M9000-157 Universal Mounting Kit

Applications

The M9000-157 Universal Mounting Kit provides for remote mount, linkage driven application of the M9204 Series Electric Spring Return Economizer Damper Actuator or the M9206-xGx-x Series Electric Spring Return Actuator. When mounted in the M9000-157, the M9204 or M9206 actuator can drive a blade, jackshaft, or crankarm. Mount the M9000-157 internally or externally on a duct, damper, or air handling unit. The M9000-157 is intended for a new or retrofit damper and actuator assembly.

Installation

Parts Included

Refer to Figure 1 for a depiction and Table 1 for a detailed list of the parts included in the M9000-157 Universal Mounting Kit

Note: Refer to the appropriate installation instructions listed in Table 2 for complete actuator mounting and adjustments.

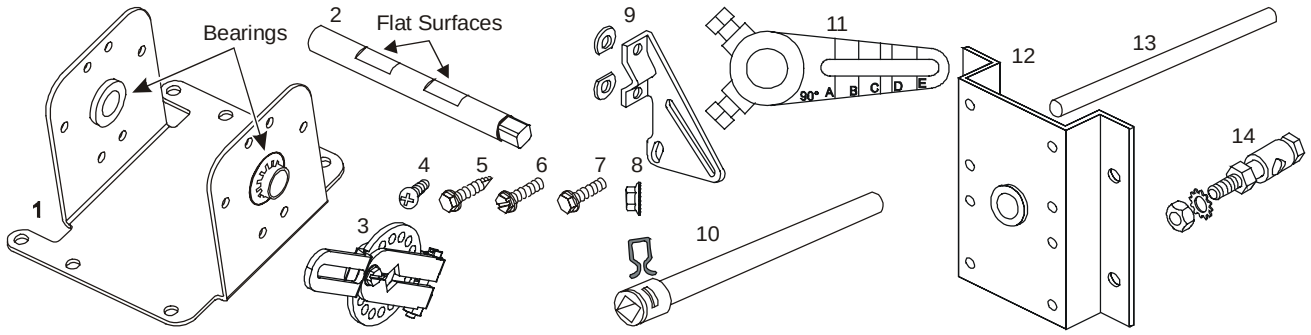


Figure 1: Components of the M9000-157 Kit

Table 1: Components of the M9000-157 Kit (Order Items with code numbers separately.)

Item	Description	Qty	Item	Description	Qty
1	Mounting Bracket	1	**8***	No. 10-32 Hex Flange Nuts	2
2	Drive Shaft	1	**9***	DMPR-KC054 Blade Arm and 2 spacing washers	1 set
3	LVR27A-602 Actuator Crankarm	1	**10****	DMPR-KC003 Blade Pin Extension with Clip	1
4	8-10 x 1/2 in. Phillips Thread-Forming Screws to secure actuator in bracket	4	**11****	DMPR-KC053 Damper Crankarm for 1/2 in. diameter shaft	1
5	No. 10-16 x 3/4 in. Self-drilling Screws to secure bracket to mounting surface	4	**12****	DMPR-KC001 Blade Pin Extension Support Bracket	1
6	No. 12-24 x 1/2 in. Hex-Head Thread-forming Screws	6	**13**	Linkage Rod, 24 in. (DMPR-KC102, 48 in. linkage rod can be ordered separately.)	1
7*	No. 10-32 x 1-1/4 in. Hex-Head Machine Screws	2	**14**	DMPR-KC300 Swivel Ball Joints	2

* Required for internal mounting applications.
** Required for external mounting applications.

Mounting

Location Considerations

Prior to installation, decide the following:

- mounting position of the actuator: internal or external to the damper frame or duct
- mounting position of the actuator crankarm
- operation of the damper: normally open or normally closed
- direction of rotation for the damper
- actuator direction of action: direct or reverse
- actuator spring return direction: Clockwise (CW) or Counterclockwise (CCW)

If using the M9206-GGA or M9206-GGC actuator in the right or left mounting position, adjust the mode selection switches **before** installing the actuator into the M9000-157 mounting bracket.

Note: See *Setting the Spring Return Direction* section in the appropriate document listed in Table 2 for more information on setting the spring return direction. To set the M9206-xGx-x switches, refer to the *Setup and Adjustments, Mode Switches (GGx Models)* section of *M9206 Series Electric Spring Return Actuators Installation Instructions (Part No. 34-1280-9)*.

Mounting Positions

The M9000-157 actuator assembly has three basic mounting positions, as shown in Figure 2. Select the appropriate mounting position for the application requirements. Figure 2 illustrates the preferred actuator crankarm location, with respect to the mounting bracket.

Set the spring return to any of the three basic positions by rotating the actuator 180°

Note: The laser markings on the M9204 or M9206-xGx-x actuator indicate the spring return direction.

Mounting the Actuator into the Bracket

Note: If selecting the left or right mounting position shown in Figure 2, fasten the bracket to the mounting surface before installing the actuator into the bracket.

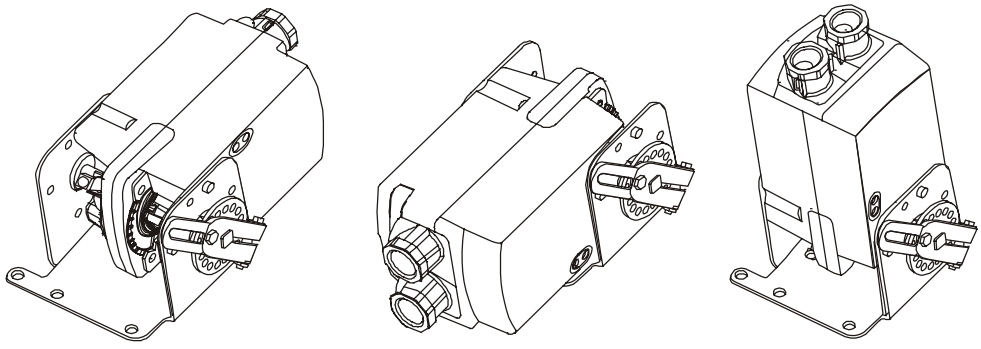
To install the actuator into the mounting bracket:

1. Insert the actuator into the mounting bracket as shown in Figure 2.
2. Insert the drive shaft through the bearings (shown in Figure 1) and the actuator coupler.
3. Rotate the drive shaft so that one of the flat surfaces on the shaft (shown in Figure 1) aligns with the bottom of the coupler set screw.

   Note: Position the junction (where the square section meets the round portion of the drive shaft) flush with the bearing in the mounting bracket.

Table 2: Actuator Mounting Kit Applications and Corresponding Documentation

Mounting Kit	Actuator	Installation Instruction
M9000-157	**M9204**	*M9204-CNx Series Electric Spring Return Economizer Damper Actuators Installation Instructions (Part No. 34-1280-41)*
	M9206-xGx-2	*M9206 Series Electric Spring Return Actuators Installation Instructions (Part No. 34-1280-9)*



Right Mounting Position **Left Mounting Position** **Upright Mounting Position**

Note: The actuator and LVR27A-602 crank arm are shown in the CCW spring return position in all views.

Figure 2: Mounting Positions for the Actuator and Bracket Assembly

4. Tighten the coupler set screw onto the drive shaft using a 5/16 in. (8 mm) combination or 3/8 in. (10 mm) 12-point box-end wrench. Recommended torque is 150 to 180 lb·in. (17 to 20 N·m).
5. Fasten the actuator to the mounting bracket with four 8-10 x 1/2 in. Phillips thread-forming screws, using a No. 2 Phillips-Head screwdriver.
6. Tighten the screws to the recommended torque: 20 to 25 lb·in. (2.3 to 2.8 N·m).
7. Position the LVR27A-602 actuator crankarm on the square end of the drive shaft with the crankarm offset away from the mounting bracket, as shown in Figure 2.
8. Tighten the retaining nut on the crankarm (shown in Figure 3) with an 11/32 in. combination wrench.

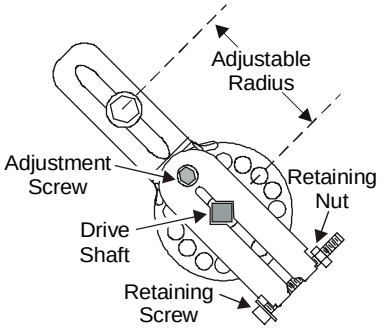


Figure 3: LVR27A-602 Actuator Crankarm

9. Proceed to the *Internal Mounting* or *External Mounting* section, depending on the application.

Internal Mounting

To mount the actuator and mounting bracket assembly to the inside of a damper frame or duct:

1. Position the assembly on the duct or damper frame in the desired location.
2. Mark the hole locations for the assembly using a center punch.
3. Secure the assembly by drilling the four No. 10-16 x 3/4 in. self-drilling screws through the holes in the mounting bracket and into the duct or damper frame.
4. Mark the holes for the DMPR-KC054 damper blade arm, and attach the damper blade arm to the preferred driving blade for the intended application, using the appropriate tool and fasteners for the type of damper used.
   - Single-piece blades: Use a 5/16 in. (8 mm) hex nut driver for the spacing washers and two hex-head thread-forming screws.
   - Two-piece blades: Use a 5/16 in. (8 mm) hex nut driver for the two hex-head thread-forming screws.
   - Airfoil: Use a 3/8 in. (10 mm) hex nut driver for the two No. 10-32 hex-head machine screws and flanged nuts.
5. Proceed to the *Connecting the Linkage* section.

External Mounting

To mount the actuator and mounting bracket assembly to the outside of a damper frame or duct:

1. Place the actuator and mounting bracket assembly outside the damper, with the actuator drive shaft parallel to the damper blade shaft.
2. Mark the hole locations for the assembly in the duct or damper frame, using a center punch.
3. Fasten the actuator assembly by drilling the No. 10-16 x 3/4 in. self-tapping screws through the holes in the mounting bracket and into the duct or damper frame.
4. Attach the DMPR-KC003 blade pin extension to the driving blade using the clip provided.
5. Position the DMPR-KC001 blade pin support bracket over the blade pin extension and onto the damper end channel. Mark the holes for the fasteners, using the punch.
6. Remove the blade pin support bracket, and drill the holes for the fasteners.
7. Fasten the blade pin extension support bracket to the damper end channel with a 5/16 in. hex driver, using four No. 12-24 x 1/2 in. hex-head thread-forming screws.
8. Tighten the screws to the recommended torque: 20 to 25 lb·in. (2.3 to 2.8 N·m).
9. Attach the DMPR-KC053 damper crankarm to the blade pin extension, using two 7/16 in. (8 mm) open-end or box wrenches.

Setup and Adjustments

Connecting the Linkage

1. Secure the two ball joints to the actuator crankarm and the damper blade arm, using two 7/16 in. (8 mm) open-end or box wrenches.
2. Make sure the actuator is in the spring return position and the damper is in the normally open or normally closed position, depending on the application. (Drive the damper blades on the linkage side of the damper, as described in the installation instructions for the damper.)

3. Insert the linkage rod through the two ball joints, and measure the length required for the application.
4. Remove the linkage rod, and cut it to the desired length with a hacksaw.
5. Reinsert the linkage rod into the ball joints. Use a 7/16 in. open-end or box wrench to tighten the locking screw on each ball joint to secure the linkage rod.
6. Make the necessary crankarm adjustments. (Refer to the *Crankarm Adjustment* section.)
7. Proceed to the *Checkout* section, and complete the entire procedure.

Note: Refer to the *Wiring* section of the installation instructions for the appropriate M9204 or M9206-xGx-x Series Electric Spring Return Actuator (Table 2).

Crankarm Adjustment

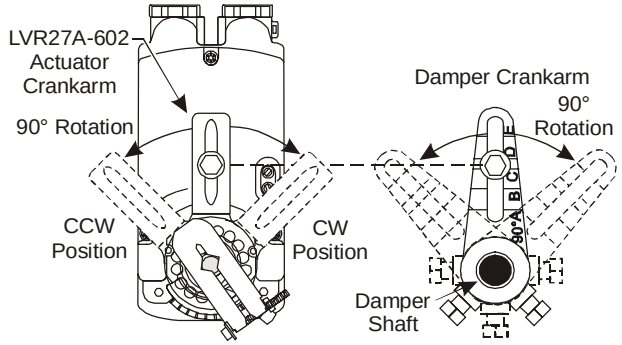


Figure 4: Crankarm Positions

Table 3: Rotation vs. Crankarm

Damper Rotation Degrees	Damper Crankarm Radius in. (mm)	Actuator Rotation Degrees	Actuator Crankarm Radius in.(mm)	Damper and Actuator Torque Ratio
90	1-5/8 (41)	90	1-5/8 (41)	1:1
60	2 (51)	90	1-5/8 (41)	1.2:1
45	4 (102)	90	2-3/8 (60)	1.6:1

Note: Other combinations are acceptable. A greater sum of both crankarm radii decreases the force on the ball joint swivel and reduces bending of the linkage rod.

If both actuator and damper rotation are 90°, the crankarm radii for both damper and actuator must be equal. Set actuator and damper crankarms parallel to each other, as shown in Figure 4.

Note: For applications where the crankarm ratio between the actuator and damper exceeds 1:1, the crankarms align parallel to each other only at mid stroke (Table 3).

To adjust the LVR27A-602 actuator crankarm:

1. Remove the adjustment screw on the actuator crankarm with a 1/4 in. (7 mm) flat-blade screwdriver or a 5/16 in. (8 mm) hex nut driver.
2. Rotate the crankarm to the desired position.

   Note: The LVR27A-602 has adjustment holes that allow travel in 22.5° increments.
3. Reinstall and tighten the adjustment screw on the actuator crankarm.

Checkout

Before powering the actuator, make sure the M9000 actuator assembly components function properly, and that the actuator operates freely from one rotation limit to the other:

1. Remove the LVR27A-602 adjustment screw with the flat-blade screwdriver or a 5/16 in. (8 mm) hex nut driver.

   Note: This allows the linkage to rotate through the selected drive angle while connected to the actuator without risking damage during powered operation.
2. Return the linkage to the spring return position and replace the adjustment screw.
3. Connect all control wires to the actuator.
4. Supply power to the actuator.
5. Cycle the actuator fully in both CW and CCW directions.

Note: If the actuator is not operating properly, refer to the appropriate installation instructions for either the M9204 or the M9206-xGx-x Series Electric Spring Return Actuator (Table 2).

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