JOHNSON CONTROLS

LVR27A-602 Crank Arm Mounting Instructions

Part Included

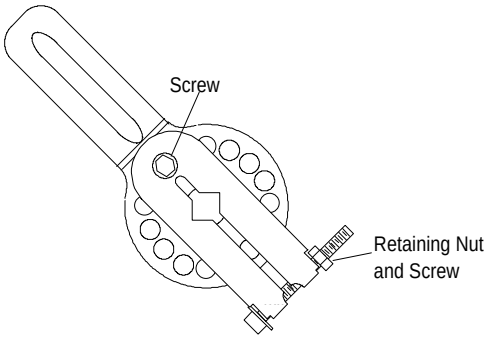

Figure 1: LVR27A-602 Actuator Crank Arm

The M110 and M130 motor actuators with spring return are provided with a LVR27A-602 adjustable crank arm. This crank arm is also available for use with non-spring return models and is typically used to link the actuator to the damper linkage or drive.

Accessories

One or more of the following accessories may be required to complete installations:

D-9999-154	Swivel Ball Joint or
D-3073-604	Swivel Ball Joint (weatherproof), quantity two
BKT22A-602	Right angle mounting bracket or equivalent
ROD16-2	5/16 inch diameter x 24 inch long plated steel push-rod shaft
ROD16-3	5/16 inch diameter x 48 inch long plated steel push-rod shaft
D-9999-134	Blade Pin Extension Kit
LVR27A-600	Damper crank arm 1/2 inch shafts
D-9999-100	Blade arm for D-1300 Dampers
BKT19A-600	Blade arm for “double-vee” dampers

Part Number 34-636-143
Rev. — (1093)

Printed in U.S.A.

Tools Required

Wrench, 7/16 inch, two required for ball joint

Wrench, 11/32 inch

Screwdriver, flat-blade

5/16 inch hex driver

Applications

The LVR27A-602 adjustable crank arm may be used for motor actuator rotations from 45° to 160°. Use of 160° rotation provides extra torque to the damper through the linkage/crank arm ratios. Also it tends to linearize the damper air flow characteristics and provides increased travel time, which is generally beneficial on control damper systems. See the motor actuator technical bulletin for travel adjustments.

When used with Johnson Controls D-1300 dampers, a D-9999-134 Blade Pin Extension Kit is required. The extension shaft must never be powered without the bearing support included in the kit.

Note: The D-9999-142 kit should only be used as a replacement item or where other means of support is provided.

The M100 can be mounted inside, outside or on top of a duct or AHU. The actuator can drive a blade, jack shaft, or crank arm.

On spring return applications, the installer must determine whether the damper will operate normally open or normally closed, the direction of rotation, and the actuator zero position prior to installation.

The following procedure covers an application with an actuator as may be mounted outside the duct. The process is virtually the same for inside the duct applications by using a blade arm such as D-9999-100 in place of damper crank arm LVR27A-600 as illustrated.

Procedures

The actuator crank arm (LVR27A-602) has a slot that allows an adjustable actuator crank radius from 1-11/16 inch to 2-7/8 inch.

The crank arm is secured to the motor actuator shaft in position increments of 22-1/2 angular degrees by removing the screw securing the two pieces of the crank arm.

To properly adjust the damper linkage for the desired damper movement when using a motor actuator with travel of approximately 160°, proceed as follows:

1. Mount the motor actuator as close to the damper shaft as practical with their respective shafts parallel.

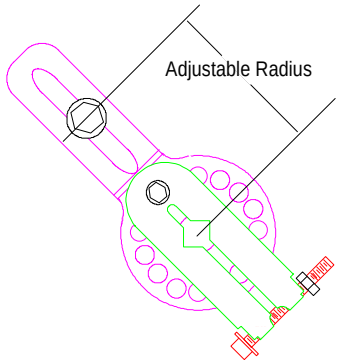

Figure 2: Actuator Crank Arm Radius

2. Set the actuator crank radius length for the rotation required. If the actuator rotation is 160° and the damper is 90°, the actuator crank length is typically set at 2-1/16 inch radius as shown in Figure 2. The damper crank arm will be set at 2-7/8 inch radius. At this position, the effective torque available to the damper shaft will be approximately 1.4 times the rated actuator torque. Thus an M130 produces 70 in·lb working torque available at the damper, and an M150 would produce 210 in·lb.

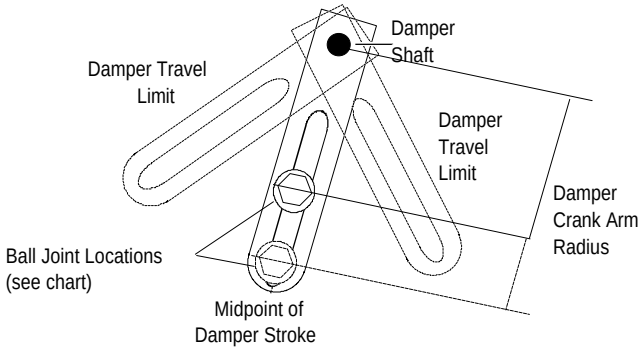

Figure 3: LVR27A-600 Damper Crank Arm

3. Mount the damper crank arm on the damper shaft and tighten the retaining screw.
4. Rotate the damper crank arm as shown in Figure 3 to determine the angular rotation of the damper.
5. With the damper angular rotation determined, position and secure the ball joint to the damper crank arm as shown in the following chart:

Damper Rotation Degrees	Damper Crank Radius	Actuator Rotation Degrees	Actuator Crank Radius	Damper Torque : Actuator Torque
90	2-7/8	160	2-1/16	1.4:1
90	2-1/8	90	2-1/8	1:1
60	4-1/6	160	2-1/16	1.9:1
60	3	90	2-1/8	1.4:1
45	4-1/2	160	1-3/4	2.5:1
45	4	90	2-3/16	1.8:1

Other combinations may be used to obtain similar results.

Note: The largest crank radius combination will decrease forces on the ball joint swivels and will reduce push-rod bending.

6. Tighten the ball joint to the crank arm using two 7/16 inch wrenches.
7. Disconnect power to the actuator.
8. Remove the actuator top cover.
9. Refer to the **technical bulletin** packaged with the actuator being used and adjust the travel for the desired amount of rotation.

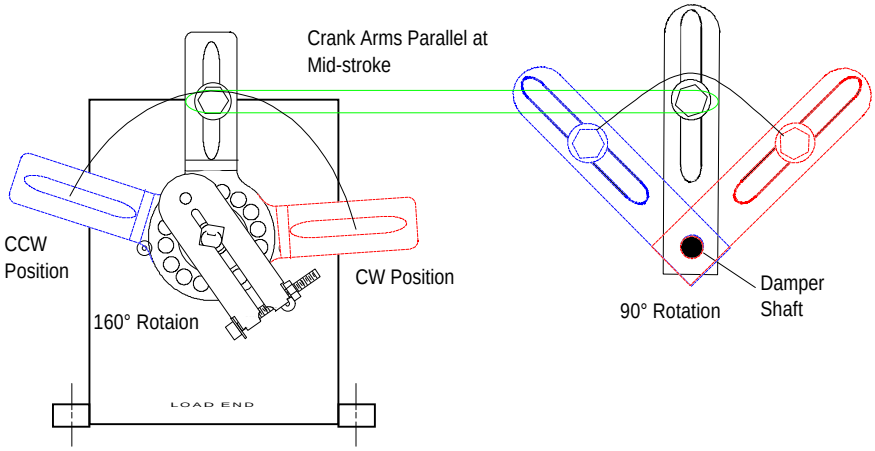

Figure 4: Crank Arm Positions

10. Position the LVR27A-602 crank arm onto the stamped load end of the M100 drive shaft so that it is parallel to the damper crank arm as shown in Figure 4. For application other than 90°, the damper and actuator crank arms will only be parallel at mid-stroke.
11. Tighten the actuator crank arm retaining nut and screw using a 11/32 inch wrench and flat-blade screwdriver.
12. Attach the ball joint to the actuator crank arm in the position as shown in the chart on page 4.
13. Tighten the ball joint to the actuator crank arm using two 7/16 inch wrenches.

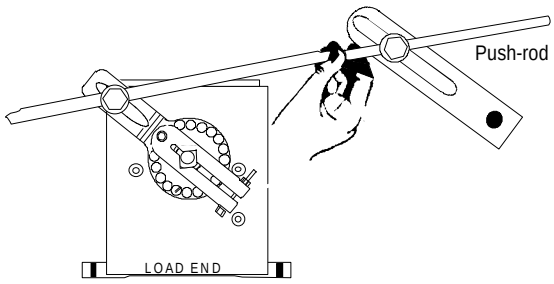

Figure 5: Measuring Push-Rod

14. Insert the push-rod through the two ball joints and lightly secure the push-rod.

15. Measure the length of the push-rod that will be required and mark the push-rod for cutting. Remove the push-rod from the ball joints and cut to the measured length. Make sure that the ends are free of any burrs.

Note: A short push-rod may be difficult to adjust. Twelve inches should be the minimum length. An excessive length between the crank arm and ball joint may cause the push-rod to bow excessively.

16. Insert the push-rod and tighten inside the ball joints using a 7/16 inch wrench.

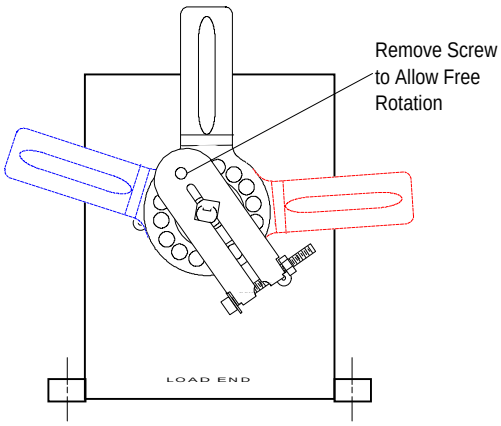

Figure 6: Free Operation

17. Verify free operation from one limit to the other by using a 5/16 inch hex driver and removing the screw to enable rotation of the crank arm without powering up the actuator. This will allow the linkage to rotate through the drive angle selected without being removed from the actuator or risking damage during powered motor operation.

18. As described in the **technical bulletin** packed with the motor actuator, make sure that the motor actuator does not stall or bind against its load. Final adjustments for rotation are accomplished using the actuator travel adjustment.
19. Remove the 24 VAC connections and jumpers used for cycling the motor actuator. Connect the power and control signals to the motor actuator as described in the **technical bulletin**.
20. Install the top cover.
21. Verify operation through the controller.