

DC-310 Series

IOM Manual

Applications

These actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers requiring up to 310 lb-in (35 Nm) torque.

Features

- Unique self-centering shaft coupling
- All metal housing
- Manual override
- Independently adjustable dual auxiliary switches available
- Built in potentiometer option
- Two torque ranges available
- UL, CE and cUL listed

Technical Specifications - DC24-310 Series Actuator

Type	Actuator Models	DC24-310-T(-A)	DCM24-310-T(-A)
			Non-Spring Return - Floating, Time Out Features with optional Auxillary Switches (-A)
	Torque	310 lb-in. (35 Nm)	
	Operating Voltage	24 VAC ±20% at 50/60 Hz	
	Power Consumption	7 VA, 7W	8 VA, 8W
	Control Signal	N/A	0 to 10 VDC
	Control Impedance	N/A	100k Ohm
	Input Signal	N/A	Y (wires 8-2) DC 0...10 V (Max. permissible input voltage DC 35 V)
Electrical	Feedback	Contact Bray	0 to 10 VDC
	Positioning Signal	N/A	DC 0...35 V at Offset U ₀ = 0...5 V and Span ΔU = 2...30 V
	Feedback Signal	N/A	DC 0 to 10 VDC
	Dual Auxiliary Switch	Standard Cable - AC, 6 A Resistive, AC 2 A General Purpose	
	Voltage	Standard Cable - 24 to 250 VAC	
	Switch Range	Switch A - 0 to 90° with 5° Intervals (Recommended Range Usage 0 to 45°) Factory Setting 5° Switch B - 0 to 90° with 5° Intervals (Recommended Range Usage 45 to 90°) Factory Setting 85°	
	Stall Protection	Yes	
Electrical Connection	3 ft. (0.9 m) Pre-cabled - AWG 18		
Operation	Equipment Rating	Class 2 According to UL, CSA - Class III per EN60730	
	Manual Override	External Push Button	
	Runtime for 90° of Rotation	90 seconds, constant for all operating conditions	
	Rotation Timing	150 sec. at 50 Hz (125 sec. at 60Hz)	
	Rotation Range	Nominal Angle of Rotation 90°, mechanically limited to 95° ± 2°	
	Cycle Life	Designed for 60,000 full stroke cycles	
	Mechanical Connections	Round Shafts - 3/8 to 1 in. (9.5 to 25.4 mm) diameter Square Shafts - 1/4 to 5/8 in. (6 to 18 mm) Minimum Shaft Length - 3/4 (20 mm)	
Environmental	Enclosure	IP54 as per EN 60 529	
	Ambient Conditions (Non-Condensing)	Operating — -25 to 130°F (-32 to 55°C); 0 to 95% RH, non-condensing Storage — -40 to 158°F (-40 to 70°C); 0 to 95% RH, non-condensing	
	Audible Noise Rating	<45 dBA at 1 m	
	Dimensions	(L) 11.8 x (W) 3.9 x (H) 2.9 in. (300 x 100 x 67.5 mm)	
	Weight	4.4 lb (2 kg)	
Conditions	Agency Certifications	UL listed to UL873-cUL certified to Canadian Standard C22.2 No. 24-93 CE conformity: Electromagnetic compatibility 2004/108/EC-Low-voltage directive 2006/95/EC	
	Warranty	5 Years limited from time of shipment.	

Disclaimer - The performance specifications are nominal and conform to acceptable industry standards.

For application at conditions beyond these specifications consult the local Bray office.

Bray, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

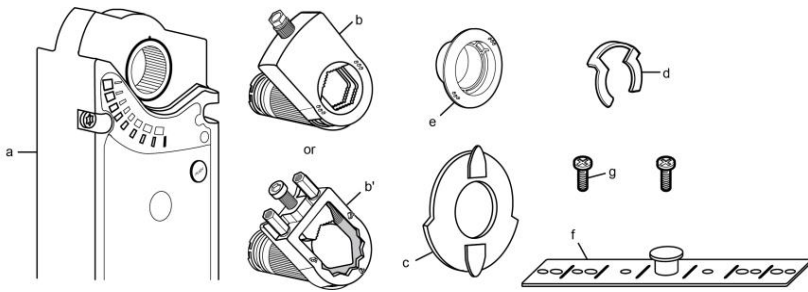


FIGURE 1 - Actuator Parts

Actuator Parts

- a. Actuator
- b. Self-centering shaft adapter
- b'. Oversized shaft adapter
- c. Position indicator
- d. Shaft adapter locking clip
- e. Position indicator adapter
- f. Mounting bracket
- g. Mounting screws

Safety Instructions - Definition of Terms Read, Follow and Save these instructions



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

Required Tools:

- 10 mm (13/32-inch) open-end wrench
- 6 mm (1/4-inch) open-end wrench for oversized shaft adapter
- Drill and 4 mm (5/32-inch) drill bit
- Phillips screwdriver
- Marker or pencil
- Adjustable pliers

Additional for oversized shaft adapter:

- 10 mm (13/32-inch) socket wrench
- 6 mm hex key

Estimated Installation Time:

30 minutes

Mounting Positions:

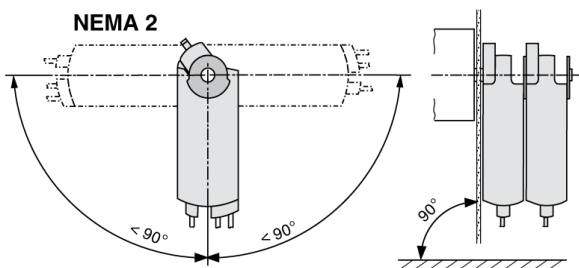
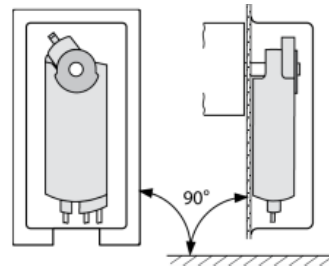


FIGURE 2 - Mounting Positions

Acceptable NEMA 2-Positions for Single and Tandem Applications.

Weather Shield in This Mounting Position Only:



The DC-310 actuator is UL listed to meet NEMA 3R requirements (a degree of protection against rain, sleet, and damage from external ice formation) when installed with the weather shield and outdoor-rated conduit fittings. The DC-310 actuator/Weather shield must be in the vertical position.

Prerequisite:

The actuator is shipped from the factory with a 5° pre-load to ensure tight close-off of the damper. To release the pre-load, press the PUSH button before mounting the actuator.



WARNING

Do not open the actuator.

1. Place the actuator on the damper shaft with the front of the actuator accessible. The label and the manual over ride button are on the front side.

2. For the 16x series only: Determine the rotation of the damper shaft. Set the direction of rotation arrow to match the rotation.



CLOCKWISE



COUNTER CLOCKWISE

FIGURE 4 - Direction of Rotation Switch

3. For all models: See Figure 5 and Figure 6 for clockwise-to-open (CW) installation. See Figure 7 and Figure 8 for counterclockwise-to-open (CCW) installation.

For Tandem Applications:

- The direction of rotation switches must be set identically on both actuators according to the clockwise or counterclockwise rotation of the damper shaft. The factory setting is clockwise.
- Minimum damper drive shaft length is 4 inches (100 mm).

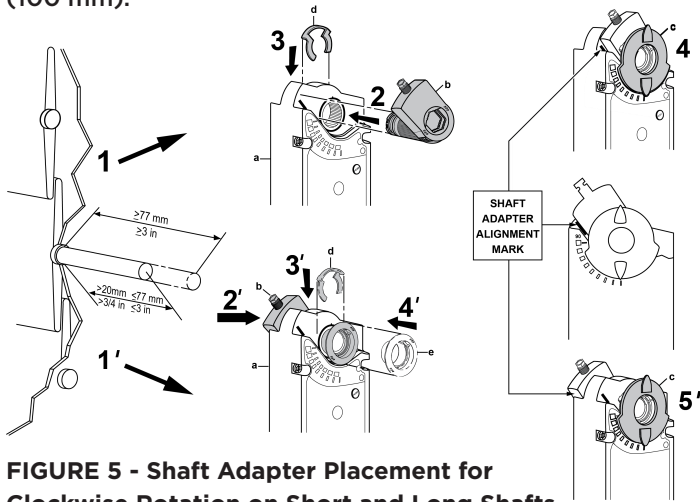


FIGURE 5 - Shaft Adapter Placement for Clockwise Rotation on Short and Long Shafts.

NOTE
Place the shaft adapter next to the alignment mark keeping the mark visible.

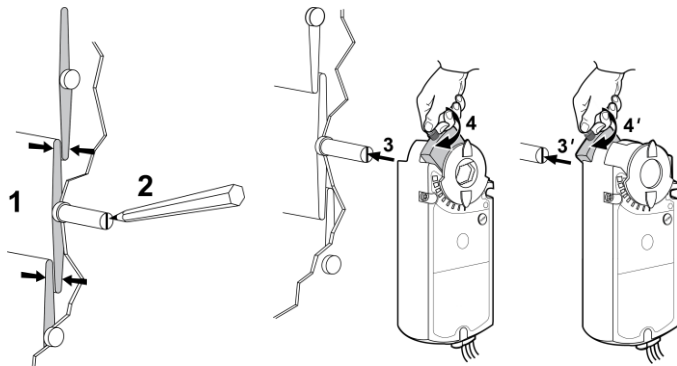


FIGURE 6 - Mount the Actuator to the Damper Shaft. Go to Figure 9 to Complete the Mounting.

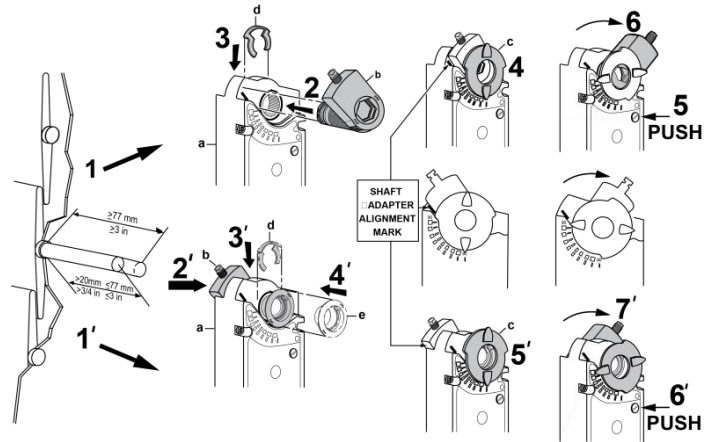


FIGURE 7 - Shaft Adapter Placement for Counterclockwise Rotation on Short and Long Shafts.

NOTE
Place the shaft adapter next to the alignment mark keeping the mark visible.

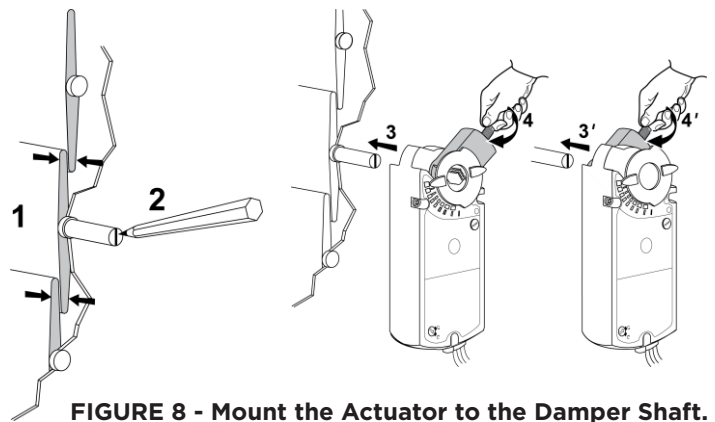


FIGURE 8 - Mount the Actuator to the Damper Shaft.

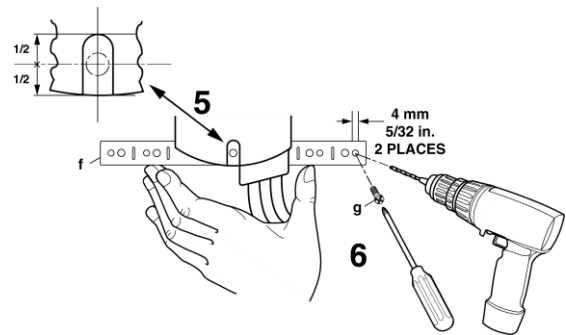


FIGURE 9 - Attach the Mounting Bracket.

NOTE
With an oversized shaft adapter (b'), tighten the middle screw so that the shaft is in the center of the shaft adapter opening.

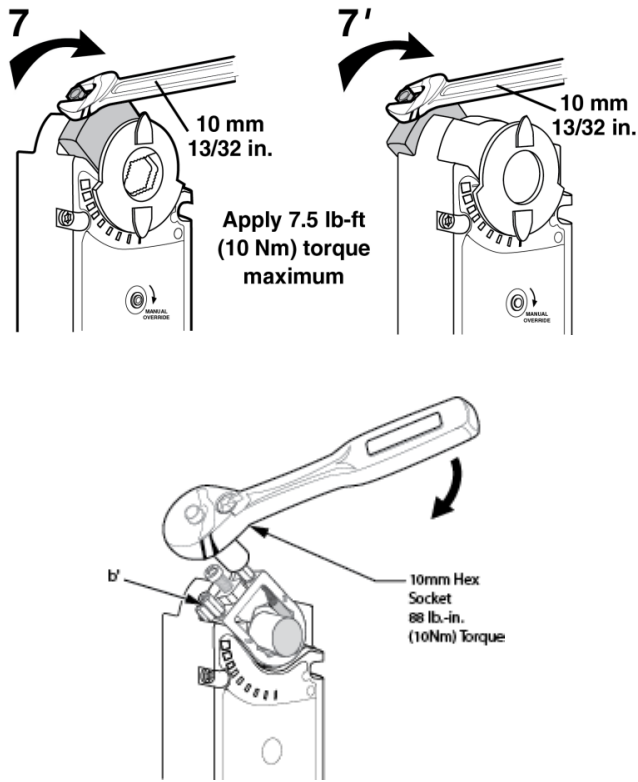


FIGURE 10 - Fasten the Shaft Adapter to the Damper Shaft.

Manual Override

To move the damper blades without power present, do the following:

1. Hold down the PUSH button.
2. Make adjustments to the damper position.
3. Release the PUSH button.

NOTE

If there is no load, the actuator will hold the new damper position. If load conditions exist, the actuator might not be able to hold.

Once power is restored, the actuator returns to automated control.

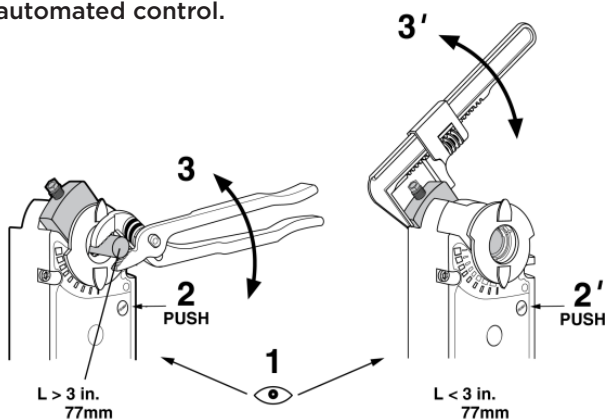


FIGURE 11 - Manual Override for Long and Short Damper Shafts.

Mechanical Range Adjustment

The angular rotation is adjustable between 0° and 90° at 5-degree intervals.

1. Loosen the shaft adapter from the damper shaft and remove the actuator from the damper shaft.

2. Remove the clip and shaft adapter from the actuator. See Figure 12.

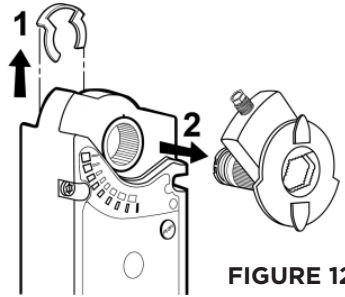


FIGURE 12

3. Return the actuator gear train to the "0" position using the steps which follow for the clockwise or counterclockwise damper shaft rotation.

Clockwise-to-open:

- a. Insert the shaft adapter to the right as close as possible to the raised stop. Figure 13.

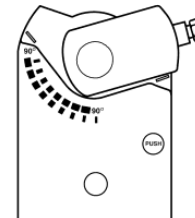


FIGURE 13

- b. Hold down the PUSH button and rotate the shaft adapter to the left until it stops. Figure 14.

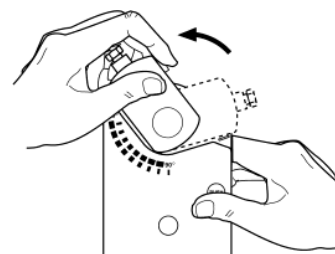


FIGURE 14

Counterclockwise-to-open:

- a. Insert the shaft adapter to the left as close as possible to the raised stop.
- b. Hold down the PUSH button and rotate the shaft adapter to the right until it stops.
- c. Release the PUSH button.
- d. If the shaft adapter is not resting against the right raised stop, remove the adapter and insert it against the right stop.
- e. Place the position indicator to "0" on the inside scale.

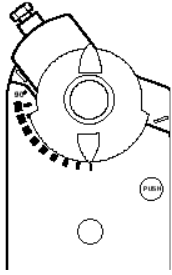


FIGURE 15

4. Determine the angle of rotation for the damper blade shaft. Subtract that amount from 90°.

5. Remove the shaft adapter and insert it with the position indicator pointing to mark on the scale calculated in the previous step. Figure 16.

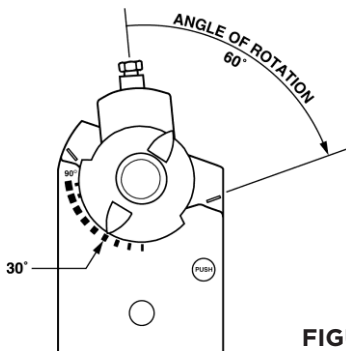


FIGURE 16

6. Attach the clip.

7. Rotate the damper blade shaft to its 0 position.

8. Return the actuator to the damper shaft and tighten the shaft adapter to the damper shaft.

Wiring

- All wiring must conform to NEC and local codes and regulations.
- Use earth ground isolating step-down Class 2 transformers. Do not use auto transformers.
- The maximum rating for a Class 2 step-down transformer is 100 VA. Determine the supply transformer rating by summing the total VA of all actuators and components used. It is recommended that no more than 10 actuators are powered by one transformer.



WARNING

Do not parallel wire DC-310 actuators with any other type of actuator, including DC-310 actuators with date codes earlier than 501.



WARNING

It is recommended to switch off the power during two-position control when the actuator has reached the open or closed position to enhance life span and reduce power consumption.



WARNING

Mixed switch operation is not permitted to the switching outputs of both auxiliary switches (A and B).

– Either AC line voltage from the same phase must be applied to all six outputs of the dual auxiliary switches, or UL-Class 2 voltage must be applied to all six outputs.

NOTE

With plenum cables, only UL-Class 2 voltage is permitted.

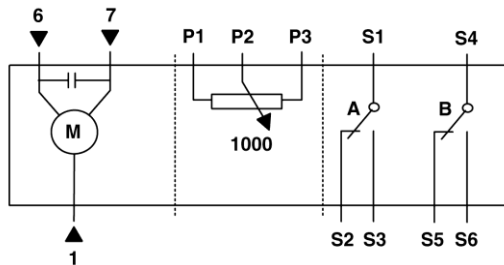
Wiring

Cable			Function
No.	Code	Color	
1	G	Red (RD)	AC 24 V Supply (SP)
2	G0	Black (BK)	Neutral (SN)
6	Y1	Violet (VT)	Control Signal Clockwise
7	Y2	Orange (OG)	Control Signal Counterclockwise
8	Y	Gray (GY)	0 to 10 VDC Input Signal
9	U	Pink (PK)	Output for 0 to 10 VDC Position Indication
P1	a	White/Red (WH RD)	Feedback 0 to 100% P1 - P2
P2	b	White/Blue (WH BU)	Feedback Common
P3	c	White/Pink (WH PK)	Feedback 100 to 0% P3 - P2

Auxiliary Switch - Factory Installed			
S1	Q11	Gray/Red (GY RD)	Switch A Common
S2	Q12	Gray/Blue (GY BU)	Switch A - N.C.
S3	Q14	Gray/Pink (GY PK)	Switch A - N.O.
S4	Q21	Black/Red (BK RD)	Switch B Common
S5	Q22	Black/Blue (BK BU)	Switch B - N.C.
S6	Q24	Black/Pink (BK PK)	Switch B - N.O.

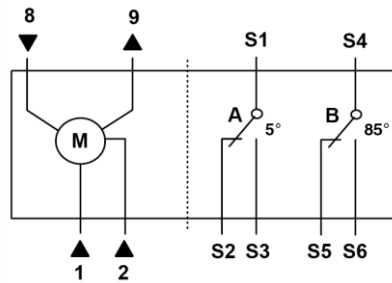
DC24-310-T(-A)
STANDARD CABLE

Floating Control



DCM24-310-T(-A)
STANDARD CABLE

Modulating Control



Warning - These actuators are designed for use only in conjunction with operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add safety devices or alarm systems that protect against, and/or warn of, control failure.

To avoid excessive wear or drive time on the motor, use a controller and/or software that provides a time-out function to remove the signal at the end of rotation (stall).

Disclaimer - The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the nearest Bray office. Bray controls shall not be liable for damages resulting from misapplication or misuse of its products.

Start-Up/Commissioning

1. Check the Operation:
 - a. Connect wires 1 (red), 6 (violet), and 7 (orange) to the actuator. b. Apply a control signal (24 VAC) to wires 1 (red) and 6 (violet).
 - c. Allow the actuator shaft coupling to rotate from 0 to 90°.
 - d. Stop applying a control signal to wires 1 (red) and 6 (violet).
 - e. Apply a control signal (24 VAC) to wires 1 (red) and 7 (orange). f. Allow the actuator shaft coupling to rotate from 90 to 0°.

2. Check the Feedback:
 - a. Set the DMM dial to ohms.
 - b. Connect wires P1 and P2 to the DMM. The DMM should indicate a resistive value.
 - c. Apply a control signal (24 VAC) to wires 1 (red) and 6 (violet).
The reading of the DMM should increase.
 - d. Stop applying a control signal to wires 1 (red) and 6 (violet).
 - e. Connect wires P2 and P3 to the DMM. The DMM should indicate a resistive value.
Apply a control signal (24 VAC) to wires 1 (red) and 7 (orange). The reading of the DMM should increase.

3. Check the Auxiliary Switch A:
 - a. Set the DMM dial to ohms (resistance) or continuity check.
 - b. Connect wires S1 and S3 to the DMM. The DMM should indicate an open circuit or no resistance.
 - c. Apply a control signal (24 VAC) to wires 1 (red) and 6 (violet).
The DMM should indicate contact closure as the actuator shaft coupling reaches the setting of switch A.
 - d. Stop applying a control signal to wires 1 (red) and 6 (violet).
 - e. Connect wires S1 and S2 to the DMM. The DMM should indicate an open circuit or no resistance.
 - f. Apply a control signal (24 VAC) to wires 1 (red) and 7 (orange).
The DMM should indicate contact closure as the actuator shaft coupling reaches the setting of switch A.

4. Check the Auxiliary Switch B:
 - a. Set the DMM dial to ohms (resistance) or continuity check.
 - b. Connect wires S4 and S6 to the DMM. The DMM should indicate an open circuit or no resistance.
 - c. Apply a control signal (24 VAC) to wires 1 (red) and 6 (violet).
The DMM should indicate contact closure as the actuator shaft coupling reaches the setting of switch B.
 - d. Stop applying a control signal to wires 1 (red) and 6 (violet).
 - e. Connect wires S4 and S5 to the DMM. The DMM should indicate an open circuit or no resistance.
 - f. Apply a control signal (24 VAC) to wires 1 (red) and 7 (orange).
The DMM should indicate contact closure as the actuator shaft coupling reaches the setting of switch B.