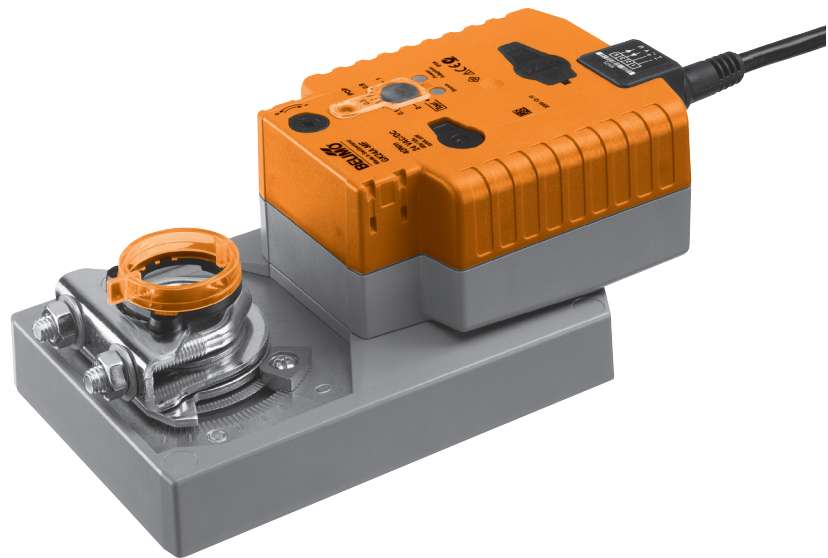


Parameterisable damper actuator with capacitor technology for adjusting air dampers with emergency control function and extended functionalities in ventilation and air-conditioning systems for building services installations and in laboratories

- For air dampers up to approx. 8 m²
- Torque 40 Nm
- Nominal voltage AC/DC 24 V
- Control: modulating DC 0 ... 10 V or variable
- Position feedback DC 0 ... 10 V or variable
- 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, 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 ↺ or 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 ≤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 7
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 travels 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)

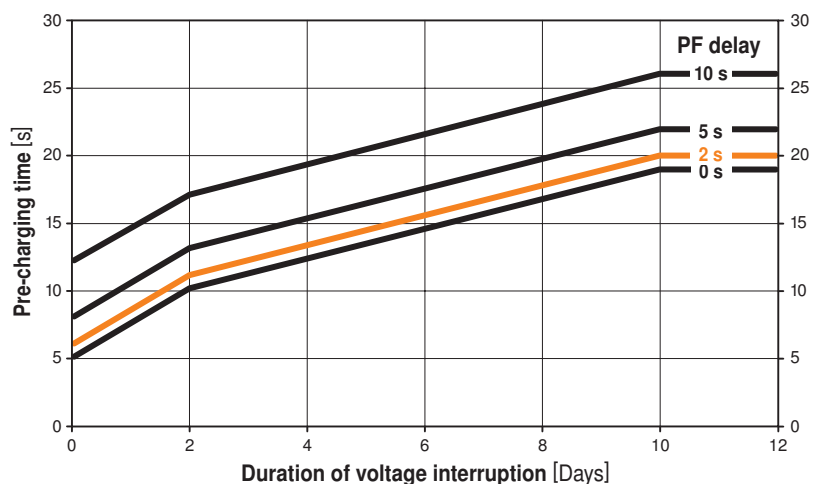
The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of a voltage interruption, the actuator can be moved at any time from its current position into the preset emergency setting position (POP).

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)

	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.
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	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° $\pm 1^\circ$. 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.
Settings	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
Bridging time (PF)	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.
Settings	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.

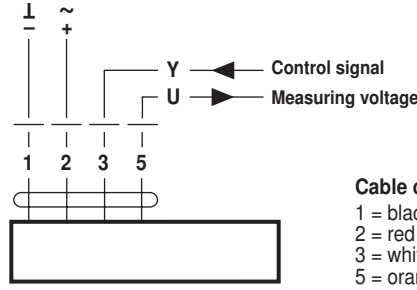
Accessories

	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
Digital position indication ZAD24	T2 - ZAD24	
Room temperature controller CR24..	S4 - CR24..	
Mechanical accessories	Various accessories	T2 - Z-GM..A../GK..A..

Electrical installation

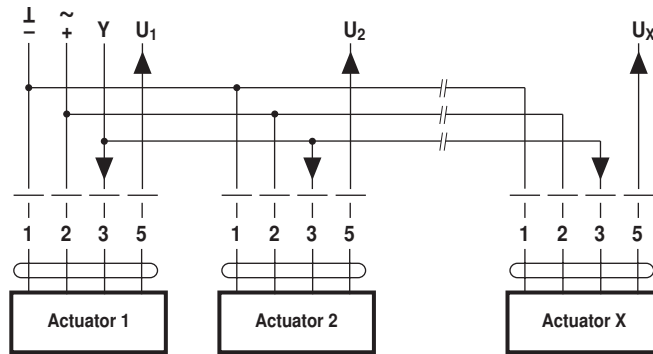
Wiring diagram

Note
Connect via safety isolation transformer.



Cable colours:
1 = black
2 = red
3 = white
5 = orange

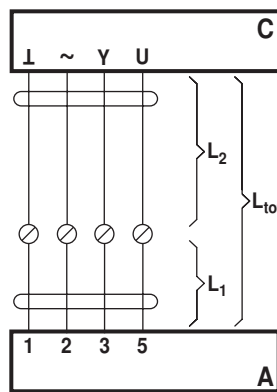
Wiring diagram for parallel operation



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.

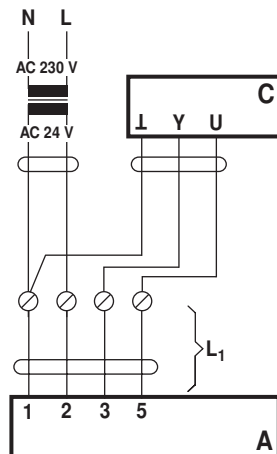
Cable lengths



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 ┴ / ~	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.

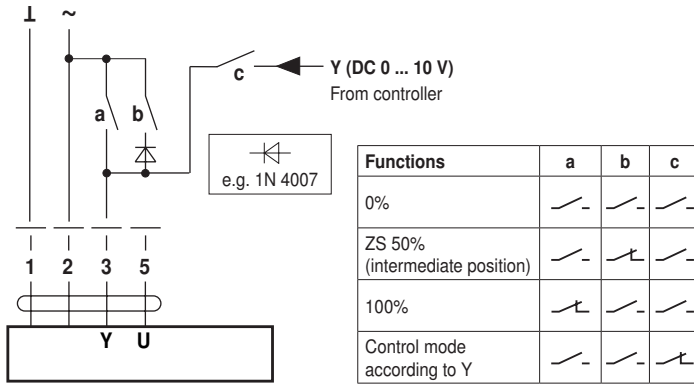


A = Actuator
C = Control unit
L₁ = Belimo connecting cable, 1 m (4 x 0.75 mm²)

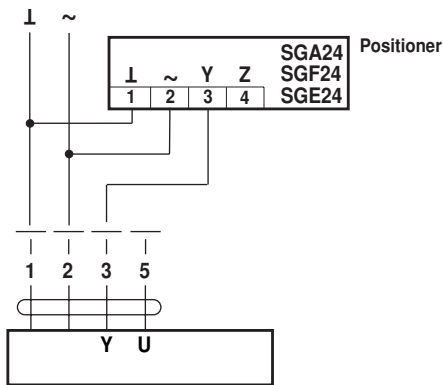
Note
There are no special restrictions on installation if the supply and data cable are routed separately.

Functions with basic values

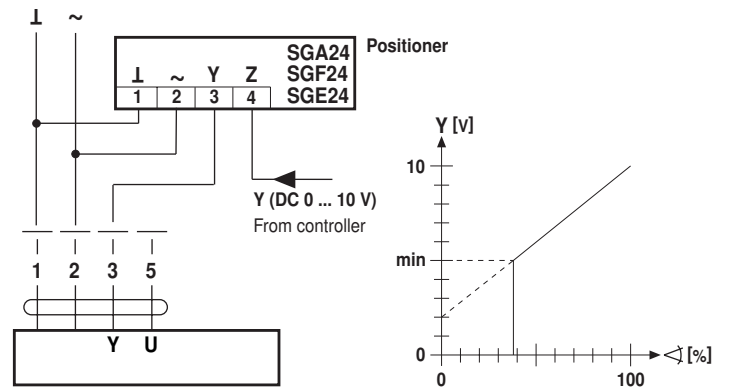
Override control with AC 24 V with relay contacts



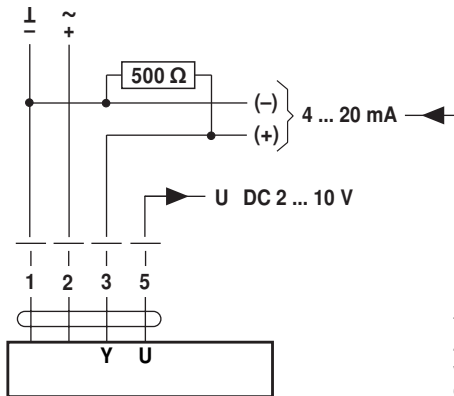
Remote control 0 ... 100%



Minimum limit

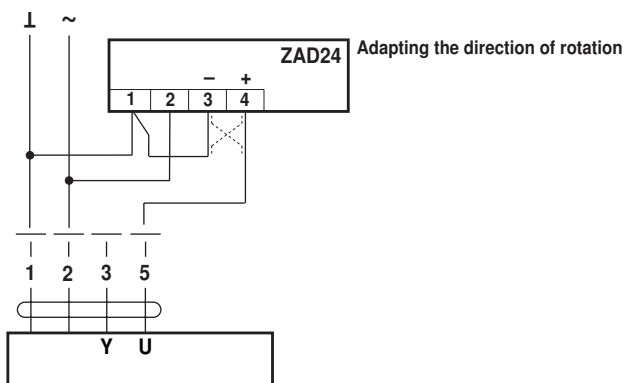


Control with 4 ... 20 mA via external resistance

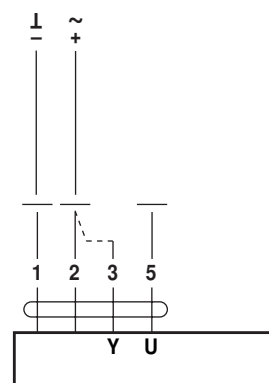


The 500 Ω-resistor converts the 4 ... 20 mA current signal to a voltage signal DC 2 ... 10 V. Operating range set to DC 2 ... 10 V.

Position indication



Functional check

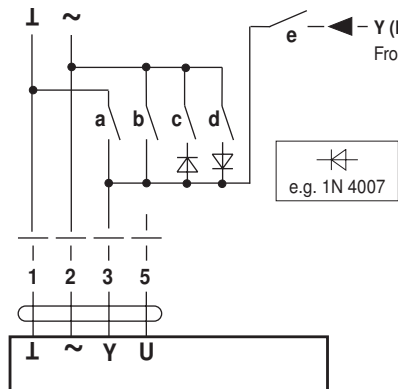


Procedure

- 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

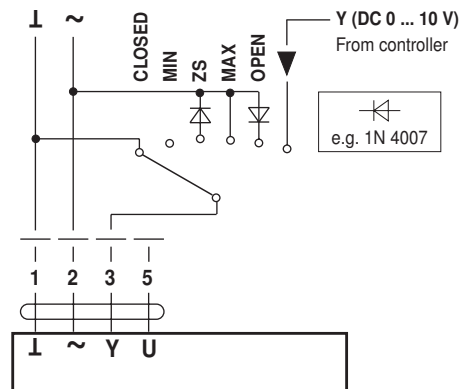
Functions for actuators with specific parameters

Override control and limiting with AC 24 V with relay contacts

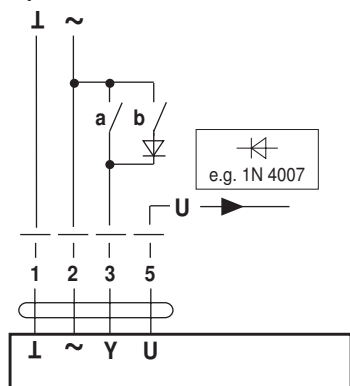


Functions	a	b	c	d	e
CLOSED					
MIN					
ZS (intermediate position)					
MAX					
OPEN					
Control mode according to Y					

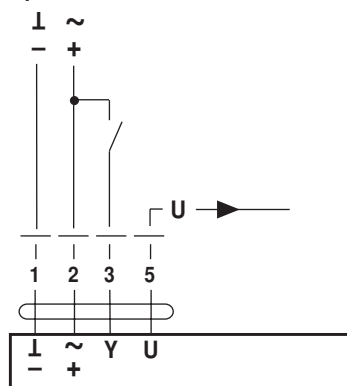
Override control and limiting with AC 24 V with rotary switch



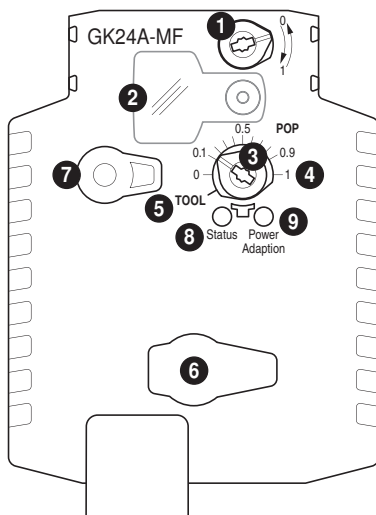
3-point control



Open-close control



Indicators and operating elements



- 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

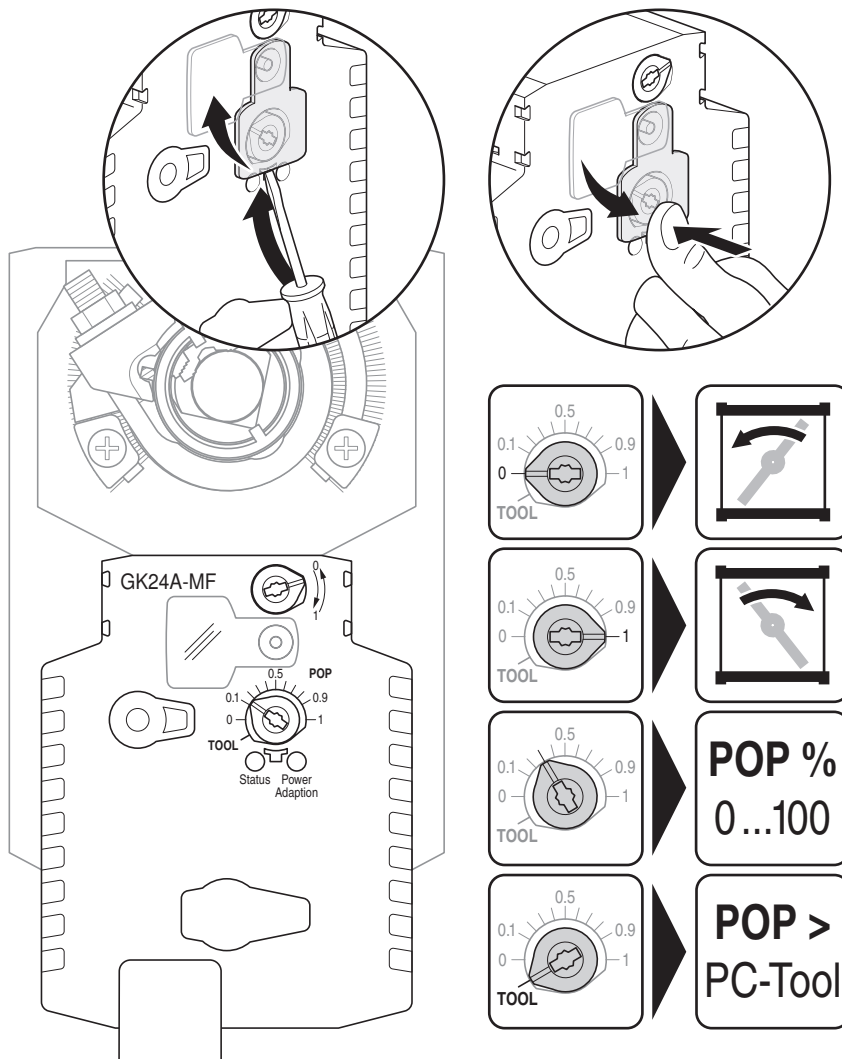
LED displays		Meaning / function
8 yellow	9 green	
Off	Illuminated	Operation OK / without fault
Illuminated	Off	Fault
Off	Off	Not in operation
Illuminated	Illuminated	Adaptation procedure running
Blinking	Illuminated	Communication with programming tool

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

Operating controls and indicators

(continued)

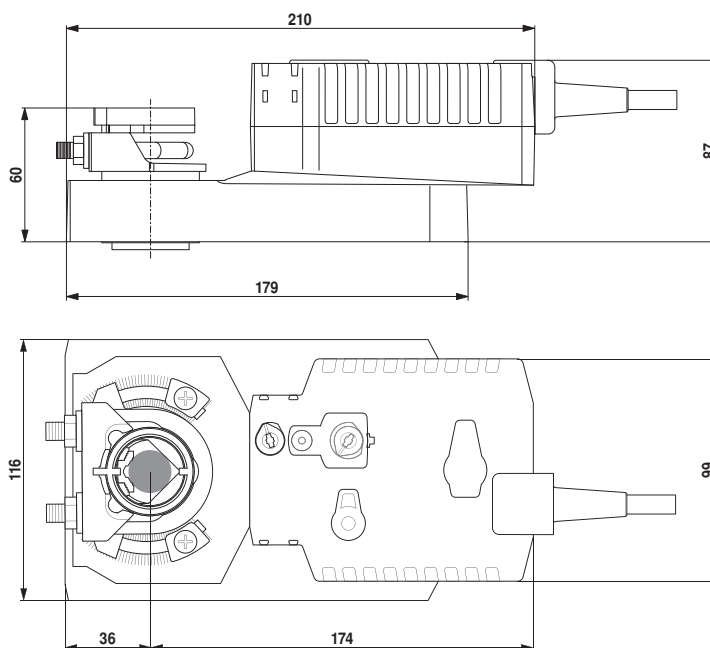
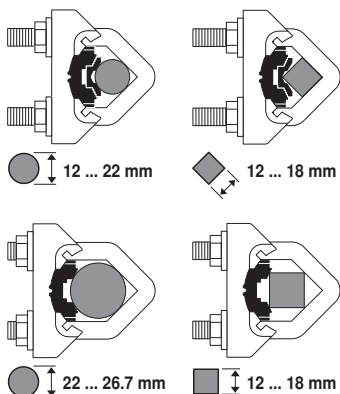
Setting the POP Power off position



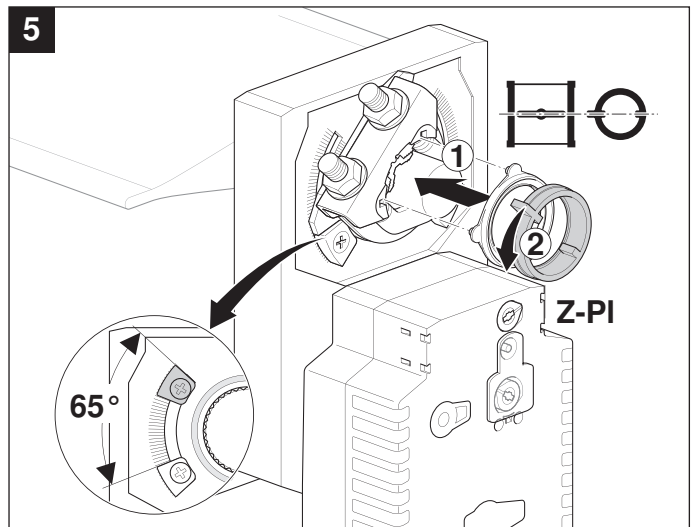
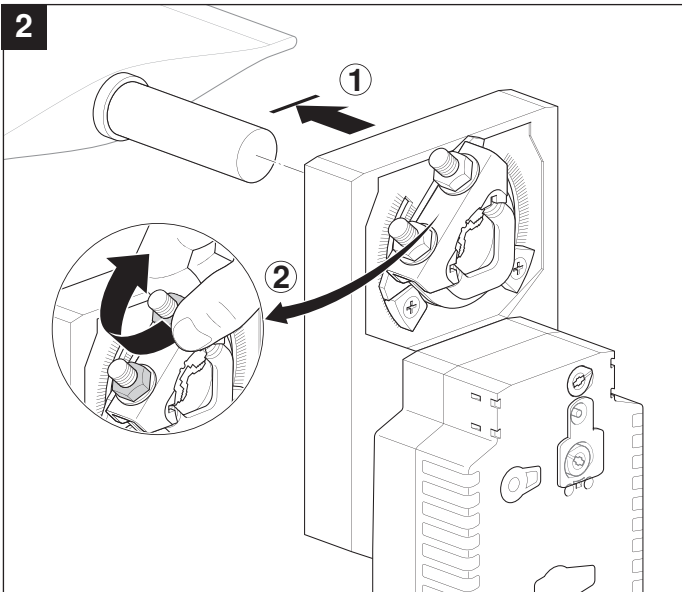
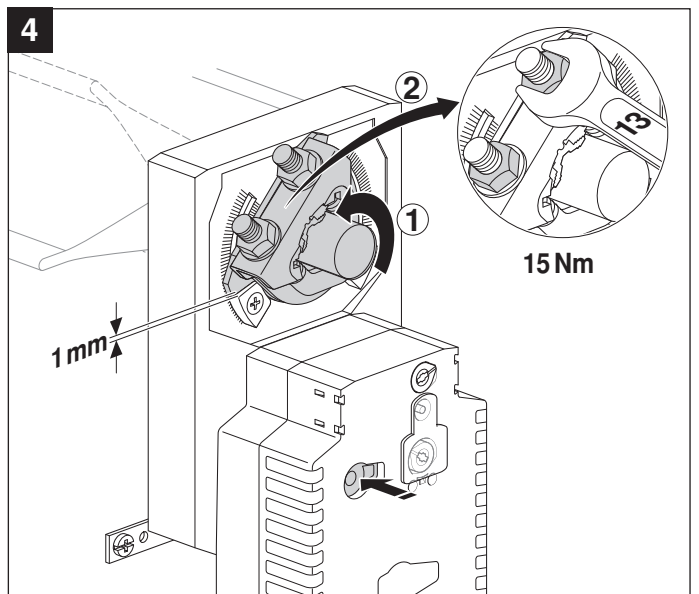
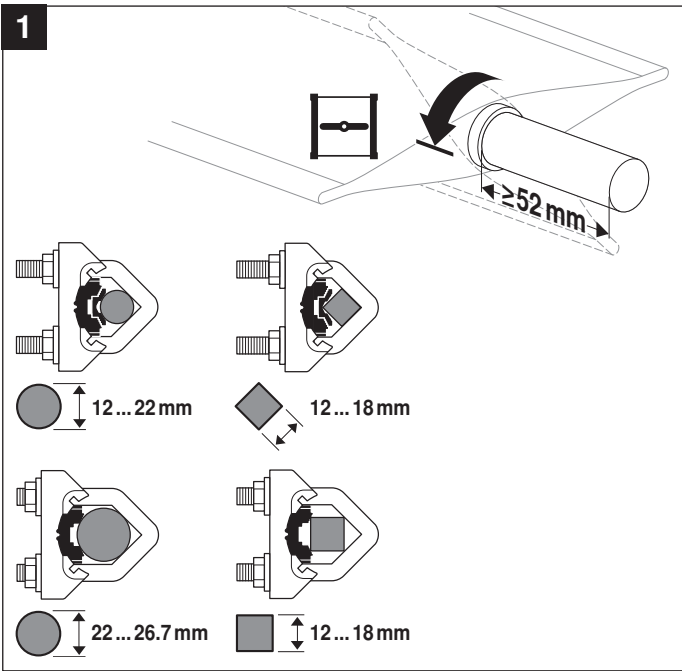
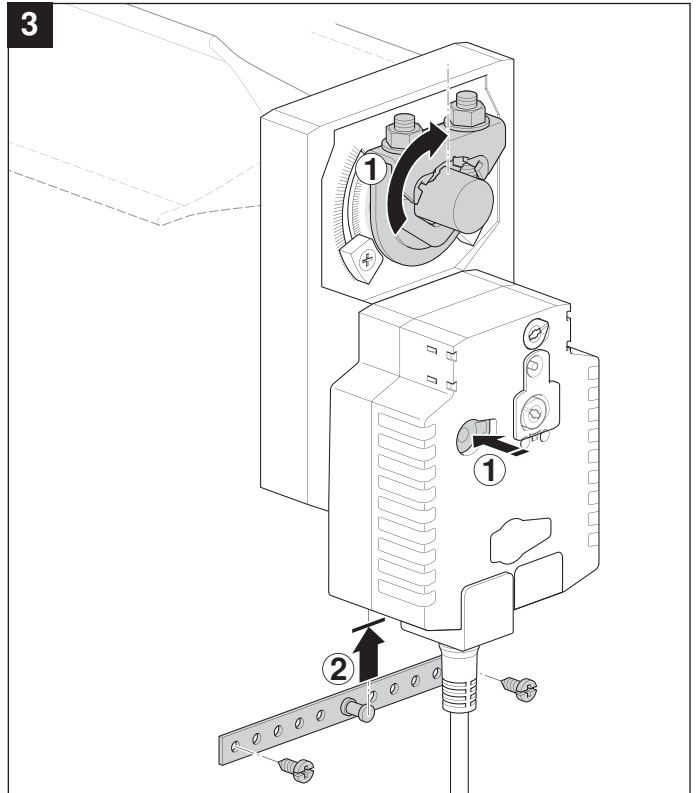
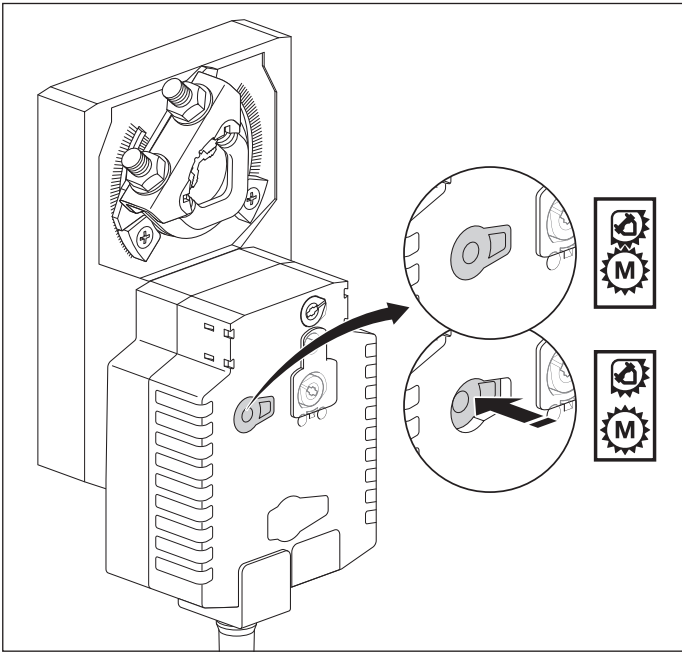
Dimensions [mm]

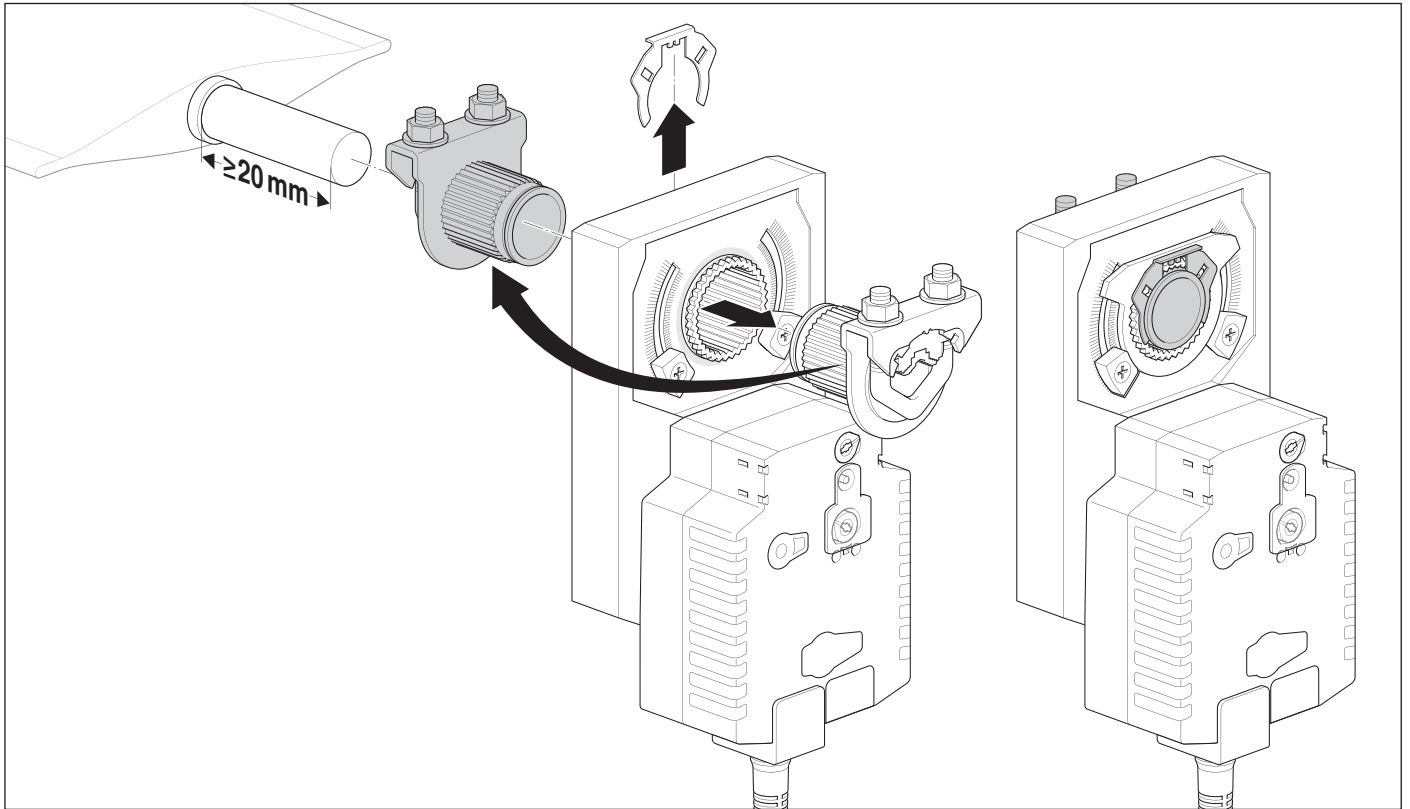
Dimensional drawings

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

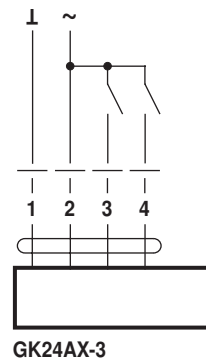
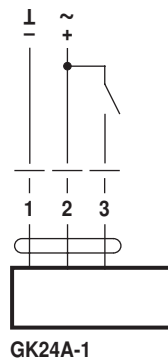
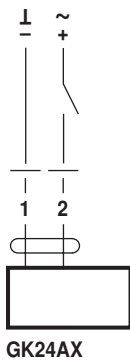


* When an auxiliary switch or a feedback potentiometer is used, see «Accessories»





AC 24 V / DC 24 V



AC 24 V / DC 24 V

