of 2-way and 3-way forged brass valves is factory or field mounted to Johnson Controls® M9106, M9108 and M9109 Series Non-Spring Return and M9206 and M9216 Series Spring Return Electric Actuators for on/off, floating, or proportional control.

Valves are available with British Standard Pipe Parallel (BSPP) and National Pipe Thread Taper (NPT) end connections for field assembly. Factory assembled valves are available in BSPP end connections

Figure 1: VG1000 Series Ball Valves Shown with Factory-Mounted M9000 Series Electric Actuators

Features and Benefits	
❑ **Forged brass body**	Provides PN40 body rating; can be used in both low rise and high-rise buildings.
❑ **Rotary movement of valve plug independent to flow direction**	Provides high close off pressure of 1380 kPa independent of the choice of actuators
❑ **Valve configurations include 2-way and 3-way models in chrome plated brass and stainless steel trim**	Offers a wide selection of styles for a variety of 2-way, 3-way mixing and 3-way diverting applications
❑ **Inherent Equal Percentage Flow Characteristic in the in-line port of all valves**	Provides flow characteristics for best temperature control and is available in a wide variety of Kvs to cover a broad range of applications
❑ **AMODEL® flow characterizing disk built into the seat**	Permits the wide fluid temperature range and steam application up to 100 kPa
❑ **Full port models available**	Permits applications with lowest pressure loss at differential pressures up to 600 kPa for two way valves
❑ **Valve bodies tested at lowest fluid temperatures**	Allows highest reliability in chilled water applications down to –30 °C

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Features and Benefits (Cont.)	
❑ **Available with BSSP and NPT end connections**	Offers a wide variety of end connections for global applications
❑ **Chrome-plated brass ball and stem**	Allows use in chilled water and hot water applications with fluid temperatures up to +95 °C
❑ **Stainless steel ball and stem**	Allows use with high temperature water of +140 °C or 100 kPa saturated steam, or where a higher degree of corrosion protection is desired
❑ **Square-head valve stem**	Reduces hysteresis, providing accurate control
❑ **Ethylene Propylene Diene Monomer (EPDM) double O-ring stem seal**	Provides leak-free seal; the packing has been tested and is leak free after 200,000 cycles in iron-oxide contaminated water
❑ **Graphite-reinforced Polytetrafluoroethylene (PTFE) seats**	Includes 15% graphite-reinforced ball seals, providing better wear resistance when compared with virgin Teflon® ball seats for longer leak free life (seal) in iron-oxide contaminated water
❑ **Seats backed with EPDM O-rings**	Aids in sealing and provides a constant seating force that compensates for expansion, contraction, and seat wear without increasing operating torque
❑ **Blowout-proof stem**	Prevents the risk of injury
❑ **Maintenance-free design**	Performs without failure in excess of 200,000 full stroke cycles in iron-oxide contaminated water, with no packings to adjust and no periodic rebuilding necessary
❑ **Available with factory-mounted M9106, M9109, M9108, M9206 and M9216 Series electric actuators**	Reduces installation time, thus reducing overall installation cost
❑ **M9000-520-5 linkage kit available for field mounting to M9106, M9109 and M9206 Series electric actuators**	Reduces installation time, thus reducing overall installation cost; provides superior thermal isolation between the valve and actuator, and meets Underwriter's Laboratories®, Inc. (UL) 94 5 V Flame Class Rating.

Application Overview

Available in sizes DN15 through DN50, VG1000 Series Ball Valves are designed specifically for automated commercial HVAC service. These valves feature a forged brass body with either a chrome plated brass ball for water or glycol solutions from –30 to 95 °C, or a Series stainless steel ball for water and water glycol solutions from –30 to 140 °C and saturated steam of 100 kPa.

The blowout-proof stem and mounting flange, combined with an innovative double O-ring stem seal and self-centering stem bushing design, provides quick and easy electric actuator field mounting while ensuring long life and leak-free valve performance. The specially engineered, graphite-reinforced PTFE seat with flexible PTFE seat design (backed with Ethylene Propylene Diene Monomer [EPDM] O-rings) significantly reduces the operating torque, allowing the smallest possible electric actuator available to provide the force required for the specific application. All valve and actuator assemblies provide 1380 kPa closeoff pressure while ensuring operation after long idle periods.

All 2-way valves and 3-way valves features equal percentage flow characteristic in the in-line port. 3-way valves can be used also as diverting valves in applications, which do not require equal percentage or linear flow characteristic in the in-line or in the angle port.

VG1000 Series Ball Valves are designed for factory or field mounting to Johnson Controls M9106, M9108 and M9109 Non-Spring Return and M9206 and M9216 Spring Return Actuators, which are ideally suited for on/off, floating or proportional HVAC service. Field actuator-to-valve coupling requires a M9000-510-5 or a M9000-520-5 Valve Linkage Kit.

Because of their cost-effective, reliable design, VG1000 Series Ball Valves are maintenance free.

IMPORTANT: The VG1000 Series Valves are intended to control saturated steam, hot water, and chilled water flow under normal equipment operating conditions. Where failure or malfunction of the VG1000 Series Valve could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the system. Incorporate and maintain other devices such as supervisory or alarm systems or safety or limit controls intended to warn of, or protect against, failure or malfunction of the VG1000 Series Valve.

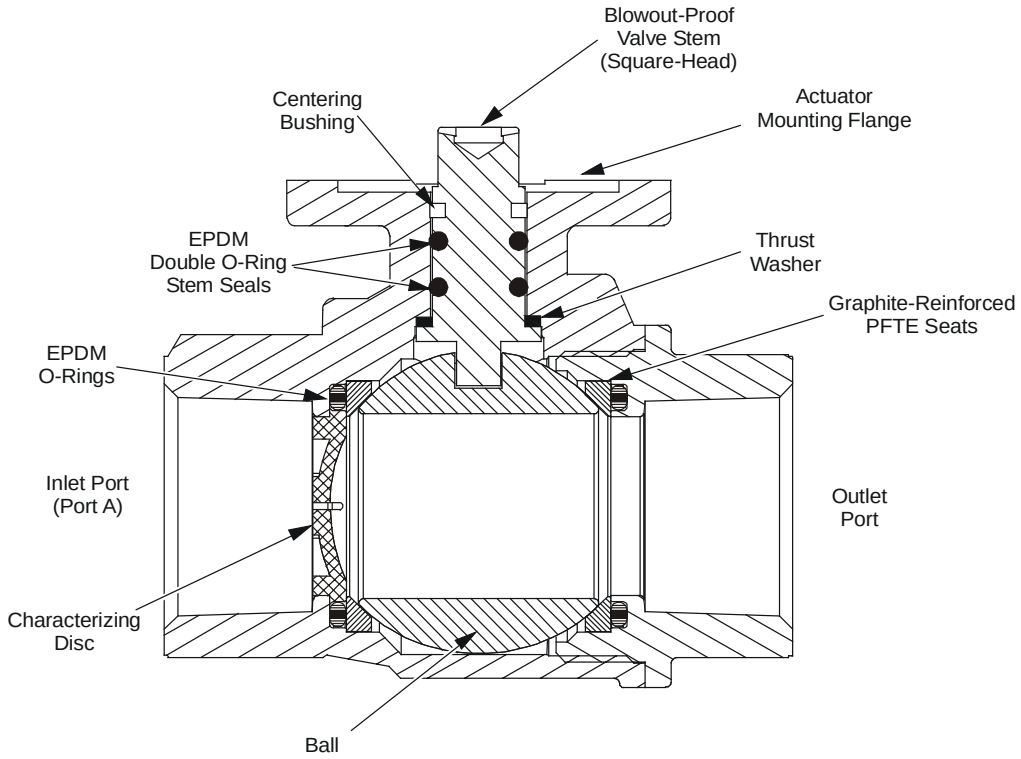


Figure 2: Internal View of a Typical VG1000 Series Ball Valve

Table 1: Ordering Data for VG1000 valve bodies

V G		**Valve Global**	
1 2	**1**	**Product**	1 = Forged Brass Ball Valve
	3	**Family**	
	2	**Body Type and Flow Characteristic**	2 = 2-way, Equal Percentage Flow Characteristics
	4		8 = 3-way, Equal Percentage Flow Characteristics of In-line Port and Linear Flow Characteristics of Angle-Port when used as mixing valve
	4	**End Connections**	0 = British Standard Pipe Parallel (BSPP)
	5		4 = Threaded - National Pipe Thread - Taper (NPT)
	1	**Trim**	1 = Chrome-Plated Brass Ball and Nickel-Plated Brass Stem
	6		5 = Stainless Steel Ball and Stem

A E	**Size and Maximum Kvs**	**Size**	**Flow Charact. Disk**	**Kvs In-line Port**	**Kvs Angle Port *(3-way valves only)***
7 8		AD = DN15	Yes	1.0	0.63
		AE = DN15	Yes	1.6	1.0
		AF = DN15	Yes	2.5	1.6
		AG = DN15	Yes	4.0	2.5
		AL = DN15	Yes	6.3	4.0
		AN = DN15	No	10.0	5.0
		BG = DN20	Yes	4.0	2.5
		BL = DN20	Yes	6.3	4.0
		BN = DN20	No	10.0	5.0
		CL = DN25	Yes	6.3	4.0
		CN = DN25	Yes	10.0	6.3
		CP = DN25	No	16.0	8.0
		DN = DN32	Yes	10.0	6.3
		DP = DN32	Yes	16.0	10.0
		DR = DN32	No	25.0	12.5
		EP = DN40	Yes	16.0	10.0
		ER = DN40	Yes	25.0	16.0
		ES = DN40	No	40.0	20.0
		FR = DN50	Yes	25.0	16.0
		FS = DN50	Yes	40.0	25.0
		FT = DN50	No	63.0	31.5

1 2 3 4 5 6 7 8 = Valve Body

V	G	1	2	0	1	A	E
Valve Body							

Example: Forged brass ball valve, two-way, threaded (BSPP), brass trim, equal %, DN15, 1.6 Kvs

Table 2: Ordering Data – Adding a Factory-Mounted Electric Actuator

V G 1 2 0 1 A E +		**Actuator Mounting**	+ = Factory-Mounted Actuator *(Leave Fields 9 through 15 blank for valve without factory-mounted actuator.)*
9			
5		**Actuator Type**	5 = CE marked actuators
10			
0 6		**Actuator Size**	06 = M9106-xxx-5 *(all DN15 to DN40 valves)*
11 12		*(See actuator*	09 = M9109-xxx-5 *(DN50 valves only)*
		product bulletin.)	08 = M9108-xDx-1 *(all DN15 to DN50 valves)*
			36 = M9206-xxx-5S Spring Opens (a*ll DN15 to DN40 valves)*
			56 = M9206-xxx-5S Spring Closes (a*ll DN15 to DN40 valves)*
			26 = M9216-xxx-1 Spring Opens (*DN50 valves only)*
			46 = M9216-xxx-1 Spring Closes (*DN50 valves only)*
G		**Control Type**	A = Floating, 24 VAC/VDC Input *(M9106, M9108, M9109, M9206 and M9216)*
13			B = On/Off (*M9206 and M9216 only)*
			G = Proportional 0-10 VDC or 0-20 mA *(M9106, M9109, M9206)*
			H = Proportional 0-10 VDC or 0-20 mA with 0-10 VDC feedback *(M9216 only)*
G		**Supply Voltage**	G = 24 VAC
14			D = 230 VAC (M9108, M9206 and M9216 only)
C		**Feedback**	A = 0-10 VDC *(Proportional Only);* no feedback
15			B = No feedback, one auxiliary switch *(M9206 Only)*
			C = 0-10 VDC *(Proportional Only);* two auxiliary switches
9 10 11 12 13 14 15			= Factory-mounted actuator

V	G	1	2	0	1	A	E	+	5	0	6	G	G	C
Valve								**+**	***Actuator***					

Example: Forged brass ball valve, 2-way, threaded (BSPP), brass trim, equal %, DN15, Kvs 1.6, factory-mounted direct acting M9106-GGC-5 Actuator, non-spring return, proportional control, 24 VAC supply, with feedback and two-way auxiliary switches.

Actuator Selection

VG1000 Series Ball Valves are designed for factory or field mounting to Johnson Controls M9106, M9108 and M9109 Series Non-Spring Return Electric Actuators. Field actuator-to-valve coupling requires a M9000-510-5 or M9000-520-5 Valve Linkage Kit. See tables 3 to 5 for valid valve, actuator, and linkage combinations.

Note: To avoid excessive wear or drive time on the motor for M9106-AGx or M9109-AGx models, use a controller and/or software that provides a timeout function to remove the signal at the end of rotation (stall).

For more information on these electric actuator series as well as details on models available, refer to:

- *M9106-xxx-5 Series Electric Non-spring Return Actuators Product Bulletin (N° 10.862E)*
- *M9108 Series Electric Floating Non-spring Return Actuators Product Bulletins (N° D5.220)*
- *M9108 Series Electric Proportional Non-spring Return Actuators Product Bulletins (N° D5.225))*
- *M9109-xxx-5 Series Electric Non-spring Return Actuators Product Bulletin (N° 10.866E)*
- *M9206-xxx-5S Series Electric Spring Return Actuators Product Bulletin*
- *M9216 Series Electric Spring Return Actuators Product Bulletins (N° D5.310; D5.311; D5.315)*

Linkage Kit

The M9000-510-5 and M9000-520-5 Valve Linkage Kits are designed specifically for field mounting Johnson Controls M9106, M9108 and M9109 Series Non-Spring Return, and M9206 and M9216 Series Spring Return Electric Actuators to VG1000 Series Ball Valves. See tables 3 to 5 for valid valve, actuator, and linkage combinations.

For more information on the M9000-510-5 Linkage Kit, refer to the *M9000-510-5 Ball Valve Linkage Kit Product Bulletin (N° 10.529E)* or the *M9000-510-5 Ball Valve Linkage Kit Installation Instructions.*

For more information on the M9000-520-5 Linkage Kit, refer to the *M9000-520-5 Ball Valve Linkage Kit Product Bulletin (N° 10.539E)* or the *M9000-520-5 Ball Valve Linkage Kit Installation Instructions (Part No. 14-1297-13)*.

Table 3: Factory-mounted assemblies of valves with proportional actuators

Spring Return Function		NO				YES			
Supply Voltage		24 VAC				24 VAC			
Torque. Nm		6	6	9	9	6	6	16	16
Running Time		72 s	72 s	72 s	72 s	25-40 s	25-40 s	90-120 s	90-120 s
Spring Return Time. power off		-	-	-	-	35 s (max 70 s)	35 s (max 70 s)	10 s	10 s
Control Signal	VDC	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10
	mA	0-20 / 4-20	0-20 / 4-20	0-20 / 4-20	0-20 / 4-20	0-20 / 4-20	0-20 / 4-20	-	-
Switches		-	2 x SPDT	-	2 x SPDT	-	1 x SPDT	-	2 x SPDT
Feedback VDC		0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10 / 2-10	0-10	0-10
Close-off pressure		1380 kPa							
Actuator code		M9106-GGA-5S	M9106-GGC-5S	M9109-GGA-5	M9109-GGC-5	M9206-GGA-5S	M9206-GGB-5S	M9216-HGA-1	M9216-HGC-1
Linkage code		M9000-520-5						M9000-510-5	
Ordering code suffix for assemblies		+506GGA	+506GGC	+509GGA	+509GGC	+536GGA (Spring Opens) +556GGA (Spring Closes)	+536GGB (Spring Opens) +556GGB (Spring Closes)	+526HGA (Spring Opens) +546HGA (Spring Closes)	+526HGC (Spring Opens) +546HGC (Spring Closes)

DN	k_{vs} (Control Port)	k_{vs} (Bypass Port)	Disc	Valve code	Valid combinations of valves, linkages and actuators							
15	1.0	0.63	Yes	VG1x0yAD	OK	OK			OK	OK		
	1.6	1.0		VG1x0yAE	OK	OK			OK	OK		
	2.5	1.6		VG1x0yAF	OK	OK			OK	OK		
	4.0	2.5		VG1x0yAG	OK	OK			OK	OK		
	6.3	4.0		VG1x0yAL	OK	OK			OK	OK		
	10	5.0	No	VG1x0yAN	OK	OK			OK	OK		
20	4.0	2.5	Yes	VG1x0yBG	OK	OK			OK	OK		
	6.3	4.0		VG1x0yBL	OK	OK			OK	OK		
	10	5.0	No	VG1x0yBN	OK	OK			OK	OK		
25	6.3	4.0	Yes	VG1x0yCL	OK	OK			OK	OK		
	10	6.3		VG1x0yCN	OK	OK			OK	OK		
	16	8.0	No	VG1x0yCP	OK	OK			OK	OK		
32	10	6.3	Yes	VG1x0yDN	OK	OK			OK	OK		
	16	10.0		VG1x0yDP	OK	OK			OK	OK		
	25	12.5	No	VG1x0yDR	OK	OK			OK	OK		
40	16	10	Yes	VG1x0yEP	OK	OK			OK	OK		
	25	16		VG1x0yER	OK	OK			OK	OK		
	40	20	No	VG1x0yES	OK	OK			OK	OK		
50	25	16.0	Yes	VG1x0yFR			OK	OK			OK	OK
	40	25.0		VG1x0yFS			OK	OK			OK	OK
	63	31.5	No	VG1x0yFT			OK	OK			OK	OK

x = 2 = 2-way
x = 8 = 3-way

y = 1 = Plated brass trim
y = 5 = Stainless steel trim

Table 4: Factory-mounted assemblies of valves with floating actuators

Spring Return Function	NO						YES			
Supply Voltage	24VAC				230VAC		24VAC			
Torque. Nm	6	6	9	9	8	8	6	6	16	16
Running time	72 s	72 s	72 s	72 s	30-45 s	30-45 s	60 / 90 s	60 / 90 s	90-120 s	90-120 s
Spring Return time. Power off	-	-	-	-	-	-	35 s (max 70 s)	35 s (max 70 s)	10 s	10 s
Control Signal	floating	floating	floating	floating	floating	floating	floating	floating	floating	floating
Switches	-	2 x SPDT	-	2 x SPDT	-	2 x SPDT	-	1 x SPDT	-	2 x SPDT
Feedback	-	-	-	-	-	-	-	-	-	-
Close-off pressure	1380 kPa									
Actuator code	M9106-AGA-5S	M9106-AGC-5S	M9109-AGA-5	M9109-AGC-5	M9108-ADA-1	M9108-ADC-1	M9206-AGA-5S	M9206-AGB-5S	M9216-AGA-1	M9216-AGC-1
Linkage Code	M9000-520-5				M9000-510-5		M9000-520-5		M9000-510-5	
Ordering code suffix for assemblies	+506AGA	+506AGC	+509AGA	+509AGC	+508ADA	+508ADC	+536AGA (Spring Opens) +556AGA (Spring Closes)	+536AGB (Spring Opens) +556AGB (Spring Closes)	+526AGA (Spring Opens) +546AGA (Spring Closes)	+526AGC (Spring Opens) +526AGC (Spring Opens)

DN	k_{vs} (Control Port)	k_{vs} (Bypass Port)	Disc	Valve code	Valid combinations of valves, linkages and actuators									
15	1.0	0.63	Yes	VG1x0yAD	OK	OK			OK	OK	OK	OK		
	1.6	1.0		VG1x0yAE	OK	OK			OK	OK	OK	OK		
	2.5	1.6		VG1x0yAF	OK	OK			OK	OK	OK	OK		
	4.0	2.5		VG1x0yAG	OK	OK			OK	OK	OK	OK		
	6.3	4.0		VG1x0yAL	OK	OK			OK	OK	OK	OK		
	10	5.0	No	VG1x0yAN	OK	OK			OK	OK	OK	OK		
20	4.0	2.5	Yes	VG1x0yBG	OK	OK			OK	OK	OK	OK		
	6.3	4.0		VG1x0yBL	OK	OK			OK	OK	OK	OK		
	10	5.0	No	VG1x0yBN	OK	OK			OK	OK	OK	OK		
25	6.3	4.0	Yes	VG1x0yCL	OK	OK			OK	OK	OK	OK		
	10	6.3		VG1x0yCN	OK	OK			OK	OK	OK	OK		
	16	8.0	No	VG1x0yCP	OK	OK			OK	OK	OK	OK		
32	10	6.3	Yes	VG1x0yDN	OK	OK			OK	OK	OK	OK		
	16	10.0		VG1x0yDP	OK	OK			OK	OK	OK	OK		
	25	12.5	No	VG1x0yDR	OK	OK			OK	OK	OK	OK		
40	16	10	Yes	VG1x0yEP	OK	OK			OK	OK	OK	OK		
	25	16		VG1x0yER	OK	OK			OK	OK	OK	OK		
	40	20	No	VG1x0yES	OK	OK			OK	OK	OK	OK		
50	25	16.0	Yes	VG1x0yFR			OK	OK	OK	OK			OK	OK
	40	25.0		VG1x0yFS			OK	OK	OK	OK			OK	OK
	63	31.5	No	VG1x0yFT			OK	OK	OK	OK			OK	OK

x = 2 = 2-way
x = 8 = 3-way

y = 1 = Plated brass trim
y = 5 = Stainless steel trim

Table 5: Factory-mounted assemblies of valves with ON/OFF actuators

Spring Return Function	YES				YES			
Supply voltage	24VAC				230VAC			
Torque. Nm	6	6	16	16	6	6	16	16
Running time	10-40 s	10-40 s	90-120 s	90-120 s	10-40 s	10-40 s	90-120 s	90-120 s
Spring return time. Power off	30 s +/- 20%	30 s +/- 20%	10 s	10 s	30 s +/- 20%	30 s +/- 20%	10 s	10 s
Control signal	On-Off	On-Off	On-Off	On-Off	On-Off	On-Off	On-Off	On-Off
Switches	-	1 x SPDT	-	2 x SPDT	-	1 x SPDT	-	2 x SPDT
Feedback								
Close-off pressure	1380 kPa							
Actuator code	M9206-BGA-5S	M9206-BGB-5S	M9216-BGA-1	M9216-BGC-1	M9206-BDA-5S	M9206-BDB-5S	M9216-BDA-1	M9216-BDC-1
Linkage code	M9000-520-5		M9000-510-5		M9000-520-5		M9000-510-5	
Ordering code suffix for assemblies	+536BGA (Spring Opens) +556BGA (Spring Closes)	+536BGB (Spring Opens) +556BGB (Spring Closes)	+526BGA (Spring Opens) +546BGA (Spring Closes)	+526BGC (Spring Opens) +526BGC (Spring Closes)	+536BDA (Spring Opens) +556BDA (Spring Closes)	+536BDB (Spring Opens) +556BDB (Spring Closes)	+526BDA (Spring Opens) +546BDA (Spring Closes)	+526BDC (Spring Opens) +526BDC (Spring Closes)

DN	k_{vs} (Control Port)	k_{vs} (Bypass Port)	Disc	Valve code	Valid combinations of valves, linkages and actuators							
15	1.0	0.63	Yes	VG1x0yAD	OK	OK			OK	OK		
	1.6	1.0		VG1x0yAE	OK	OK			OK	OK		
	2.5	1.6		VG1x0yAF	OK	OK			OK	OK		
	4.0	2.5		VG1x0yAG	OK	OK			OK	OK		
	6.3	4.0		VG1x0yAL	OK	OK			OK	OK		
	10	5.0	No	VG1x0yAN	OK	OK			OK	OK		
20	4.0	2.5	Yes	VG1x0yBG	OK	OK			OK	OK		
	6.3	4.0		VG1x0yBL	OK	OK			OK	OK		
	10	5.0	No	VG1x0yBN	OK	OK			OK	OK		
25	6.3	4.0	Yes	VG1x0yCL	OK	OK			OK	OK		
	10	6.3		VG1x0yCN	OK	OK			OK	OK		
	16	8.0	No	VG1x0yCP	OK	OK			OK	OK		
32	10	6.3	Yes	VG1x0yDN	OK	OK			OK	OK		
	16	10.0		VG1x0yDP	OK	OK			OK	OK		
	25	12.5	No	VG1x0yDR	OK	OK			OK	OK		
40	16	10	Yes	VG1x0yEP	OK	OK			OK	OK		
	25	16		VG1x0yER	OK	OK			OK	OK		
	40	20	No	VG1x0yES	OK	OK			OK	OK		
50	25	16.0	Yes	VG1x0yFR			OK	OK			OK	OK
	40	25.0		VG1x0yFS			OK	OK			OK	OK
	63	31.5	No	VG1x0yFT			OK	OK			OK	OK

x = 2 = Two-way
x = 8 = Three-way

y = 1 = Plated brass trim
y = 5 = Stainless steel trim

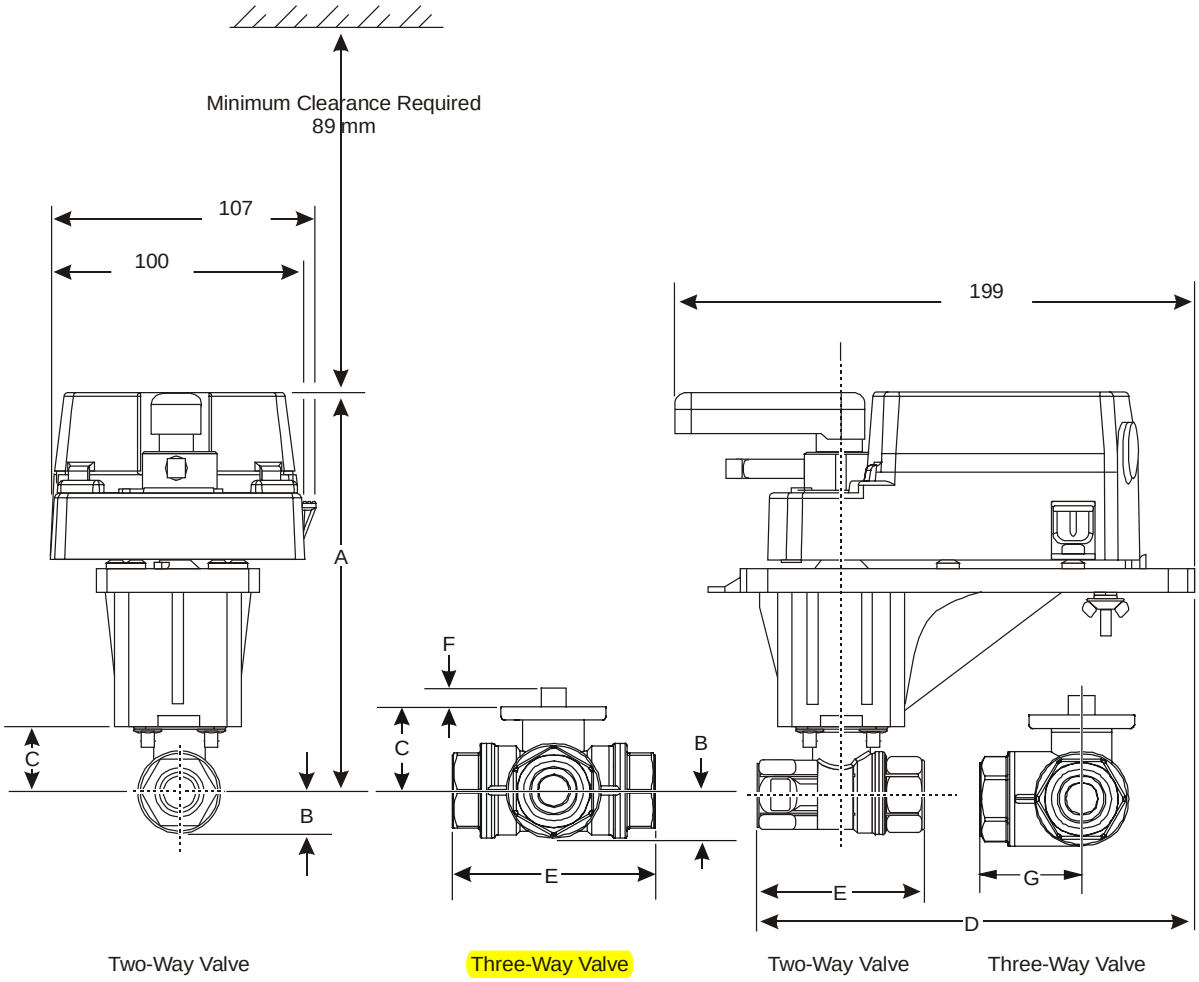


Figure 3: Non-Spring Return M9106 or M9109 actuated VG1000 Series ball valve with M9000-520-5 Linkage. Dimensions, mm

Table 6: M9106 and M9109 actuated VG1000 Series ball valve with M9000-520-5 Linkage. Dimensions, mm

Valve Size, DN*	A	B	C	D	E		F	G	
					NPT	BSPP		NPT	BSPP
DN15	160	17	31	172	64	67	9	32	33
DN20	160	17	31	175	71	75	9	36	38
DN25	162	19	33	183	87	92	9	43	46
DN32	173	26	44	190	100	109	9	51	54
DN40	177	29	48	195	110	119	9	54	59
DN50	182	37	53	201	123	139	9	65	74

* On models with the flow-characterizing disk, the disk is located in Port A. Port A must be the inlet.

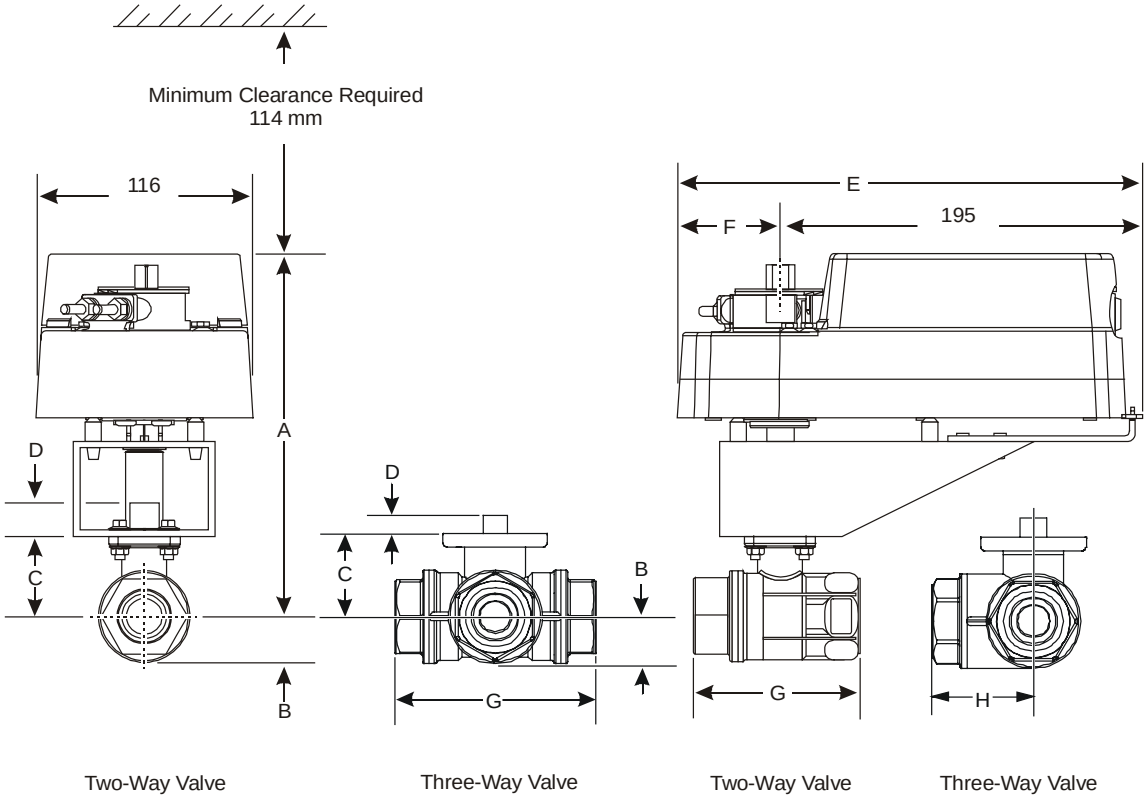


Figure 4: Non Spring Return M9108 actuated VG1000 Series ball valve with M9000-510-5 Linkage Dimensions, mm

Table 7: M9108 actuated VG1000 Series ball valve with M9000-510-5 Linkage. Dimensions, mm

Valve Size*	A	B	C	D	E	F	G		H	
							NPT	BSPP	NPT	BSPP
DN15	163	17	31	9	179	31	64	67	32	33
DN20	163	17	31	9	179	31	71	75	36	38
DN25	165	19	33	9	179	31	87	92	43	46
DN32	176	26	44	9	179	31	100	109	51	54
DN40	180	29	48	9	179	31	110	119	54	59
DN50	184	37	52	9	179	31	123	139	65	74

* On models with the flow-characterizing disk, the disk is located in Port A. Port A must be the in let.

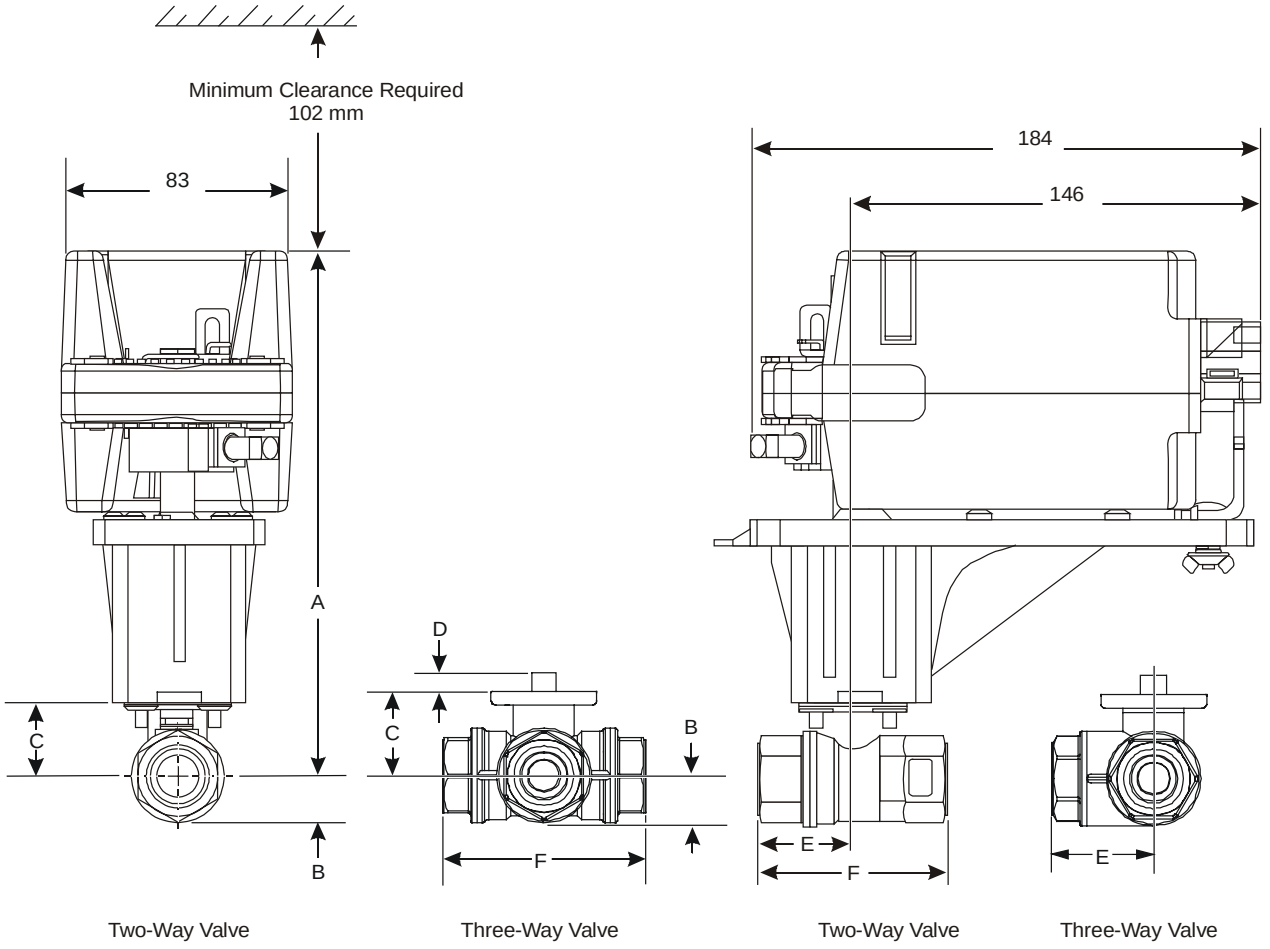


Figure 5: Spring Return M9206 actuated VG1000 Series ball valve with M9000-520-5 Linkage Dimensions, mm.

Table 8: M9206 actuated VG1000 Series ball valve with M9000-520-5 Linkage. Dimensions, mm

Valve Size*	A	B	C	D	E		F	
					NPT	BSPP	NPT	BSPP
DN15	168	17	31	9	32	33	64	67
DN20	168	17	31	9	36	38	71	75
DN25	170	19	33	9	43	46	87	92
DN32	180	26	44	9	50	54	100	109
DN40	185	29	48	9	55	59	110	119

* On models with the flow-characterizing disk, the disk is located in Port A. Port A must be the inlet.

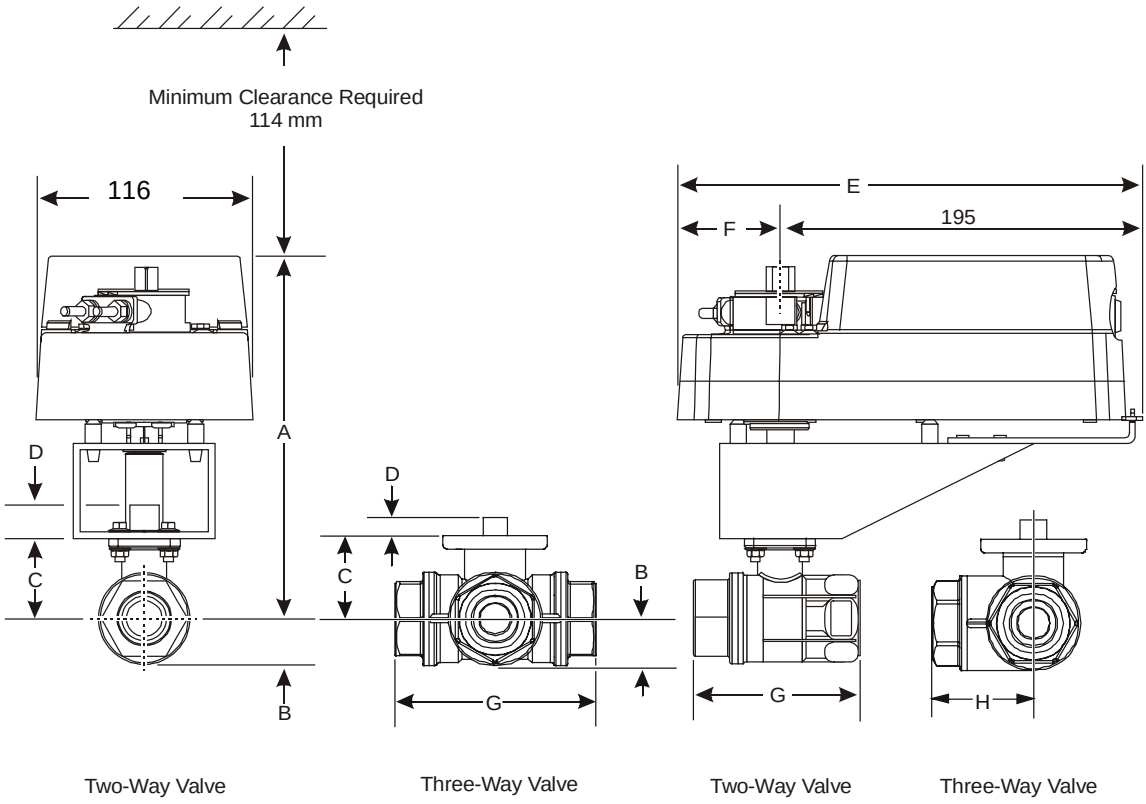


Figure 6: Spring Return M9216 actuated VG1000 Series ball valve with M9000-510-5 Linkage Dimensions, mm.

Table 9: M9216 actuated VG1000 Series Ball Valve with M9000-510-5 Linkage. Dimensions, mm

Valve Size*	A	B	C	D	E	F	G		H	
							NPT	BSPP	NPT	BSPP
DN50	204	37	54	9	250	55	123	139	62	74

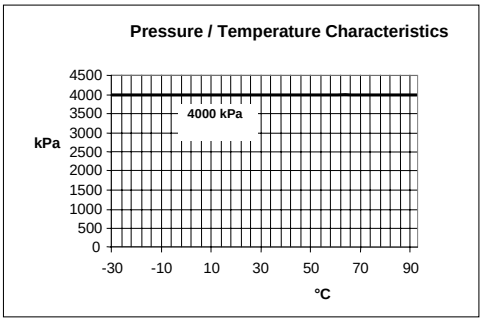
* On models with the flow-characterizing disk, the disk is located in Port A. Port A must be the inlet.

Table 7: Shipping Weights

Valve Item Code	Body Type	Body Size	Shipping Weight, kg
VG12xxAx	2-way	DN15	0.4
VG12xxBx		DN20	0.4
VG12xxCx		DN25	0.4
VG12xxDx		DN32	1.0
VG12xxEx		DN40	1.7
VG12xxFx		DN50	2.3
VG18xxAx	3-way	DN15	0.6
VG18xxBx		DN20	0.7
VG18xxCx		DN25	1.3
VG18xxDx		DN32	2.0
VG18xxEx		DN40	2.8
VG18xxFx		DN50	3.7

For M9106, M9108 and M9109 actuated non-spring return valve assemblies, add 1.5 kg; for M9206 actuated spring return valve assemblies, 2.0 kg; for M9216 actuated valve assemblies, add 3.6 kg.

Technical Specifications

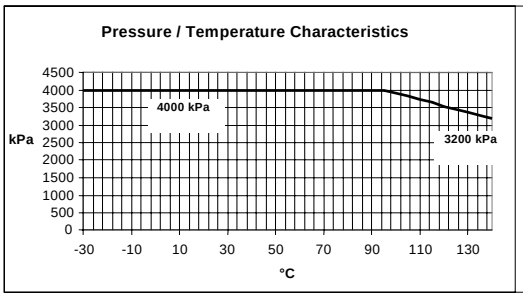
Product	**VG1xx1 Series Forged Brass Ball Valves with plated brass trim**		
Service*	Hot water, chilled water, 50% glycol solutions for HVAC systems. Fluid Group1 according 67/548/EEC		
Fluid Temperature Limits	**Water**	-30 to +95 °C	
	Steam	Not Rated for Steam Service	
Valve Body Pressure/Temperature Rating	PN40 according EN 1333; EN 13547; DIN EN 764; EN 331; UL 429, CEI EN 60534-1, UNI 8858, DIN 2410: 		
Maximum Closeoff Pressure	1380 kPa		
Maximum Recommended Operating Pressure Drop	340 kPa (240 kPa for Quiet Service Ball Valves), 600 kPa for 2-way valves without flow characterization disk		
Flow Characteristics	**2-way**	Equal Percentage (according EN60534-2-4)	
	3-way	Equal Percentage (according EN60534-2-4) Flow Characteristics of In-line Port (Coil) and Linear Flow Characteristics of Angle Port (Bypass)	
Rangeability**	> 500:1 (according EN60534-2-4)		
Ambient Operating Conditions of Valve & Actuator Assemblies * **	**With linkage:**	**For Fluid Temperature**	**Ambient Operating Conditions**
	M9000-510-5	-30 … -20 °C -20 … +95 °C	Not recommended -20…40 °C, non condensing
	M9000-520-5	-30 … -20 °C -20 … +95 °C	-20…50 °C, non condensing -20…50 °C, non condensing
Valve Body Size (Kvs)	See table 1.		
Leakage	0.01% of Maximum Flow per EN60534-4, Class 4 (2-way and 3-way control port) 1% of Maximum Flow per EN60534-4 for 3-way bypass port		
End Connections	British Standard Pipe Parallel (BSPP) – (Rp, ISO 7/1) National Pipe Thread (NPT) – (ANSI B1.20.1)		
Materials	**Body**	Forged Brass	
	Ball	Chrome Plated Brass	
	Blowout-Proof Stem	Nickel Plated Brass	
	Seats	Graphite-Reinforced PTFE with EPDM O-Ring Backing	
	Stem Seals	EPDM Double O-Rings	
	Characterizing Disk	AMODEL® AS-1145HS Polyphthalamide Resin	
CE Compliance	**DN15…DN25**	PED (Pressure Equipment Directive) 97/23/EC (paragraph3, comma 3). CE mark is not applicable	
	DN32…DN50	PED (Pressure Equipment Directive) 97/23/EC, Category II for Fluid Group 1 Notified Body Code: 0036	

* Proper water treatment is recommended; refer to VDI 2035 Standard.

** Rangeability is defined as the ratio of maximum controllable flow to minimum controllable flow.

*** In hot water and steam applications, install the valve with the stem horizontal to the piping, and wrap the valve and piping with insulation material and assure that the temperature at the actuator do not exceed 50 °C.

Technical Specifications (continued)

Product	**VG1xx5 Series Forged Brass Ball Valves with stainless steel trim**		
Service*	Hot water, chilled water, 50% Glycol Solutions, and 100 kPa saturated steam for HVAC Systems. Fluid Group1 according 67/548/EEC		
Fluid Temperature Limits	**Water**	-30 to +140 °C	
	Steam	max. 100 kPa	
Valve Body Pressure/Temperature Rating	PN40 according EN 1333; EN 13547; DIN EN 764; EN 331; UL 429, CEI EN 60534-1, UNI 8858, DIN 2410:  	
Maximum Closeoff Pressure	1380 kPa		
Maximum Recommended Operating Pressure Drop	340 kPa (240 kPa for Quiet Service Ball Valves), 600 kPa for 2-way valves without flow characterization disk		
Flow Characteristics	**2-way**	Equal Percentage (according EN60534-2-4)	
	3-way	Equal Percentage (according EN60534-2-4) Flow Characteristics of In-line Port (Coil) and Linear Flow Characteristics of Angle Port (Bypass)	
Rangeability**	> 500:1 (according EN60534-2-4)		
Ambient Operating Conditions of Valve & Actuator Assemblies *	**With linkage:**	**For Fluid Temperature**	**Ambient Operating Conditions**
	M9000-510-5	-30 … -20 °C -20 … +100 °C +100…+120 °C +120…+140 °C	Not recommended -20…40 °C, non condensing -20…30 °C, non condensing Not recommended
	M9000-520-5	-30 … -20 °C -20 … +100 °C +100 …+120 °C +120 … +140 °C	-20…50 °C, non condensing -20…50 °C, non condensing -20…40 °C, non condensing -20…30 °C, non condensing
Valve Body Size (Kvs)	See table 1.		
Leakage	0.01% of Maximum Flow per EN60534-4, Class 4 (2-way and 3-way control port) 1% of Maximum Flow per EN60534-4 for 3-way bypass port		
End Connections	British Standard Pipe Parallel (BSPP) – (Rp, ISO 7/1) National Pipe Thread (NPT) – (ANSI B1.20.1)		
Materials	**Body**	Forged Brass	
	Ball	Stainless Steel	
	Blowout-Proof Stem	Stainless Steel	
	Seats	Graphite-Reinforced PTFE with EPDM O-Ring Backing	
	Stem Seals	EPDM Double O-Rings	
	Characterizing Disk	AMODEL® AS-1145HS Polyphthalamide Resin	
CE **Compliance**	**DN15…DN25**	PED (Pressure Equipment Directive) 97/23/EC (paragraph3, comma 3). CE mark is not applicable	
	DN32…DN50	PED (Pressure Equipment Directive) 97/23/EC, Category II for Fluid Group 1 Notified Body Code: 0036	

* Proper water treatment is recommended; refer to VDI 2035 Standard.

** Rangeability is defined as the ratio of maximum controllable flow to minimum controllable flow.

*** In hot water and steam applications, install the valve with the stem horizontal to the piping, and wrap the valve and piping with insulation material and assure that the temperature at the actuator do not exceed 50 °C.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

JOHNSON CONTROLS

Headquarters: Milwaukee, Wisconsin, USA
European Customer Service Center: Westendhof 3, D-45143 Essen, Germany
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