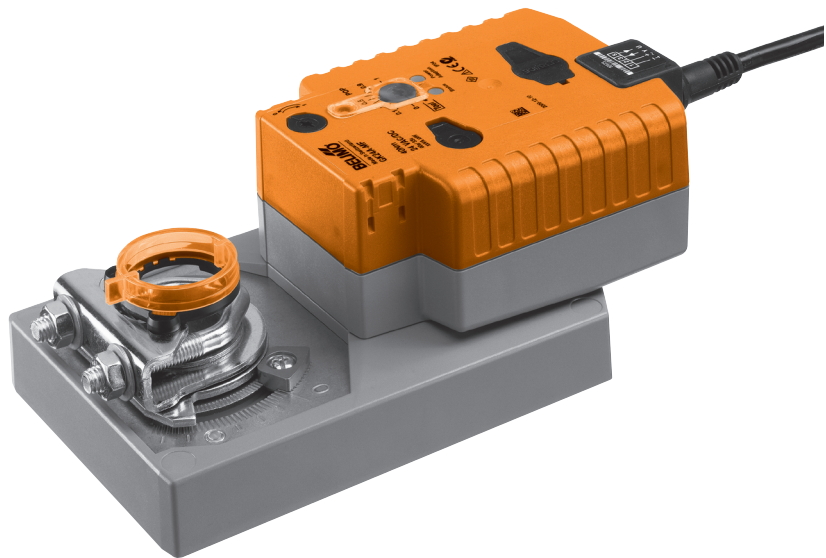


SuperCap rotary actuator with emergency setting function and extended functionalities for adjusting air dampers in ventilation and air-conditioning systems for building services installations and in laboratories

- For air dampers up to approx. 8 m²
- Torque 40 Nm
- Nominal voltage AC/DC 24 V
- Control: Open-close
- Design life SuperCaps 15 years



Technical data

| | | | |
|---------------------------------|---|--|--------------------------------------|
| Electrical data | Nominal voltage | AC 24 V, 50/60 Hz / DC 24 V | |
| | Nominal voltage range | AC 19.2 ... 28.8 V / DC 21.6 ... 28.8 V | |
| | Power consumption | In operation | 11 W @ nominal torque |
| | | At rest | 3 W |
| | | For wire sizing | 21 VA (I _{max} 20 A @ 5 ms) |
| | Connection | Cable 1 m, 3 x 0.75 mm ² | |
| | Parallel operation | Yes (note the performance data) | |
| Functional data | Torque | ≥40 Nm | |
| | Inhibiting torque | ≥40 Nm | |
| | Setting emergency position (POP) | 0 ... 100%, adjustable (POP rotary button) of maximum angle of rotation | |
| | Bridging time with voltage interruption | 2 s | |
| | Position accuracy | ±5% | |
| | Direction of rotation | Motor | Reversible with switch ↺ / ↻ |
| | | Emergency setting position | Reversible with switch 0 ... 100% |
| | Direction of rotation | At switch position 1 ↺ and 0 ↻, respectively | |
| | Manual override | Gearing latch disengaged with push button | |
| | Angle of rotation | Max. 95°↺, can be limited at both ends with adjustable mechanical end stops | |
| | Running time | Motor | 150 s / 90°↺ |
| | | Emergency setting position | 35 s @ 0 ... 50°C |
| | Sound power level | Motor | ≤53 dB (A) @ 90 s running time |
| ≤52 dB (A) @ 150 s running time | | | |
| | Emergency setting position | ≤61 dB (A) | |
| | Position indication | Mechanical, pluggable | |
| Safety | Protection class | III Safety extra-low voltage UL Class 2 Supply | |
| | Degree of protection | IP54 NEMA 2, UL Enclosure Type 2 | |
| | EMC | CE according to 2004/108/EC | |
| | Certification | Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14 cULus according to UL 60730-1A and UL 60730-2-14 and CAN/CSA E60730-1:02 | |
| | Mode of operation | Type 1.AA | |
| | Rated impulse voltage | 0.8 kV | |
| | Control pollution degree | 3 | |
| | Ambient temperature | -30 ... +50°C | |
| | Non-operating temperature | -40 ... +80°C | |
| | Ambient humidity | 95% r.h., non-condensating | |
| | Maintenance | Maintenance-free | |

Terms and abbreviations POP = Power off position / emergency setting position
PF = Power fail delay time / bridging time

Technical data

(continued)

| | | |
|---------------------|------------|----------------------------|
| Dimensions / Weight | Dimensions | See «Dimensions» on page 4 |
| | Weight | Approx. 1.8 kg |

Safety notes



- The actuator is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed during installation.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

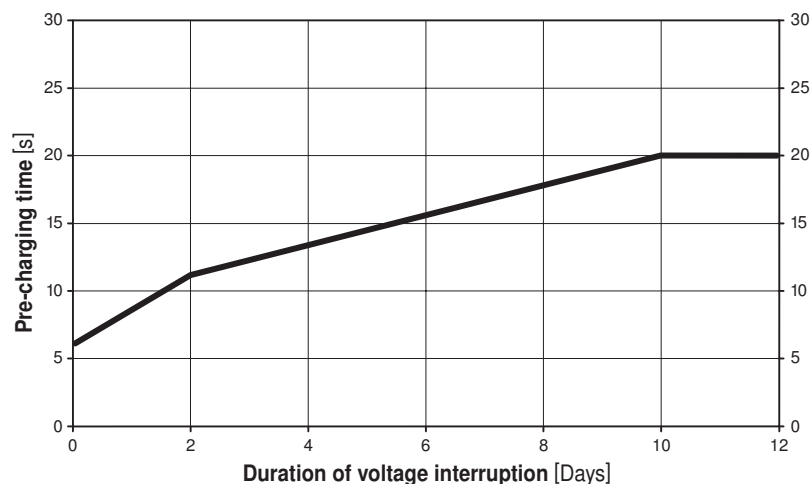
Product features

Mode of operation The actuator moves the air damper to the desired operating position at the same time as the integrated capacitors are loaded (open-closed). Interrupting the supply voltage causes the air damper to be rotated to the selected emergency setting position (POP) by means of stored electrical energy.

Pre-charging time (start up) The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of an electricity interruption, the actuator can be moved at any time from its current position into the preset emergency setting position (POP).
The duration of the pre-charging time depends mainly on how long the power was interrupted.

Typical pre-charging times

| Pre-charging time [s] | Duration of voltage interruption [Days] | | | | |
|-----------------------|---|---|----|----|-----|
| | 0 | 1 | 2 | 7 | ≥10 |
| | 6 | 9 | 11 | 16 | 20 |



Delivery condition (capacitors) The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20 s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level.

Simple direct mounting Simple direct mounting on the damper spindle with a universal spindle clamp, supplied with an anti-rotation strap to prevent the actuator from rotating.

Manual override Manual override with push button possible (the gear is disengaged for as long as the button remains pressed down).

High operational reliability The actuator is overload-proof, requires no limit switches and automatically stops when the end stop is reached.

Home position / Start The spindle clamp of the actuator is set ex-works to 0° -> eingestellt.
After the supply voltage has been applied, the actuator moves into the selected position.

Product features

(continued)

Direction of rotation switch When actuated, the direction of rotation switch changes the running direction in normal operation.
The direction of rotation switch has no influence on the emergency setting position (POP) which has been set.

Emergency setting position (POP) rotary button The «Emergency setting position» rotary button can be used to adjust the desired emergency setting position (POP). The POP range is in reference to the maximum angle of rotation of the actuator.
The rotary button is always in reference to an angle of rotation of 95° and does not take into consideration any end stops which were set retroactively.
In the event of a voltage interruption, the actuator will move into the selected emergency setting position, taking into account the bridging time (PF) of 2 s which was set ex-works.


Accessories

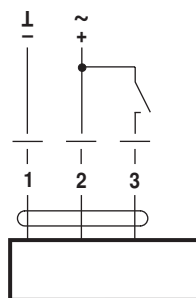
| | Description | Data sheet |
|------------------------|--|------------------------|
| Electrical accessories | Auxiliary switch S..A.. | T2 - S..A.. |
| | Feedback potentiometer P..A.. | T2 - P..A.. |
| | Adapter Z-SPA | |
| | It is imperative that this adapter be ordered if an auxiliary switch or a feedback potentiometer is required and if at the same time the shaft adapter is installed on the rear side of the actuator (e.g. with short-spindle installation). | |
| Mechanical accessories | Various accessories | T2 - Z-GM..A../GK..A.. |

Electrical installation

Wiring diagram

Notes

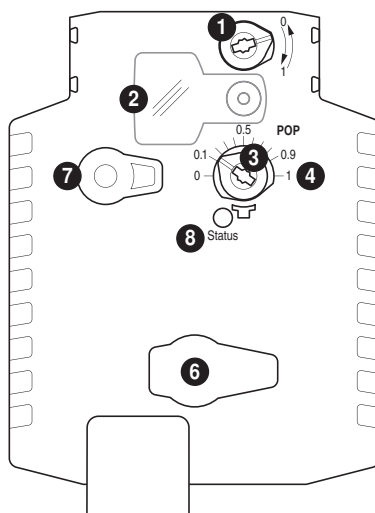
- Connection via safety isolation transformer. 
- Parallel connection of other actuators possible. Note the performance data.



Cable colours:

- 1 = black
- 2 = red
- 3 = white

Operating controls and indicators



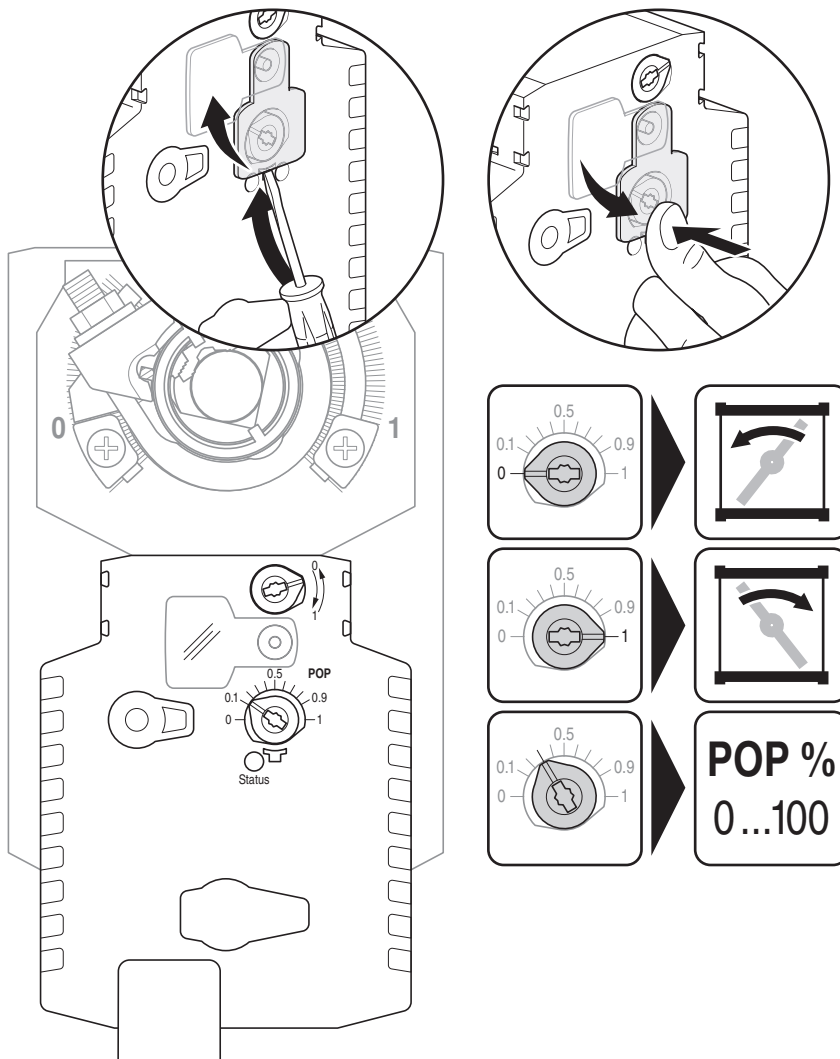
- ➊ Direction of rotation switch
- ➋ Cover, POP button
- ➌ POP button
- ➍ Scale for manual adjustment
- ➎ (no function)
- ➏ Disengagement button

| LED display | Meaning / function |
|-------------|--|
| ➐ green | |
| Illuminated | Operation OK / without fault |
| Blinking | POP function active |
| Off | – Not in operation – Pre-charging time SuperCap – Fault SuperCap |

Operating controls and indicators

(continued)

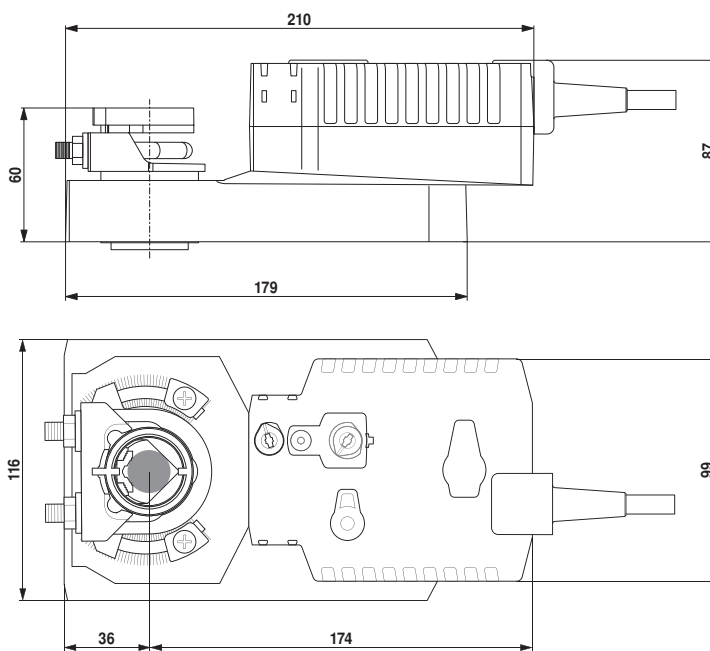
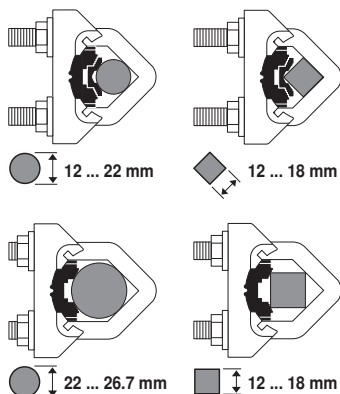
Setting the POP Power off position



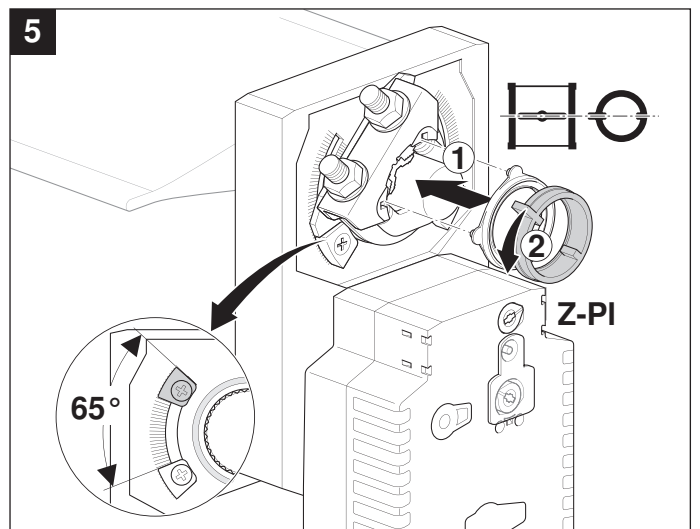
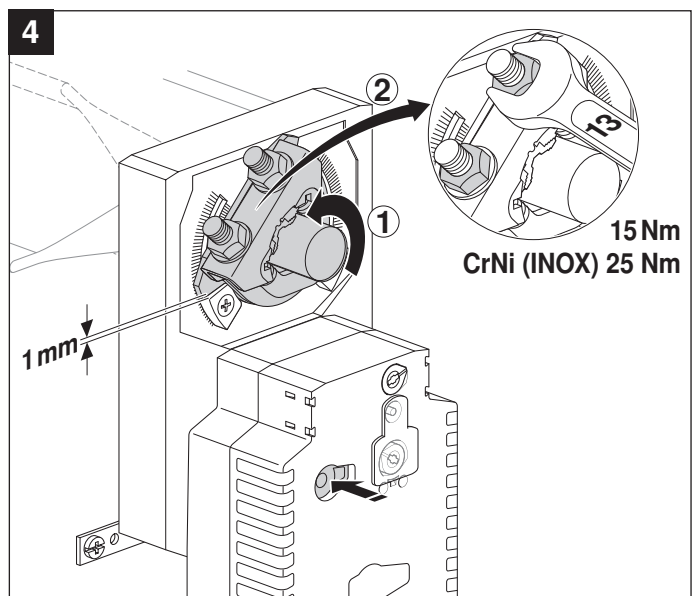
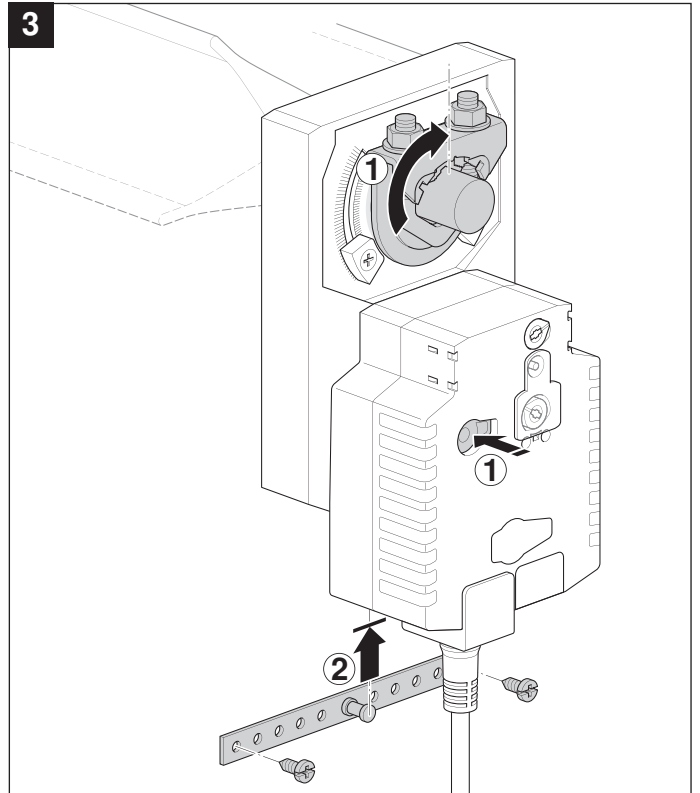
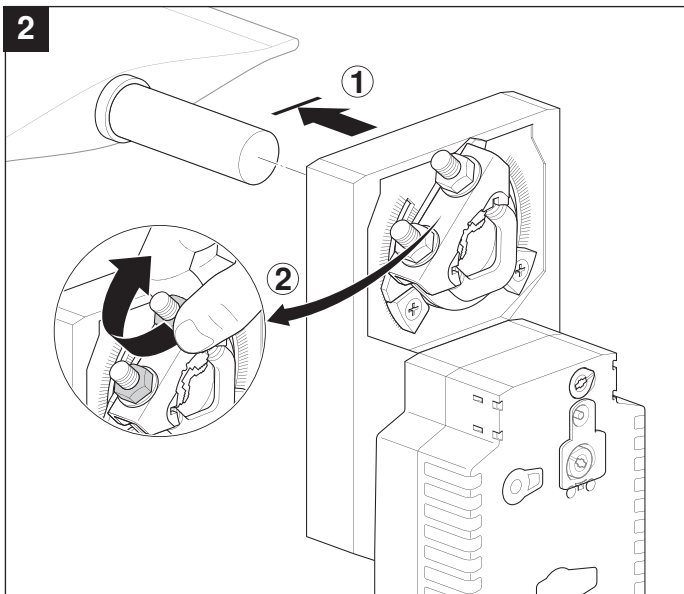
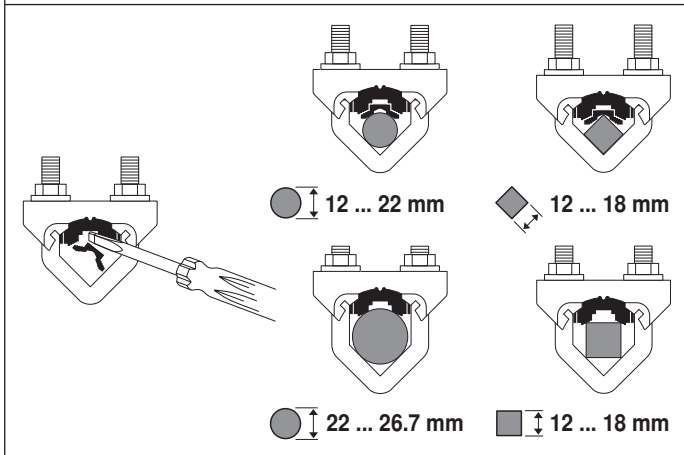
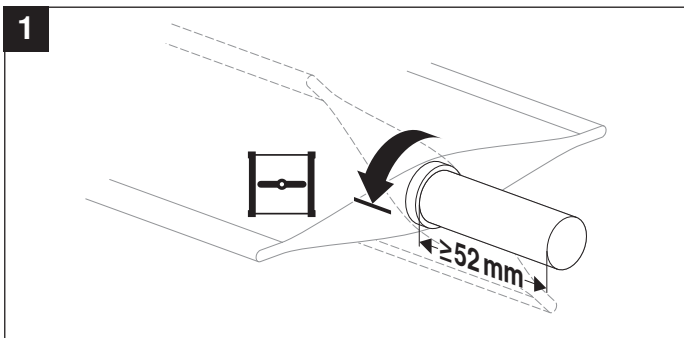
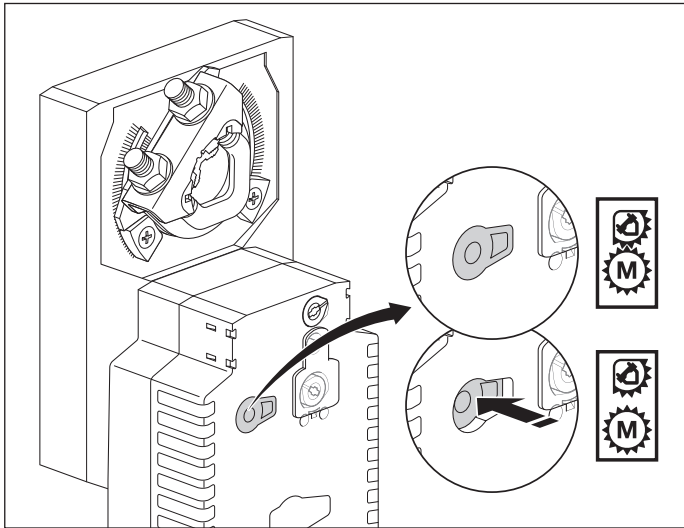
Dimensions [mm]

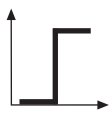
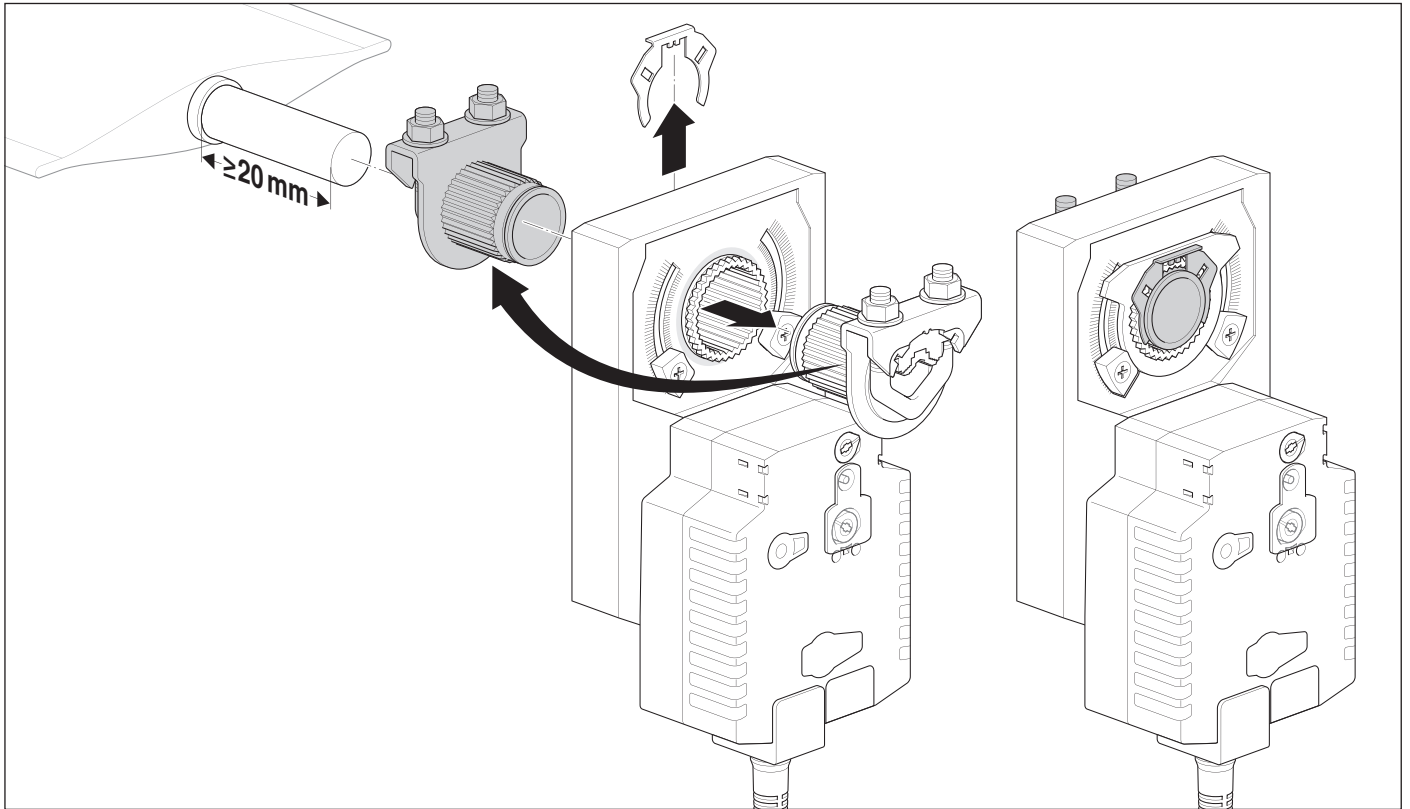
Dimensional drawings

| Damper spindle | Length | | | |
|----------------|--------|-------------|-----|-------|
| | ≥52 | 12 ... 26.7 | ≥12 | ≤25.5 |
| | ≥20 | 12 ... 26.7 | ≥12 | ≤25.5 |

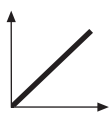
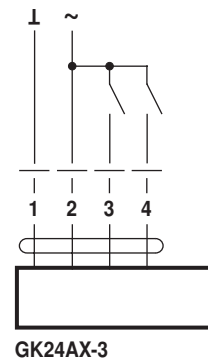
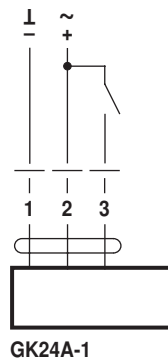
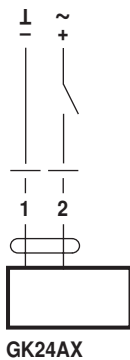


* When an auxiliary switch or a feedback potentiometer is used, see «Accessories»

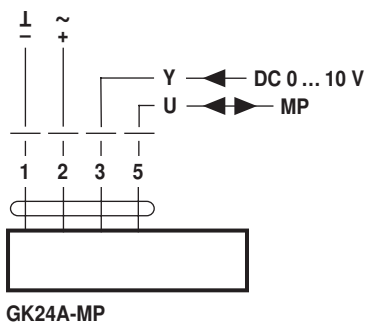
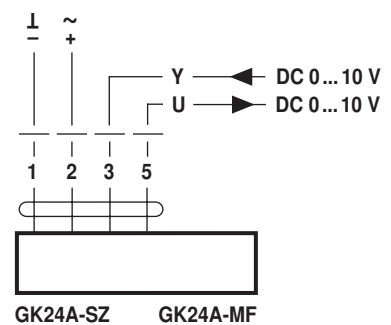
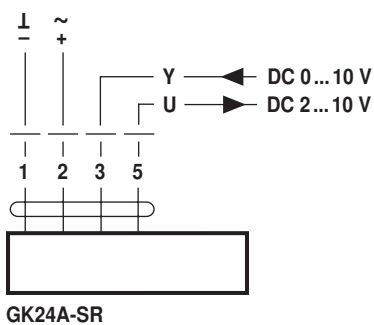




AC 24 V / DC 24 V

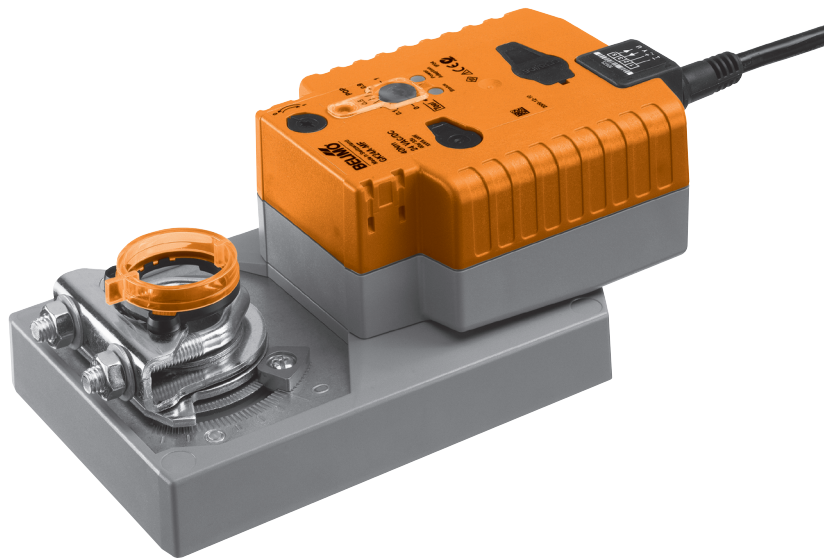


AC 24 V / DC 24 V



Parameterisable SuperCap rotary actuator with emergency setting function and extended functionalities for adjusting air dampers in ventilation and air-conditioning systems for building services installations and in laboratories

- For air dampers up to approx. 8 m²
- Torque 40 Nm (Piggyback 80 Nm) *
- Nominal voltage AC/DC 24 V
- Control: modulating DC 0 ... 10 V or variable
- Position feedback DC 0 ... 10 V or variable
- Design life SuperCaps 15 years



* For more detailed information about piggyback, please contact your Belimo representative.

Technical data

Electrical data

| | |
|-----------------------|---|
| Nominal voltage | AC 24 V, 50/60 Hz / DC 24 V |
| Nominal voltage range | AC 19.2 ... 28.8 V / DC 21.6 ... 28.8 V |
| Power consumption | 11 W @ nominal torque |
| In operation | 3 W |
| At rest | 21 VA (I _{max} 20 A @ 5 ms) |
| For wire sizing | |
| Connection | Cable 1 m, 4 x 0.75 mm ² |
| Parallel operation | Yes (note the performance data) |

| Functional data | Factory settings | Variable | Setting |
|--|---|---|---------|
| Torque | ≥40 Nm | | |
| Inhibiting torque | ≥40 Nm | | |
| Control Control signal Y | DC 0 ... 10 V, input impedance 100 kΩ | Open-close, 3-point (only AC) Modulating (DC 0 ... 32 V) | |
| Operating range | DC 0.5 ... 10 V | Start point DC 0.5 ... 30 V End point DC 2.5 ... 32 V | |
| Position feedback (Measuring voltage U) | DC 0.5 ... 10 V, max. 0.5 mA | Start point DC 0.5 ... 8 V End point DC 2.5 ... 10 V | |
| Setting emergency position (POP) | 0% (POP rotary button end stop, left) | 0 ... 100% | |
| Bridging time (PF) | 2 s | 1 ... 10 s | |
| Position accuracy | ±5% | | |
| Direction of rotation Motor | As an option with ↻ / ↻ | | |
| Emergency setting position | Reversible with switch 0 ... 100% | | |
| Direction of rotation Y = 0 V | At switch position 1 ↻ and 0 ↻, respectively | Electronically reversible | |
| Manual override | Gearing latch disengaged with push button | | |
| Angle of rotation | Max. 95° ↻, can be limited at both ends with adjustable mechanical end stops | | |
| Running time Standard operation | 150 s / 90° ↻ | 90 ... 150 s | |
| Emergency setting position | 35 s @ 0 ... 50°C | | |
| Automatic adjustment of running time, operating range and measuring signal U to match the mechanical angle of rotation | Manual triggering of the adaption by pressing the «Adaption» button | Automatic adaption whenever the supply voltage is switched on, or manual triggering | |
| Override control | MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position, only AC) = 50% | MAX = (MIN + 32%) ... 100% MIN = 0% ... (MAX - 32%) ZS = MIN ... MAX | |
| Sound power level Standard operation | ≤53 dB (A) @ 90 s running time | | |
| Emergency setting position | ≤52 dB (A) @ 150 s running time | | |
| Emergency setting position | ≤61 dB (A) | | |
| Position indication | Mechanical, pluggable | | |

Terms and abbreviations POP = Power off position / emergency setting position
PF = Power fail delay time / bridging time

Technical data

(continued)

Safety

| | |
|---------------------------|--|
| Protection class | III Safety extra-low voltage UL Class 2 Supply |
| Degree of protection | IP54 NEMA 2, UL Enclosure Type 2 |
| EMC | CE according to 2004/108/EC |
| Certification | Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14 cULus according to UL 60730-1A and UL 60730-2-14 and CAN/CSA E60730-1:02 |
| Mode of operation | Type 1.AA |
| Rated impulse voltage | 0.8 kV |
| Control pollution degree | 3 |
| Ambient temperature | -30 ... +50 °C |
| Non-operating temperature | -40 ... +80 °C |
| Ambient humidity | 95% r.h., non-condensating |
| Maintenance | Maintenance-free |

Dimensions / Weight

| | |
|------------|----------------------------|
| Dimensions | See «Dimensions» on page 8 |
| Weight | Approx. 1.8 kg |

Safety notes


- The actuator is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed during installation.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Product features
Mode of operation

The actuator moves the air damper to the **desired operating position at the same time** as the integrated capacitors are loaded. Interrupting the supply voltage causes the air damper to be rotated back into the emergency setting position by means of stored electrical energy. The actuator is controlled with a standard modulating signal of DC 0 ... 10 V and moves to the position defined by the control signal. The measuring voltage U serves for the electrical display of the damper position 0 ... 100%.

Pre-charging time (start up)

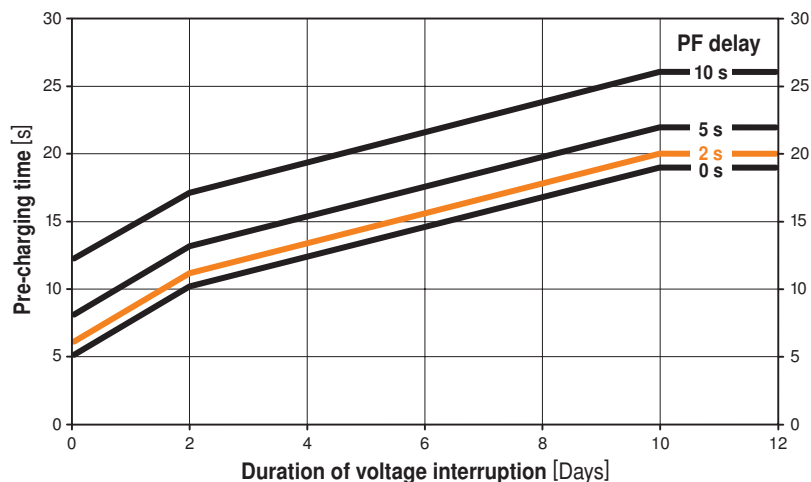
The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of a voltage interruption, the actuator can be moved at any time from its current position into the preset emergency setting position (POP).

The duration of the pre-charging time depends mainly on the following factors:

- Duration of the voltage interruption
- PF delay time (bridging time)

Typical pre-charging times

| PF delay [s] | Duration of voltage interruption [Days] | | | | |
|-----------------------|---|----|----|----|-----|
| | 0 | 1 | 2 | 7 | ≥10 |
| 0 | 5 | 8 | 10 | 15 | 19 |
| 2 | 6 | 9 | 11 | 16 | 20 |
| 5 | 8 | 11 | 13 | 18 | 22 |
| 10 | 12 | 15 | 17 | 22 | 26 |
| Pre-charging time [s] | | | | | |



| Product features | (continued) |
|---|---|
| | <p>Calculation example: In the event of a voltage interruption of 3 days and a set bridging time (PF) of 5 s, the actuator requires a pre-charging time of 14 s (see graphic on page 2) after the voltage has been reconnected.</p> |
| Delivery condition (capacitors) | The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20 s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level. |
| Parameterisable actuators | The factory settings cover the most common applications. Input and output signals and other parameters can be altered with the Belimo service tool MFT-P or with the ZTH-GEN adjustment and diagnostic tool. |
| Simple direct mounting | Simple direct mounting on the damper spindle with a universal spindle clamp, supplied with an anti-rotation strap to prevent the actuator from rotating. |
| Manual override | Manual override with push button possible (the gear is disengaged for as long as the button remains pressed down). |
| High operational reliability | The actuator is overload-proof, requires no limit switches and automatically stops when the end stop is reached. |
| Home position / Start | The clamp of the actuator is set ex-works to 0° $\pm 1^\circ$. After the supply voltage has been applied, the actuator moves into the position defined by the control signal. |
| Direction of rotation switch | When actuated, the direction of rotation switch changes the running direction in normal operation. The direction of rotation switch has no influence on the emergency setting position (POP) which has been set. |
| Emergency setting position (POP) rotary button | <p>The «Emergency setting position» rotary button can be used to adjust the desired emergency setting position (POP) between 0 and 100% in 10% increments. The rotary button applies only to the adapted angle of rotation range of between 30 and 95° <math>\pm 1^\circ</math>. No minimum or maximum set values are taken into account. In the event of a voltage interruption, the actuator will move into the selected emergency setting position, taking into account the bridging time.</p> |
| Settings | <p>The rotary button must be set to the «Tool» position for retroactive settings of the emergency setting position with the Belimo service tool MFT-P. Once the rotary button is set back to the range 0 ... 100%, the manually set value will have positioning authority</p> |
| Bridging time (PF) | <p>Voltage interruptions can be bridged up to a maximum of 10 s. In the event of a voltage interruption, the actuator will remain stationary in accordance with the set bridging time. If the voltage interruption is greater than the set bridging time, then the actuator will move into the selected emergency setting position (POP). The bridging time set ex-works is 2 s. This can be modified at the site of operations with the use of the Belimo service tool MFT-P.</p> |
| Settings | <p>The rotary button must not be set to the «Tool» position! Only the values need to be entered for retroactive adjustments of the bridging time with the Belimo service tool MFT-P.</p> |
| Piggyback (mechanically coupled actuators) | The torque can be increased to 80 Nm by coupling two GK24A-MF actuators with one another. For more detailed information about piggyback, please contact your Belimo representative. |

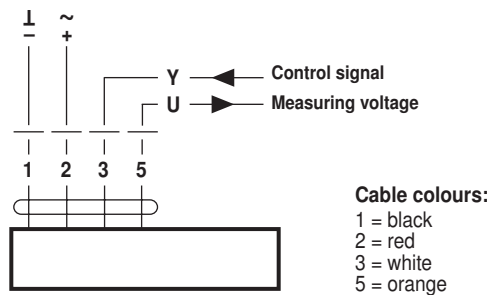
Accessories

| | Description | Data sheet |
|------------------------|--|------------------------|
| Electrical accessories | Auxiliary switch S..A.. | T2 - S..A.. |
| | Feedback potentiometer P..A.. | T2 - P..A.. |
| | Adapter Z-SPA | |
| | It is imperative that this adapter be ordered if an auxiliary switch or a feedback potentiometer is required and if at the same time the shaft adapter is installed on the rear side of the actuator (e.g. with short-spindle installation). | |
| | Belimo service tool MFT-P | |
| | ZTH-GEN adjustment and diagnostic tool | |
| | Position sensor SGA24, SGE24 and SGF24 | T2 - SG..24 |
| Mechanical accessories | Digital position indication ZAD24 | T2 - ZAD24 |
| | Room temperature controller CR24.. | S4 - CR24.. |
| | Various accessories | T2 - Z-GM..A../GK..A.. |

Electrical installation

Wiring diagram

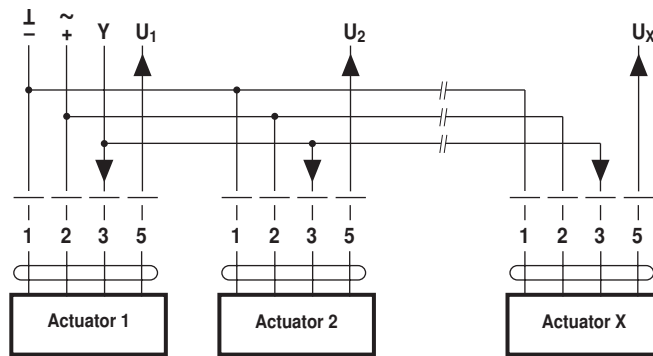
Note
Connect via safety isolation transformer.



Wiring diagram for parallel operation
(mechanically decoupled actuators)

Notes

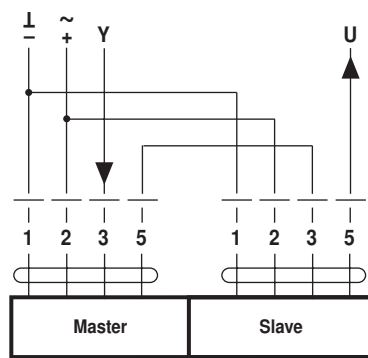
- A maximum of eight actuators can be connected in parallel.
- Parallel operation is permitted only on separated axes.
- It is imperative that the performance data be observed with parallel operation.



Piggyback operation wiring diagram
(mechanically coupled actuators)

Notes

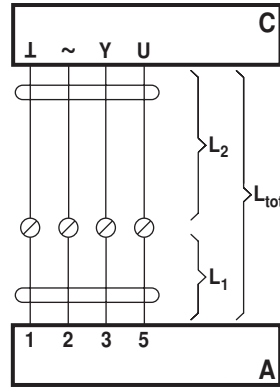
- A maximum of two actuators can be connected in Master-Slave operation.
- Master-Slave operation is permitted only on one fixed axis or on two mechanically coupled axes.
- The programming of the Master actuator is adopted by the Slave actuator.



Electrical installation

(continued)

Cable lengths

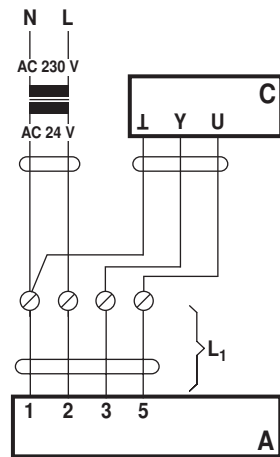


- A = Actuator
- C = Control unit
- L₁ = Belimo connecting cable, 1 m (4 x 0.75 mm²)
- L₂ = Customer cable
- L_{tot} = Maximum cable length

| Cross section L ₂ I / ~ | Max. cable length L _{tot} = L ₁ + L ₂ | | Example for DC |
|--|---|-------|--|
| | AC | DC | |
| 0.75 mm ² | ≤40 m | ≤20 m | 1 m (L ₁) + 19 m (L ₂) |
| 1.00 mm ² | ≤50 m | ≤30 m | 1 m (L ₁) + 29 m (L ₂) |
| 1.50 mm ² | ≤80 m | ≤45 m | 1 m (L ₁) + 44 m (L ₂) |
| 2.50 mm ² | ≤130 m | ≤80 m | 1 m (L ₁) + 79 m (L ₂) |

Note

When several actuators are connected in parallel, the maximum cable length must be divided by the number of actuators.



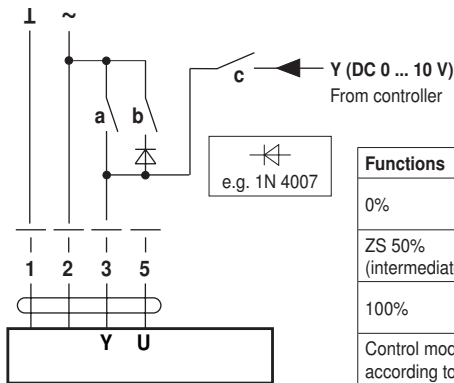
- A = Actuator
- C = Control unit
- L₁ = Belimo connecting cable, 1 m (4 x 0.75 mm²)

Note

There are no special restrictions on installation if the supply and data cable are routed separately.

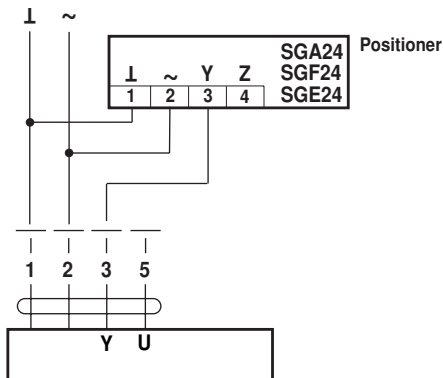
Functions with basic values

Override control with AC 24 V with relay contacts

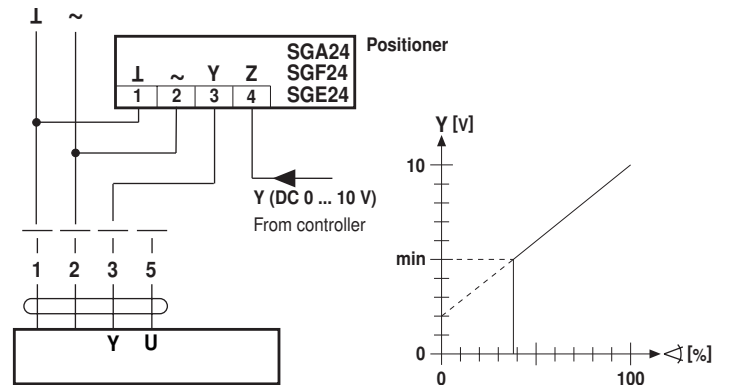


| Functions | a | b | c |
|--------------------------------|---|---|---|
| 0% | — | — | — |
| ZS 50% (intermediate position) | — | — | — |
| 100% | — | — | — |
| Control mode according to Y | — | — | — |

Remote control 0 ... 100%



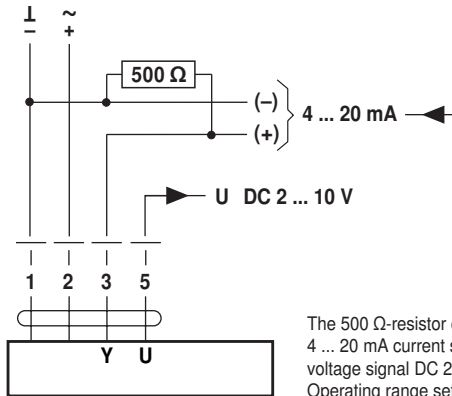
Minimum limit



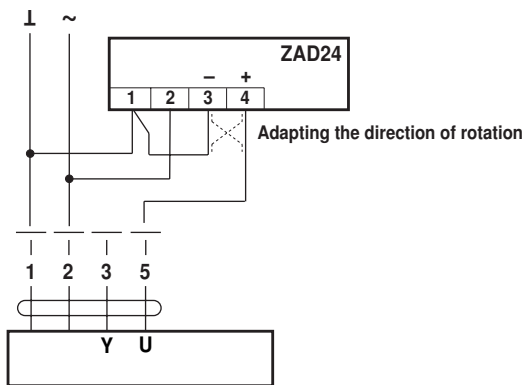
Functions with basic values

(continued)

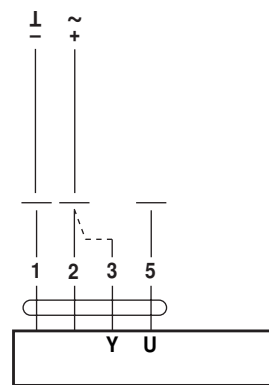
Control with 4 ... 20 mA via external resistance



Position indication



Functional check

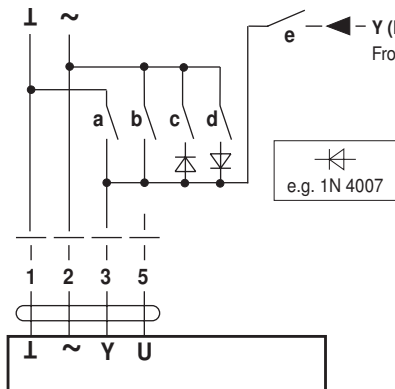


Procedure

- Apply 24 V to connection 1 and 2
- Disconnect connection 3:
 - For direction of rotation 0: Actuator turns in the direction of ↻
 - For direction of rotation 1: Actuator turns in the direction of ↻
- Short circuit connections 2 and 3:
 - Actuator runs in the opposite direction

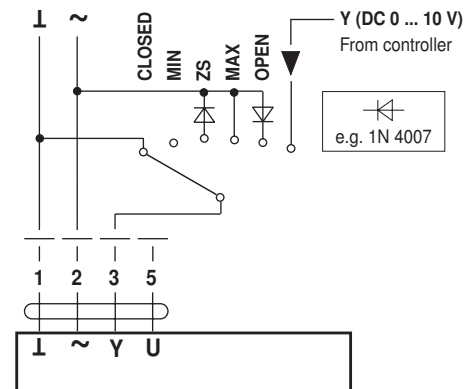
Functions for actuators with specific parameters

Override control and limiting with AC 24 V with relay contacts

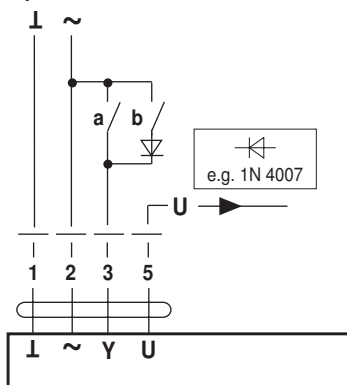


| Functions | a | b | c | d | e |
|-----------------------------|---|---|---|---|---|
| CLOSED | | | | | |
| MIN | | | | | |
| ZS (intermediate position) | | | | | |
| MAX | | | | | |
| OPEN | | | | | |
| Control mode according to Y | | | | | |

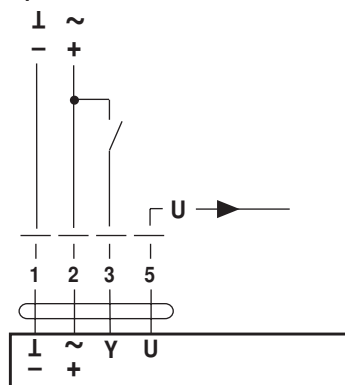
Override control and limiting with AC 24 V with rotary switch



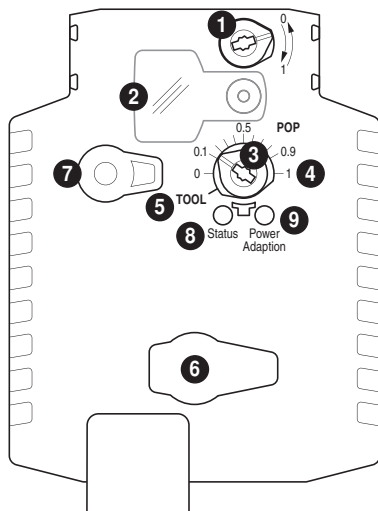
3-point control



Open-close control



Operating controls and indicators

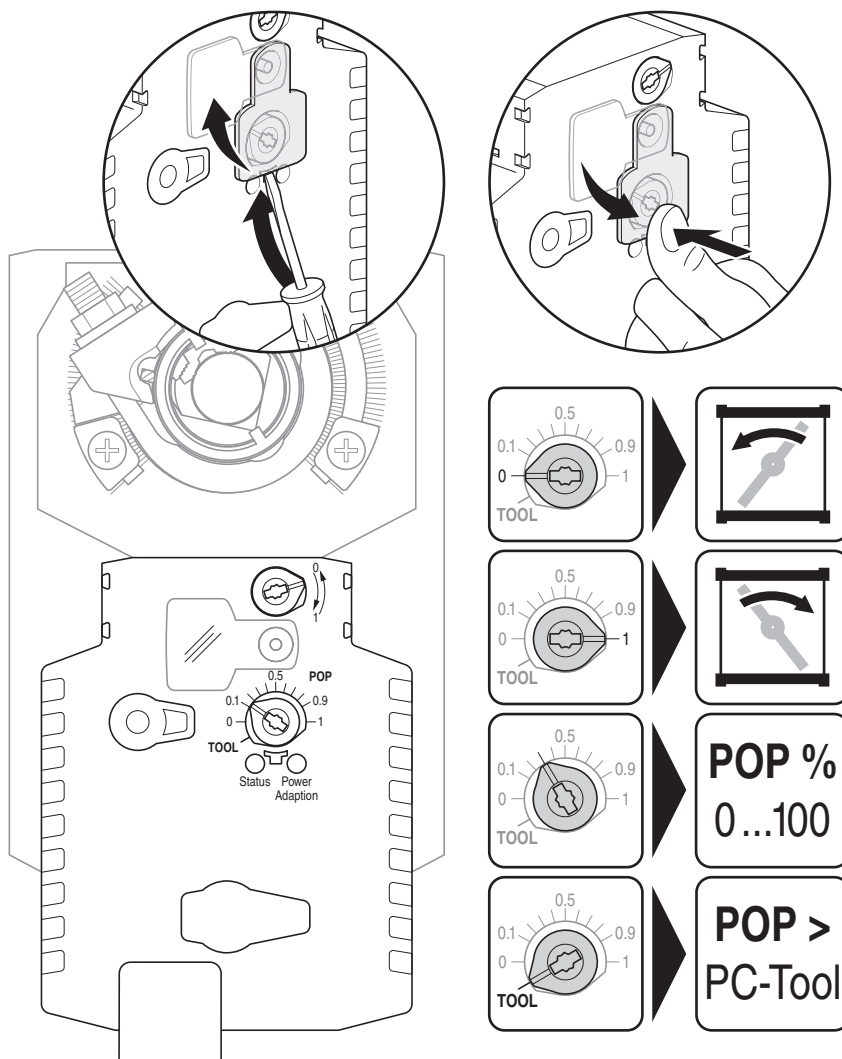


- 1 Direction of rotation switch
- 2 Cover, POP button
- 3 POP button
- 4 Scale for manual adjustment
- 5 Position for adjustment with tool
- 6 Tool socket
- 7 Disengagement button

| LED displays | | Meaning / function |
|--------------|-------------|-------------------------------------|
| 8 yellow | 9 green | |
| Off | Illuminated | Operation OK / without fault |
| Off | Blinking | POP function active |
| Illuminated | Off | Fault |
| Off | Off | Not in operation |
| Illuminated | Illuminated | Adaptation procedure running |
| Blinking | Illuminated | Communication with programming tool |

- 9 Press button: Triggers angle of rotation adaption, followed by standard operation

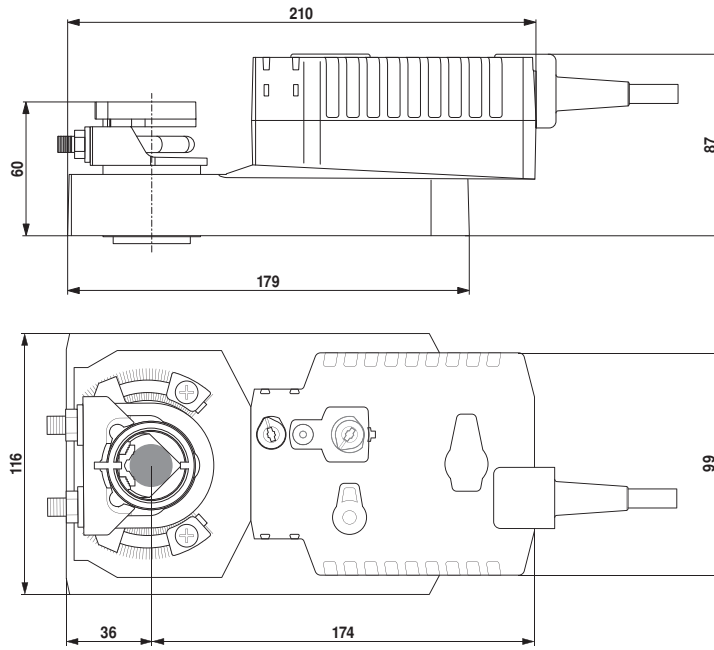
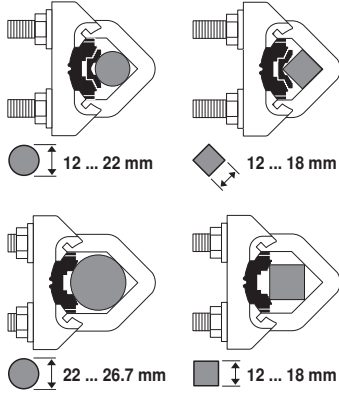
Setting the POP Power off position



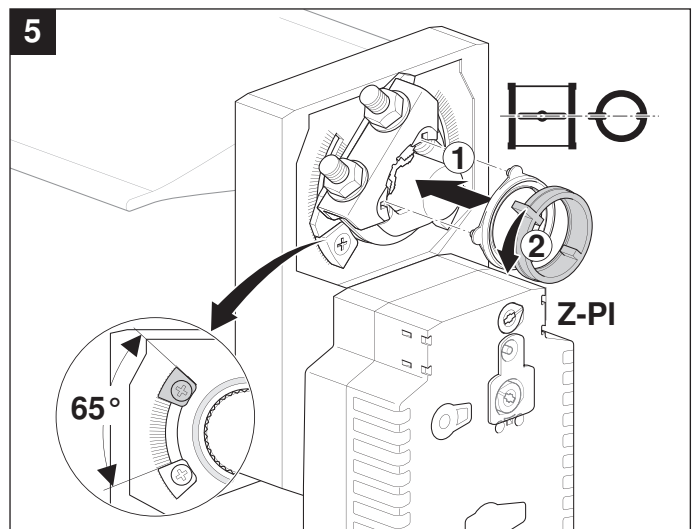
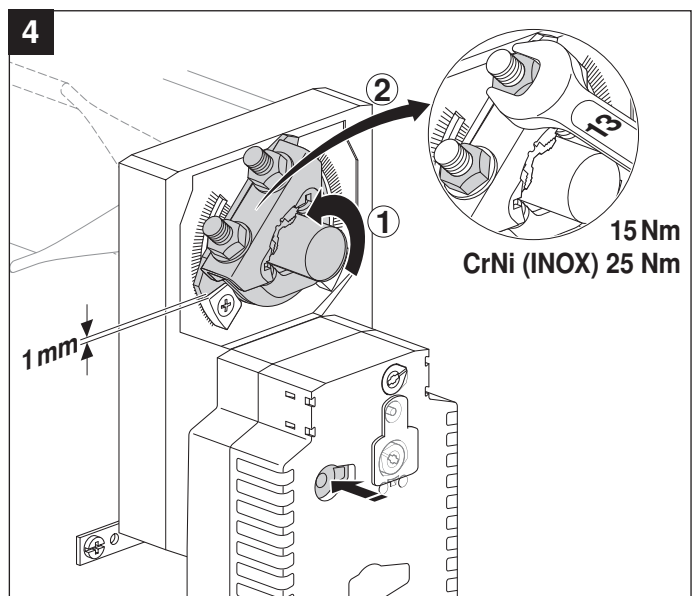
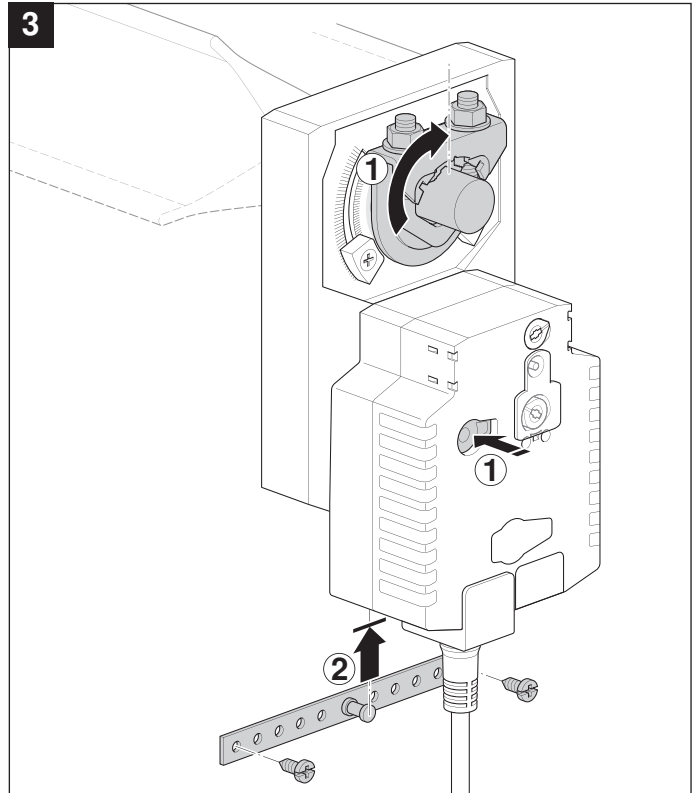
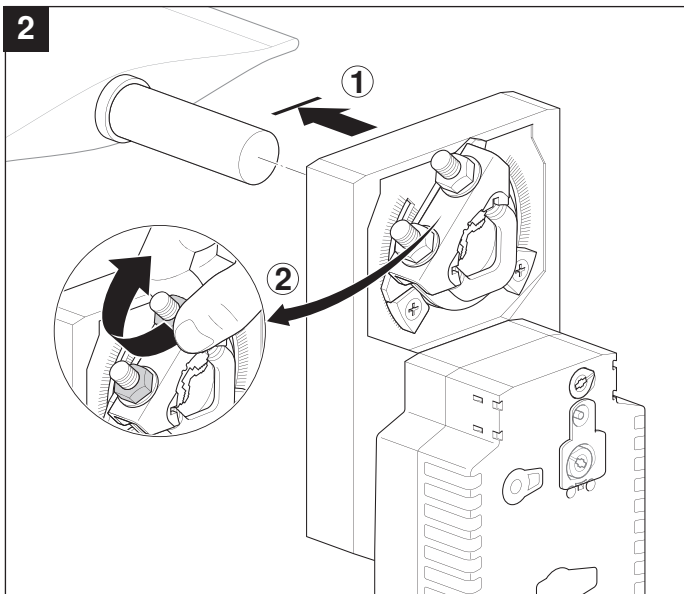
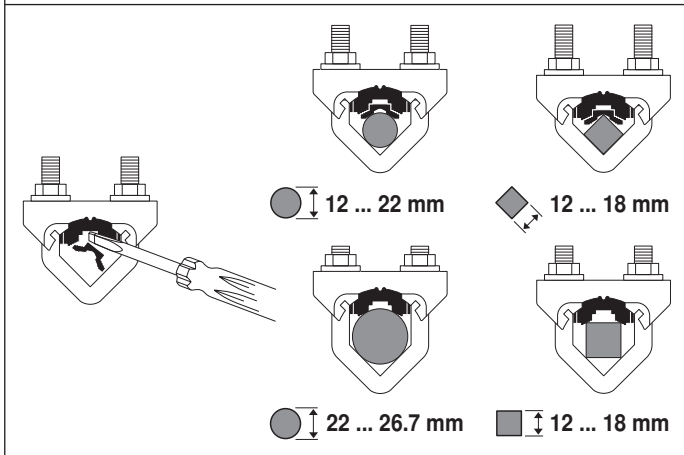
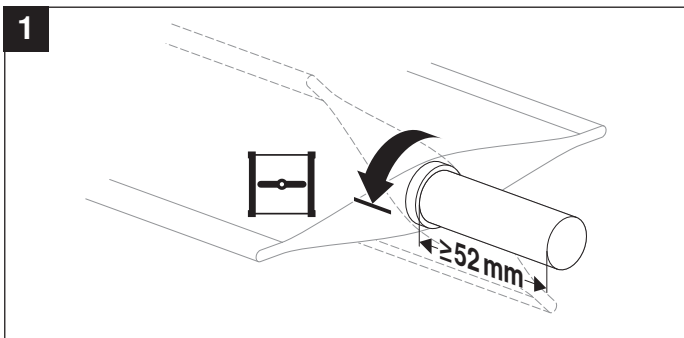
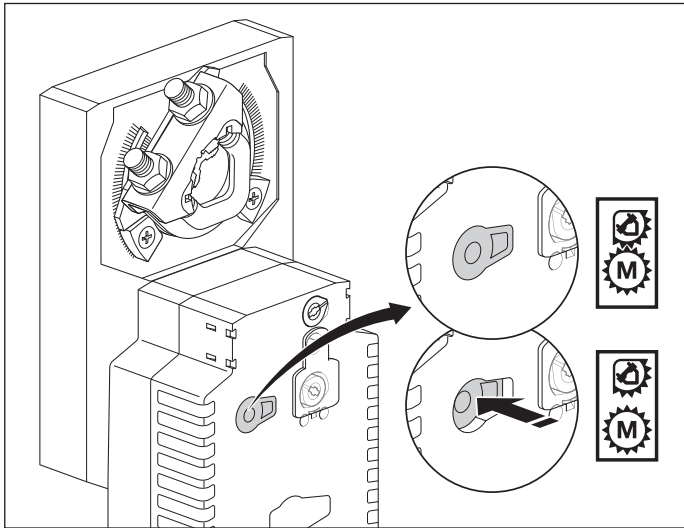
Dimensions [mm]

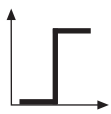
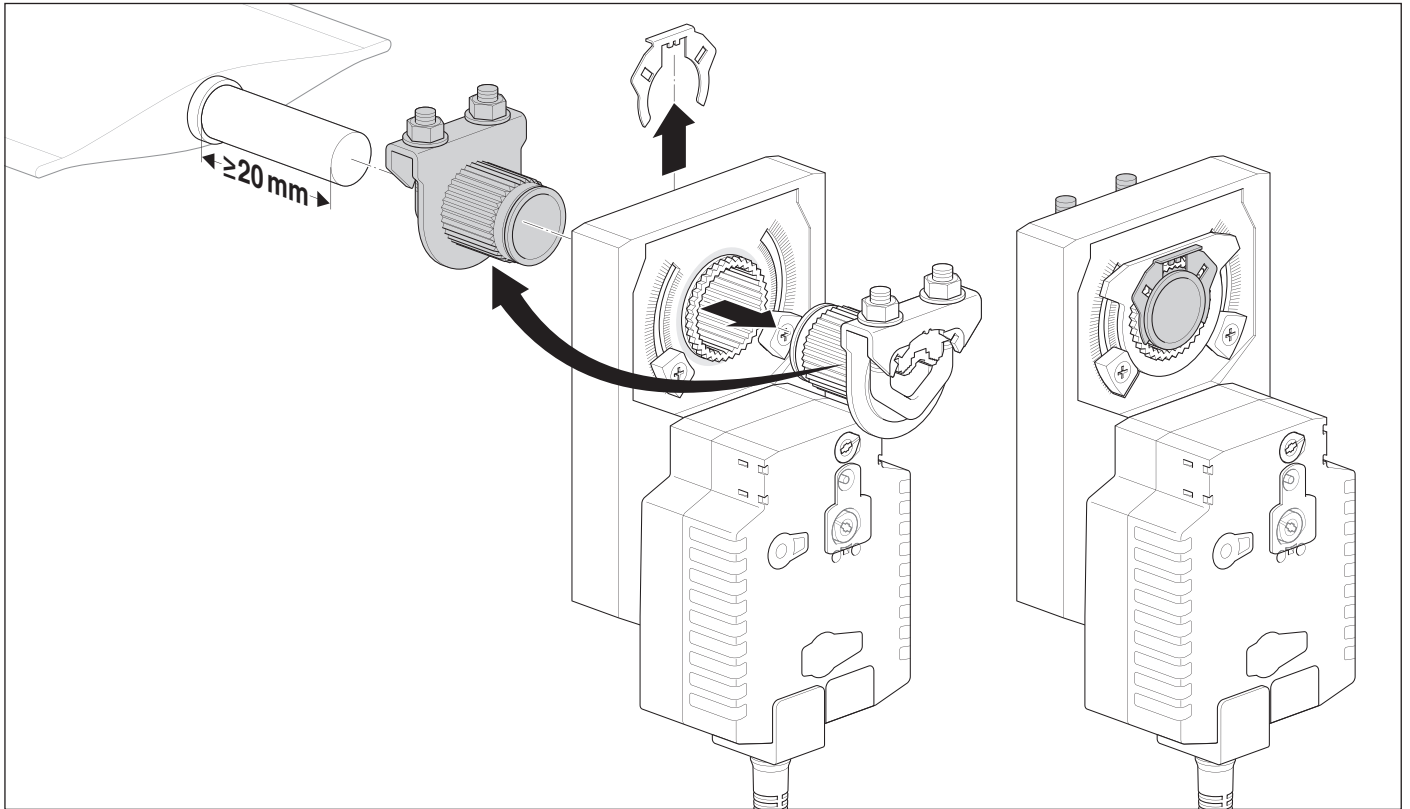
Dimensional drawings

| Damper spindle | Length | ● | ■ | ◆ |
|----------------|--------|-------------|-----|-------|
| | ≥52 | 12 ... 26.7 | ≥12 | ≤25.5 |
| | ≥20 | 12 ... 26.7 | ≥12 | ≤25.5 |

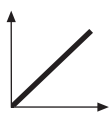
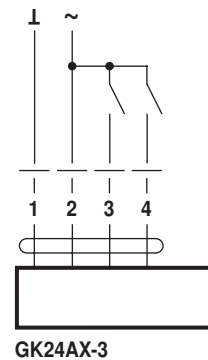
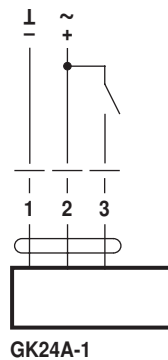
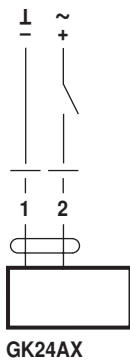


* When an auxiliary switch or a feedback potentiometer is used, see «Accessories»





AC 24 V / DC 24 V



AC 24 V / DC 24 V

