M9000-51x Series Valve Linkage Kits

Product Bulletin

M9000-51x

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M9000-51x Series Valve Linkage Kits are designed specifically for field mounting Johnson Controls® M9106 and M9100 Series Non-Spring Return and M9206, M9210, and M9220 Series Spring Return Electric Actuators to Johnson Controls VG1000 Series Ball Valves in sizes 1/2 through 4 in. (DN15 through DN100). These sturdy linkage kits provide stable actuator mounting while preventing loading on the valve stem and stem seals, to ensure longer seal life.

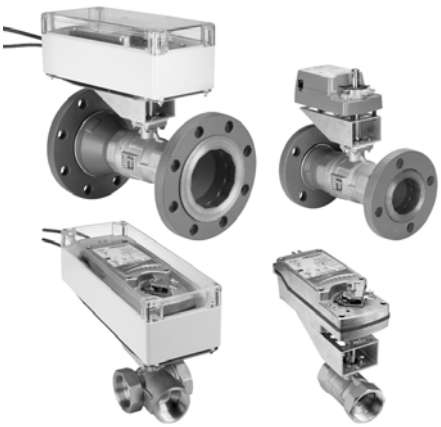

Figure 1: M9000-51x Series Linkage Kits Used to Field Mount M9000 Series Electric Actuators to VG1000 Series Ball Valves

Table 1: Features and Benefits

Features	Benefits
Dual-Centering Bearing Design	Maintains accurate stem alignment eliminating side loading on the VG1000 Series Ball Valve stem and stem seal, to ensure longer seal life.
Sturdy Aluminum Construction	Provides exceptional strength and stability.
Multi-Position Setup	Allows the actuator and linkage kit to be positioned in 45-degree increments, facilitating installation in confined areas.
Adjustable Anti-Rotation Slider	Allows one linkage to accommodate multiple sizes of valve bodies and electric actuators.
Index Markings on Drive Shaft and Mounting Bracket	Allow the valve to be positioned in increments from fully open to fully closed, providing visual indication of the current valve position during setup and operation.
Installation Requiring No Special Tools	Facilitates quick and easy installation.
Thermal Spacer between Valve and Linkage	Reduces temperature and condensation from the valve to the actuator.
Weather Shield Kits Available for Field Mount	Protect actuator from extreme environments.

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Product Guidelines

Install the VG1000 Series Ball Valves with the actuator at or above the centerline of the horizontal piping.

IMPORTANT: In steam applications, install the valve with the stem horizontal to the piping. Failure to follow these guidelines may shorten the life of the actuator.

To minimize heat transfer in steam applications, wrap the valve and piping with insulation. Allow sufficient clearance to remove the actuator (as illustrated in Figure 2 through Figure 6).

IMPORTANT: Do not cover the actuator with thermal insulating material. High ambient temperatures may damage the actuator, and a hot water pipe, a steam pipe, or other heat source may overheat it.

Before installing the electric actuator, use an adjustable wrench to manually rotate the valve stem several times. Rotating the valve stem breaks the torque that may have built up during long-term storage.

IMPORTANT: Do not attempt to manually rotate the drive shaft while the actuator is installed without first releasing the actuator gears. Manually rotating the drive shaft without releasing the actuator gears may result in permanent damage to the actuator.

Install VG1241, VG1245, VG1271, VG1275, VG1291, VG1295, VG12A5, VG1841, VG1845, and VG18A5 Series Ball Valves with Port A as the inlet from the coil. VG1243 Series reduced port models feature a black arrow on the bottom of the valve outlet indicating the direction of flow for proper piping.

IMPORTANT: Wire all electrically actuated VG1000 Series Ball Valves in accordance with applicable electrical code requirements. Wire the input lines to the electric actuator correctly so that the valve moves in the proper direction.

IMPORTANT: Use copper conductors only. Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the actuator's electrical ratings.

IMPORTANT: Protect the actuator from dripping water, condensation, and other moisture. Water or moisture could result in an electrical short, which may damage or affect the operation of the actuator.

For detailed installation instructions, refer to the *M9000-51x Series Valve Linkage Kits Installation Instructions (Part No. 14-1201-13)*.

IMPORTANT: Take care to prevent foreign materials such as weld slag, thread burrs, metal chips, and scale from entering the piping system. This debris can damage or severely impede the operation of the valve by embedding itself in the seats, scoring the valve, and ultimately resulting in seat leakage. If the debris becomes embedded in the seats, subsequent flushing and filtering of the piping system with the valve installed does not remedy the problem.

Contact the local Johnson Controls representative for compatibility concerns before using VG1000 Series Ball Valves to control the flow of fluids other than those outlined in the *Technical Specifications* table at the end of this document.

When servicing the electric actuator or the piping system:

- disconnect the power supply to the actuator before servicing
- relieve the pressure in the piping system

WARNING: Risk of Electric Shock. Disconnect power supply before making electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

CAUTION: Risk of Property Damage. Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

Linkage Kit Selection

Use the M9000-51x Series Valve Linkage Kits to field mount Johnson Controls M9106 and M9100 Series Non-Spring Return and M9206, M9210, and M9220 Series Spring Return Electric Actuators to Johnson Controls VG1000 Series Ball Valves.

The dual centering bearing design of the linkage maintains accurate stem alignment, eliminating side loading on the valve stem and improving stem seal positioning to ensure longer seal life. The linkage kit venting and overall height, as well as piping insulation, minimize heat transfer to the electric actuator in higher temperature fluid applications.

See Table 2 for a list of valid ball valve, electric actuator, and linkage kit combinations for assembly in the field. See Table 3 for information about proper linkage to discontinued valve models.

Table 2: Valid Ball Valve, Electric Actuator, and Linkage Kit Combinations for Field Assembly

Valve Size, in. (DN)	Valve Code Number	Actuator Base Number[1]	Linkage Kit Code Number	Optional Weathershield
1/2 (DN15)	VG1241Ax, VG1245Ax, VG1271Ax, VG1275Ax, VG1291Ax, VG1295Ax, VG1841Ax, VG1845Ax	M9108	M9000-516	M9000-330
		M9210	M9000-517	M9000-340
3/4 (DN20)	VG1241Bx, VG1245Bx, VG1271Bx, VG1275Bx, VG1291Bx, VG1295Bx, VG1841Bx, VG1845Bx	M9108	M9000-516	M9000-330
		M9210	M9000-517	M9000-340
1 (DN25)	VG1241Cx, VG1245Cx, VG1271Cx, VG1275Cx, VG1291Cx, VG1295Cx, VG1841Cx, VG1845Cx,	M9108	M9000-516	M9000-330
		M9210	M9000-517	M9000-340
1-1/4 (DN32)	VG1241Dx, VG1245Dx, VG1841Dx, VG1845Dx	M9108	M9000-516	M9000-330
		M9210	M9000-517	M9000-340
1-1/2 (DN40)	VG1241Ex, VG1245Ex, VG1841Ex, VG1845Ex	M9108	M9000-516	M9000-330
		M9210	M9000-517	M9000-340
2 (DN50)	VG1241Fx, VG1245Fx, VG1841Fx, VG1845Fx	M9116	M9000-516	M9000-330
		M9210	M9000-517	M9000-340
2-1/2 (DN65)	VG12A5Gx, VG18A5Gx	M9124	M9000-518	M9000-330
		M9220	M9000-519	M9000-340
3 (DN80)	VG12A5Hx, VG18A5Hx	M9124	M9000-518	M9000-330
		M9220	M9000-519	M9000-340
4 (DN100)	VG12A5Jx, VG18A5Jx	M9124	M9000-518	M9000-330
		M9220	M9000-519	M9000-340

1. M9100 Series are Non-Spring Return Actuators; M9210 and M9220 Series are Spring-Return Actuators.

Table 3: Linkages for Discontinued Series Ball Valves (Part 1 of 2)

Valve Size, in. (DN)	Valve Code Number	Actuator Base Number	Linkage Kit Code Number
1/2 (DN15)	VG1243Ax, VG1644AB	M9106	M9000-514
		M9206	M9000-515
		M9108	M9000-516
3/4 (DN20)	VG1243Bx	M9106	M9000-514
		M9206	M9000-515
		M9108	M9000-516
	VG1644BB	M9108	M9000-516
		M9210	M9000-517

Table 3: Linkages for Discontinued Series Ball Valves (Part 2 of 2)

Valve Size, in. (DN)	Valve Code Number	Actuator Base Number	Linkage Kit Code Number
1 (DN25)	VG1243Cx, VG1243Dx	M9116	M9000-516
		M9220	M9000-517
1-1/4 (DN32)	VG1644CB, VG1644DB	M9116	M9000-518
		M9220	M9000-519
1-1/2 (DN40)	VG1243EC	M9124	M9000-518

Dimensions

For dimensions, see Figure 2 for the M9100 Series Non-Spring Return actuated VG1243 Series Two-Way Ball Valves. See Table 4 for specific model dimensions.

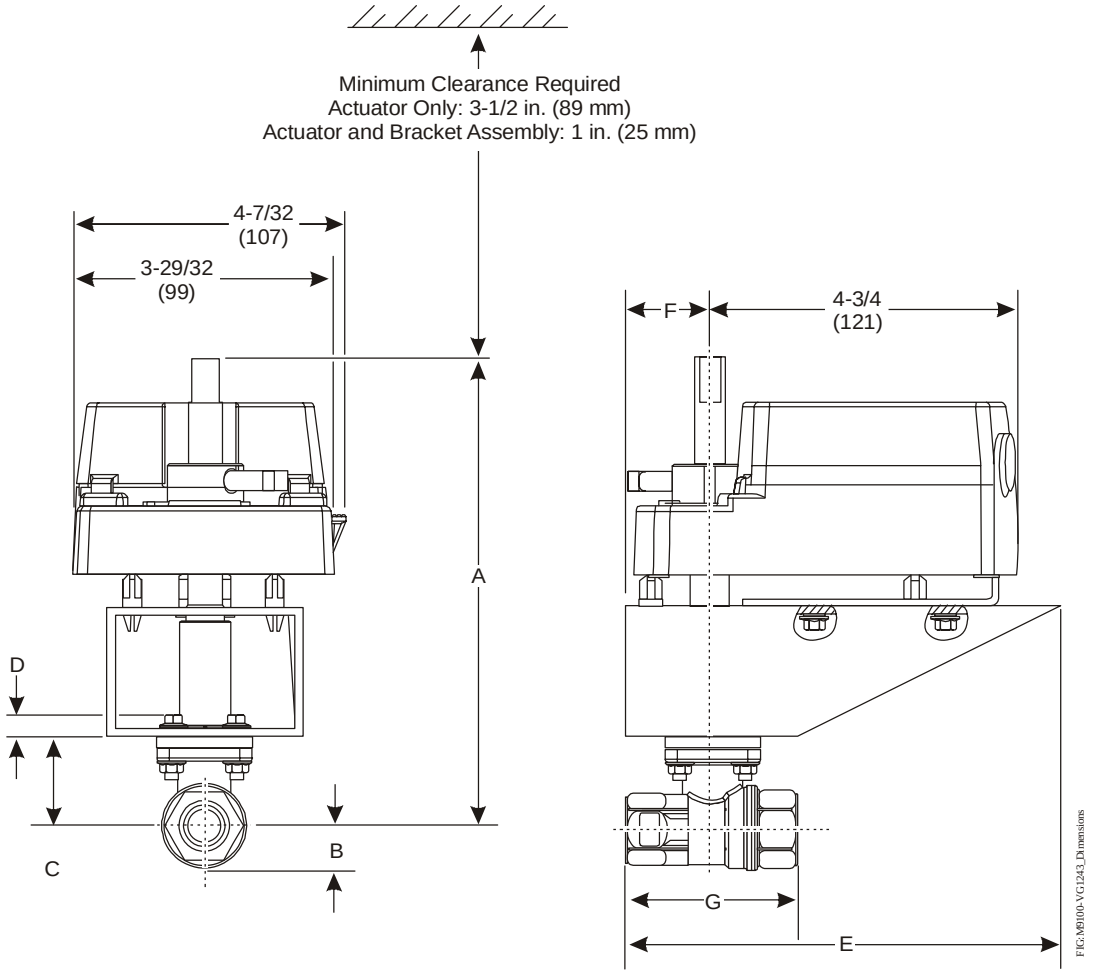

Figure 2: Actuated Ball Valve Dimensions, in. (mm)

Table 4: M9106 Actuated VG1243 Series Ball Valve Dimensions, in. (mm)

Valve Size, in. (DN)[1]	A	B	C	D	E	F	G
1/2 (DN15)	7-3/16 (183)	21/32 (17)	1-15/32 (37)	9/32 (7)	7-1/32 (179)	1-11/32 (34)	2-5/8 (67)

1. All reduced port models feature a black arrow on the bottom of the valve outlet indicating the direction of flow for proper piping. Pipe all other models in either direction.

For dimensions, see Figure 3 for the Non-Spring Return M9100 Series actuated valves: the VG1243 Series Two-Way and the VG1644 Series Three-Way Ball Valves. See Table 5 for specific model dimensions.

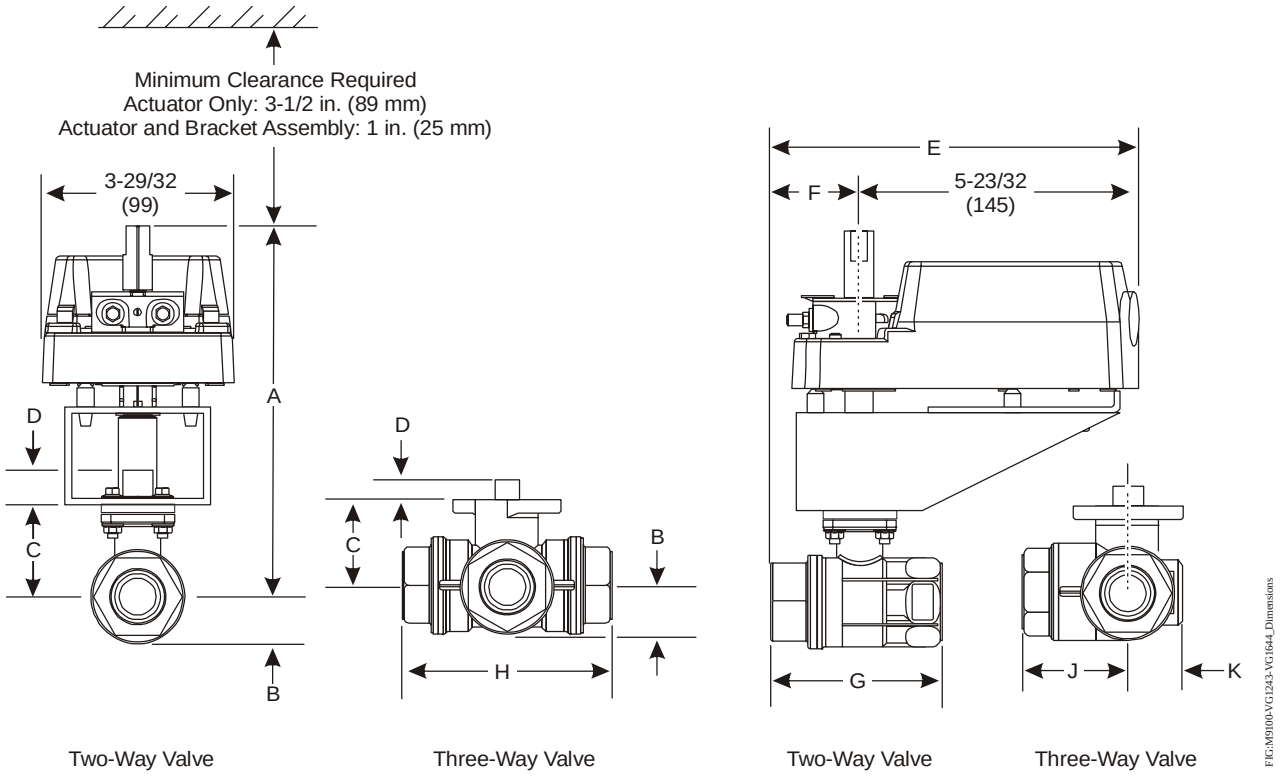

Figure 3: Actuated Ball Valve Dimensions, in. (mm)

Table 5: M9100 Actuated VG1243 and VG1644 Series Ball Valve Dimensions, in. (mm)

Valve Size, in. (DN)[1]	A	B	C	D	E	F	G	H	J	K
1/2 (DN15)	7-3/16 (183)	21/32 (17)	1-7/16 (37)	9/32 (7)	7-1/32 (179)	1-11/32 (34)	2-5/8 (67)	2-7/8 (73)	1-7/16 (37)	25/32 (20)
3/4 (DN20)	7-1/4 (184)	25/32 (20)	1-17/32 (39)	9/32 (7)	7-5/32 (182)	1-15/32 (37)	3 (76)	3-5/32 (80)	1-9/16 (40)	7/8 (22)
1 (DN25)	7-21/32 (194)	31/32 (25)	1-15/16 (49)	11/32 (9)	7-7/32 (183)	1-1/2 (38)	3-11/32 (85)	3-3/4 (95)	1-7/8 (48)	1 (25)
1-1/4 (DN32)	7-13/16 (198)	1-5/32 (29)	2-1/16 (52)	11/32 (9)	7-9/16 (192)	1-13/16 (46)	3-21/32 (93)	4-13/32 (112)	2-3/16 (56)	1-7/32 (31)
1-1/2 (DN40)	8-3/8 (213)	1-13/32 (36)	2-21/32 (67)	7/16 (11)	7-25/32 (198)	2-3/32 (53)	4-1/8 (105)	4-7/8 (124)	2-7/16 (62)	1-15/32 (37)

1. All reduced port models feature a black arrow on the bottom of the valve outlet indicating the direction of flow for proper piping. Pipe all other models in either direction.

For dimensions, see Figure 4 for the Spring Return M9206 Series actuated valves, which work with both the VG1243 Series Two-Way and the VG1644 Series Three-Way Ball Valves. See Table 6 for specific model dimensions.

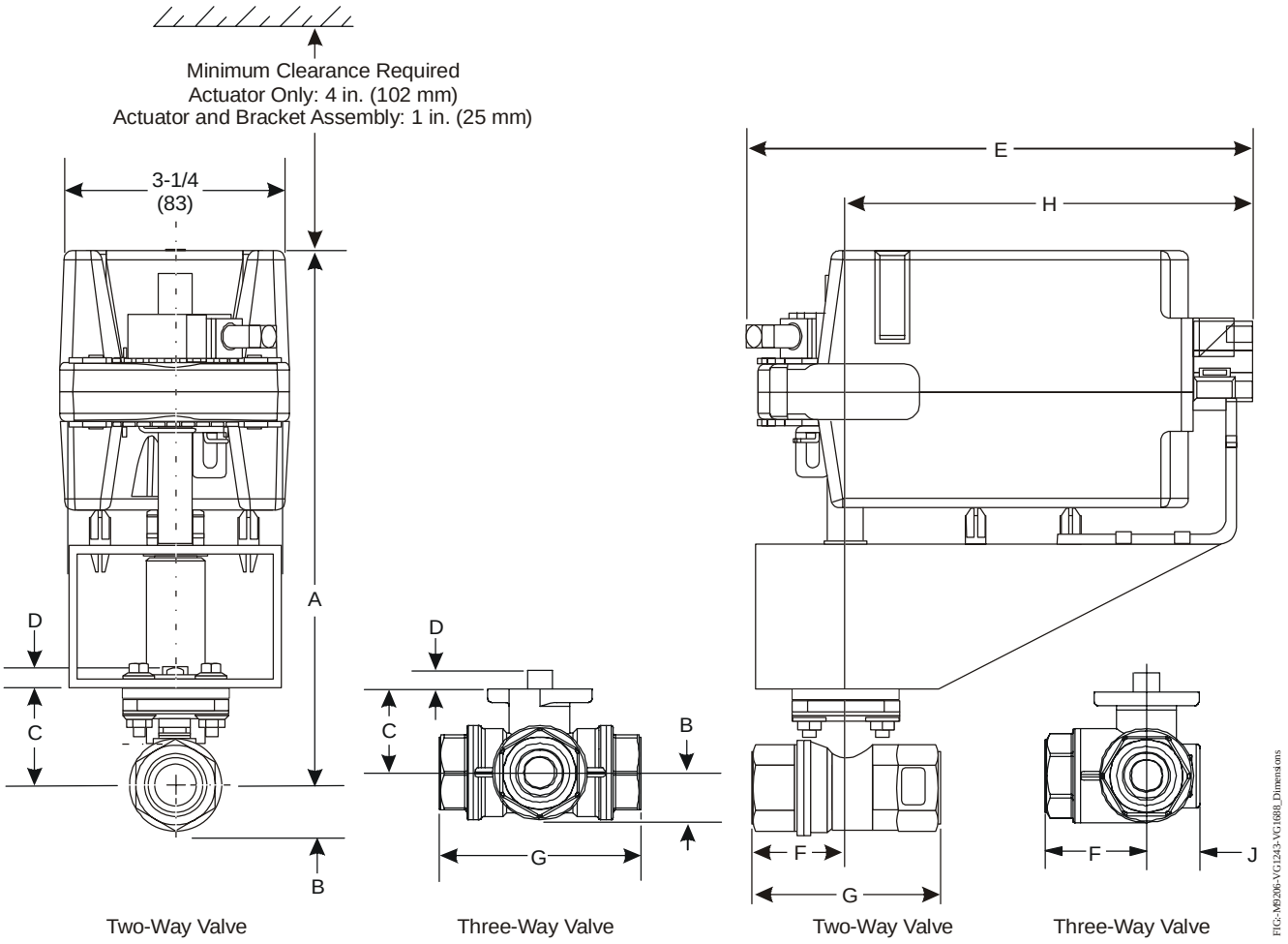

Figure 4: Actuated Ball Valve Dimensions, in. (mm)

Table 6: M9206 Actuated VG1243 and VG1644 Series Ball Valve Dimensions, in. (mm)

Valve Size, in. (DN)[1]	A[2]	B	C	D	E[3]	F	G	H	J
1/2 (DN15)	7-19/32 (193)	11/16 (17)	1-7/16 (37)	9/32 (7)	7-3/16 (183)	1-7/16 (37)	2-7/8 (73)	5-3/4 (146)	25/32 (20)
3/4 (DN20)	7-11/16 (195)	25/32 (20)	1-17/32 (39)	9/32 (7)	7-1/4 (184)	1-1/2[4] (38)	3[4] (76)	5-3/4 (146)	—

1. All reduced port models feature a black arrow on the bottom of the valve outlet indicating the direction of flow for proper piping. Pipe all other models in either direction.
2. For valve assemblies with M9206-xxx-2S Series Actuators, subtract 19/32 in. (15 mm) from Dimension A (Column A).
3. Add 1-11/32 in. (34 mm) for models with auxiliary switches.
4. Two-way actuator and valve assemblies only.

For dimensions, see Figure 5 for the Spring Return M9210 Series actuated valves, which work with both the VG1241 and VG1245 Series Two-Way and the VG1841 and VG1845 Series Three-Way Ball Valves. See Table 7 for specific model dimensions.

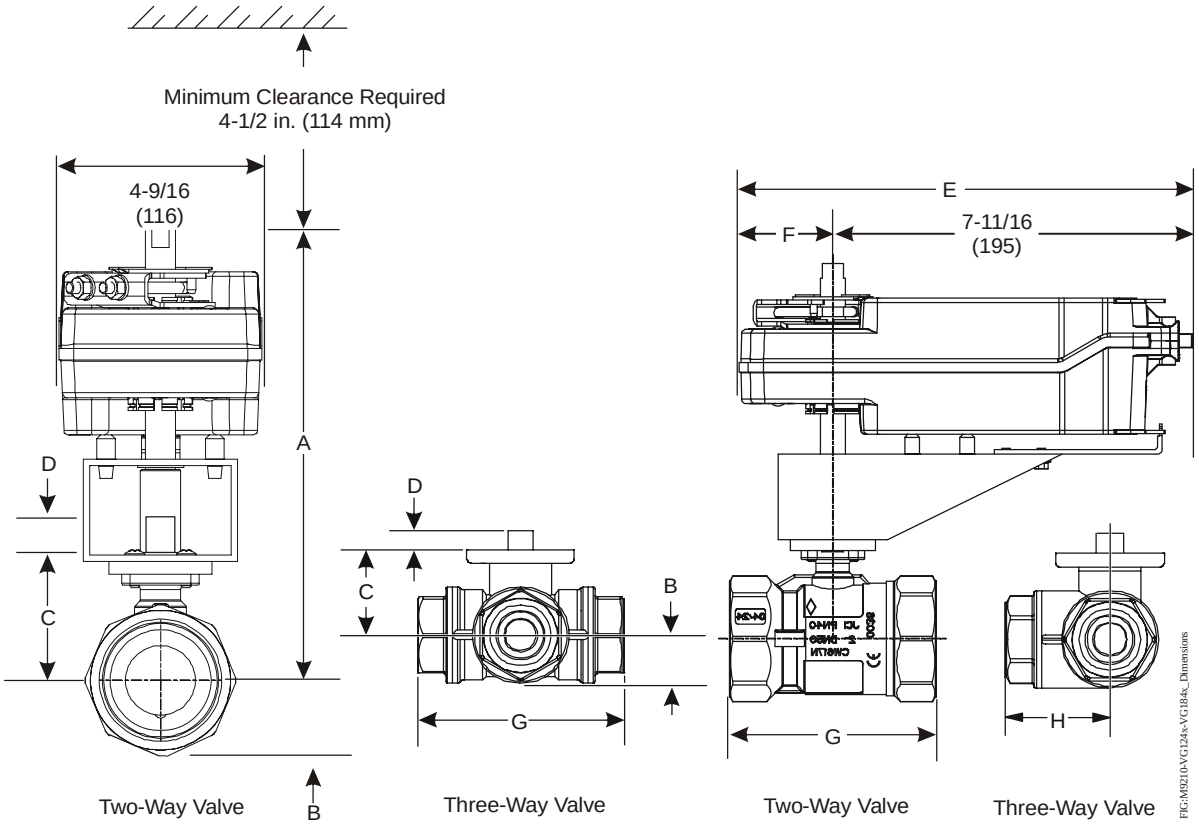

Figure 5: M9210 Actuated Ball Valve Dimensions, in. (mm)

Table 7: M9210 Actuated VG1241, VG1245, VG1841, and VG1845 Series Ball Valve Dimensions, in. (mm)

Valve Size, in. (DN)[1]	A	B	C	D	E	F	G	H
2 (DN50)	8-1/32 (204)	1-15/32 (37)	2-1/8 (54)	11/32 (9)	9-13/16 (249)	2-5/32 (55)	4-27/32 (123)	2-27/64 (62)

1. On models with the flow-characterizing disk, the disk is located in Port A (as indicated on the valve body). Port A must be the inlet.

For two-way valve dimensions, see Figure 6. On the left-hand figure, see the combination of the M9124 Series Non-Spring Return Actuators with VG12A5xx Series Two-Way Ball Valves.

On the right-hand figure, see the combination of the M9220 Series Spring Return Actuators with VG12A5xx Series Two-Way Ball Valves. See Table 8 for specific model dimensions for both combinations.

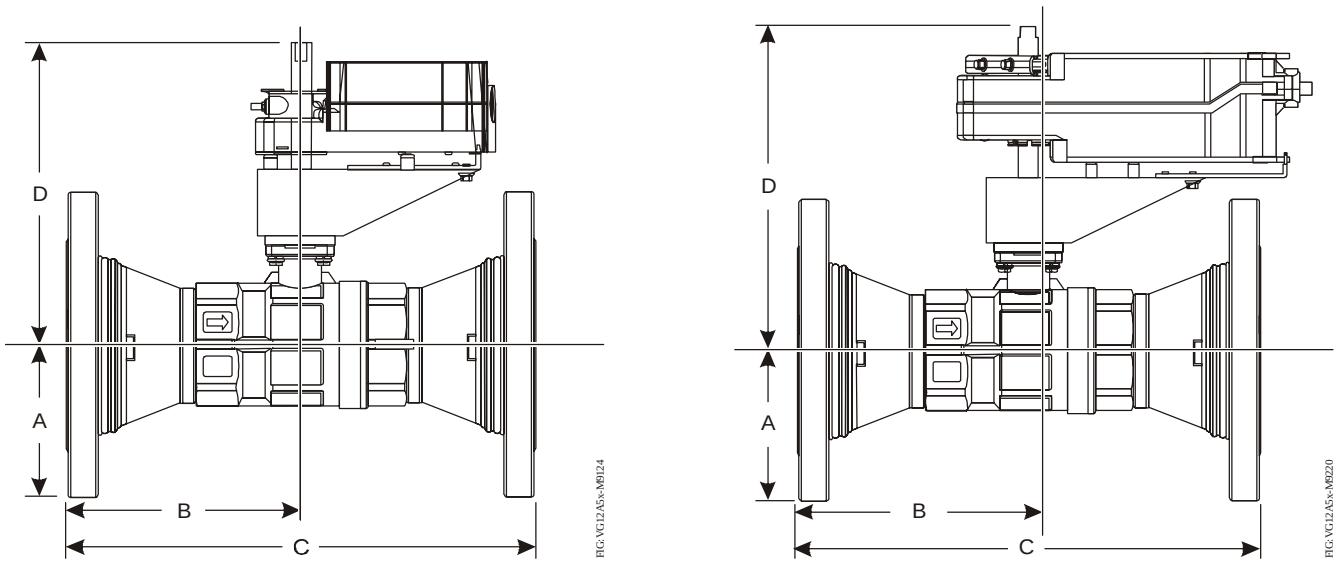

Figure 6: Two-Way Ball Valves with Actuators

Table 8: VG12A5xx Series Two-Way Flanged Ball Valves with Actuators; Dimensions, in. (mm)

Valve Size, in. (DN)	A	B	C	D	
				M9124	M9220
2-1/2 (DN65)	3.50 (88.9)	5.71 (145)	11.42 (290)	8.89 (226)	9.64 (245)
3 (DN80)	3.75 (95.3)	6.10 (155)	12.20 (310)		
4 (DN100)	4.50 (114)	6.89 (175)	13.77 (350)		

For two-way valve dimensions with the appropriate field installed M9000-340 weathershields, see Figure 7. On the left-hand figure, see the combination of the M9124 Series Non-Spring Return Actuators with VG12A5xx Series Two-Way Ball Valves.

On the right-hand figure, see the M9220 Series Spring Return Actuators with the VG12A5xx Series Two-Way Ball Valves. See Table 9 for specific model dimensions for both combinations.

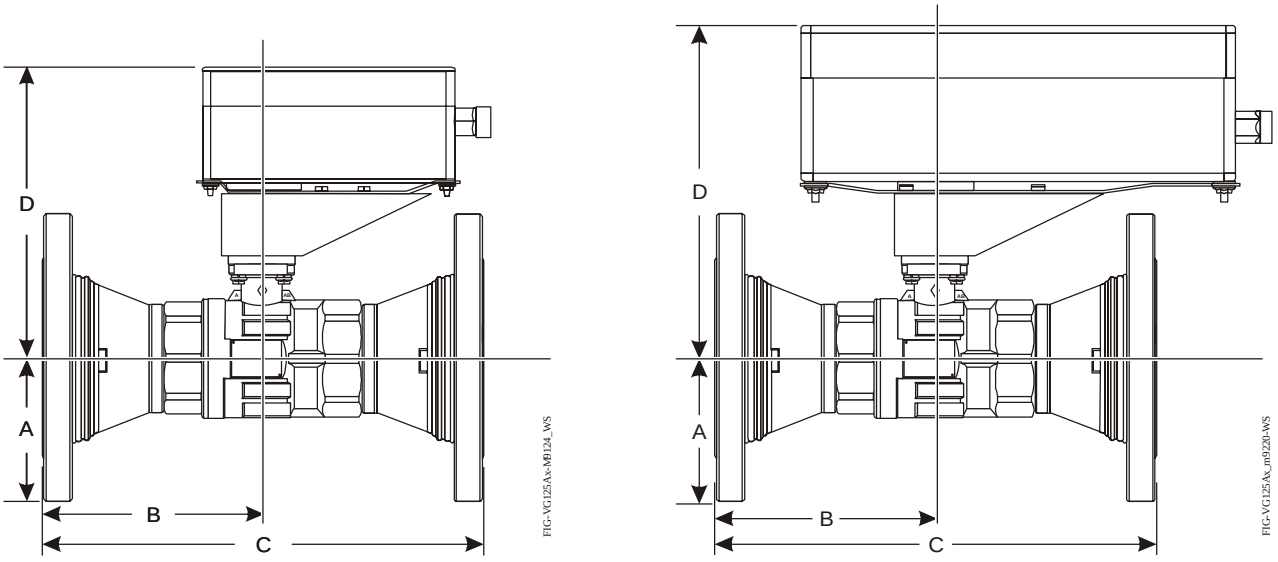

Figure 7: Two-Way Ball Valves with Actuators and Weathershields

Table 9: VG12A5xx Series Two-Way Flanged Ball Valve with Actuators and Weathershields; Dimensions, in. (mm)

Valve Size, in. (DN)	A	B	C	D	
				M9124	M9220
2-1/2 (DN65)	3.50 (88.9)	5.71 (145)	11.42 (290)	9.07 (230)	10.25 (260)
3 (DN80)	3.75 (95.3)	6.10 (155)	12.20 (310)		
4 (DN100)	4.50 (114)	6.89 (175)	13.77 (350)		

For three-way valve dimensions, see Figure 8. On the left-hand figure, see the combination of the M9124 Series Non-Spring Return Actuators with VG18A5xx Series Three-Way Ball Valves.

On the right-hand figure, see the combination of the M9220 Series Spring Return Actuators with VG18A5xx Series Three-Way Ball Valves. See Table 10 for specific model dimensions for both combinations.

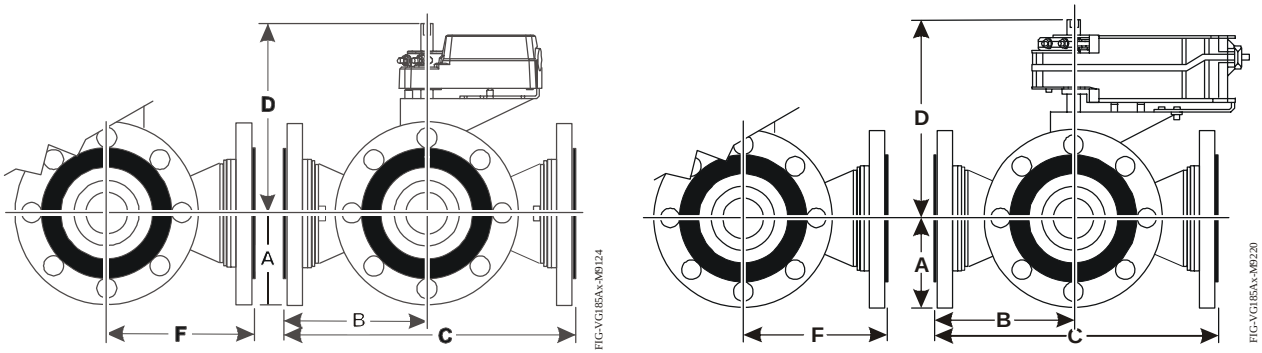

Figure 8: Three-Way Ball Valves with Non-Spring Return Actuators and Weathershields

Table 10: VG18A5xx Series Three-Way Flanged Ball Valves with Actuators; Dimensions, in. (mm)

Valve Size, in. (DN)	A	B	C	D		F
				M9124	M9220	
2-1/2 (DN65)	3.50 (88.9)	5.71 (145)	11.42 (290)	8.89 (226)	9.64 (2456)	5.87 (149)
3 (DN80)	3.75 (95.3)	6.10 (155)	12.20 (310)			6.26 (159)
4 (DN100)	4.50 (114)	6.89 (175)	13.77 (350)			7.05 (179)

For three-way valves with the appropriate field installed M9000-340 weathershield dimensions, see Figure 9. On the left-hand figure, see the combination of the M9124 Series Non-Spring Return Actuators with the VG18A5xx Series Three-Way Ball Valves.

On the right-hand figure, see the combination of the M9220 Series Spring Return Actuators with the VG18A5xx Series Three-Way Ball Valves. See Table 11 for specific model dimensions for both combinations.

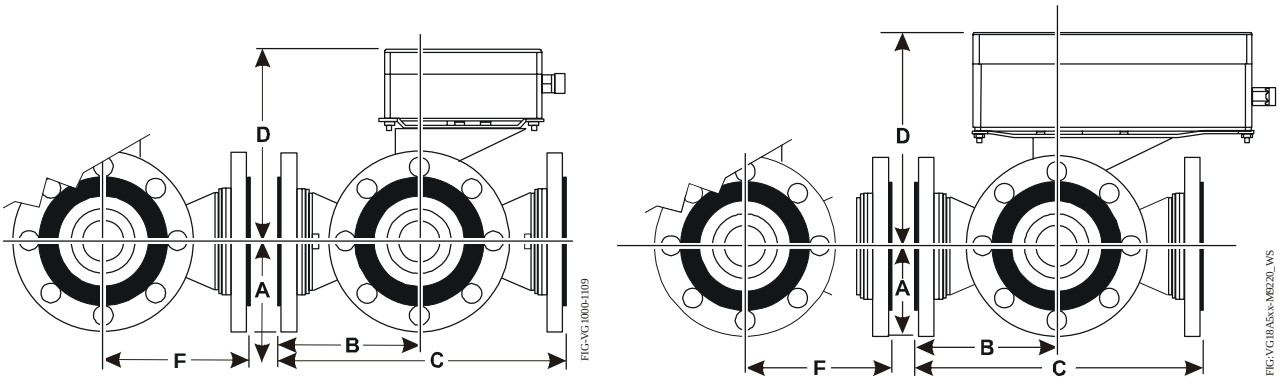

Figure 9: Three-Way Ball Valves with Spring Return Actuators and Weathershields; Dimensions, in. (mm)

Table 11: VG18A5xx Series Two-Way Flanged Ball Valve with Weathershield Dimensions, in. (mm)

Valve Size, in. (DN)	A	B	C	D		F
				M9124	M9220	
2-1/2 (DN65)	3.50 (88.9)	5.71 (145)	11.42 (290)	9.07 (230)	10.25 (260)	5.87 (149)
3 (DN80)	3.75 (95.3)	6.10 (155)	12.20 (310)			6.26 (159)
4 (DN100)	4.50 (114)	6.89 (175)	13.77 (350)			7.05 (179)

Repair Information

If the M9000-51x Series Valve Linkage Kit fails to operate within its specifications, replace the unit. For a replacement valve, contact the nearest Johnson Controls representative.

Technical Specifications

M9000-51x Series Ball Valve Linkage Kits

Service[1]		Hot Water, Chilled Water, 50/50 Glycol Solutions, and Low Pressure Steam
Maximum Actuator Fluid Temperature Limits	**284°F (140°C)**	M9000-516 Linkage: M9100 Series Non-Spring Return Actuators
		M9000-517 Linkage: M9210 Series Spring Return Actuators
		M9000-518 Linkage: M9124 Series Non-Spring Return Actuators
		M9000-519 Linkage: M9220 Series Spring Return Actuators
Maximum Steam Service[2]	**15 psig saturated steam 250°F (121°C)**	M9000-516 Linkage: M9100 Series Non-Spring Return Actuators
		M9000-517 Linkage: M9210 Series Spring Return Actuators
	25 psig saturated steam 267°F (30°C)	M9000-518 Linkage: M9124 Series Non-Spring Return Actuators
		M9000-519 Linkage: M9220 Series Spring Return Actuators
Minimum Ambient Operating Temperature	**-40°F (-40°C)**	M9000-517 Linkage: M9210 Series Spring Return Actuators
		M9000-519 Linkage: M9220 Series Spring Return Actuators
	-22°F (-30°C)	M2000-500 Linkage: M2202 Series Spring Return Actuators
	-4°F (-20°C)	M9000-516 Linkage: M9100 Series Non-Spring Return Actuators
		M9000-518 Linkage: M9124 Series Non-Spring Return Actuators
Maximum Ambient Operating Temperature	**122°F (50°C)**	M9000-516 Linkage: M9100 Series Non-Spring Return Actuators
		M9000-518 Linkage: M9124 Series Non-Spring Return Actuators
	131°F (55°C)	M9000-517 Linkage: M9210 Series Spring Return Actuators M9000-519 Linkage: M9220 Series Spring Return Actuators
Enclosure		NEMA 3R, IP32
Material	**M9000-5xx**	Bracket: Aluminum
		Anti-Rotation Slider: 1018 Steel
		Drive Shaft: 12L14 Steel
		Standoff: Thermoplastic Resin
		Thermo-Isolator: PTFE (Polytetrafluoroethylene)
Shipping Weight		1.5 lb (0.68 kg)

1. Refer to VDI 2035 Standard for proper water treatment.
2. In steam applications, install the valve with the stem horizontal to the piping, and wrap the valve and piping with insulation.

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.

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