

M9000-5xx Series Ball Valve Linkage Kits

Product Bulletin

M9000-51x, M9000-520

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The M9000-5xx Series Ball Valve Linkage Kits are designed specifically for mounting Johnson Controls® M9104, M9106, M9109, and M9100 Series Non-Spring-Return and M9203, M9208, and M9220 Series Spring-Return 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.

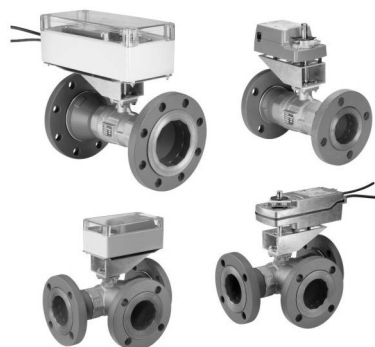


Figure 1: M9000-51x Series Linkage Kits Used to Field Mount M9000 Series Electric Actuators to VG1000 Series Ball Valves

Table 1: Features and Benefits

Features	Benefits
Dual-Centering Bearing Design (M9000-51x only)	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 (M9000-51x only)	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.
Glass-Reinforced Thermoplastic Resin (M9000-520 only)	Provides superior thermal isolation between the valve and actuator, and meets Underwriters Laboratories Inc.® (UL) 94 5V Flame Class Rating.

Product Guidelines

**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.

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.

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.

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 VG12x5 and VG18x5 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.

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

IMPORTANT: Take care to prevent foreign material 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 become embedded in the seats, subsequent flushing and filtering of the piping system with the valve installed does not remedy the problem.

For detailed installation instructions, refer to the *M9000-51x Series Valve Linkage Kits Installation Instructions (Part No. 14-1201-13)* and the *M9000-520 Ball Valve Linkage Kit Installation Instructions (Part No. 14-1297-5)*.

For proper actuator wiring and commissioning instructions, refer to the following documentation:

- *M9106-xGx-2 Series Electric Non-spring Return Actuators Installation Instructions (Part No. 34-636-1085)*
- *M9109 Series Electric Non-spring Return Actuators Installation Instructions (Part No. 34-636-1190)*
- *M9206 Series Electric Spring Return Actuators Installation Instructions (Part No. 34-1280-9)*
- *M9206-Bxx-2S Series On/Off Electric Spring Return Actuators Installation Instructions (Part No. 34-1280-122)*
- *M9206-AGx-2S Series Floating Electric Spring Return Actuators Installation Instructions (Part No. 34-1280-238)*
- *M9206-GGx-2S Series Proportional Electric Spring Return Actuators Installation Instructions (Part No. 34-1280-246)*

Linkage Kit Selection

Use the M9000-51x Series Valve Linkage Kits to field mount Johnson Controls M9104, M9106, M9109, and M9100 Series Non-Spring-Return and M9203, M9208, and M9220 Series Spring-Return Actuators to Johnson Controls VG1000 Series Ball Valves.

The linkage kit venting and overall height, as well as piping insulation, minimize heat transfer to the electric actuator in higher temperature fluid applications.

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.

Before you service the electric actuator or the piping system:

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

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)	VG1x41Ax, VG1x45Ax, VG1x71Ax, VG1x75Ax, VG1x91Ax, VG1x95Ax	M9108	M9000-516	M9000-330
3/4 (DN20)	VG1x41Bx, VG1x45Bx, VG1x71Bx, VG1x75Bx, VG1x91Bx, VG1x95Bx	M9108	M9000-516	M9000-330
1 (DN25)	VG1x41Cx, VG1x45Cx, VG1x71Cx, VG1x75Cx, VG1x91Cx, VG1x95Cx	M9108	M9000-516	M9000-330
1-1/4 (DN32)	VG1x41Dx, VG1x45Dx	M9108	M9000-516	M9000-330
1-1/2 (DN40)	VG1x41Ex, VG1x45Ex	M9108	M9000-516	M9000-330
2 (DN50)	VG1x41Fx, VG1x45Fx	M9116	M9000-516	M9000-330
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; M9220 Series are Spring-Return Actuators.

Table 3: Linkages for Discontinued Series Ball Valves

Valve Size, in. (DN)	Valve Code Number	Actuator Base Number	Linkage Kit Code Number
1/2 (DN15)	VG1243Ax, VG1644AB	VA9208	M9000-561
		M9109	M9000-520
3/4 (DN20)	VG1243Bx	VA9208	M9000-561
		M9109	M9000-520
	VG1644BB	M9108, M9109	M9000-520
		VA9208	M9000-561
1 (DN25)	VG1243Cx, VG1243Dx	M9109	M9000-520
		VA9208	M9000-561
	VG1644	M9116	M9000-516
		M9220	M9000-517
1-1/4 (DN32)	VG1243Dx, VG1644DB	M9116	M9000-518
		M9220	M9000-519
1-1/2 (DN40)	VG1243EC	M9124	M9000-518

Figure 2 shows the dimensions for the M9100 Actuated VG1243 and VG1644 Series Ball Valves. See Table 4 for specific model dimensions.

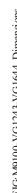


Table 4: M9100 Actuated VG1243 and VG1644 Series Ball Valve Dimensions, in. (mm)

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 two-way valve dimensions, see Figure 3. The figure on the left shows the combination of the M9124 Series Non-Spring Return Actuators with VG12A5xx Series Two-Way Ball Valves.

The figure on the right shows the combination of the M9220 Series Spring Return Actuators with VG12A5xx Series Two-Way Ball Valves. See Table 5 for specific model dimensions for both combinations.

For three-way valve dimensions, see Figure 4. The figure on the left shows the combination of the M9124 Series Non-Spring Return Actuators with VG18A5xx Series Three-Way Ball Valves.

The figure on the right shows the combination of the M9220 Series Spring Return Actuators with VG18A5xx Series Three-Way Ball Valves. See Table 5 for specific model dimensions for both combinations.

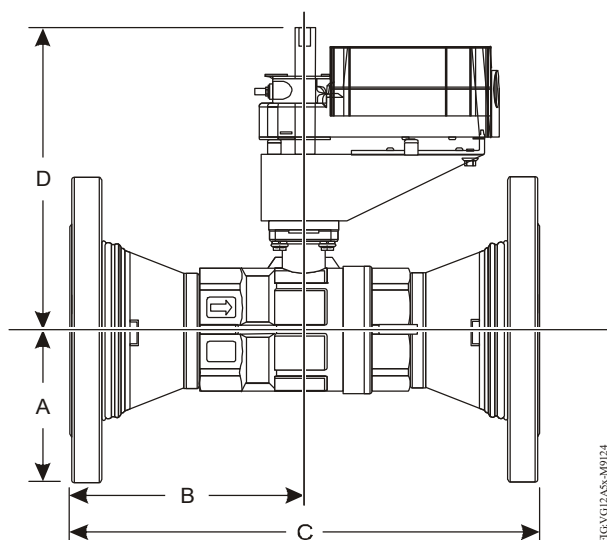


FIG-VG12A5x-M9124

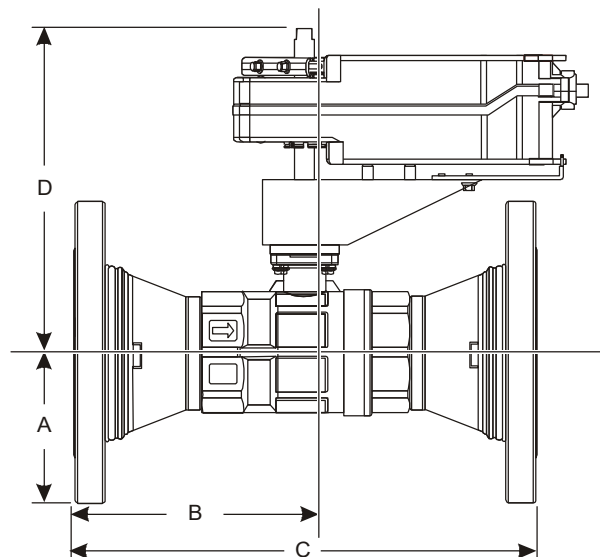


FIG-VG12A5x-M9220

Figure 3: Two-Way Ball Valves with Actuators

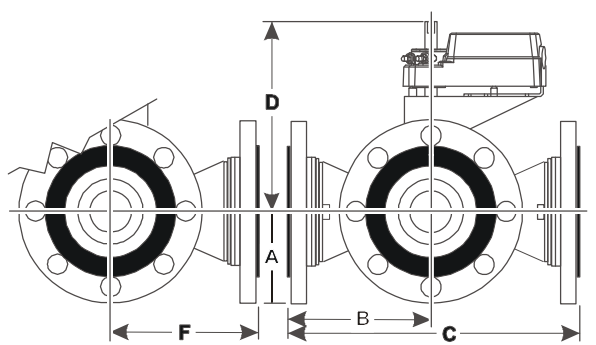


FIG-VG18A5x-M9124

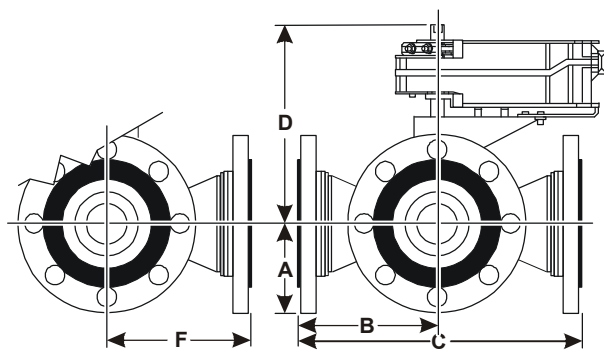


FIG-VG18A5x-M9220

Figure 4: Three-Way Ball Valves with Non-Spring Return Actuators and Weathershields

Table 5: VG18A5xx Series Three-Way Flanged Ball Valves with Actuators Dimensions, in. (mm)

Valve Size, in. (DN)	A	B	C	D		F (3-Way Only)
				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 two-way valve dimensions with field-installed M9000-340 weathershields, see Figure 5. The figure on the left shows the combination of the M9124 Series Non-Spring Return Actuators with VG12A5xx Series Two-Way Ball Valves.

The figure on the right shows the M9220 Series Spring Return Actuators with the VG12A5xx Series Two-Way Ball Valves. See Table 6 for specific model dimensions for both combinations.

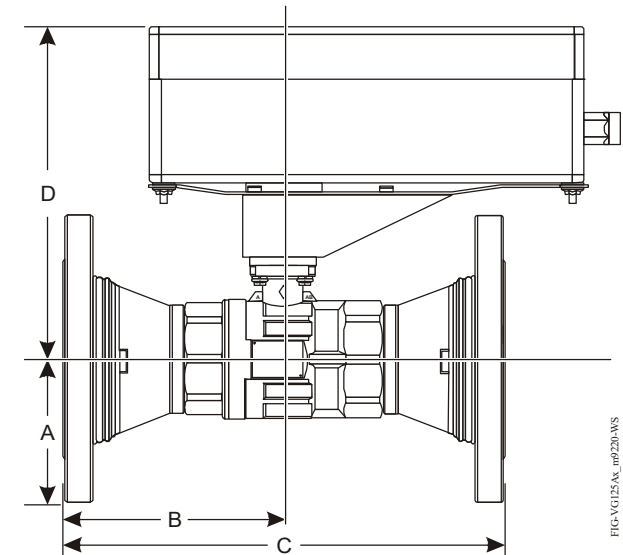
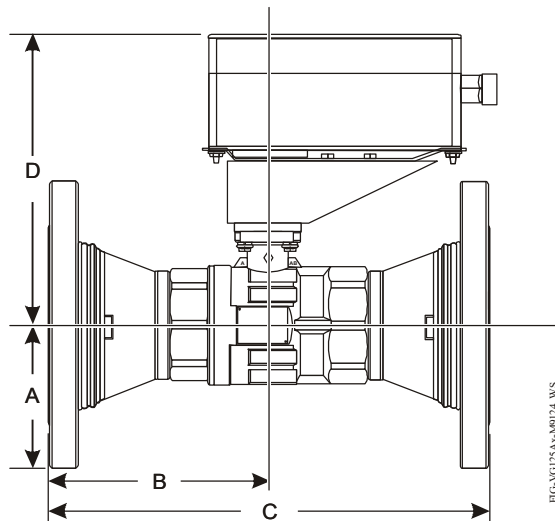
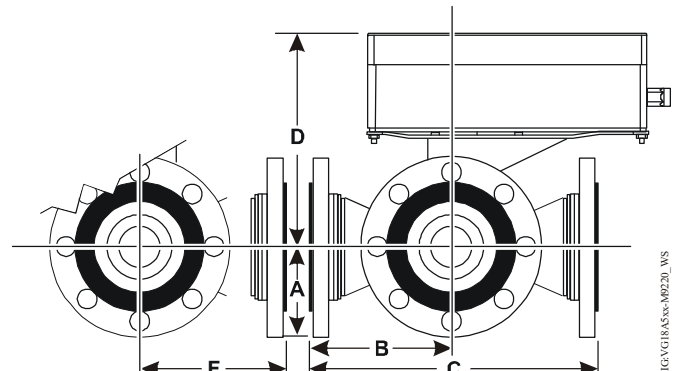
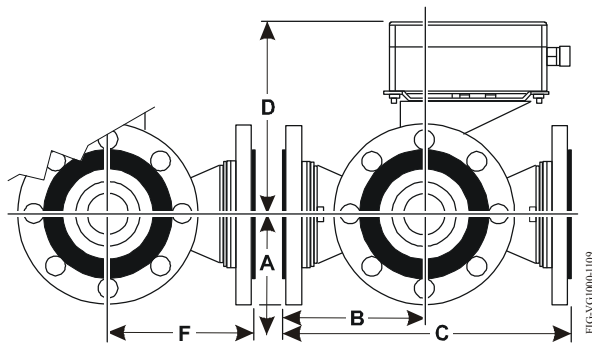


Figure 5: Two-Way Ball Valves with Actuators and Weathershields



**Figure 6: Three-Way Ball Valves with Spring Return Actuators and Weathershields;
Dimensions, in. (mm)**

Table 6: VG18A5xx Series Two-Way Flanged Ball Valve with Weathershield Dimensions, in. (mm)

Valve Size, in. (DN)	A	B	C	D		F (3-Way Only)
				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)

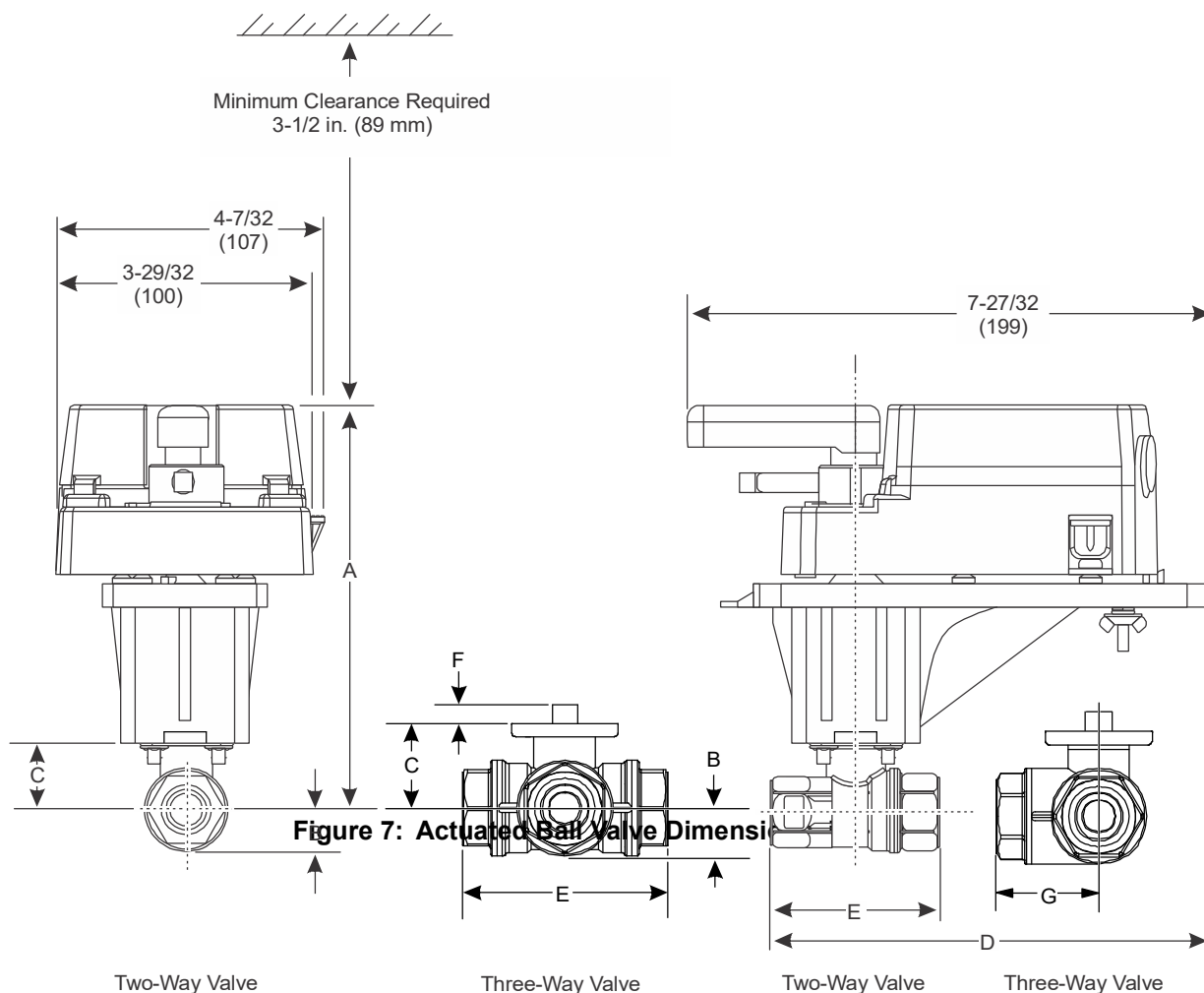


Figure 1: Non-Spring Return M9106 or M9109 Actuated VG1245 and VG1845 Series Ball Valve with M9000-520 Linkage Dimensions, in. (mm)

Table 7: M9106 or M9109 Actuated VG1245 and VG1845 Series Ball Valve with M9000-520 Linkage Dimensions, in. (mm)

Valve Size, in. (DN) ¹	A	B	C	D	E	F	G
1/2 (DN15)	6-19/64 (160)	21/32 (17)	1-7/32 (31)	6-49/64 (172)	2-33/64 (64)	11/32 (9)	1-1/4 (32)
3/4 (DN20)	6-19/64 (160)	21/32 (17)	1-7/32 (31)	6-29/32 (175)	2-51/64 (71)	11/32 (9)	1-13/32 (36)
1 (DN25)	6-3/8 (162)	3/4 (19)	1-19/64 (33)	7-13/64 (183)	3-13/32 (87)	11/32 (9)	1-11/16 (43)
1-1/4 (DN32)	6-13/16 (173)	1-1/32 (26)	1-23/32 (44)	7-15/32 (190)	3-15/16 (100)	11/32 (9)	2 (51)
1-1/2 (DN40)	6-31/32 (177)	1-9/64 (29)	1-57/64 (48)	7-43/64 (195)	4-21/64 (110)	11/32 (9)	2-1/8 (54)
2 (DN50)	7-11/64 (182)	1-15/32 (37)	2-1/16 (53)	7-59/64 (201)	4-27/32 (123)	11/32 (9)	2-9/16 (65)

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

Repair Information

If the M9000-5xx Series Valve Linkage Kit fails to operate within its specifications, replace the unit. For a replacement valve, contact the nearest Johnson Controls representative.

Table 8: Repair Parts (Order Separately)

Code Number	Description
M9000-600	Anti-rotation slider; includes bracket, carriage screw, split lock washer, flat washer, and wing nut
M9000-601	Mounting screws and nuts; includes four M5 (5 mm) x 16 mm machine screws and four M5 (5 mm) serrated washer head nuts
M9000-602	Drive shaft
M9000-603	Manual handle; includes handle and a No. 4 thread-forming PLASTITE® screw
M9206-602	M9206 hub locking clip
M9206-604	New hub designed to accommodate older M9206 actuators to M9000-520 linkage

Technical Specifications

M9000-5xx Series Ball Valve Linkage Kits (Part 1 of 2)

Service¹		Hot Water, Chilled Water, 50/50 Glycol Solutions, and Low Pressure Steam
Valid Actuators		1/2 through 1-1/2 in. Valves: • M9106-AGx-2 On/Off Floating Control without Timeout Non-Spring Return • M9106-IGx-2 On/Off Floating Control with Timeout Non-Spring Return • M9106-GGx-2 Proportional Control Non-Spring Return 2 in. Valves: • M9109-AGx-2 On/Off Floating Control without Timeout Non-Spring Return • M9109-GGX-2 Proportional Control Non-Spring Return
Maximum Actuator Fluid Temperature Limits	284°F (140°C)	M9000-516 Linkage: M9100 Series Non-Spring Return Actuators
		M9000-517 Linkage: M9220 Series Spring Return Actuators
		M9000-518 Linkage: M9124 Series Non-Spring Return Actuators
		M9000-519 Linkage: M9220 Series Spring Return Actuators
		M9000-520 Linkage: M9109 Non-Spring Return Actuators
Maximum Steam Service²	15 psig saturated steam 250°F (121°C)	M9000-516 Linkage: M9100 Series Non-Spring Return Actuators
		M9000-517 Linkage: M9220 Series Spring Return Actuators
		M9000-520 Linkage: M9109 Non-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: M9220 Series Spring Return Actuators
		M9000-519 Linkage: M9220 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
		M9000-520 Linkage: M9109 Non-Spring Return Actuators

M9000-5xx Series Ball Valve Linkage Kits (Part 2 of 2)

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	
		M9000-520 Linkage: M9109 Non-Spring Return Actuators	
	131°F (55°C)	M9000-517 Linkage: M9220 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; UL 94 5V Flame Class Rating
		Thermo-Isolator:	Glass-filled Nylon, heat stabilized
Shipping Weight		1.5 lb (0.68 kg)	

1. Refer to the VDI 2035 guideline 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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