OpenAir™

Air damper actuators

Rotary version, two-position control, with spring return, AC 24 V or AC 230 V

Electromotive rotary actuators for two-position control, nominal torque 16 Nm, spring return to fail-safe position, operating voltage AC 24 V or AC 230 V, for two-position control, span mechanically adjustable between 0°...90°, pre-wired with 0.9 m long connection cables. Type-specific variations with adjustable auxiliary switches for supplementary functions.

Use

To control air dampers in ventilating and air conditioning plants

- using a nominal torque of 16 Nm for damper surfaces up to 3 m², friction-dependent.
- requiring fail-safe position (zero position) when there is a power failure.

Functions

Basic functions

Rotational movement
- Direction of rotation (right or left) determined by the actuator's mounting on the damper shaft.
- As soon as an operating voltage of either AC 24 V or AC 230 V is applied, the actuator turns to “90°”.

Fail-safe function
In the event of power failure or when the operating voltage is shut off, the actuator spring returns to the fail-safe position “0”.

Position indication
The position indicator located on the shaft adapter displays the rotational angle position of the damper blade.

Manual override
The actuator can be turned to any position using a hex wrench and locked using a screwdriver. After mechanically releasing the lock or after briefly applying operating voltage, the actuator returns to the “0” position.

Mechanical limitation of rotational angle
The rotational angle of the shaft adapter can be limited to 5° increments between 0° and 90°.
Auxiliary switches provide supplementary functions. The switching points for switches A and B (one changeover switch each) can be set independently in increments of 5° within the 0°...90° rotational angle.
Refer to "Technical design", "Commissioning notes" and "Internal diagram".

### Summary of types

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<th>Operating voltage</th>
<th>AC 24 V</th>
<th>AC 230 V</th>
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<td>Standard application</td>
<td>GCA121.1E</td>
<td>GCA321.1E</td>
</tr>
<tr>
<td>With 2 auxiliary switches</td>
<td>GCA126.1E</td>
<td>GCA326.1E</td>
</tr>
</tbody>
</table>

### Ordering

The auxiliary switches cannot be integrated retroactively. For that reason, order the respective type that contains the desired option.

### Delivery

Due to various mounting options depending on the direction of rotation and shaft length, separate parts such as the shaft adapter with position indicator and other mounting parts are shipped separately with the actuator.

### Connection cables

The actuator comes with 0.9 m long pre-wired connection cables.

### Accessories and spare parts

The following accessories and spare parts are available for function upgrades of the actuators; see data sheet N4699:

- **Accessories**
  - Rotary/linear set for duct mounting ASK71.1
  - Rotary/linear set for wall mounting ASK71.2
  - Rotary/linear set with lever ASK71.3
  - Rotary/linear set with lever and mounting plate ASK71.4
  - Bracket for Powerpack ASK73.1
  - Weather shield ASK75.1

- **Spare parts** and ordering information as per data sheet N4699

### Equipment combination

These actuators can be connected to all regulating and controlling devices with a two-position output supplying a switching voltage of AC 24 V or AC 230 V.

### Technical design

- **Motor technology**
  The brushless DC motor provides accurate speed control, torque monitoring to protect the actuator and dampers as well as a reliable fail-safe function.

- **Spring return mechanism in the event of power failure**
  Springs supply the fail-safe function. The problems caused by conventional frictional grip for multi-stage gearing are solved using a second, synchronously turning spring in the motor which eliminates the motor’s frictional grip.
The illustration below shows the adjustable switching values for auxiliary switches A and B in relation to the rotational angle.

**Note**

The setting shafts for the auxiliary switches turn together with the actuator. The scales are valid only for the zero position of the actuator.

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**Mechanical design**

**Basic components**

**Housing**

Robust, lightweight all metal housing made from aluminum diecast which guarantees a long actuator life even under extreme ambient conditions.

**Gear train**

Maintenance-free and noise-free gear train with stall and overload protection for the life of the actuator.

**Spring preload**

The spring has a factory set preload of 5° which ensures tight close-off for the air dampers.

**Manual adjustment**

A wrench lock in the center of the actuator allows the manual setting of the gears. A hex wrench is supplied.

**Self-centering shaft adapter**

The actuator can be fastened to shafts with various diameters and in various shapes (square, round) using just one screw due to the L&G patented mounting. Insert the shaft adapter from either side into the opening for the shaft adapter depending on the damper shaft length. For short shafts, the shaft adapter is on the duct side. The shaft adapter coupling and the shaft holding are coupled via double-sided gearing.

**Mechanical limitation of the rotational angle**

The limitation of the rotational angle can be adjusted in the span of 0...90° in increments of 5°.

**Mounting bracket**

A metal strip with bolt serves to fasten the actuator on the opposite side of the shaft holding.

**Electrical connection**

All actuators come with pre-wired 0.9 m long connection cables.

**Note**

You can mount the actuator on either side depending on the required rotation direction. All setting and operating elements are available on both sides of the actuator.

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**Type-specific elements**

**Auxiliary switches**

For supplementary functions, the auxiliary switches A and B can be adjusted on the actuator front, below the opening for the shaft adapter.
Refer to "Technical design" and "Commissioning notes" in this data sheet.

Setting and operating elements

1 Housing
2 Angle of rotation scale 0°...90°
3 Wrench lock for manual override
4 Connection cable for power supply
5 Connection cable for auxiliary switches
6 Stop shaft for gear train
7, 8 Adjustment dials for auxiliary switches A and B
9 Position indicator
10 Self-centering shaft adapter
11 Locking ring for shaft adapter
12 Adapter for position indicator
13 Mounting bracket

Arrangement for long shaft adapters

Arrangement for short shaft adapters
Engineering notes

The basic system data for the control systems in use contains all engineering notes. Read all the engineering notes before mounting, wiring, and commissioning the actuator and pay special attention to all safety information.

Proper use

These actuators must be used in a system only for applications as described in the basic system data documents for the applied control systems. Additionally, all actuator specific features and rules must be observed as described in the brief description on the title page of this data sheet (bold print) and in the chapters "Use", "Engineering notes", and "Technical data".

All paragraphs marked with the special warning triangle as illustrated on the left contain additional safety information and limitations that must be observed under any circumstances to avoid physical injuries or damages to equipment.

AC 24 V supply

These actuators must only be used with safety extra-low voltage (SELV) or protection by extra-low voltage (PELV) in accordance with HD 384.

AC 230 V supply

The actuators are double-insulated and do not provide a connection for the protective ground.

Auxiliary switches A,B

Use either line voltage or safety extra-low voltage for auxiliary switches A and B. Do not mix the two for operation. However, operation using various phases is permissible.

Do not open the actuator!

The actuator is maintenance-free. Maintenance work may only be conducted by the manufacturer.

Warning, maintenance

Parallel connection of actuators

- Electric: Electric parallel connection for the same actuator types is permissible provided the operating voltage is within the required tolerance. Voltage drops at the feed lines must be included.
- Mechanical: On using the bracket for Powerpack ASK73.1, the actuators may be mounted on the same damper shaft.

Required actuators

The quantity of actuators required depends on several torque factors. After obtaining the damper torque rating (Nm/m²) from the manufacturer and determining the damper area, calculate the torque required to move the damper as follows:

Total Torque = Torque Rating × Damper Area

Calculating the required actuators

\[
\text{Number of actuators} = \frac{\text{Total Damper Torque required}}{\text{SF} \times \text{Actuator Torque (Refer to Specifications)}}
\]

1 Safety Factor: When calculating the number of actuators 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).

Sizing transformers for AC 24 V

- Use safety insulating transformers with double insulation in accordance with EN 60 742; The transformers must be made for 100% runtime.
- Observe all local safety rules and regulations pertaining to sizing and protecting transformers.
- Determine the transformer’s power consumption by adding the power consumption in VA for all actuators used.

Wiring and commissioning

Refer to "Commissioning notes" and "Internal diagram" in this data sheet as well as to the HVAC job drawings.
### Mounting notes

#### Mounting instructions
All information and steps to properly prepare and mount the actuator are listed in the Mounting Instruction guide M4613 delivered with the actuator. The shaft adapter as well as all other individual parts are not pre-mounted as the actuator components are put together differently depending on the direction of rotation (right or left) and the damper shaft length. Refer to “Mechanical design” in this data sheet.

#### Mounting position
Select the mounting position so that you can easily access the cables as well as the setting dials on the front of the actuator. Refer to "Dimensions".

#### Housing protection
In order to satisfy the requirements as per IP54, the following mounting conditions must be fulfilled:
- Mount the actuators only vertically (cabling see below) for air dampers with horizontal shafts.
- When the actuator is mounted directly on the damper shaft, the mounting angle may be a maximum of $+/- 45 \, ^\circ$.
- Use the ASK75.1 weather shield for mounting in any other position.

#### Mounting bracket
If you mount the actuator directly on the damper shaft, the mounting bracket must be used. The insertion depth for the shaft into the housing must be sufficient and guaranteed.

#### Damper shafts
Information on minimum length and diameter for the damper shaft is listed in "Technical data".

#### Spring preload
The actuator is shipped with a 5° preload which ensures closing pressure for the air dampers.

#### Mechanical limitation of the rotational angle
If necessary, you can limit the rotational angle in increments of 5° for the entire span by positioning the shaft adapter in the respective position.

#### Using the mounting sets
The mounting sets which are used to change the rotational movement into a linear stroke as described in "Type summary" are mounted separately.

### Commissioning notes

#### References
All information necessary for commissioning is contained in the following:
- This data sheet 4613
- Mounting instructions M4613
- Job diagram

#### Environmental conditions
Check to ensure that all permissible values as contained in "Technical data" are observed.

#### Mechanical check
- Check for proper mounting and to ensure that all mechanical settings are in accordance with the plant-specific requirements. Additionally, ensure that the dampers are shut tight when in the closed position.
- Fasten the actuator securely to avoid side load.
- Check the rotation direction: Manually change the damper position by turning the gearing using a plug-in hex wrench in accordance with the mounting instructions.

#### Electrical check
- Check to ensure that the cables are connected in accordance with the plant wiring diagram.
- The operating voltage AC 24 V (SELV/PELV) or AC 230 V must be within the tolerance values.
- Functional check:
  - The actuator must turn from 0° to 90° (end position with rotational angle limitation) when applying operating voltage.
  - After interrupting the supply voltage, the actuator must return to the zero-position.
- Switch the auxiliary switch contacts "A" and "B" while the actuator reaches the respective switching positions.
**Factory settings for auxiliary switches A and B**
(see "Technical design")

The auxiliary switches are factory set:
- **Switch A**: Switching point at 5°
- **Switch B**: Switching point at 85°

To change the settings of A and B, use a flat blade screwdriver to turn the switch adjustment dials to the desired setting.

**Important**

The angle values are valid only for the actuator position "0"°. (The switch adjustment dials turn together with the actuator).

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**Technical data**

<table>
<thead>
<tr>
<th><strong>Power supply AC 24V</strong></th>
<th><strong>Power supply AC 230V</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>for</strong> GCA121.1E &amp; GCA126.1E</td>
<td><strong>for</strong> GCA321.1E &amp; GCA326.1E</td>
</tr>
<tr>
<td><strong>Operating voltage</strong></td>
<td>AC 230 V ± 10 %</td>
</tr>
<tr>
<td><strong>Safety extra-low voltage (SELV) or protection by extra-low voltage (PELV) as per</strong></td>
<td>HD 384</td>
</tr>
<tr>
<td><strong>Protection class</strong></td>
<td>III as per EN 60 730</td>
</tr>
<tr>
<td><strong>Requirements for external safety insulating transformer (100% duty) to Feeder protection external</strong></td>
<td>EN 60 742</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>max. 10 A</td>
</tr>
<tr>
<td><strong>Power consumption: running</strong></td>
<td>50/60 Hz</td>
</tr>
<tr>
<td><strong>Power consumption: holding</strong></td>
<td>8 VA/6 W</td>
</tr>
<tr>
<td><strong>Power supply line AC 24 V (wires 1-2) / AC 230 V (wires 3-4)</strong></td>
<td>3 VA/1.5 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Auxiliary switches</strong></th>
<th><strong>Contact rating</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>for</strong> GCA126.1E &amp; GCA326.1E</td>
<td>6 A resistive, 2 A inductive</td>
</tr>
<tr>
<td><strong>Life:</strong></td>
<td>10⁴ switchings</td>
</tr>
<tr>
<td>6 A resistive, 2 A inductive</td>
<td>5 x 10⁴ switchings</td>
</tr>
<tr>
<td>5 A resistive, 1 A inductive</td>
<td>10⁵ switchings</td>
</tr>
<tr>
<td><strong>no load</strong></td>
<td><strong>Protection class</strong></td>
</tr>
<tr>
<td></td>
<td>II as per EN 60 730</td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td><strong>Voltage proof auxiliary switch to housing</strong></td>
</tr>
<tr>
<td>AC 24...230 V</td>
<td>AC 4 kV</td>
</tr>
<tr>
<td><strong>Protection class</strong></td>
<td><strong>Setting range for switchover contacts</strong></td>
</tr>
<tr>
<td>II as per EN 60 730</td>
<td>5°...85°</td>
</tr>
<tr>
<td><strong>Factory setting:</strong></td>
<td><strong>Setting increments</strong></td>
</tr>
<tr>
<td>Switch A</td>
<td>5°</td>
</tr>
<tr>
<td>Switch B</td>
<td>85°</td>
</tr>
</tbody>
</table>

**Connection cables**

- Power supply line AC 24 V (wires 1-2) / AC 230 V (wires 3-4): 2 x 0.75 mm²
- Auxiliary switch cables (wires S1...S6): 6 x 0.75 mm²

**Mechanical data**

- **Nominal torque**: 16 Nm
- **Restoring torque (for power failure)**: 16 Nm
- **Min. holding torque**: > 16 Nm
- **Max. torque**: < 50 Nm
- **Nominal angle of rotation (with position indication)**: 90°
- **Max. angle of rotation (mechanically limited)**: 95° ± 2°
- **Runtime for nominal angle of rotation 90° (motor operation)**: 90 s
- **Closing (on power loss) with spring return**: 15 s
- **Direction of rotation (determined by type of mounting)**: clockwise/counter clockwise
- **Mechanical life**: 10⁶ cycles

**Dimensions for the damper shaft**

- Round: 8...25.6 mm
- Square: 6...18 mm
- Min. length: 20 MONOGYR

**Max. shaft hardness**: < 400 HV

**Actuator dimensions**: see "Dimensions"

**Weight**

- GCA121.1E, GCA126.1E: 2 kg
- GCA321.1E, GCA326.1E: 2.1 kg

**Environmental conditions**

- **Transport**: IEC 721-3-2
- **Climatic conditions**: Class 2K2
- **Temperature**: −32...+70 °C
- **Humidity (non-condensing)**: < 95% r.h.
- **Mechanical conditions**: Class 2M3
### Operation
- **Climatic conditions**: IEC 721-3-3
- **Mounting location**: Class 3K5
- **Temperature**: Inside, weather-protected
- **Temperature range**: -32...+55 °C
- **Humidity (non-condensing)**: < 95% r.h.

### IP-Code
- **Housing type according to EN 60 529**: IP 54

### Conformity
- In accordance with the directives set forth by the European Union
- **Electromagnetic compatibility (EMC)**: 89/336/EEC
- **Low voltage directive**: 73/23/EEC

### Product standards
- **Automatic electric regulating and controlling devices for residential use and other applications (Type 1)**: EN 60 730-2-14

### Electromagnetic compatibility
- **Emissions**: EN 50 081-1
- **Immunity**: EN 50 082-2

### Diagrams

#### Internal diagrams

**GCA121.1E**
- **AC 24 V**
- **AC 24 V...230 V / 6 (2) A**
- **GCA126.1E**
- **AC 24 V (SELV/PELV)**

**GCA321.1E**
- **AC 230 V**
- **AC 24 V...230 V / 6 (2) A**
- **GCA326.1E**
- **AC 230 V**

#### Cable labeling

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<th>Designation</th>
<th>Color</th>
<th>L&amp;G terminal code</th>
</tr>
</thead>
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<tr>
<td>Actuators AC 24 V</td>
<td>1</td>
<td>System potential AC 24 V</td>
<td>red</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>System neutral</td>
<td>black</td>
<td>G0</td>
</tr>
<tr>
<td>Actuators AC 230V</td>
<td>3</td>
<td>Phase AC 230 V</td>
<td>brown</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Neutral conductor</td>
<td>blue</td>
<td>N</td>
</tr>
<tr>
<td>Auxiliary switches</td>
<td>S1</td>
<td>Switch A Input</td>
<td>gray/red</td>
<td>Q11</td>
</tr>
<tr>
<td></td>
<td>S2</td>
<td>Switch A Normally closed contact</td>
<td>gray/blue</td>
<td>Q12</td>
</tr>
<tr>
<td></td>
<td>S3</td>
<td>Switch A Normally open contact</td>
<td>gray/pink</td>
<td>Q14</td>
</tr>
<tr>
<td></td>
<td>S4</td>
<td>Switch B Input</td>
<td>black/red</td>
<td>Q21</td>
</tr>
<tr>
<td></td>
<td>S5</td>
<td>Switch B Normally closed contact</td>
<td>black/blue</td>
<td>Q22</td>
</tr>
<tr>
<td></td>
<td>S6</td>
<td>Switch B Normally open contact</td>
<td>black/pink</td>
<td>Q24</td>
</tr>
</tbody>
</table>
Connection diagram

GCA121.1E
GCA126.1E

AC 24 V (SELV/PELV)

N Regulator or controller
Y Actuator GCA12..., two-position, AC 24 V
SP System potential AC 24 V
SN System neutral

GCA321.1E
GCA326.1E

AC 230 V

N Regulator or controller
Y Actuator GCA32..., two-position, AC 24 V
L Phase conductor AC 230 V
N Neutral conductor

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Dimensions

Dimensions in mm © 1999 Siemens Building Technologies Ltd.