

# OpenAir™ Electric Damper Actuator

## GDE/GLB Series

## Non-spring Return Rotary

## 24 Vac 3-position Control



### Description

OpenAir direct coupled 24 Vac non-spring return rotary electric actuators are designed for 3-position (floating) control of dampers.

### Features

- Compact, lightweight design
- Manual override
- Standard and plenum models available
- Feedback potentiometer models available
- cUL and UL listed; plenum versions also CE certified
- Independently adjustable dual auxiliary switches available




### Application

These actuators are used in constant or variable air volume installations for control of HVAC dampers requiring up to 44 lb-in (5 Nm) or 88 lb-in (10 Nm) of torque.

### Product Numbers

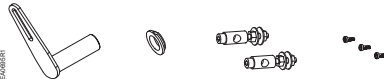
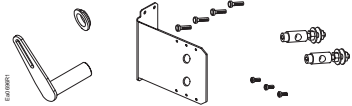
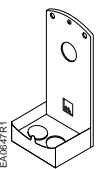
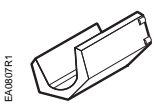

Table 1.

Torque	Cabling	Standard	With Potentiometer	Dual Auxiliary Switches Only
44 lb-in (5 Nm)	Plenum	GDE131.1P	GDE132.1P	GDE136.1P
		GDE131.1P/B (24-pk)	—	—
		GDE131.1Q/B 6-ft Plenum (12-pk)	—	—
	Standard	GDE131.1U	—	—
		GDE131.1U/B (24-pk)	—	—
	Terminal Strip	GDE131.1T	—	—
		GDE131.1T/B (24-pk)	—	—
88 lb-in (10 Nm)	Plenum Cable	GLB131.1P	GLB132.1P	GLB136.1P

<b>Specifications</b>	Operating voltage (G–Y1 or G-Y2)	24 Vac +20%, -15%
	Frequency	50/60 Hz
	Power consumption	2.3 VA
<b>Power supply</b>		
<b>Equipment rating</b>	Rating	Class 2 according to UL, CSA Class III per EN60730
<b>Auxiliary features</b>	Feedback potentiometer (GDE/GLB132.1P)	
	Sliding contact (P2)	0 to 1000 ohm < 10 mA
	Load	< 1W
	Voltage	UL-Class 2 (SELV/PELV for CE) < 24 Vac/dc
	Dual auxiliary switch contact rating	
	AC Rating	24 Vac/24 Vdc 4A resistive, 2A inductive
	DC Rating	12 to 30 Vdc DC 2A
	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°
	Switching hysteresis	2°
<b>Function</b>	Torque	
	GDE	44 lb-in (5 Nm)
	GLB	88 lb-in (10 Nm)
	Runtime for 90° opening or closing	
	GDE	90 sec. at 60 Hz (108 sec. at 50 Hz)
	GLB	125 sec. at 60 Hz (150 sec. at 50 Hz)
	Nominal angle of rotation	90°
<b>Mounting</b>	Maximum angular rotation	95°
	Shaft size: Minimum shaft length 3/4-inch (20 mm)	
<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>EA1010R1</p> <p><b>3/8 to 5/8 inch</b> <b>8 -16 mm</b></p> </div> <div style="text-align: center;">  <p><b>1/4 to 1/2 inch</b> <b>6 - 12.7 mm</b></p> </div> <div style="text-align: center;">  <p><b>9/16 inch</b> <b>15 mm</b></p> </div> </div>		

**Figure 1. Acceptable Shaft Sizes.**

<b>Housing</b>	Enclosure	NEMA Type 2 IP54 according to EN60529
	Material	Durable plastic
	Gear lubrication	Silicone-free

<b>Specifications, cont'd</b>	Ambient temperature operation	-25°F to 130°F (-32°C to 55°C)
	storage and transport	-40°F to 158°F (-40°C to 70°C)
<b>Ambient conditions</b>	Ambient humidity (non-condensing)	95% rh
<b>Agency certification</b>		UL listed to UL873 cUL certified to Canadian Standard C22.2 No. 24-93
<b>CE Conformity for Plenum Models</b>	In accordance with the directive set forth by the European Union for	
	Electromagnetic Compatibility (EMC)	89/336/EEC
	Emissions standards	EN 50081-1
	Immunity standards	EN 50082-2
<b>Miscellaneous</b>	Pre-cabled connection	18 AWG
	Cable length	3 feet (0.9 m)
	Life cycle	Designed for over 60,000 full strokes and a minimum of 1.5 million repositions at rated torque and temperature
	Dimensions	See Figure 10
	Weight	1.06 lb. (0.48 kg)
<b>Accessories</b>	<b>NOTE:</b> Neither the auxiliary switches nor feedback potentiometer can be added in the field. Order the product number that includes these options. See Table 1.	
		
	Rotary to linear	
		
	Rotary to linear with bracket	
		
	Conduit adapter	
		
	Shaft insert	
		
	Shaft guide insert	

## Actuator Components

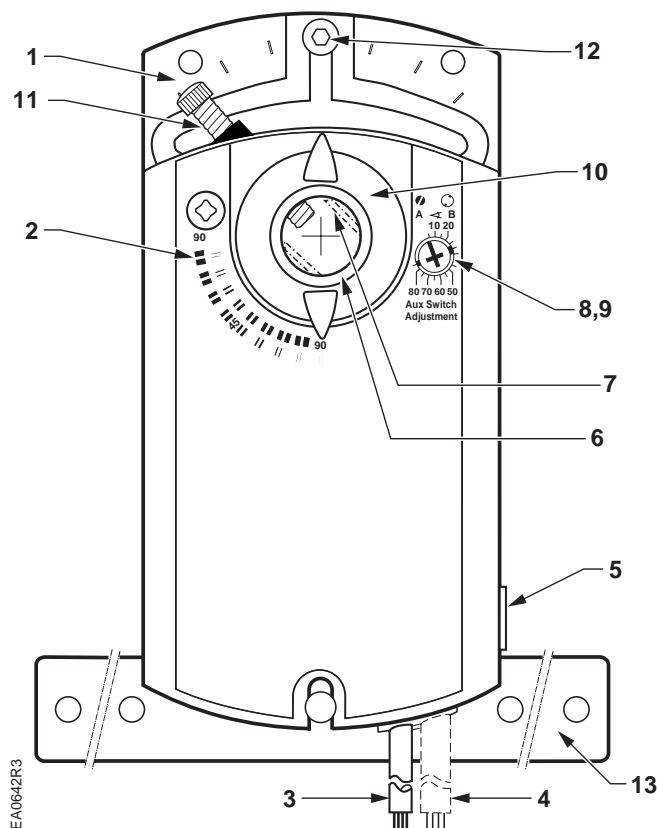
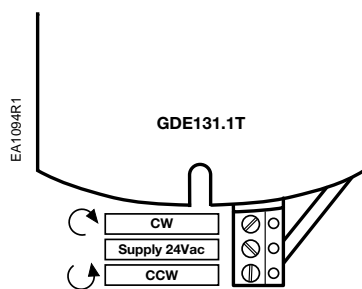


Figure 2. Parts of the Actuator.

## Legend

1. Base plate
2. Positioning scale for angle of rotation
3. Connection cables
4. Connection cables
5. Manual override
6. Coupling bushing
7. Factory installed 1/2-inch guide
8. Auxiliary switch A
9. Auxiliary switch B
10. Position indicator
11. Adjustment lever with locking screw (4 mm hex)
12. Set screw for mechanical range stop (4 mm hex)
13. Mounting bracket



## GDE131.1T

This model uses a terminal strip connection rather than the cable connection (3,4)

## Operation

A floating control signal controls the damper actuator. The actuator's angle of rotation is proportional to the length of time the signal is applied. A 24 Vac control signal to wires 1 and 6 (G-Y1) causes the actuator coupling to rotate clockwise. A 24 Vac control signal to wires 1 and 7 (G-Y2) causes the actuator coupling to rotate counterclockwise.

To reverse the direction of rotation, the wires 6 and 7 (Y1 and Y2) can be interchanged.

In the event of a power failure or with no control voltage, the damper actuator holds its position.

## Life expectancy

An improperly tuned loop will cause excessive repositioning that will shorten the life of the actuator.

## Auxiliary switches

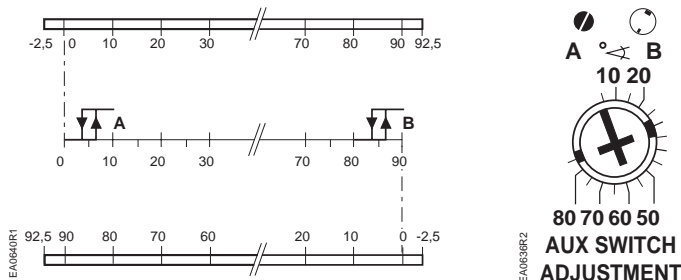
Figure 3 shows the adjustable switching values for the auxiliary switches A and B.

### GDE/GLB136.1P

Actuator Scale:  
clockwise

Adjustment range for  
Switches A and B  
Setting interval: 5°  
Switching hysteresis: 2°

Actuator Scale:  
counterclockwise



**Figure 3. Adjustable Switching Values for the Dual Auxiliary Switches.**

**NOTE:** The auxiliary switch setting shafts rotate with the actuator. The scale is valid only when the actuator is in the "0" position on clockwise motion.

Use the long arm of the † to point to the position of switch A. Use the narrower tab on the red ring to point to the position of switch B.

## Sizing

The type of actuator required depends on several factors.

1. Obtain damper torque ratings (ft-lb/ft<sup>2</sup> or Nm/m<sup>2</sup>) from the damper manufacturer.
2. Determine the area of the damper.
3. Calculate the total torque required to move the damper:

$$\text{Total Torque} = \frac{\text{Torque Rating} \times \text{Damper Area}}{\text{SF}^1}$$

4. Select the actuator type from Table 2.

<sup>1</sup> Safety Factor: When determining the torque of an actuator required, a safety factor should be included for unaccountable variables such as slight misalignments, aging of the damper, etc. A suggested safety factor is 0.80 (or 80% of the rated torque).

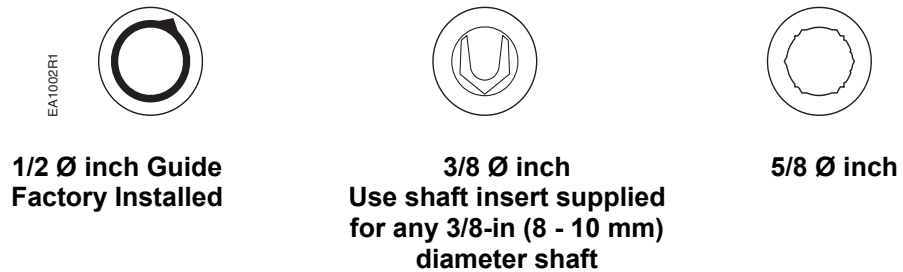
**Table 2.**

Total Torque	Actuator
<44 lb-in (5 Nm)	GDE13x
<88 lb-in (10 Nm)	GLB13x
<132 lb-in (15 Nm)	GEB13x
<177 lb-in (20 Nm)	GBB17x
<310 lb-in (35 Nm)	GIB17x

## Mounting and Installation

You must place the actuator on the damper shaft so that the front of the actuator is accessible. The label is on the front side.

The minimum damper drive shaft length is 3/4-inch (20 mm).



**NOTE:** For all damper shafts with the exception of the 1/2-inch round shaft: Remove 1/2 Ø inch guide before installation.

**Figure 4. Damper Shaft Sizes.**

A mounting bracket is included with the actuator.

Observe the service envelope around the actuator as shown in Figure 10.

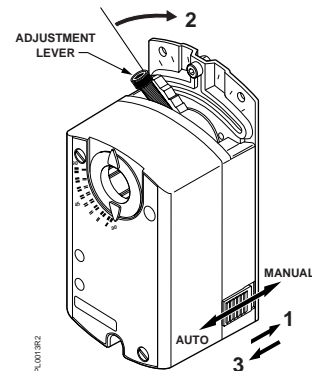
Detailed mounting instructions are included with each actuator.

## Manual override

To move the damper blades and lock the position with no power present:

1. Slide the red manual override knob toward the back of the actuator.
2. Make adjustments to the damper position.
3. Slide the red manual override knob toward the front of the actuator.

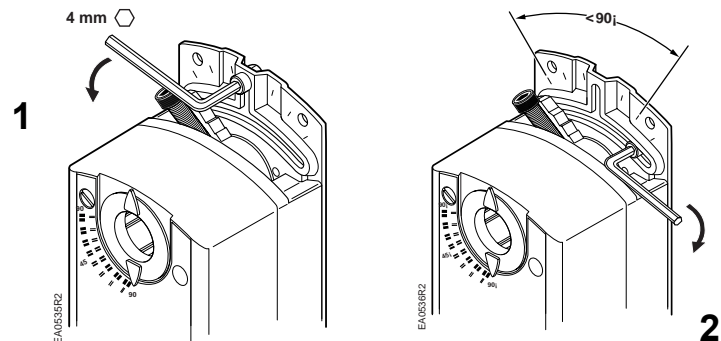
Once power is restored, the actuator returns to automated control.



**Figure 5. Manual Override.**

## Mechanical range adjustment

1. Loosen the stop set screw.
2. Move the screw along the track to the desired position, and fasten it in place.



**Figure 6. Moving the Mechanical Range Stop.**

## Wiring

All wiring must conform to NEC and local codes and regulations.

Use earth ground isolating step-down Class 2 transformers. Do not use autotransformers.

The sum of the VA ratings of all actuators and all other components powered by one transformer must not exceed the rating of the transformer. It is recommended that one transformer power no more than ten actuators.



### CAUTION:

Do not wire different types of actuators (such as GBB... or GIB...) in parallel with the GDE13x or the GLB13x models.



### WARNINGS:

All six outputs of the dual auxiliary switch (A and B) must only be connected to:

- Class 2 voltage (UL/CSA).
- Separated Extra-Low Voltage (SELV) or Protective Extra Low Voltage (PELV) (according to HD384-4-41) for installations requiring  $\text{CE}$  conformance. You must use a  $\text{CE}$  certified plenum rated actuator.

Installations requiring  $\text{CE}$  Conformance:

- All wiring for CE certified actuators must be "Separated Extra Low Voltage" (SELV) or "Protective Extra Low Voltage" (PELV) per HD384-4-41.
- Use safety-isolating transformers (Class III transformer) per EN61558. They must be rated for 100% duty cycle.
- Overcurrent protection for supply lines is maximum 10A.

## Direction of Damper Rotation

If the damper blades turn counterclockwise to open (CCW), reverse the 6 (violet) and 7 (orange) wires at the controller.

## Wiring Designations

Each wire has the standard symbol printed on it.

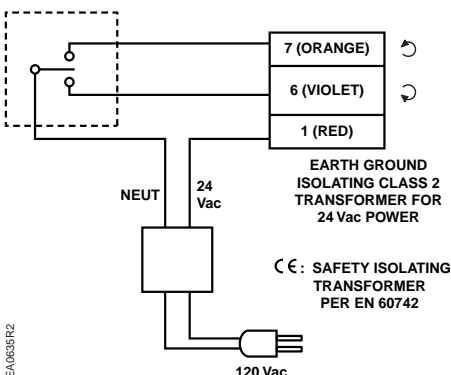


Figure 7. 3-Position Control.

Wiring Designations, Continued

24 Vac power supply

3-Position control 24 Vac

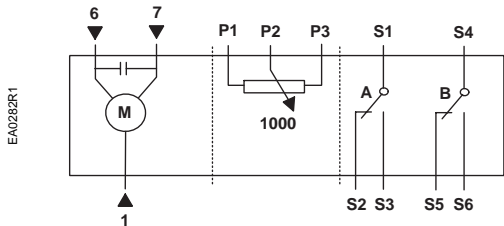


Table 3. 3-Position Control 24 Vac.

Standard Symbol	Function	Terminal Designation	Color
1	Supply (SP)	G	Red
6	Control signal clockwise	Y1	Violet
7	Control signal counterclockwise	Y2	Orange
<b>Factory-Installed Options</b>			
S1	Switch A - Common	Q11	Black
S2	Switch A - N.C.	Q12	Black
S3	Switch A - N.O.	Q14	Black
S4	Switch B - Common	Q21	Black
S5	Switch B - N.C.	Q22	Black
S6	Switch B - N.O.	Q24	Black
P1	Feedback Potentiometer 0 to 100% P1 - P2	a	Black
P2	Feedback Potentiometer Common	b	Black
P3	Feedback Potentiometer 100 to 0% P3 - P2	c	Black

GDE131.1T

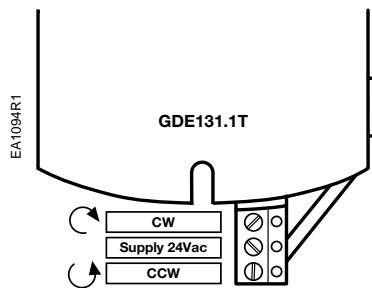
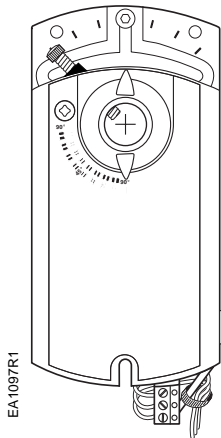


Figure 8. GDE131.1T Terminal Strip Wire Connections.



NOTES:

- Maximum wire size 14 AWG.
- The open bracket to the right of the actuator terminal strip is the strain relief for the customer provided control wires. Secure the wires to the actuator bracket with a tie wrap as shown in Figure 9.

Figure 9. GDE131.1T Strain Relief.



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## Start-Up/ Commissioning

1. Check that the wires are connected correctly.
2. Connect wires 1 (red) and 6 (violet) to a Digital Multimeter (DMM) with the dial set at Vac. Apply a control signal (24 Vac) to wires 1 and 6 to verify that the operating voltage is within range.
3. Connect wires 1 (red) and 7 (orange) to a DMM with the dial set at Vac. Apply a control signal (24 Vac) to wires 1 and 7 to verify that the operating voltage is within range.

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### Check Operation:

1. Connect wire 1 (red) to the actuator.
2. Apply a control signal (24 Vac) to wires 1 (red) and 6 (violet).
3. Allow the actuator shaft coupling to rotate from 0° to 90°.
4. Stop applying a control signal to wires 1 (red) and 6 (violet).
5. Apply a control signal (24 Vac) to wires 1 (red) and 7 (orange).
6. Allow the actuator shaft coupling to rotate from 90° to 0°.

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### Check Feedback:

1. Set the DMM dial to ohms.
2. Connect wires P1 and P2 to the DMM. The DMM should indicate a resistive value.
3. Apply a control signal (24 Vac) to wires 1 (red) and 6 (violet). The reading of the DMM should increase.
4. Connect wires P2 and P3 to the DMM. The DMM should indicate a resistive value.
5. Apply a control signal (24 Vac) to wires 1 (red) and 7 (orange). The reading of the DMM should increase.

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### Check the Auxiliary Switch A:

1. Set the DMM dial to ohms (resistance) or continuity check.
2. Connect wires S1 and S3 to the DMM. The DMM should indicate an open circuit or no resistance.
3. 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.
4. Stop applying a control signal to wires 1 (red) and 6 (violet).
5. Connect wires S1 and S2 to the DMM. The DMM should indicate an open circuit or no resistance.
6. 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.

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### Check the Auxiliary Switch B:

1. Set the DMM dial to ohms (resistance) or continuity check.
2. Connect wires S4 and S6 to the DMM. The DMM should indicate an open circuit or no resistance.
3. 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.
4. Stop applying a control signal to wires 1 (red) and 6 (violet).
5. Connect wires S4 and S5 to the DMM. The DMM should indicate an open circuit or no resistance.
6. 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.

## Service



### WARNING:

Do not open the actuator. If the actuator is inoperative, replace the unit.

## Dimensions

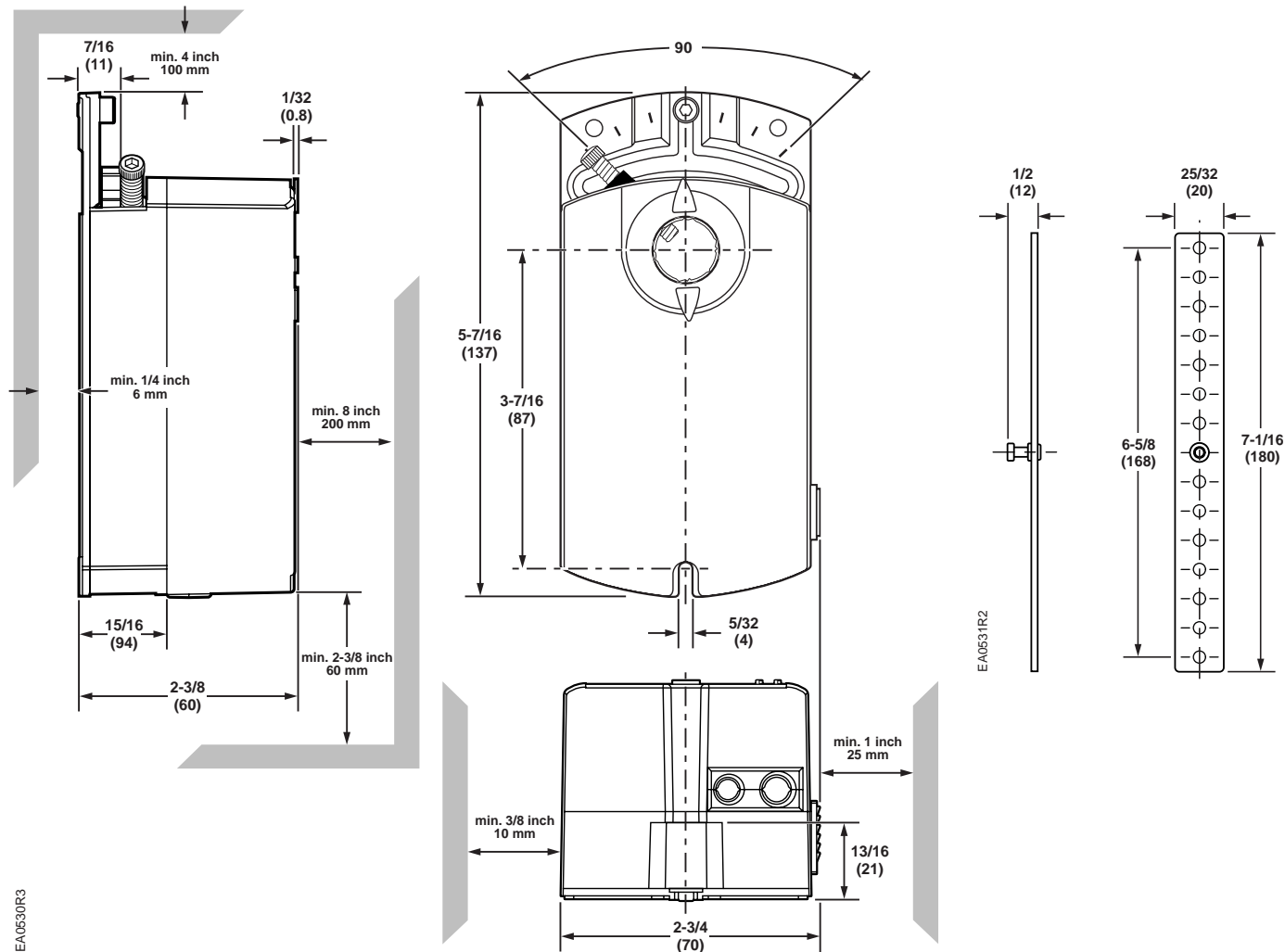


Figure 10. Dimensions of the GDE/GLB Actuator and Mounting Bracket.

## Dimensions, Continued

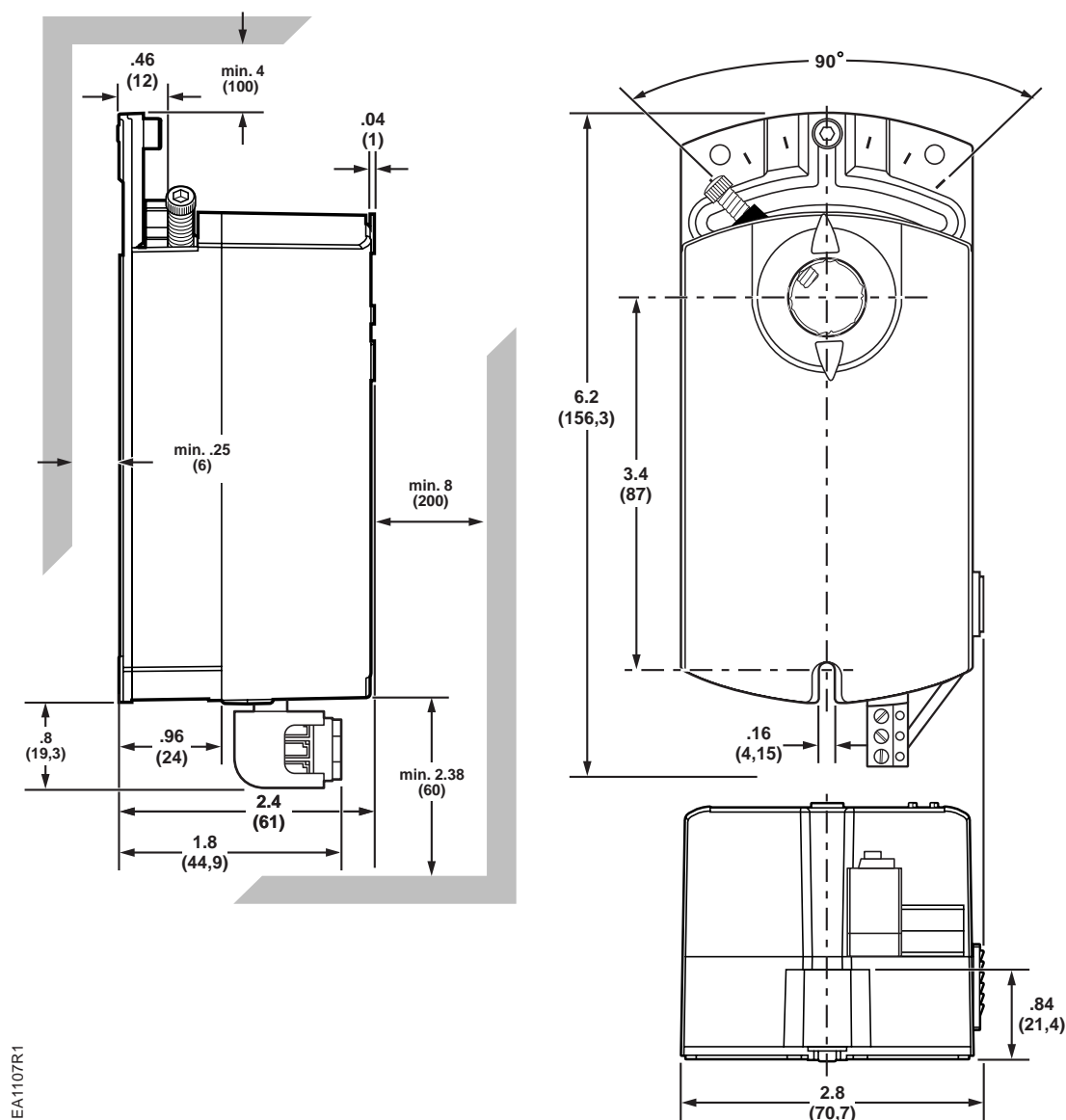


Figure 11. GDE131.1T Dimensions in Inches (mm).

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