

M9000-520-4 Ball Valve Linkage Kit

Installation

Parts Included

Quantity	Description
1*	Actuator Mounting Bracket
1*	Adjustable Anti-Rotation Slider
1*	No. 10-24 Carriage Screw for Anti-Rotation Slider
1*	No. 10-24 Wing Nut for Anti-Rotation Slider
1*	No. 10 Split Lock Washer for Anti-Rotation Slider
1*	No. 10 Flat Washer for Anti-Rotation Slider
1	Drive Shaft
4	M5 (5 mm) x 16 mm Machine Screws
4	M5 x 0.8 Hex Nuts (Use on 1/2 through 1 in. valves)
1	Manual Handle for Non-Spring Return Actuators Only
1	No. 4 Thread Forming Screw for Mounting the Manual Handle
1	Installation Instructions

* These items come factory assembled as one unit.

Special Tools Needed

Quantity	Description
1	No. 2 Phillips Screw Driver
1	5/16 in. (8 mm) Square Socket or 3/8 in. (10 mm) 12-Point Socket for actuator

IMPORTANT: The M9000-520-4 Ball Valve Linkage Kits are intended to control saturated steam, hot water, and chilled water flow under normal equipment operating conditions. Where failure or malfunction of the M9000-520-4 Ball Valve Linkage Kit 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 M9000-520-4 Ball Valve Linkage Kit.

IMPORTANT: Mount the actuator within 90° of the vertical position above the valve body. Failure to do so may permit water or moisture to travel down the valve stem, damaging the actuator and voiding the warranty.

Note: The new style of VG18x1 and VG18x5 Series Ball Valves has a different port configuration from the old style of VG1644 valves. See Figure 1 and Figure 2 when piping the valve.

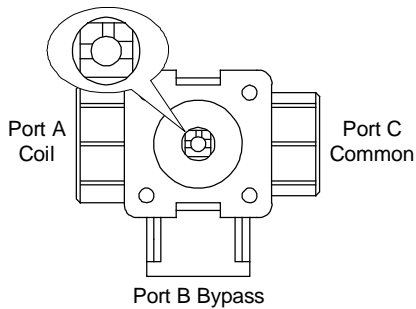


Figure 1: VG1000 Series Three-Way Ball Valve (Port A Connected to Port C)

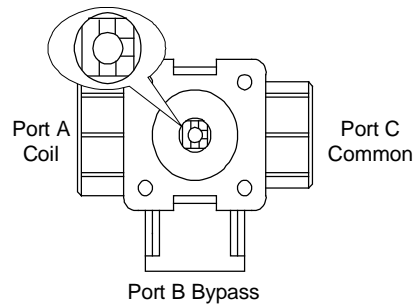


Figure 2: VG1000 Series Three-Way Ball Valve (Port B Connected to Port C)

Installing an M9106 or M9109 Series Electric Actuator

M9106 and M9109 Series Electric Actuators require at least 3 1/2 in. (89 mm) of clearance above the actuator.

Note: The factory installs the adjustable anti-rotation slider for M9106 or M9109 Series Electric Actuators.

To install an M9000-520-4 linkage kit on an M9106 or M9109 Series Electric Actuator:

1. Insert the drive shaft into the bottom of the mounting bracket while aligning the tab on the drive shaft with the drive shaft slot on the bracket. After inserting the drive shaft tab through the slot in the bracket, turn the drive shaft so that the surface with only two grooved splines faces away from the anti-rotation slider. With the drive shaft in this position, you can mount the linkage kit to the valve.

Note: The drive shaft has four sets of grooved splines located 90° apart. Three of the sets have four grooved splines, and the fourth set has two grooved splines.

2. Rotate the valve stem manually several times using an adjustable wrench to break the torque that may have built up during long-term storage. Then rotate the stem to position the valve in the normal position.

Note: Two-way valves in the fully open position have the index marking on the top of the valve stem, parallel with the direction of flow. Two-way valves in the fully closed position have the index marking perpendicular to the direction of flow. Three-way valves feature two index markings on the top of the valve stem, with one of the index markings parallel to the common port. See Figure 1 and Figure 2.

3. Install the linkage kit assembly onto the valve-mounting flange. Make sure the side of the drive shaft with only two grooved splines faces away from the anti-rotation slider and that one set of four grooved splines faces the anti-rotation slider.

Note: Depending on the installation, position the linkage kit assembly in any one of four 90° increments on the valve.

4. Secure the linkage kit assembly to the mounting flange of the valve using the M5 (5 mm) x 16 mm machine screws. For 1/2 through 1 in. valves you also need to use the four M5 x 0.8 hex nuts. The 1-1/4 through 2 in. valves have threaded holes in the valve flange and do not require the hex nuts. Hand tighten the screws evenly to avoid any side loading on the mounting bracket.
5. Position the actuator coupler over the drive shaft and insert the tab of the anti-rotation slider into the slot on the base of the actuator. Make sure the actuator base rests squarely on all four standoffs, maintaining parallel alignment with the mounting bracket. Loosen the wing nut on the anti-rotation slider, and move the anti-rotation slider toward the actuator. Tighten the wing nut to secure the assembly in place.
6. Secure the actuator coupler to the drive shaft using a 5/16 (8 mm) square socket or a 3/8 in. (10 mm) 12-point socket. Tighten the set screw 1/4 turn after the tip of the screw contacts the shaft.

IMPORTANT: Tighten the actuator set screw 1/4 turn past finger tight. Overtightening the set screw may damage the linkage.

7. Install the manual handle on the drive shaft and align the handle with the actuator coupler set screw. Tighten the No. 4 Phillips thread-forming screw to secure the assembly.

For proper actuator wiring and commissioning instructions, refer to the *M9106-xGx-2 Series Electric Non-Spring Return Actuators Installation Instructions (Part No. 34-636-1085)* and the *M9109 Series Electric Non-spring Return Actuators Installation Instructions (Part No. 34-636-1190)*.

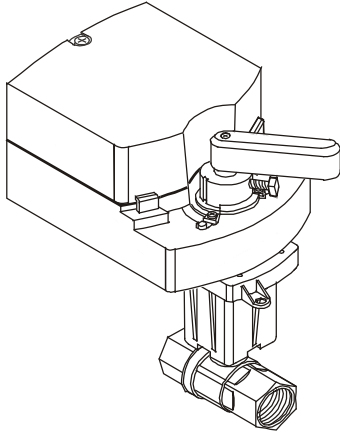


Figure 3: Two-Way Ball Valve with M9106 Actuator (Valve Open Position)

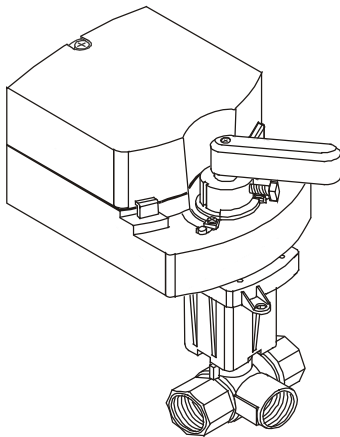


Figure 4: Three-Way Ball Valve with M9106 Actuator (Port A Open to Port C)

Installing an M9206 Series Electric Actuator

M9206 Series Electric Actuators require at least 4 in. (102 mm) of clearance above the actuator.

Note: Discard the manual handle provided, because it is used with only non-spring return actuators.

To install the M9000-520-4 Linkage Kit on an M9206 Series Electric Actuator:

1. Reposition the slider as shown in Figure 5. Loosen the wing nut and remove the carriage screw and anti-rotation slider. Move the anti-rotation slider to the back of the mounting bracket as shown in Figure 5. Secure the assembly using the carriage screw, split lock washer, flat washer, and wing nut provided. Loosely engage the wing nut only a few turns on the carriage screw to reposition the anti-rotation slider until after you mount the actuator.

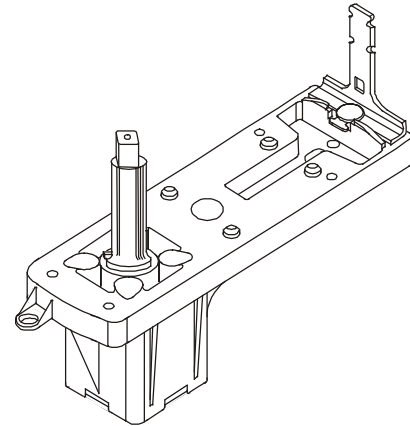


Figure 5: M9206 Anti-rotation Slider Mounting Location

2. Insert the drive shaft into the bottom of the mounting bracket while aligning the tab on the drive shaft with the drive shaft slot on the mounting bracket. After inserting the drive shaft tab through the slot in the bracket, turn the drive shaft so that the surface with only two grooved splines faces away from the anti-rotation slider. With the drive shaft in this position, you can mount the linkage kit to the valve.

Note: The drive shaft has four sets of grooved splines located 90° apart. Three of the sets have four grooved splines, and the fourth set has two grooved splines.

3. Rotate the valve stem manually several times using an adjustable wrench to break the torque that may have built up during long-term storage. Then, rotate the stem to position the valve for the spring return position.

Note: Two-way valves in the fully open position have the index marking on the top of the valve stem, parallel to the direction of flow. Two-way valves in the fully closed position have the index marking perpendicular to the direction of flow. Three-way valves feature two index markings on the top of the valve stem, with one of the index markings parallel to the common port. See Figure 1 and Figure 2.

4. Install the linkage kit assembly onto the valve-mounting flange. Make sure the side of the drive shaft with only two grooved splines faces away from the anti-rotation slider and that one set of four grooved splines faces the anti-rotation slider.

Note: Depending on the installation, position the linkage kit assembly in any one of four 90° increments on the valve.

5. Secure the mounting bracket assembly to the mounting flange of the valve using the M5 (5 mm) x 16 mm drive machine screws. For 1/2 through 1 in. valves you also need to use the four M5 x 0.8 hex nuts. The 1-1/4 through 2 in. valves have threaded holes in the valve flange and do not require the hex nuts. Hand tighten the screws evenly to avoid any side loading on the mounting bracket.

6. Determine the desired actuator position on the valve depending on the spring return position of the valve. For proper actuator positioning for two-way valves, see Figure 7 and Figure 9. For three-way valves, see Figure 1 and Figure 2.

- a. If the valve fail position is Port A to Port C as shown in Figure 1, position the actuator on the valve as shown in Figure 8.
- b. If the valve fail position is Port B to Port C as shown in Figure 2, position the actuator on the valve as shown in Figure 10.

Note: Notice the position of the spring return arrows.

7. If the coupler is on the top side of the actuator, remove the coupler. To change the coupler's position, pull the locking clip off the coupler, and remove the coupler of the actuator. Reinsert the coupler into either the Clockwise (CW) or Counterclockwise (CCW) face of the actuator. The coupler splines are designed to prevent inserting the coupler at the wrong end of the rotation range. See Figure 6.

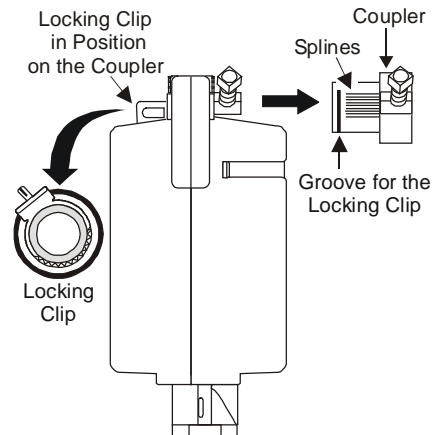


Figure 6: Changing the Position of the Coupler

IMPORTANT: For 0 to 93° rotation, the coupler must fit as closely as possible to, but not on top of, the metal plate at the spring return position. Improper placement may damage the coupler.

8. Position the coupler between the actuator and the linkage, and snap the locking clip securely into the coupler groove to retain the coupler in the actuator.
9. Slide the actuator over the drive shaft and make sure the actuator base rests squarely on all four standoffs, maintaining parallel alignment with the mounting bracket.
10. Insert the tab of the anti-rotation slider into the slot on the base of the actuator. Slide the anti-rotation slider toward the actuator and tighten the wing nut.
11. Secure the actuator coupler to the drive shaft using a 5/16 (8 mm) square socket or a 3/8 in. (10 mm) 12-point socket. Tighten the set screw 1/4 turn after the tip of the screw contacts the shaft.

IMPORTANT: Tighten the actuator set screw 1/4 turn past finger tight. Overtightening the set screw may damage the linkage.

For proper actuator wiring and commissioning instructions, refer to the *M9206 Series Electric Spring Return Actuators Installation Instructions* (Part No. 34-1280-9).

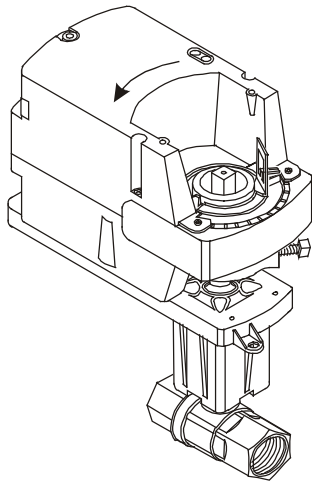


Figure 7: Two-Way Ball Valve with M9206 Actuator (Valve Open Position)

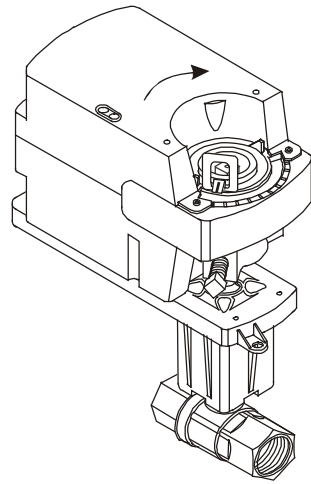


Figure 9: Two-Way Ball Valve with M9206 Actuator (Valve Closed Position)

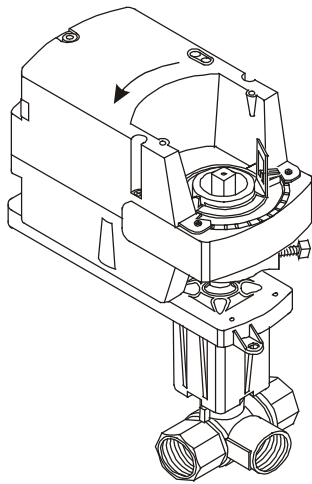


Figure 8: Three-Way Ball Valve with M9206 Actuator (Spring Returned with Port A Open to Port C)

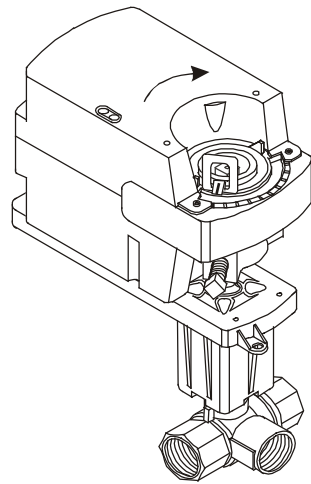


Figure 10: Three-Way Ball Valve with M9206 Actuator (Spring Returned with Port B Open to Port C)

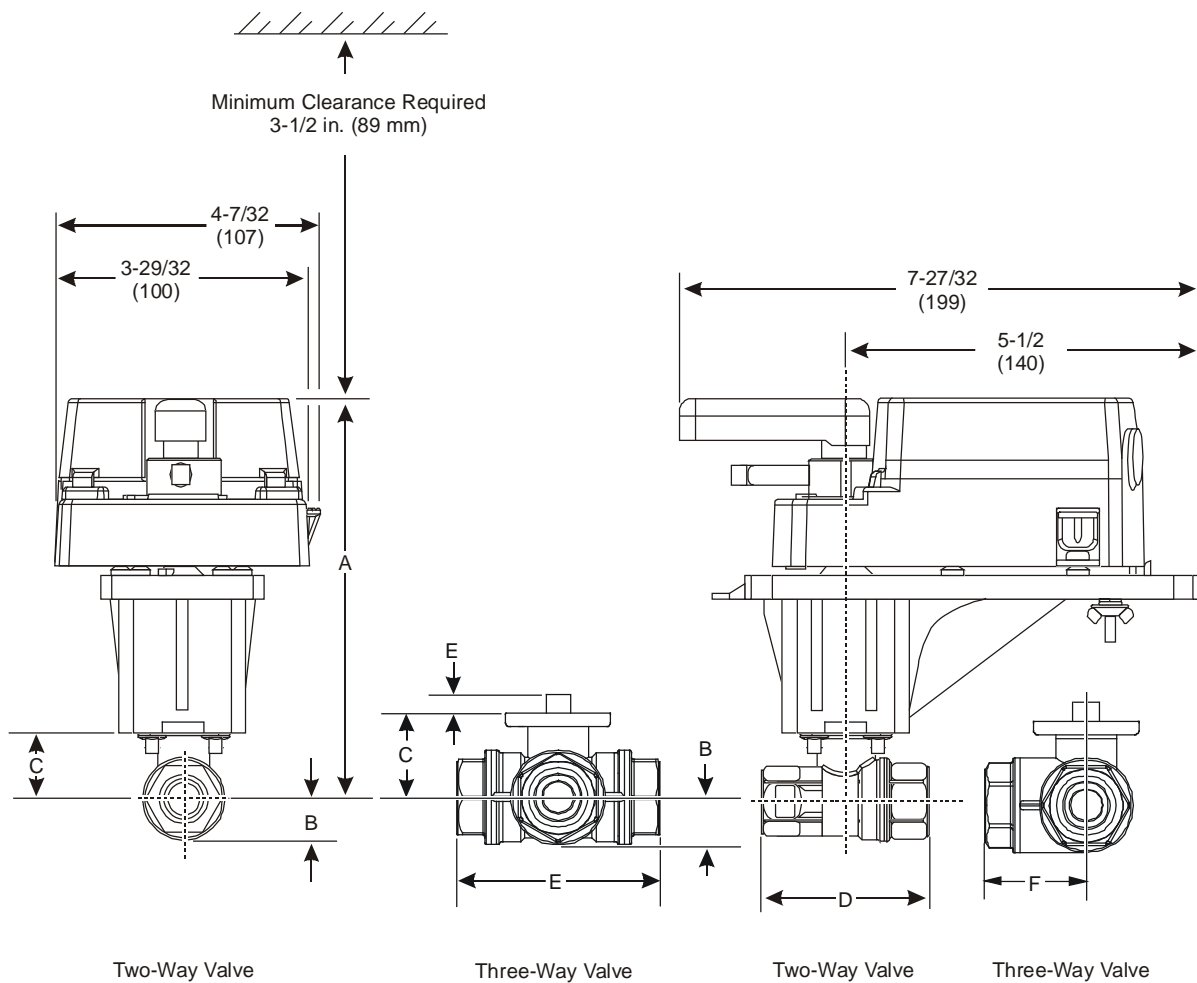


Figure 11: Field-Installed M9106 or M9109 Series Electric Actuator

Table 1: M9106 and M9109 Actuated VG12x1, VG12x5, VG18x1, and VG18x5 Series Ball Valve Dimensions, in. (mm)

Valve Size, in. (DN)*	A	B	C	D		E	F	
				NPT	BSPP/ BSPT		NPT	BSPP/ BSPT
1/2 (DN15)	6-19/64 (160)	21/32 (17)	1-7/32 (31)	2-33/64 (64)	2-5/8 (66.5)	11/32 (9)	1-1/4 (32)	1-5/16 (33.3)
3/4 (DN20)	6-19/64 (160)	21/32 (17)	1-7/32 (31)	2-51/64 (71)	2-15/16 (75)	11/32 (9)	1-13/32 (36)	1-15/32 (37.5)
1 (DN25)	6-3/8 (162)	3/4 (19)	1-19/64 (33)	3-13/32 (87)	3-19/32 (91.5)	11/32 (9)	1-11/16 (43)	1-13/16 (45.8)
1-1/4 (DN32)	6-13/16 (173)	1-1/32 (26)	1-23/32 (44)	3-15/16 (100)	4-9/32 (108.5)	11/32 (9)	2 (51)	2-1/8 (54.3)
1-1/2 (DN40)	6-31/32 (177)	1-9/64 (29)	1-57/64 (48)	4-21/64 (110)	4-21/32 (118.5)	11/32 (9)	2-1/8 (54)	2-11/32 (59.3)
2 (DN50)	7-11/64 (182)	1-15/32 (37)	2-1/16 (53)	4-27/32 (123)	5-15/32 (139)	11/32 (9)	2-9/16 (65)	2-29/32 (74)

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

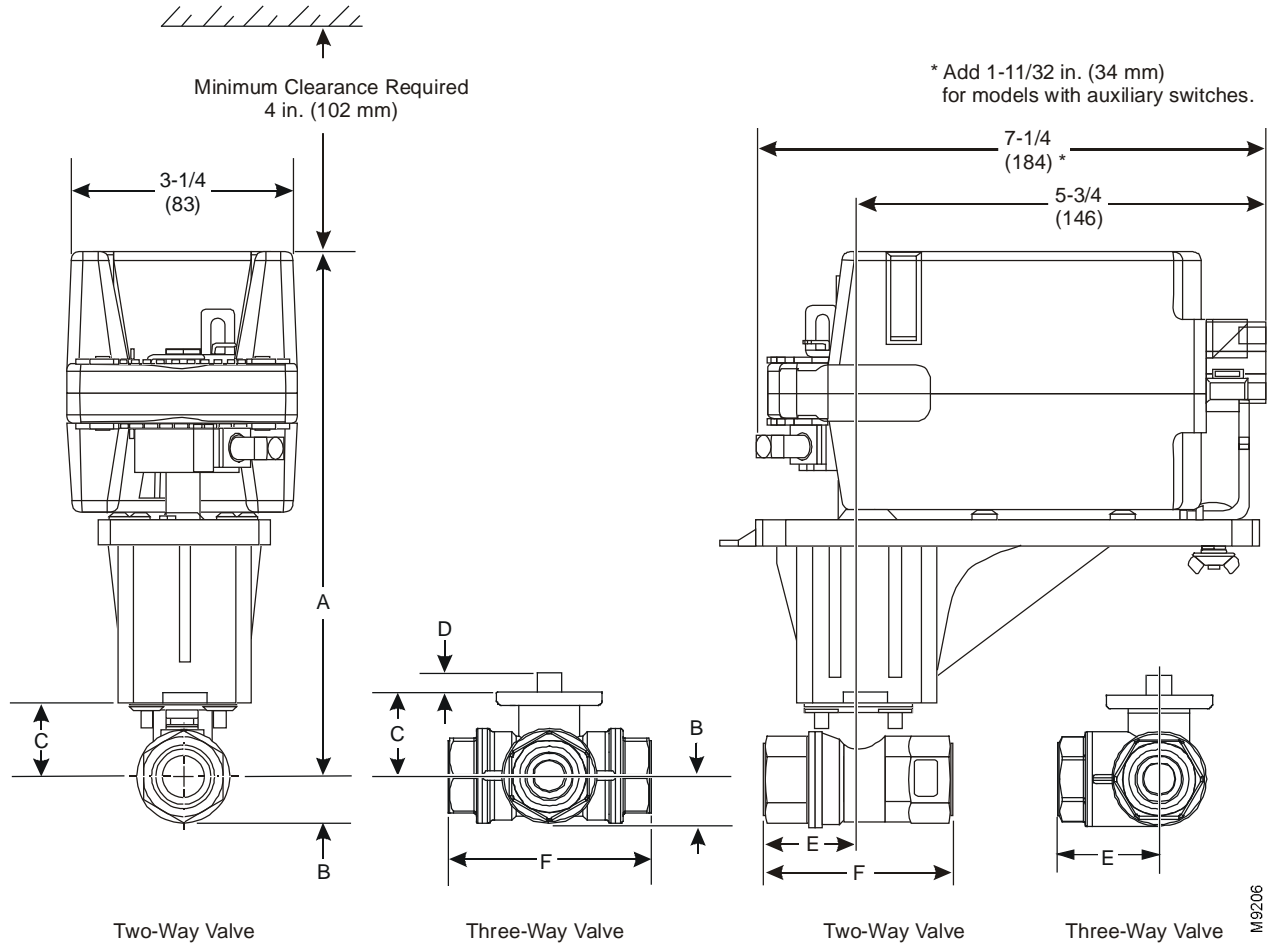


Figure 12: Field-Installed M9206 Series Electric Actuator

Table 2: M9206 Actuated VG12x1, VG12x5, VG18x1, and VG18x5 Series Ball Valve Dimensions, in. (mm)

Valve Size, in. (DN)*	A**	B	C	D	E		F	
					NPT	BSPP/ BSPT	NPT	BSPP/ BSPT
1/2 (DN15)	7-13/64 (183)	21/32 (17)	1-7/32 (31)	11/32 (9)	1-1/4 (32)	1-5/16 (33.3)	2-33/64 (64)	2-5/8 (66.5)
3/4 (DN20)	7-13/64 (183)	21/32 (17)	1-7/32 (31)	11/32 (9)	1-13/32 (36)	1-15/32 (37.5)	2-51/64 (71)	2-15/16 (75)
1 (DN25)	7-9/32 (185)	3/4 (19)	1-19/64 (33)	11/32 (9)	1-45/64 (43)	1-13/16 (45.8)	3-13/32 (87)	3-19/32 (91.5)
1-1/4 (DN32)	7-11/16 (195)	1-1/32 (26)	1-23/32 (44)	11/32 (9)	1-31/32 (50)	2-1/8 (54.3)	3-15/16 (100)	4-9/32 (108.5)
1-1/2 (DN40)	7-7/8 (200)	1-9/64 (29)	1-57/64 (48)	11/32 (9)	2-11/64 (55)	2-11/32 (59.3)	4-21/64 (110)	4-21/32 (118.5)

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

** For valve assemblies with M9206-Bxx-2S Series Actuators, subtract 19/32 (15 mm) from Dimension A (Column A).

Repair Parts (Order Separately)

Code Number	Description
M9000-600	Anti-rotation slider; includes bracket, carriage screw, split lock washer, flat washer, and wing nut.
M9000-602	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 M9000-520-4 linkage

Technical Specifications

Product	M9000-520-4 Ball Valve Linkage Kit
Service*	Hot Water, Chilled Water, 50/50 Glycol Solutions, and 15 psig (103 kPa) Saturated Steam for HVAC Systems
Ambient Operating Temperature**	-40 to 250°F (-40 to 121°C) for M9000-520-4 Linkage -4 to 125°F (-20 to 52°C) for M9106 and M9109 Series Actuators -25 to 140°F (-32 to 60°C) for M9206 Series Actuators
Material	Glass-Reinforced Thermoplastic Resin; UL 94 5 V Flame Class Rating
Shipping Weight	1.5 lb (0.68 kg)

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

** 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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