

M9000-551 Ball Valve Linkage Kit

Installation Instructions

Part No. 34-636-1816, Rev. B
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Applications

The M9000-551 Ball Valve Linkage Kit (Figure 1) is designed to mount an M9104 Series actuator to a VG1000 Series ball valve, either the VG1241, VG1245, VG1841, or VG1845 Series 1/2, 3/4, or 1 in. (DN15, DN20, or DN25) ball valve. (See the [Technical Specifications](#) table.)

IMPORTANT: The M9000-551 Ball Valve Linkage Kits are intended to control hot water and chilled water flow under normal equipment operating conditions. Where failure or malfunction of the M9000-551 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 M9000-551 Ball Valve Linkage Kit.

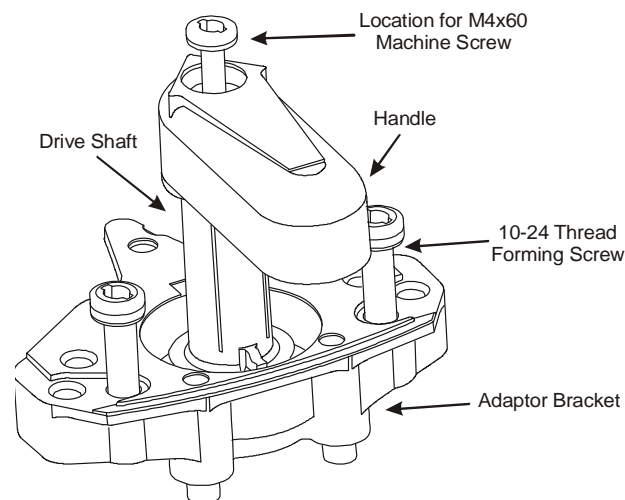


Figure 1: Parts Included with M9000-551 Linkage Kit

Installation

Parts Included

- adaptor bracket
- drive shaft
- handle
- M4 x 60 machine screw
- two No. 10-24 thread forming screw
- installation instructions

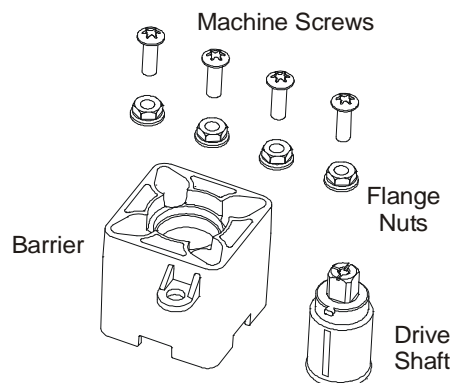


Figure 2: Parts Included with optional M9000-561 Thermal Barrier Kit

Special Tools Needed

- T-20 TORX® driver
- 1/4 in. flat-blade screw driver

Dimensions

See Figure 3 and Table 1 for the dimension drawings of the Spring Return M9104 Actuated VG1241, VG1245, VG1841, and VG1845 Series National Pipe Thread (NPT) End Connection Ball Valve.

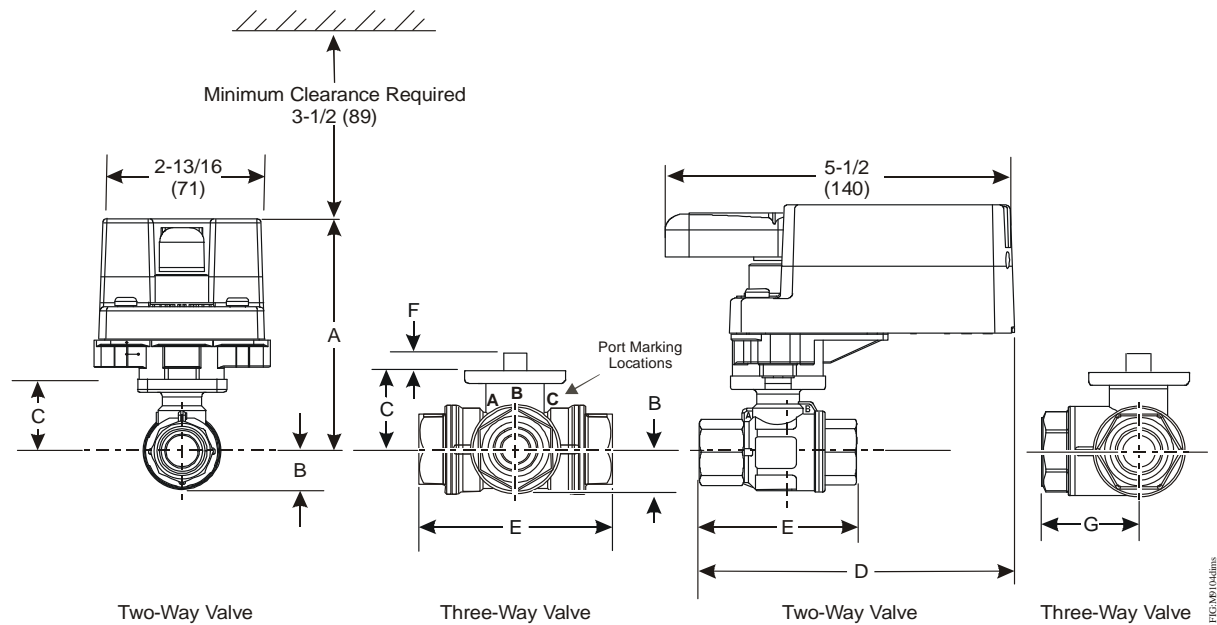


Figure 3: Field-Installed M9104 Series Electric Actuator Dimensions, in. (mm)

Table 1: M9104 Actuated VG1241, VG1245, VG1841, and VG1845 Series NPT Ball Valve Dimensions, in. (mm)

Valve Size in. (DN) ¹	A	B	C	D	E	F	G
1/2 (DN15)	3-7/8 (98)	21/32 (17)	1-7/32 (31)	5-7/64 (129)	2-33/64 (64)	11/32 (9)	1-1/4 (32)
3/4 (DN20)	3-7/8 (98)	21/32 (17)	1-7/32 (31)	5-7/32 (133)	2-51/64 (71)	11/32 (9)	1-13/32 (36)
1 (DN25)	3-61/64 (100)	3/4 (19)	1-19/64 (33)	5-9/16 (141)	3-13/32 (87)	11/32 (9)	1-11/16 (43)

1. Port A must always be connected to the coil.

Table 2: M9104 Actuated VG1271, VG1275, VG1871, and VG1875 Series Sweat Ball Valve and M9104 Actuated VG1291, VG1295, VG1891, and VG1895 Series Press Ball Valve Dimensions, in. (mm)

Valve Size in. (DN) ¹	A	B	C	D		E	F	G
				2-Way	3-Way			
1/2 (DN15)	3-7/8 (98)	21/32 (17)	1-7/32 (31)	5-45/64 (145)	6 (152)	2-33/64 (64)	11/32 (9)	2-3/16 (55)
3/4 (DN20)	3-7/8 (98)	21/32 (17)	1-7/32 (31)	5-57/64 (150)	6-9/32 (159)	2-51/64 (71)	11/32 (9)	2-15/32 (62)
1 (DN25)	3-61/64 (100)	3/4 (19)	1-19/64 (33)	6-1/8 (156)	6-11/16 (169)	3-13/32 (87)	11/32 (9)	2-27/32 (72)

1. Port A must always be connected to the coil.

See Figure 4 and Table 3 for dimension drawings of the Non-Spring Return M9104 Actuated VG1241, VG1245, VG1841, and VG1845 Series NPT End Connection Ball Valve with optional M9000-561 Thermal Barrier installed.

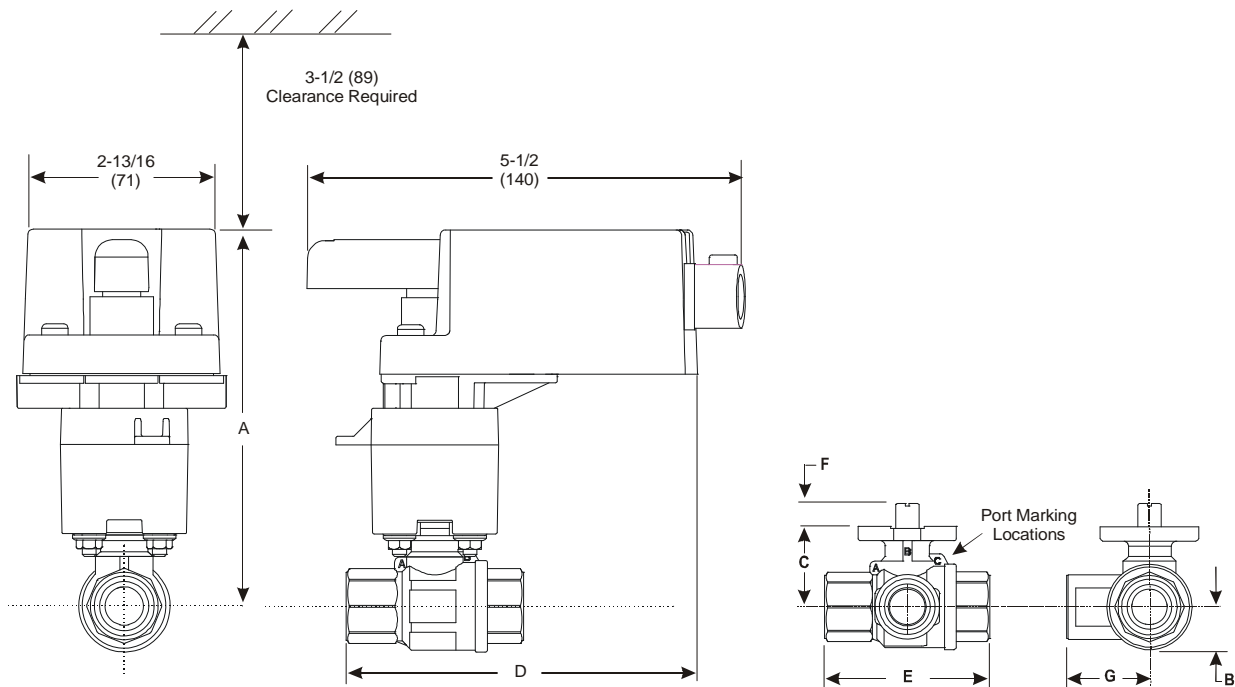


Figure 4: Field Installed M9104 Series Electric Actuator Dimensions with M9000-561 Thermal Barrier, in. (mm)

Table 3: M9104 Actuated VG1241, VG1245, VG1841, and VG1845 Series NPT Ball Valve with Optional M9000-561 Thermal Barrier Installed Dimensions, in. (mm)

Valve Size in. (DN) ¹	A	B	C	D	E	F	G
1/2 (DN15)	5-11/32 (136)	21/32 (17)	1-7/32 (31)	5-7/64 (129)	2-33/64 (64)	11/32 (9)	1-1/4 (32)
3/4 (DN20)	5-11/32 (136)	21/32 (17)	1-7/32 (31)	5-7/32 (133)	2-51/64 (71)	11/32 (9)	1-13/32 (36)
1 (DN25)	5-27/64 (138)	3/4 (19)	1-19/64 (33)	5-9/16 (141)	3-13/32 (87)	11/32 (9)	1-11/16 (43)

1. Port A must always be connected to the coil.

Mounting

Mount VG1000 Series Ball Valves with the actuator at or above the centerline of the horizontal piping, as shown in Figure 5. This position prevents water or condensation from flowing into the actuator. To minimize heat transfer, wrap the valve and piping with insulation. Allow sufficient clearance to remove the actuator.

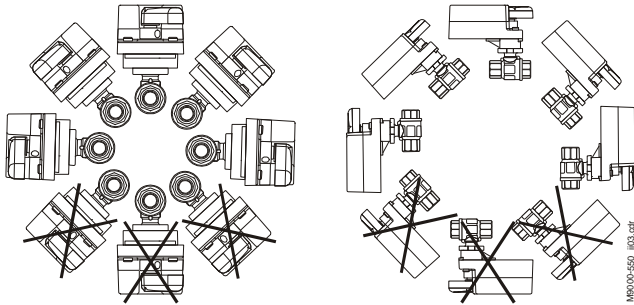


Figure 5: Mounting Positions for Chilled Water and Condensing Atmosphere Applications

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.

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

Installing the M9104-xGx-xS Series Electric Actuator

To install the M9104-xGx-xS Series Electric Actuator:

1. Turn the valve stem to the position outlined in Figure 6.

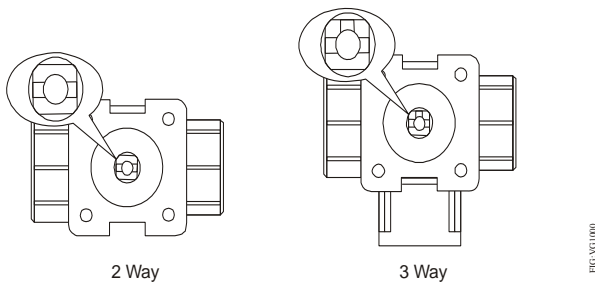


Figure 6: Positioning the Valve Stem

2. Mount optional M9000-561 Thermal Barrier to the valve if fluid temperature exceeds 212°F (100°C). See the *Mounting the Thermal Barrier* section for more information.

Note: M9104 Series Electric Actuators require at least 3-1/2 in. (89 mm) of clearance above the actuator.

3. Remove the metal anti-rotation feature, located at rear tab.
4. Remove the actuator hub set screw, if present.
5. Insert the linkage drive shaft into the actuator output hub as shown in Figure 7.

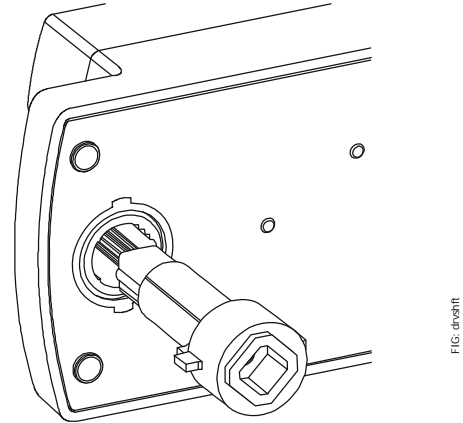


Figure 7: Installing the Drive Shaft

6. Attach the linkage adapter bracket to the bottom plate of the actuator with the two 10-24 thread-forming screws (Figure 8). Hand-tighten the screws using a T-20 TORX driver or a 1/4 in. flat blade screw driver. Recommended torque is 13.5 to 16.5 lb-in (1.5 to 1.9 N-m).

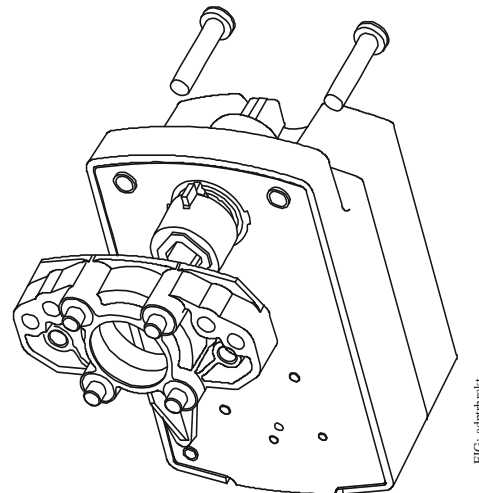


Figure 8: Installing the Adapter Bracket

- Place the handle on top of the linkage drive shaft as shown in by Figure 9. The handle is keyed and mounts only in one orientation.

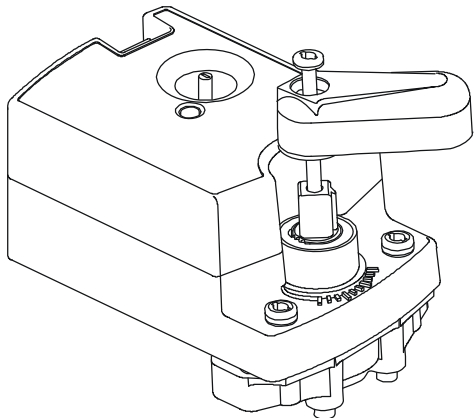


Figure 9: Installing the Handle

- Insert the M4x60 long machine screw into the hole in the handle. Use a T-20 driver or 1/4 in. flat blade screw driver to drive the screw into the linkage drive shaft until the screw sits below the top of the handle.
- Before installing the actuator and linkage assembly on the VG1000 Series ball valve, 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 valve stem to position the valve in the required position.

Two Way Valves: When the marking of the valve stem is parallel or in line with the direction of flow (Figure 10), the valve is open from Port A (inlet) to Port B (outlet).

Three Way Valves: When the valve stem is in the position shown in Figure 11, the valve is open and flow is established from Port A (coil) to Port C (common) with Port B (bypass) blocked. As the actuator rotates the valve 90 degrees in the clockwise direction, the stem appears as shown in Figure 12. In this position, Port A (coil) is blocked, and flow is established between Port B (bypass) and Port C (common).

- Depress the gear release button and position the actuator output hub in the fully counterclockwise position as viewed from the top of the actuator.

For two-way valves, position the stem to open the valve as shown in Figure 10. For three-way valves, position the stem to open the valve from Port A to Port C as shown in Figure 11.

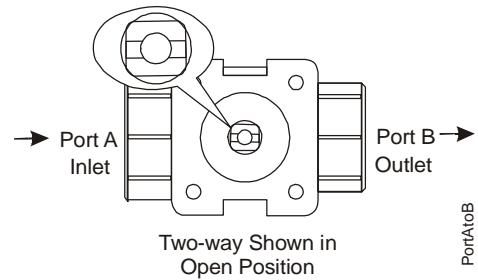


Figure 10: VG1000 Series Two-Way Ball Valve (Port A Connected to Port B)

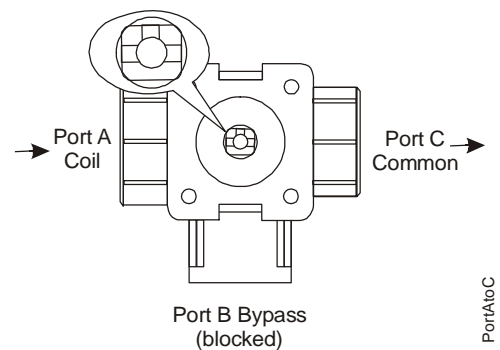


Figure 11: VG1000 Series Three-Way Ball Valve (Port A Connected to Port C)

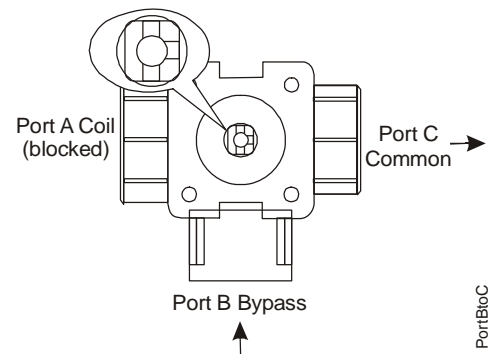


Figure 12: VG1000 Series Three-Way Ball Valve (Port B Connected to Port C)

11. Install the actuator and linkage assembly over the ball valve mounting flange, as shown in Figure 13. Depending on the application, position the assembly in any of four 90° increments on the valve.

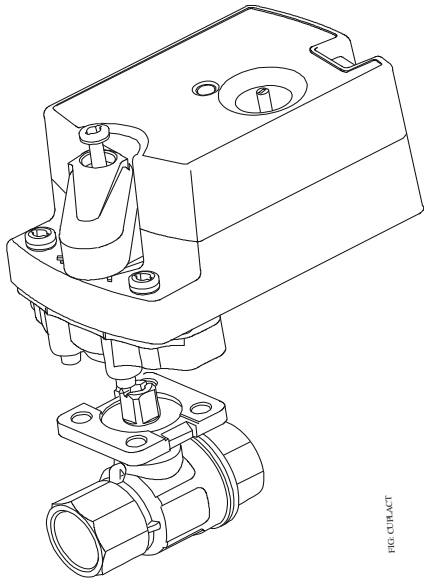


Figure 13: Coupling the Actuator to the Valve

Note: For proper operation, the actuator must drive the valve clockwise to close Port A, when viewed from above the valve.

12. Using a T-20 TORX driver or 1/4 in. flat-blade screw driver, fasten the actuator to the valve. Recommended torque is 8 to 12 lb-in (0.9 to 1.4 N·m).

IMPORTANT: Do not overtighten the mounting screw. Overtightening the mounting screw may strip the threads.

Mounting the Thermal Barrier

Figure 2 shows the optional M9000-561 Thermal Barrier.

To mount the optional thermal barrier:

1. Install the thermal barrier drive shaft into the thermal barrier by aligning the tab on the drive shaft with the slot on the thermal barrier (Figure 14).

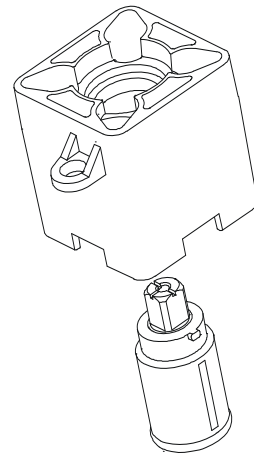


Figure 14: Installing the Drive Shaft into the Thermal Barrier

2. Rotate the drive shaft to align marks on the top of the thermal drive shaft with matching marks on the valve stem.
3. Mount the thermal barrier onto the valve using the four included M5x16 mm machine screws and four M5 flange nuts. Tighten the screws to a recommended torque of 21 to 25 lb-in. (2.4 to 2.8 N·m) (Figure 15).

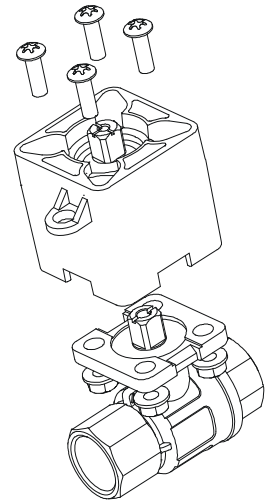


Figure 15: Installing the Barrier

4. Proceed to actuator mounting instructions. Follow the same steps as mounting directly to the valve when mounting the actuator to the thermal barrier.

Note: Depending on your application, you may position the assembly in any of the four 90° increments on the valve.

Wiring

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

- *M9102-AGA-2S and M9104-AGA-2S Series Electric Non-Spring Return Actuators Installation Instructions (Part No. 34-636-1220)*

- *M9102-AGA-3S and M9104-AGA-3S Series Electric Non-Spring Return Actuators Installation instructions (Part No. 34-636-1433)*

Repair and Replacement

Do not attempt to field repair the M9000-551 Ball Valve Linkage Kit components. For replacement parts, see *Technical Specifications* and contact your nearest Johnson Controls® representative.

Technical Specifications

M9000-551 Ball Valve Linkage Kit

Fluid Temperature Limits	VG12x1 and VG18x1 Series	23 to 203°F (-5 to 95°C); Not Rated for Steam Service
	VG12x5 and VG18x5 Series	-22 to 212°F (-30 to 100°C); Not Rated for Steam Service
Ambient Conditions M9104	Standard Operating	-4 to 140°F (-20 to 60°C); 90% RH Maximum, Noncondensing
	Storage	-20 to 150°F (-29 to 66°C); 90% RH Maximum, Noncondensing
Material	Glass-Reinforced Thermoplastic Resin; Suitable for use in other environmental air space (plenums) in accordance with Section 300.22(c) in the National Electric Code.	
Shipping Weight	M9000-551 Linkage Kit	1.5 lb (0.7 kg)

M9000-561 Thermal Barrier Kit

Fluid Temperature Limits	VG12x5 and VG18x5 Series with M9000-561 Thermal Barrier Installed	-22 to 284°F (-30 to 140°C) Water; 15 psig (103kPa) at 250°F (121°C) Saturated Steam
Material	Glass-Reinforced Thermoplastic Resin; Suitable for use in other environmental air space (plenums) in accordance with Section 300.22(c) in the National Electric Code.	
Shipping Weight	M9000-561 Thermal Barrier	1.5 lb (0.7 kg)

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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