# M9000-53x Cast Iron Flanged Valve Linkage Kit for Mounting a Single M9000 Series Electric Actuator

## Installation

### Parts Included

- Linkage
- Stem Extender
- Two Clamps
- Two 5 mm Hex Screws
- Two 5 mm Hex Nuts
- One Anti-Rotation Bracket
- Two #12-24 x 1/2 in. Long Screws
- Yoke Nut

### Special Tools Needed

| Actuator/Valve/ Linkage Part | Recommended Actuator Mounting Tools |
|---|---|
| **Packing Nut** | 1-1/4 in. Wrench to Remove Packing Nut |
| **Stem Coupler** | 11/16 in. Wrench for Valves with 3/8 in. Stem |
| | 7/8 in. Wrench for Valves with 1/2 in. Stem |
| **Stem Nut** | 7/8 in. Wrench for Valves with 1/2 in. Stem |
| | Two 9/16 in. Wrenches for Valves with 3/8 in. Stem |
| **5 mm Hex Screws** | 5 mm Allen Wrench |
| **Yoke Nut** | 1-3/8 in. Wrench for Valves with 3/8 in. Stem |
| | Adjustable-Face, Pin-Style Spanner Wrench with Circle Diameter to 3 in. for Valves with 1/2 in. Stem |
| **Actuator U-bolt Clamp Nuts** | Torque Wrench with 10 mm Socket |
| **#12-24 x 1/2 in. Long Screws** | 5/16 in. Driver |

### Pre-Installation Details

Before installing a M9000 Series Electric Actuator onto a Johnson Controls Cast Iron Flanged Globe Valve using a M9000-53x Series Linkage Kit, please note the following:

- Mount the valve in an upright position in a conveniently accessible location. If you mount the valve horizontally, orient the yoke so that the yoke supports are positioned vertically, one above the other (as illustrated in Figure 1).
- Relieve the pressure in the piping system.

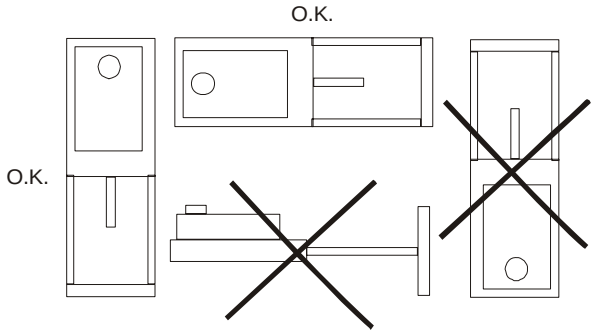
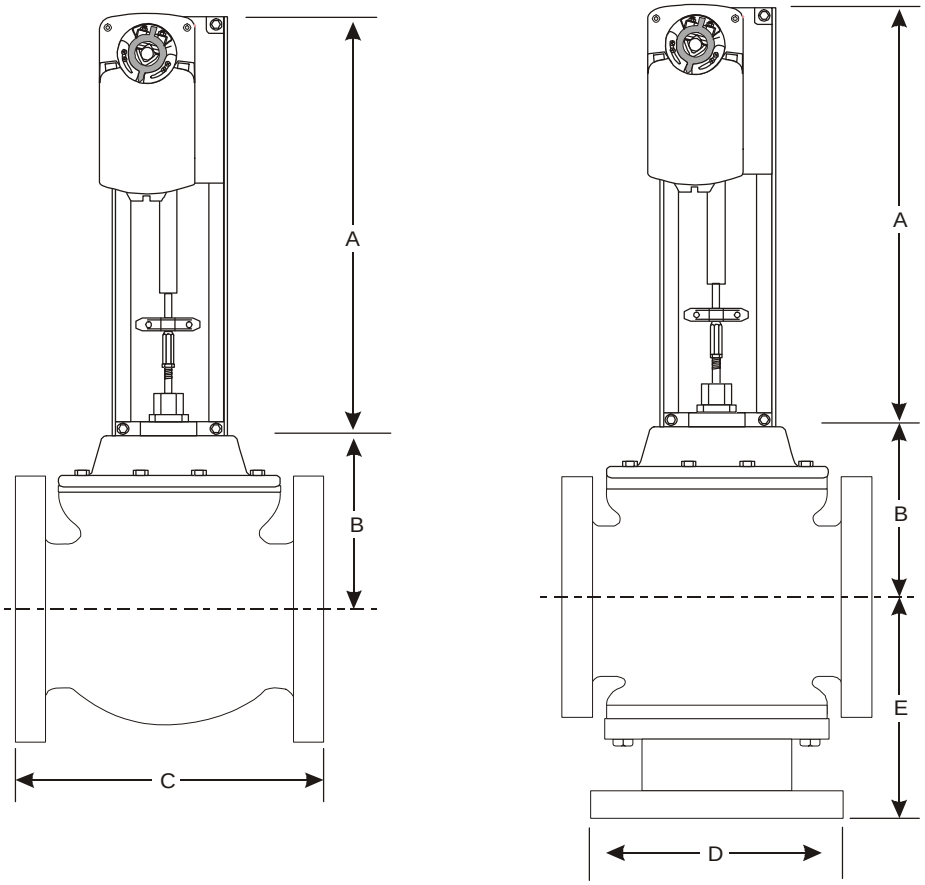



**Figure 1: Proper Yoke Orientation**

- Protect the actuator from dripping water that could enter the actuator housing and damage the mechanism or motor.
- Do not cover the actuator with insulating material.
- Allow sufficient clearance for actuator removal (as illustrated in Figure 4).
- Pipe the valve with the flow in the direction of the arrow on the valve body, so that the plug seats against the flow.

**CAUTION: Risk of Equipment Damage.**
Disconnect all power supplies before making wiring connections or prior to performing maintenance. Check all wiring connections before applying power to the system. Short-circuited or improperly connected wires will result in permanent damage to the equipment.

**Dimensions**




**Two-Way PDTC Assembly**

**Three-Way Mixing Assembly**

**Figure 2: M9000-53x Series Valve Linkage Dimensions**

**Table 1: M9000 Actuated VG2000 Series Cast Iron Flanged Valve Dimensions, in. (mm)**

| Actuator Style | Valve Size in. | Stem Diameter, in. | A | B | C | D | E |
|---|---|---|---|---|---|---|---|
| M9000 | 2-1/2 | 3/8 | 16-13/16 (427) | 4-21/32 (118) | 7-1/4 (184) | 7 (178) | 6-25/32 (172) |
| | 3 | 3/8 | 16-13/16 (427) | 5-5/16 (135) | 8-5/8 (219) | 7-1/2 (191) | 6-13/16 (175) |
| | | 1/2 | 17-3/8 (441) | 5-5/16 (135) | 8-5/8 (219) | 7-1/2 (191) | 6-13/16 (175) |
| | 4 | 3/8 | 16-13/16 (427) | 6-7/16 (164) | 10-1/2 (267) | 9 (229) | 8-1/16 (205) |
| | | 1/2 | 17-3/8 (441) | 6-7/16 (164) | 10-1/2 (267) | 9 (229) | 8-1/16 (205) |
| | 5 | 1/2 | 17-3/8 (441) | 6-7/8 (175) | 12-1/2 (318) | 10 (254) | 9-5/32 (233) |
| | 6 | 1/2 | 17-3/8 (441) | 8-3/16 (208) | 14-1/2 (368) | 11 (279) | 9-15/16 (252) |

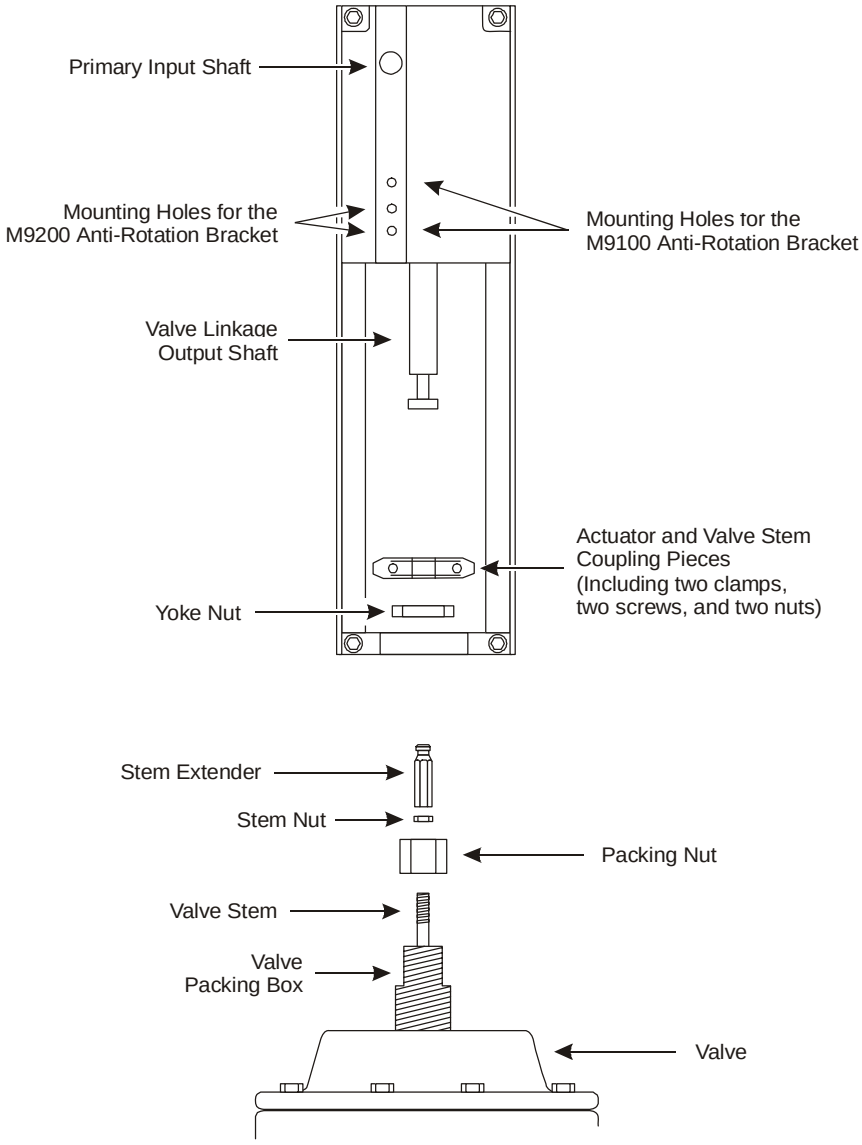
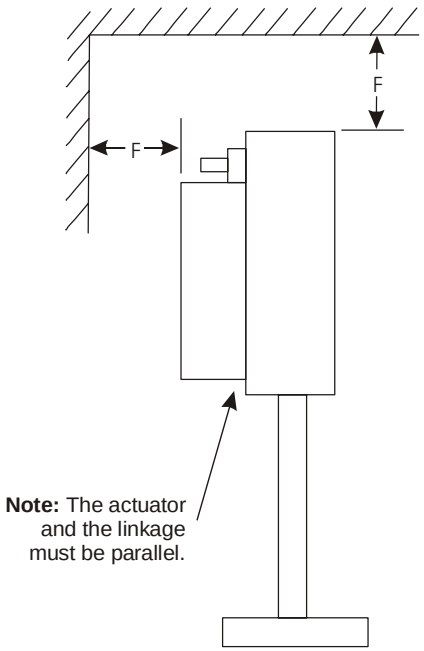



**Figure 3: Exploded View of Linkage Mounting**




F = 5 in. (127 mm) minimum clearance

**Figure 4: Minimum Distance Required for Maintenance and Removal of Linkage**

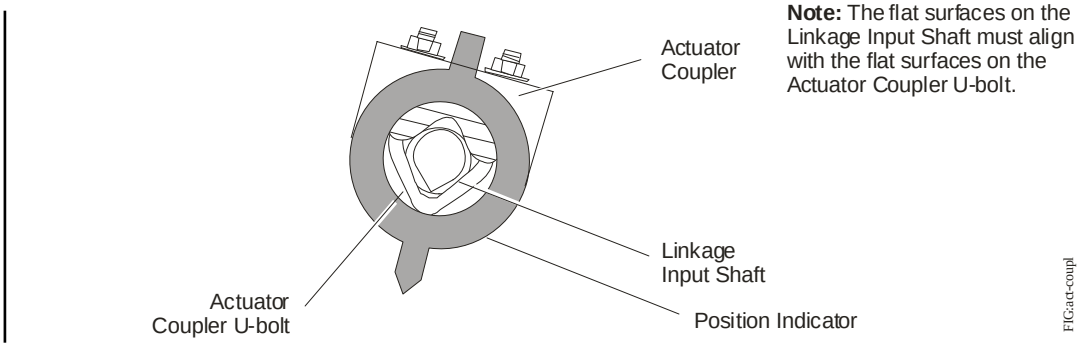



**Figure 5: Alignment of Input Shaft to U-Bolt in the Actuator Coupler**

## Mounting

### Single Actuator – Spring Return Valve Stem Up

1. Identify master side of M9000-53x Series valve linkage. The master side has the primary input shaft installed.
2. Mount the anti-rotation bracket included with the M9000-53x Linkage Kit, using the two No. 12-24 x 1/2 in. self-tapping screws, to the master side of the valve linkage by aligning the two holes marked 9200 on the anti-rotation bracket with the two holes for the M9200 as shown in Figure 3 and tighten to a torque of 25 lb·ft (33.9 N·m).
3. Remove the valve stem nut(s), hex packing nut and yoke nut (if present) from the valve packing box and save for later use.
4. Push the valve stem fully down into the valve body.
5. Refer to Figure 3 and mount the valve linkage onto the valve bonnet.
6. Thread the yoke nut supplied with the linkage kit onto the valve packing box. Refer to Figure 1 and rotate the linkage to the proper orientation and tighten the yoke nut to a torque of 15 lb·ft (20.3 N·m).
7. Thread the packing nut from Step 3 onto the packing box, and tighten to a torque of 4 lb·ft (5.4 N·m).
8. Thread one stem nut and the stem extender fully onto the valve stem, without tightening either securely in place.

9. Refer to the actuator installation instructions and manually wind the actuator 85 degrees clockwise and lock into position (actuators are shipped in the fully counterclockwise position).
10. Mount the actuator to the master side primary input shaft and anti-rotation bracket. The back of the actuator should remain parallel with the linkage (refer to Figure 4).
11. Refer to Figure 5 and rotate the primary input shaft to align with the U-bolt in the actuator coupler and use a torque wrench to evenly tighten each clamp nut on the U-bolt of the actuator coupler to a torque of 100 to 125 lb·in (11 to 14 N·m).
12. Thread the stem extender up until it is flush with the linkage output shaft.
13. Ensure that the linkage output shaft is aligned with the stem extender. If necessary, loosen the yoke nut and reposition the linkage and retighten to 15 lb·ft (20.3 N·m).
14. Secure the linkage output shaft to the stem extender using the two clamps, two screws, and two nuts of the valve stem coupling assembly. When properly aligned, the linkage output shaft and the stem extender fit perfectly into the cutouts on the inside of the clamping pieces. Tighten the two clamping assembly screws to a torque of 4 lb·ft (5.4 N·m).
15. Use a wrench to secure the stem extender in place and tighten the stem nut against the stem extender to a torque of 9 lb·ft (12.2 N·m).
16. Spring return the actuator to have the valve stem in the full up position. Check that the primary input shaft has remained secure in the u-bolt of the actuator coupler.

**Single Actuator – Spring Return Valve Stem Down**

1. Identify master side of M9000-53x valve linkage. The master side has the primary input shaft installed.
2. Mount the anti-rotation bracket included with the M9000-53x Linkage Kit, using the two No. 12-24 x 1/2 in. self-tapping screws, to the master side of the valve linkage by aligning the two holes marked 9200 on the anti-rotation bracket with the two holes for the M9200 as shown in Figure 3 and tighten to a torque of 25 lb·ft (33.9 N·m).
3. Remove the valve stem nut(s), hex packing nut and yoke nut (if present) from the valve packing box and save for later use.
4. Push the valve stem fully down into the valve body.
5. Refer to Figure 3 and mount the valve linkage onto the valve bonnet.
6. Thread the yoke nut supplied with the linkage kit fully onto the valve packing box. Refer to Figure 1 and rotate the linkage to the proper orientation and tighten the yoke nut to a torque of 15 lb·ft (20.3 N·m).
7. Thread the packing nut from Step 3 onto the packing box, and tighten to a torque of 4 lb·ft (5.4 N·m).
8. Thread one stem nut and the stem extender onto the valve stem without tightening either securely in place.
9. Refer to the actuator installation instruction and reverse the spring return direction from counterclockwise to clockwise.
10. Refer to the actuator installation instructions and wind the actuator 5 degrees counterclockwise and lock into position.
11. Mount the actuator to the master side primary input shaft and anti-rotation bracket. The back of the actuator should remain parallel with the linkage (refer to Figure 4).
12. Refer to Figure 5 and rotate the primary input shaft to align with the u-bolt in the actuator coupler and use a torque wrench to evenly tighten each clamp nut on the u-bolt of the actuator coupler to a torque of 100 to 125 lb·in (11 to 14 N·m).
13. Thread the stem extender up until it is flush with the linkage output shaft.
14. Ensure that the linkage output shaft is aligned with the stem extender. If necessary, loosen the yoke nut and reposition the linkage and retighten to 15 lb·ft (20.3 N·m).
15. Secure the linkage output shaft to the stem extender using the two clamps, two screws, and two nuts of the valve stem coupling assembly. When properly aligned, the linkage output shaft and the stem extender will fit perfectly into the cutouts on the inside of the clamping pieces. Tighten the two clamping assembly screws to a torque of 4 lb·ft (5.4 N·m).
16. Use a wrench to secure the stem extender in place and tighten the stem nut against the stem extender to a torque of 9 lb·ft (12.2 N·m).

17. Spring return the actuator to have the valve stem in the full down position. Check that the primary input shaft has remained secure in the u-bolt of the actuator coupler.

**Single Actuator – Non-Spring Return**

1. Identify the master side of M9000-53x valve linkage. The master side has the primary input shaft installed.
2. Mount the anti-rotation bracket included with the M9000-53x Linkage Kit, using the two No. 12-24 x 1/2 in. self-tapping screws, to the master side of the valve linkage by aligning the two holes marked 9100 on the anti-rotation bracket with the two holes for the M9100 as shown in Figure 3 and tighten to a torque of 25 lb·ft (33.9 N·m).
3. Remove the valve stem nut(s), hex packing nut and yoke nut (if present) from the valve packing box and save for later use.
4. Push the valve stem fully down into the valve body.
5. Refer to Figure 3 and mount the valve linkage onto the valve bonnet.
6. Thread the yoke nut supplied with the linkage kit onto the valve packing box. Refer to Figure 1 and rotate the linkage to the proper orientation and tighten the yoke nut to a torque of 15 lb·ft (20.3 N·m).
7. Thread the packing nut from Step 3 onto the packing box, and tighten to a torque of 4 lb·ft (5.4 N·m).
8. Thread one stem nut and the stem extender fully onto the valve stem without tightening either securely in place.
9. Refer to the actuator installation instructions and press the gear release and rotate the actuator coupler clockwise to the 85 degree position (actuators are shipped in the fully counterclockwise 0 degree position).
10. Mount the actuator to the master side primary input shaft and anti-rotation bracket. The back of the actuator should remain parallel with the linkage (refer to Figure 4).
11. Refer to Figure 5 and rotate the primary input shaft to align with the U-bolt in the actuator coupler and use a torque wrench to evenly tighten each clamp nut on the u-bolt of the actuator coupler to a torque of 100 to 125 lb·in (11 to 14 N·m).
12. Thread the stem extender up until it is flush with the linkage output shaft.
13. Ensure that the linkage output shaft is aligned with the stem extender. If necessary, loosen the yoke nut and reposition the linkage and retighten to 15 lb·ft (20.3 N·m).
14. Secure the linkage output shaft to the stem extender using the two clamps, two screws, and two nuts of the valve stem coupling assembly. When properly aligned, the linkage output shaft and the stem extender fit perfectly into the cutouts on the inside of the clamping pieces. Tighten the two clamping assembly screws to a torque of 4 lb·ft (5.4 N·m).
15. Use a wrench to secure the stem extender in place and tighten the stem nut against the stem extender to a torque of 9 lb·ft (12.2 N·m).
16. Press the gear release on the actuator to move the valve stem to the full up position and release the gear release.

## Setup and Adjustments

Refer to the actuator installation instructions for the correct wiring and calibration.

## Repairs and Replacement

If the M9000-53x Series Valve Linkage Kit fails to operate within its specifications, unit replacement is required. For a replacement M9000-53x Series Valve Linkage Kit, contact the nearest Johnson Controls representative.

## Technical Specifications

| | | |
|---|---|---|
| **Product** | | M9000-53x Series cast iron flanged valve linkage for mounting a single actuator |
| **Service** | | Hot Water, Chilled Water, and Steam |
| **Force Output** | **M9000-530** | 378 lb (1684 N) minimum with M9116 Series Actuator<br>605 lb (2691 N) minimum with M9124 Series Actuator<br>457 lb (2035 N) minimum with M9220 Series Actuator |
| | **M9000-531** | 238 lb (1060 N) minimum with M9116 Series Actuator<br>380 lb (1694 N) minimum with M9124 Series Actuator<br>288 lb (1281 N) minimum with M9220 Series Actuator |
| | **M9000-533** | 315 lb (1405 N) minimum with M9124 Series Actuator |
| | **M9000-535** | 280 lb (12 N) minimum with M9124 Series Actuator |
| **Valve Stroke** | **M9000-530** | 3/4 in. (19 mm) (Nominal) |
| | **M9000-531** | 1-1/8 in. (29 mm) (Nominal) |
| | **M9000-533** | 1-3/8 in. (35 mm) (Nominal) |
| | **M9000-535** | 1-1/2 in. (38 mm) (Nominal) |
| **Valve Fluid Operating Temperature Limits** | | 35 to 281°F (2 to 138°C),<br>35 psig (241 kPa) Saturated Steam |
| **Actuator Ambient Operating Temperature Limits** | **M91xx Series** | -4 to 122°F (-20 to 50°C) |
| | **M9220 Series** | -40 to 131°F (-40 to 55°C) |
| **Dimensions** | | Refer to Table 1 |
| **Shipping Weight** | | 7-1/2 lb (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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