



ES52 Series On/Off Electric Spring Return Actuators

Installation

IMPORTANT: Use this ES52 Series actuator only to control equipment under normal operating conditions. Where failure or malfunction of the actuator 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 actuator.

Parts Included

- ES52 Series actuator
- anti-rotation bracket
- two No. 12-24 sheet metal screws

Special Tools Required

- 5/16 in. (8 mm) nut driver
- 5/16 in. (8 mm) square socket or 3/8 in. (10 mm) 12-point socket
- drill with a 3/16 in. (No. 15, 4.57 mm) drill bit

Setup and Adjustments

Spring Return Direction - Counterclockwise (CCW) Operation

For CCW spring return operation, mount the actuator to the damper shaft so the CCW face of the actuator (shown in Figure 1) is away from the damper. The coupler is at the 0° position to drive Clockwise (CW) and spring return CCW.

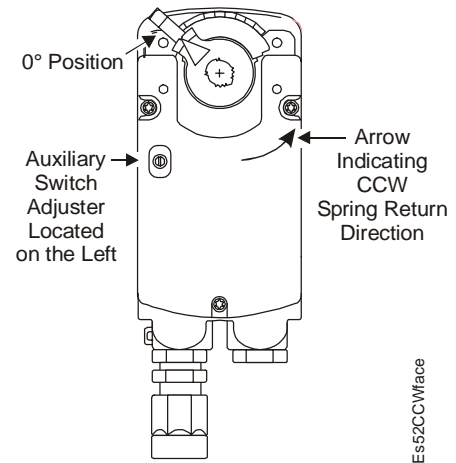


Figure 1: CCW Face of the Actuator

Spring Return Direction - CW Operation

To change the spring return direction to CW, mount the actuator to the damper shaft so the CW face of the actuator (Figure 2) is away from the damper. The actuator now drives CCW from the 0° position.

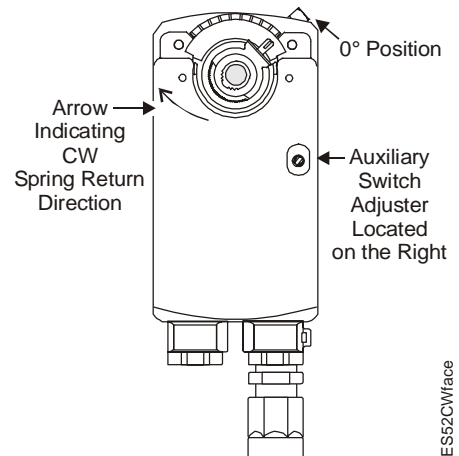


Figure 2: CW Face of the Actuator

Insert the coupler into the CW face of the actuator for easier access to the coupler set screw. (See the *Removable Coupler* section.)

Removable Coupler

If the damper shaft is less than 3.2 in. (80 mm) long, insert the coupler into the face of the actuator closest to the damper.

If the damper shaft is shorter than 1.7 in. (42 mm), use a shaft extension to mount the actuator.

To change the coupler position, see Figure 3 and proceed as follows:

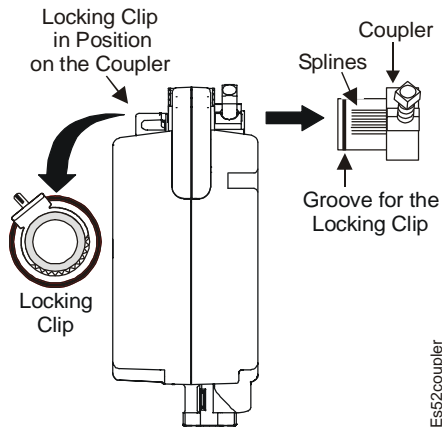


Figure 3: Changing the Position of the Coupler

1. Pull the locking clip off the coupler, and remove the coupler from the actuator.
2. For setting a rotation range of less than 90°, proceed to the *Rotation Range* section.

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.

3. Reinsert the coupler into either the CW or CCW face of the actuator (determined by the shaft length discussed earlier in this section).

The coupler splines (Figure 3) are designed to prevent insertion of the coupler at the wrong end of the rotation range.

4. Snap the locking clip securely into the coupler groove to retain the coupler in the actuator.

Mounting

Location Considerations

Mount the ES52 Series actuators in any convenient orientation. Install the actuators on a 3/8 to 1/2 in. (10 to 13 mm) round shaft and a 3/8 in. (9.5 mm) square shaft. If the shaft extends less than 3.2 in. (80 mm), see the *Removable Coupler* section.

IMPORTANT: Do not install this actuator in condensing, wet, or damp environments. Moisture may cause damage to the actuator.

Actuator Mounting

To mount the actuator, proceed as follows:

1. Bend or cut the anti-rotation mounting bracket to fit the damper frame or duct as shown in Figure 4. (The bracket can be bent to fit a round damper.)

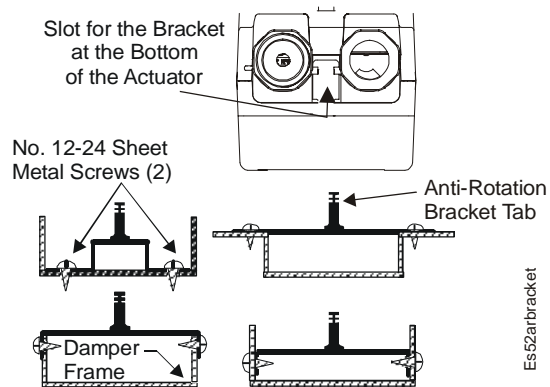


Figure 4: Anti-rotation Mounting Bracket Positions

2. Slide the actuator onto the damper shaft.

CAUTION Risk of Property Damage. Mount the actuator perpendicular to the shaft. Failure to mount the actuator perpendicular to the shaft may cause the shaft to bind. Binding may result in damage to the actuator or other property, and will void the warranty.

3. Position the anti-rotation mounting bracket into the slot at the bottom of the actuator. (See Figure 4).

IMPORTANT: Place the anti-rotation bracket tab midway in the actuator slot. Failure to do so may cause the actuator to bind, may cause premature wear, and will void the warranty.

- See the A through D dimensions in Figure 5 and Table 1 to ensure the anti-rotation mounting bracket tab fits midway in the actuator slot.

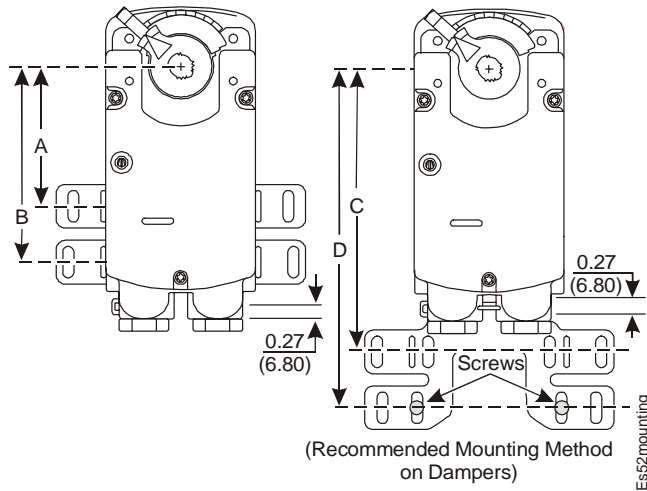


Figure 5: Mounting Positions, in. (mm)

Table 1: Shaft Sizes and Distances from the Anti-rotation Bracket to Shaft Center

Dimensions in. (mm)	Shaft Diameter	
	1/2 in. (mm)	3/8 in. (mm)
A	3.00 (76.3)	2.94 (74.7)
B	4.23 (107.5)	4.17 (105.9)
C	6.11 (155.3)	6.05 (153.7)
D	7.35 (186.6)	7.30 (185.0)

- Use the anti-rotation mounting bracket as a guide, and drill the holes in the damper frame or duct for the bracket (based on the measurements obtained in Figure 5 and Table 1).
- Rotate the damper to the position desired when power is lost. If a tight seal is required, rotate the actuator 3° away from the spring return direction.
- Tighten the coupler set screw onto the damper shaft. Recommended torque for the set screw is 150 to 180 lb-in (17 to 20 N-m).
- Attach the anti-rotation mounting bracket to the damper frame or duct with the two sheet metal screws provided, using a 5/16 in. (8 mm) nut driver.

Note: Do not overtighten the mounting screws. Overtightening may strip the threads.

- Verify that the actuator rotates freely throughout the range by applying power long enough for the actuator to travel a full stroke.

Rotation Range

The actuator is factory set for 0 to 93° rotation.

Note: The minimum rotation range is 34.5°.

To reduce the rotation range, reposition the coupler as follows:

- Make sure that the damper blade is visually accessible or its position is permanently marked on the end of the damper shaft as shown in Figure 6.

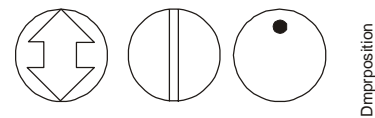


Figure 6: Damper Position Icons

- Determine the desired rotation range, and subtract that number of degrees from 90°.
- Remove the locking clip from the coupler. (See Figure 3.)
- Manually reposition the coupler, so the coupler set screw aligns with the nodule guide that corresponds to the value determined in Step 2.

Examples:

- For a rotation range of 60°, move the coupler so the coupler set screw is at the 30° nodule guide (90° – 60° = 30°). See Figure 7.

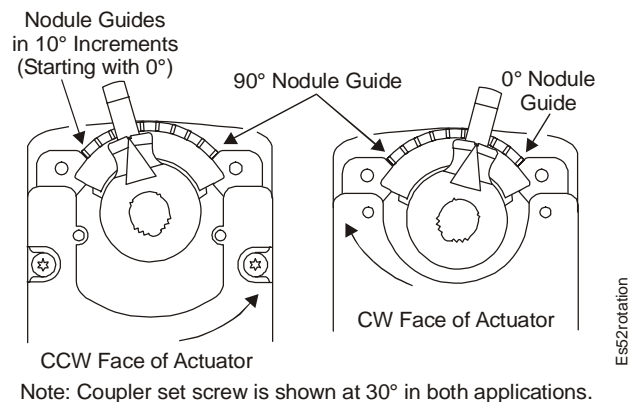


Figure 7: Actuator Set for 60° Rotation

- For a rotation range of 45°, move the coupler so the coupler set screw is midway between the 40° and 50° nodule guides (90° – 45° = 45°).
- Snap the locking clip securely into the coupler groove to retain the coupler in the actuator.

Wiring

See Figure 8 to wire the applicable ES52 Series model.

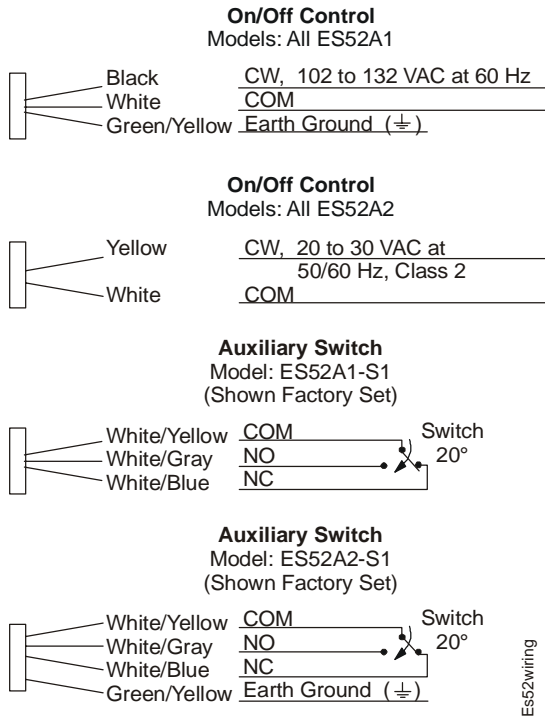


Figure 8: Wiring Diagrams for ES52 Series Models



WARNING: Risk of Electric Shock.

Disconnect each of multiple power supplies before making electrical connections. More than one disconnect may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electrical shock and may result in severe personal injury or death.



WARNING: Risk of Electric Shock and Property Damage.

Insulate and secure each unused wire lead before applying power to the actuator. Failure to insulate and secure each unused wire lead may result in property damage, electrical shock, and severe personal injury or death.



WARNING: Risk of Electric Shock.

Ground the actuator according to local, national, and regional regulations. Failure to ground the actuator may result in electrical shock and severe personal injury or death.



CAUTION: Risk of Property Damage.

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

IMPORTANT:

Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the electrical ratings of the actuator.

Using Conduit

If using conduit or other electrical fittings, see Figure 9 and proceed as follows:

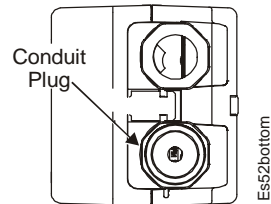


Figure 9: Bottom of the Actuator

1. Pry the plastic plug out of the wired conduit opening (if present) with a flat-blade screwdriver.
2. Slide the plug off the wiring cable and discard it.

3. Insert the conduit fitting (not provided) into the 1/2 in. conduit opening, and hand tighten in a CW direction.

Note: Use flexible metallic conduit or its equivalent with the conduit fitting.

! WARNING: Risk of Electric Shock.
Do not tighten, loosen or otherwise reposition the factory installed conduit adaptor. Tightening, loosening or repositioning may damage or reduce the insulating and strain relief characteristics of the adaptor, which can cause electrical shock and may result in severe personal injury or death.

4. Feed the wiring cable through the conduit assembly, and finish wiring.

! WARNING: Risk of Electric Shock.
Do not remove the conduit adaptor on the actuator. Removing the adaptor defeats the double insulation and strain relief features and can result in electrical shock leading to severe personal injury or death.

Auxiliary Switch (-S1 Models)

The -S1 models have a built-in auxiliary switch with a switch adjuster accessible on either face of the actuator. (See Figure 1 and Figure 2.) The factory setting is 20°, nominal. See *Auxiliary Switch Rating* in the *Technical Specifications* section.

! WARNING: Risk of Electric Shock.
Insulate and secure each unused wire lead before applying power to the actuator. Failure to insulate and secure each unused wire lead may result in property damage, electrical shock, and severe personal injury or death.

The switch point is independently and continuously adjustable from 0 to 90°. For the most accurate positioning of the switch, see Figure 10 and use the method in the following example.

To change the trip point:

1. Position the actuator in the full spring return position.

Note: The switch is factory set to trip when the actuator reaches the 20° position.

2. Turn the switch adjuster until it points to the desired switch trip point.

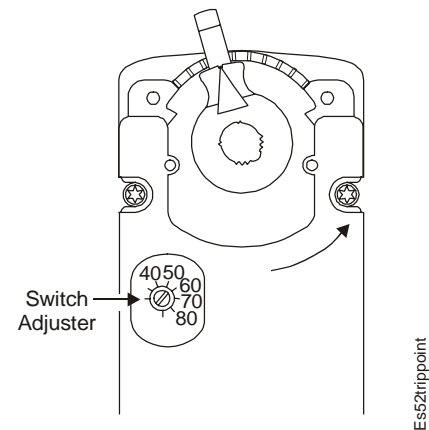


Figure 10: Switch Trip Point Settings

3. Connect the switch to a power source or an ohmmeter, and apply power to the actuator. Observe the switch trip point.
4. Turn the adjuster again to reset the trip point, if required.

Repairs and Replacement

Do not make field repairs. For a replacement or an accessory, refer to the *ES52 Series On/Off Electric Spring Return Actuators Product Bulletin (LIT-1201797)*.

Technical Specifications

Product	ES52 Series On/Off Electric Spring Return Actuators	
Power Requirements	Typically:	
	ES52A2:	Nominal 9.8 VA running; 5.8 VA holding position
	ES52A1:	Nominal 120 V 60 Hz 0.08 A running; 0.05 A holding position
Input Signal	ES52A2:	20 to 30 VAC at 50/60 Hz Class 2
	ES52A1:	102 to 132 VAC at 60 Hz
Auxiliary Switch Rating	-S1 Models: Rating:	One Single-Pole, Double-Throw switch 24 VAC: 50 VA pilot duty 120 VAC: 5.8 A resistive, 1/4 hp, 275 VA pilot duty 240 VAC: 5.0 A resistive, 1/4 hp, 275 VA pilot duty
Spring Return	Select the spring return direction by mounting the actuator with: CCW actuator face away from the damper for CCW spring return; CW actuator face away from the damper for CW spring return.	
Mechanical Output	Running Torque: 53 lb-in (6 N·m)	
Rotation Range	Adjustable from 34.5 to 90° CW or CCW; mechanically limited to 93°	
Rotation Time	Powered (On):	10 to 40 seconds for 0 to 53 lb-in (0 to 6 N·m) at all operating conditions. 25 seconds nominal for 50% rated load
	Not powered (Off):	Spring return time is 35 seconds nominal, 70 seconds maximum
Cycles	60,000 full stroke cycles; rated at 53 lb-in (6 N·m)	
Audible Noise Rating	55 dBA nominal at 1 m	
Electrical Connections	Actuator:	48 in. (1.2 m) cable with 18 AWG wire leads
	Auxiliary Switch:	48 in. (1.2 m) cable with 18 AWG wire leads
Mechanical Connection	3/8 to 1/2 in. (10.0 to 12.7 mm) diameter round shaft or 3/8 in. (10 mm) square shaft	
Enclosure	NEMA 2, IP42	
Ambient Conditions	Operating:	-25 to 140°F (-32 to 60°C); 10 to 90% RH, noncondensing
	Storage:	-40 to 186°F (-40 to 86°C); 5 to 95% RH, noncondensing
Dimensions (H x W x D)	ES52A2	6.98 x 3.25 x 2.99 in. (177.29 x 82.55 x 75.95 mm)
	All Other Models:	8.32 x 3.25 x 2.99 in. (211.33 x 82.55 x 75.95 mm) with conduit adaptor
Shipping Weight	3.45 lb (1.56 kg)	
Agency Compliance	UL Listed, File E191697, CCN XAPX (US) and XAPX7 (Canada)	

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult Dodge Engineering & Controls, Inc. Dodge Engineering & Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



Dodge Engineering & Controls, Inc.
196 Riverneck Road
Chelmsford, MA 01824
978-244-1200 or 877-DEI-CTRL (Toll Free)
978-244-1422 (FAX)

Printed in U.S.A.