

OpenAir™ Electric Damper Actuator

GDE/GLB Series

Non-spring Return Rotary

24 Vac Floating Control



Description

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

Features

- Compact, lightweight design
- Manual override
- Standard and plenum models available
- Feedback potentiometer models available
- cUL and UL listed, 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	Standard	With Potentiometer	Dual Auxiliary Switches Only	Pre-Cabled	No Cables
44 lb-in (5 Nm)	GDE131.1U	—	—	Standard	—
	GDE131.1U/B (24 pk)	—	—		—
	GDE131.1P	GDE132.1P	GDE136.1P	Plenum	—
	GDE131.1P/B (24 pk)	—	—		—
	GDE131.1Q	—	—	6 ft length	—
	GDE131.1Q/B (12 pk)	—	—		—
	GDE131.1N	—	—	—	Post Header AMP
	GDE131.1N/B (24 pk)	—	—	—	
	GDE131.1T	—	—	—	Terminal Strip
	GDE131.1T/B (24 pk)	—	—	—	
88 lb-in (10 Nm)	GLB131.1P	GLB132.1P	GLB136.1P	Plenum	—
	GLB131.1Q	—	—	6 ft length	—

Specifications	Operating voltage (G–Y1 or G–Y2)	24 Vac +20%, -15%
	Frequency	50/60 Hz
	Power supply	Power consumption
Equipment rating	Rating	Class 2 according to UL, CSA Class III per EN60730
Auxiliary features	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°
Function	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°
Maximum angular rotation	95°	
Mounting	Shaft size: Minimum shaft length 3/4 inch (20 mm)	
	EA1010R1 3/8 to 5/8 inch 8 -16 mm 1/4 to 1/2 inch 6 - 12.7 mm 9/16 inch 15 mm	
Figure 1. Acceptable Shaft Sizes.		
Housing	Enclosure	NEMA Type 2 IP54 according to EN60529
	GDE131.1N and GDE 131.1T	NEMA1
	Material	Durable plastic
	Gear lubrication	Silicone-free

Specifications, Continued

Ambient conditions	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)
	Ambient humidity (non-condensing)	95% RH
Agency certification		UL listed to UL873 cUL certified to Canadian Standard C22.2 No. 24-93
CE Conformity for Plenum Models	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
Miscellaneous	Pre-cabled connection	18 AWG
	Standard cable length	3 feet (0.9m)
	Life cycle:	Designed for over 60,000 full strokes and a minimum of 1.5 million repositions at rated torque and temperature
	Dimensions	6.2" L × 2.8" W × 2.4" D × 2.4" D (157 mm L × 71 mm W × 61 mm D)
	Weight	1.06 lb. (0.48 kg)
Accessories	NOTE: Neither the auxiliary switches nor feedback potentiometer can be added in the field. Order the product number that includes these options. See Table 1.	



Figure 2. Rotary to Linear.

ASK71.5 Allows a direct-coupled actuator to provide an auxiliary linear drive.

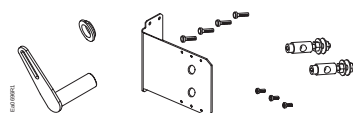


Figure 3. Rotary to Linear with Bracket.

ASK71.6 Allows economical mounting of an OpenAir actuator to a variety of surfaces. Should be used in applications where the actuator can be rigid-surface mounted and a linear stroke output is needed.

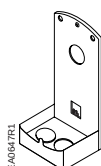


Figure 4. Conduit Adapter.

ASK76.1U Provides the connection between the actuator and conduit.

NOTE: GDE131.1T and GDE131.1N are not compatible with the ASK76.1U.

Accessories, Continued

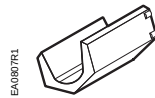


Figure 5. Shaft Insert.

ASK78.3U Shaft insert for use with 3/8-inch (8 to 10 mm) diameter shafts. (Included in box with GDE/GLB Series). (Pkg/10)

NOTE: Factory installed 1/2-inch guide must be removed prior to installation.

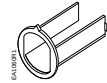


Figure 6. Shaft Guide Insert.

985-101P25 –Shaft guide insert, 1/2 inch 25 Pk (Factory installed with GDE/GLB Series).



Figure 7.

985-132: Floating input cable for use only with the Siemens Building Technologies, Inc. Terminal Equipment Controller (TEC), 3 ft, 12 pk.



Figure 8.

985-131: Floating input cable; 3 ft, 12 pk.



Figure 9.

985-134: Daisy chain cable 12 ft, 12 pk.

985-135: Daisy chain cable 25 ft, 12 pk.

Actuator Components

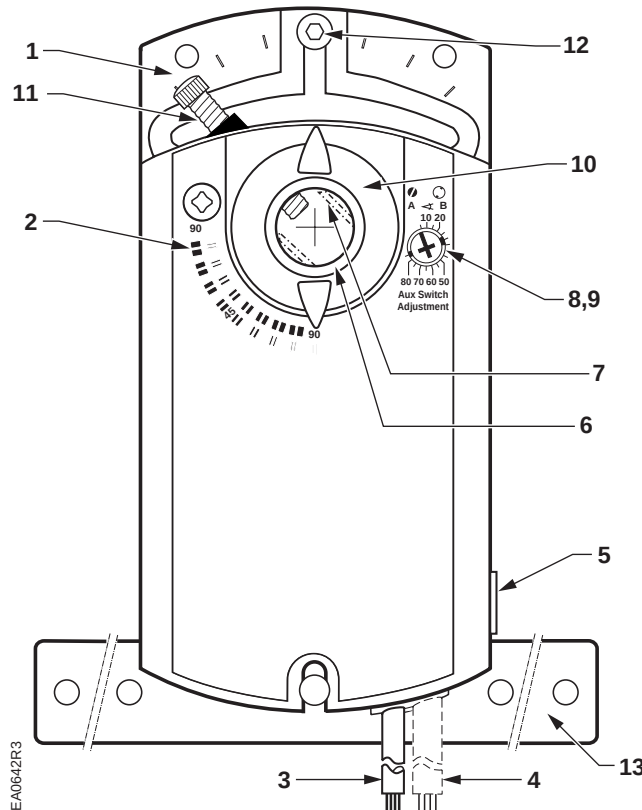


Figure 10. Parts of the Actuator.

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

Actuator Components, Continued

Terminal Strip

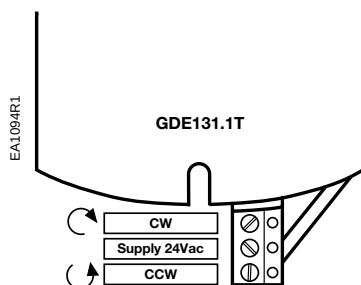


Figure 11.

GDE131.1T

The GDE131.1T uses a Terminal Strip connection for connection purposes rather than the cable connection.

NOTE: Wires are supplied by the customer.

Post Header AMP

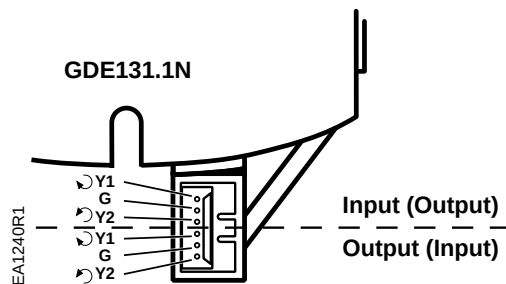


Figure 12.

GDE131.1N

The GDE131.1N model uses a Post Header for connection purposes rather than cable connections.

The Post Header has two identical sets of contacts.

NOTE: Cables are purchased separately. See *Accessories*.

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 13 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 13. 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/ft² or Nm/m²) from the damper manufacturer.
 2. Determine the area of the damper.
 3. Calculate the total torque required to move the damper:

Total Torque = $\frac{\text{Torque Rating} \times \text{Damper Area}}{\text{SF}^1}$
 4. Select the actuator type from Table 2.
- ¹Safety 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
<221 lb-in (25 Nm)	GBB13x
<310 lb-in (35 Nm)	GIB13x

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 14. Damper Shaft Sizes.

A mounting bracket is included with the actuator.

Observe the service envelope around the actuator as shown in Figure 25.

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.

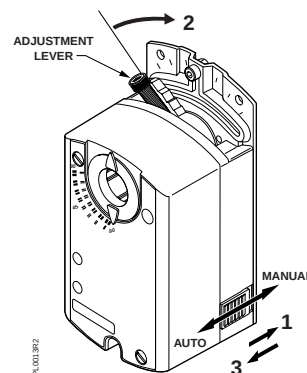


Figure 15. Manual Override.

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.

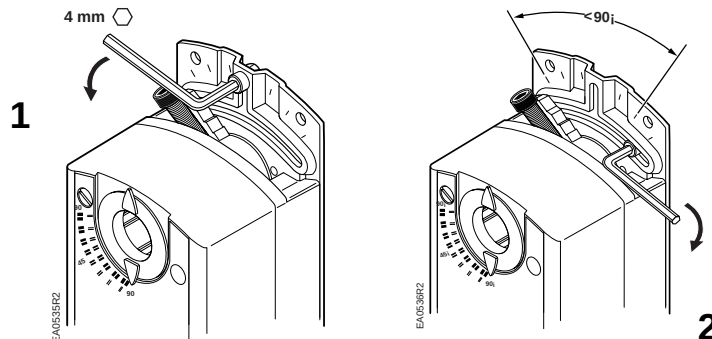


Figure 16. Moving the Mechanical Range Stop.

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 GBBx or GIBx) 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  conformance. You must use a  certified plenum rated actuator.

Installations requiring  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.
- Over current 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 , Continued

Terminal Strip

NOTE: Maximum wire size for the GDE131.1T 14 AWG.

GDE161.1T

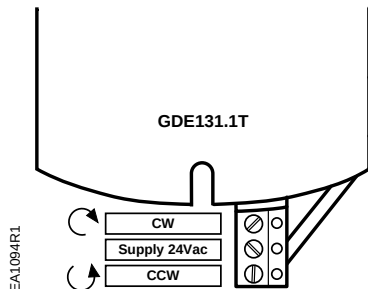


Figure 17. GDE131.1T Terminal Strip.

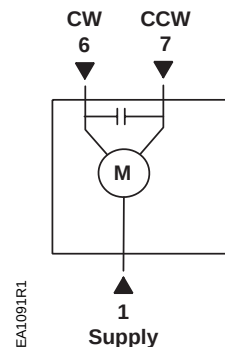


Figure 18. GDE131.1T Wiring Diagram.

Strain Relief

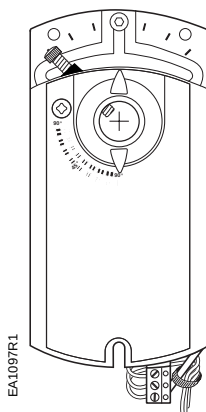


Figure 19.

Securing the wires/cabling will prevent breakage and ensure strong signals to the GDE131.1T model. The following is recommended:

1. The open bracket to the right of the actuator terminal strip is the strain relief for the customer provided control wires.
2. Secure the wires to the actuator bracket with a cable tie as shown in Figure 19.

Wiring, Continued

Post Header AMP

GDE131.1N

The GDE131.1N has two sets of identical contacts as shown in Figure 20.

- All wiring must conform to NEC and local codes and regulations.
- Use earth ground isolating step-down Class 2 transformers. Do not use autotransformers.
- Determine the supply transformer rating by summing the total VA of all actuators used. It is recommended that one transformer power no more than 12 actuators.

Direction of Damper Rotation

To change the direction of rotation of the GDE131.1N, switch the Y1 and Y2 wires at the controller.

NOTE: This rotation will affect all actuators in the daisy chain configuration.

NOTE:
You must select
either the top 3
contacts or the
bottom 3 contacts.

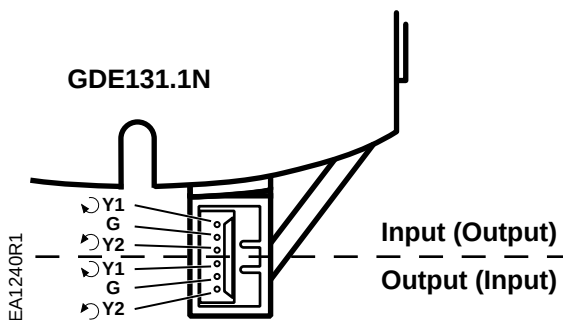


Figure 20. GDE131.1N Post Header AMP.

Wiring, Continued

Post Header AMP, Continued GDE131.1N

Daisy Chain

The input cable (purchased separately) brings power and a control signal to the first actuator in a daisy chain configuration.

Table 3.

Floating Control Input Cables	
985-131	3 ft
	12 pk
985-132	3 ft Siemens TEC
	12 pk



CAUTIONS:

Insert the plug into the Post Header AMP from the left to prevent damage to the cable wires. See Figure 21.

1. The open bracket (See Figure 21), to the right of the actuator, is used for strain relief of the customer purchased daisy chain cable (See *Required Tools*).
2. Secure the cable to the actuator bracket with a cable tie as shown in Figure 22.

NOTE:

You must select either the top 3 contacts or the bottom 3 contacts.

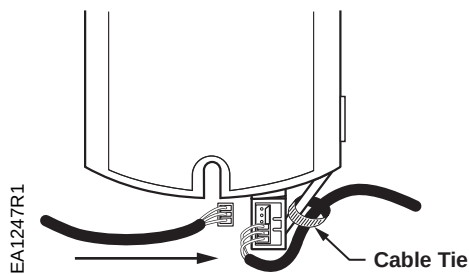


Figure 21.
Always Install the Cable Plug from the Left.

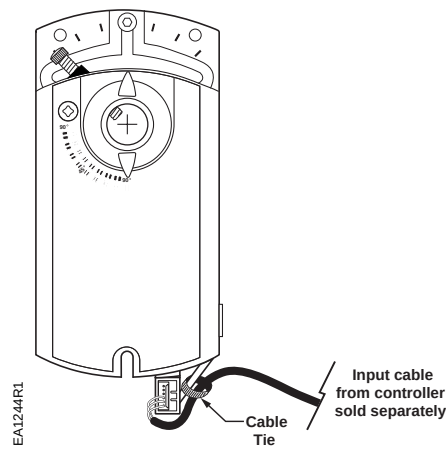


Figure 22. Input Cable Installed in Bottom Three Contacts.

Wiring, Continued

GDE131.1N

Daisy Chain

Table 4.

Daisy Chain Cable	
985-134	12 ft
	12 pk
985-135	25 ft
	12 pk

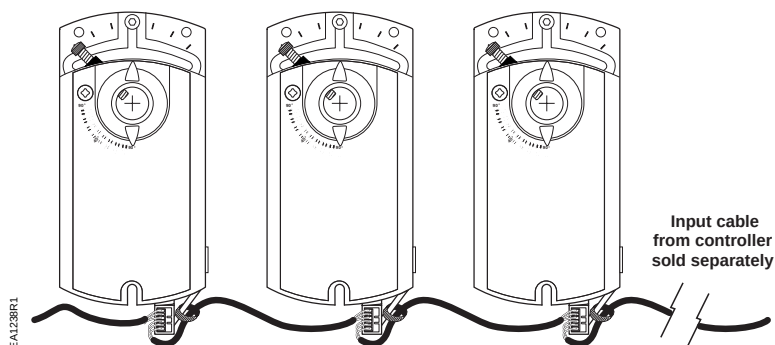


Figure 23.



WARNING:

Do not daisy chain more than 12 actuators together at any time.

Troubleshooting



WARNING:

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

Wiring Designations Each wire has the standard symbol printed on it.

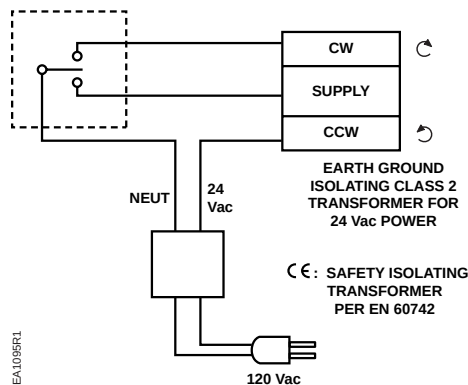


Figure 24. Floating Control.

24 Vac power supply

Floating Control 24 Vac

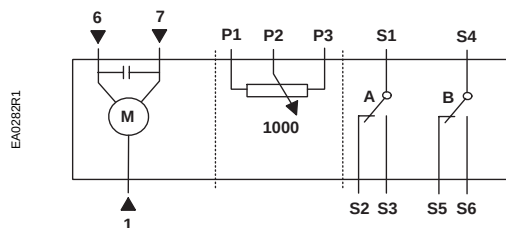


Table 5. Floating Control 24 Vac.

Standard Symbol	Function	Terminal Designation	Color
1	Supply (SP)	G	Red
6	Control signal clockwise	Y1	Violet
7	Control signal counterclockwise	Y2	Orange
Factory-Installed Options			
S1	Switch A - Common	Q11	Black
S2	Switch A - NC	Q12	Black
S3	Switch A - NO	Q14	Black
S4	Switch B - Common	Q21	Black
S5	Switch B - NC	Q22	Black
S6	Switch B - NO	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

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.

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°.

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.

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.

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.
-

Dimensions

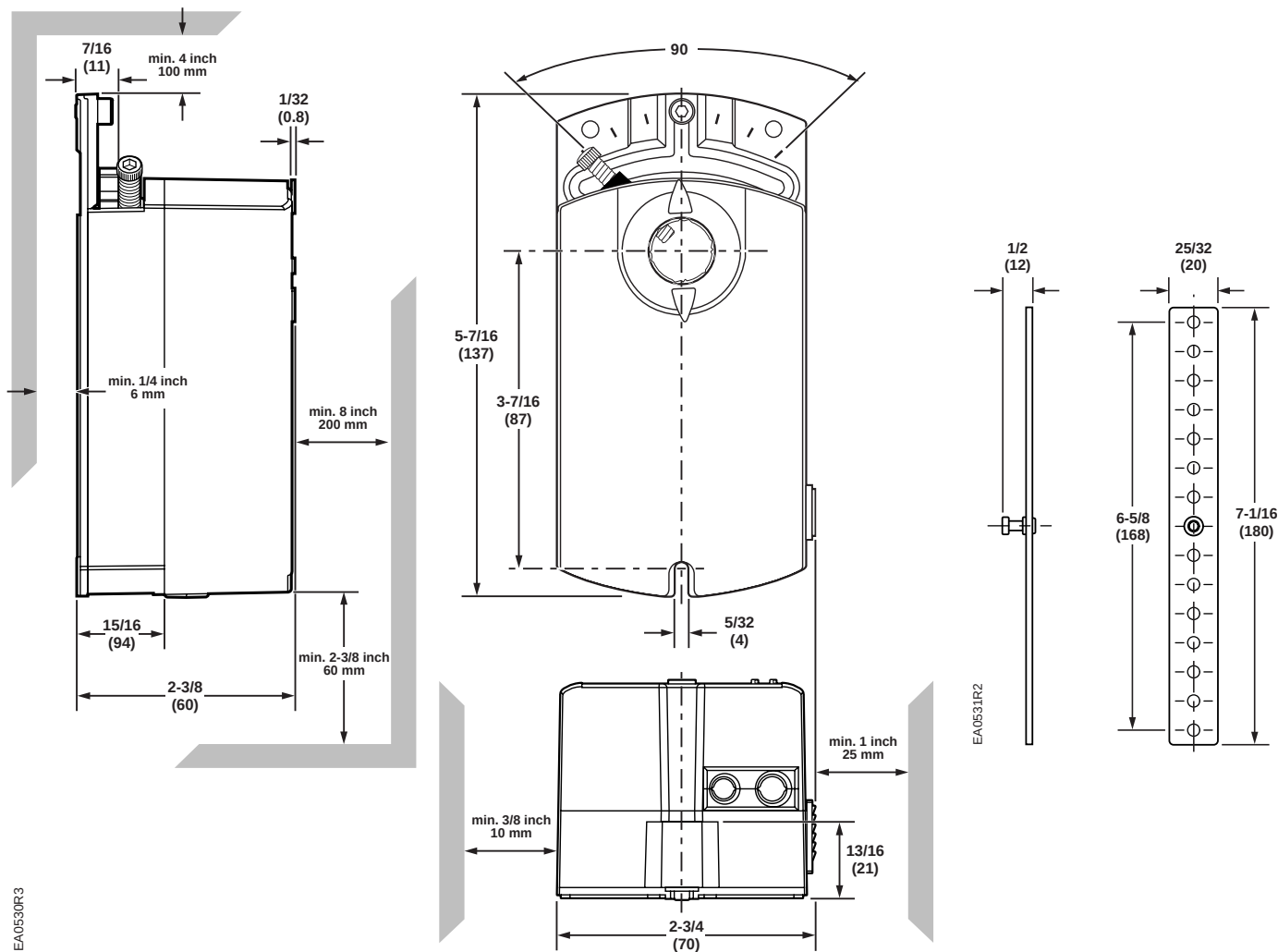


Figure 25. GDE/GLB Actuator and Mounting Bracket Dimensions in Inches (Millimeters).

Dimensions, Continued

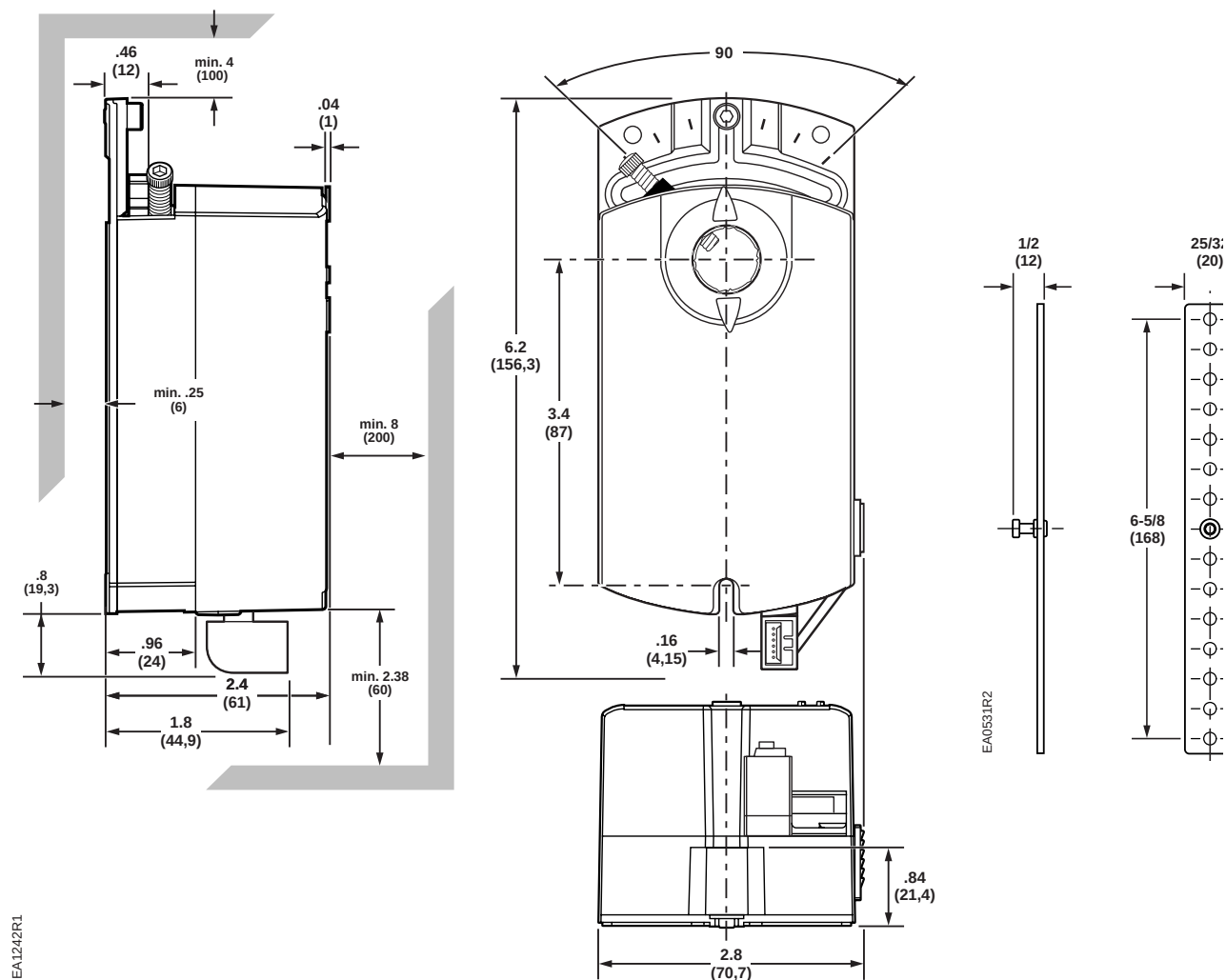


Figure 26. GDE131.1T, GDE131.1N, and Mounting Bracket Dimensions in Inches (Millimeters).

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