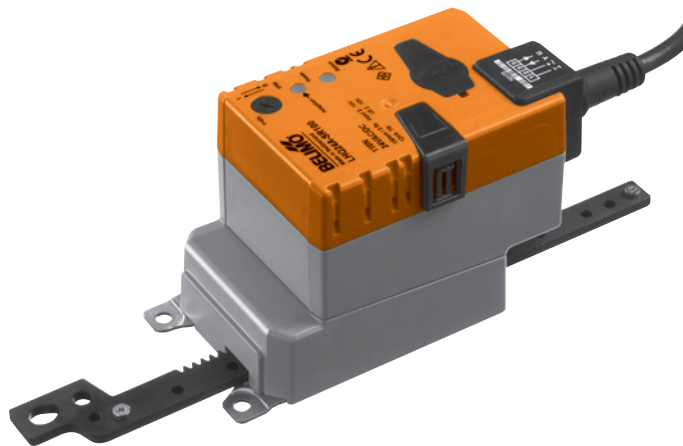


Modulating linear actuator for adjusting air dampers and slide valves in ventilation and air conditioning systems in buildings

- For air dampers up to approx. 0.7 m²
- Actuating force 100 N
- Nominal voltage AC/DC 24 V
- Control: modulating DC 0 ... 10 V
- Position feedback DC 2 ... 10 V
- Length of stroke max. 100 mm, adjustable in 20 mm-steps
- Running time 3.5 s



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	13 W @ nominal torque	
		At rest	2 W	
	For wire sizing	23 VA (I max. 20 A @ 5 ms)		
	Connection	Cable 1 m, 4 x 0.75 mm ²		
Functional data	Actuating force	Min. 100 N @ nominal voltage		
	Control	Control signal Y	DC 0 ... 10 V, input impedance 100 kΩ	
		Operating range	DC 2 ... 10 V	
	Position feedback (Measuring voltage)	DC 2 ... 10 V, max. 0.5 mA		
	Position accuracy	±5%		
	Direction of stroke	Reversible with switch 0 / 1		
	Direction of stroke at Y = 0 V	At switch position 1↑ resp. 0↓		
	Manual override	Gearing latch disengaged with pushbutton, can be locked		
	Stroke adjustment	20 ... 100 mm, adjustable in 20 mm-steps, can be limited at both ends with mechanical end stops		
	Stroke limiting	Min. 40 mm		
	Running time	3.5 s / 100 mm		
	Automatic adjustment of operating range and measuring signal U to match the mechanical stroke adjustment	Manual triggering of the adaption by pressing the «Adaption» button		
	Override control	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position, only AC) = 50%		
	Sound power level	52 dB (A)		
Negative torque	⚠	≤50% from nominal torque (Caution: can only be used with restrictions. Please contact your Belimo representative.)		
Safety	Protection class	III Safety extra-low voltage		
	Degree of protection	UL Class 2 Supply		
		IP54 in any mounting position		
		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		
	Rated impulse voltage	0.8 kV		
	Control pollution degree	3		
	Ambient temperature		-30 ... +40 °C (no restrictions)	
		⚠	+40 ... +50 °C (Caution: can only be used with restrictions. Please contact your Belimo representative.)	
Non-operating temperature	-40 ... +80 °C			
Ambient humidity	95% r.H., non-condensating			
Maintenance	Maintenance-free			

Technical data

(continued)

Dimensions / Weight

Dimensions
Weight

See «Dimensions» on page 6
Approx. 640 g




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 assembly.
- 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 rotary supports and coupling pieces available as accessories must always be used if lateral forces are likely. In addition, the actuator must not be tightly bolted to the application. It must remain movable via the rotary support (refer to «Assembly notes»).
- If the linear actuator is exposed to severely contaminated atmosphere, appropriate precautions must be taken on the system side. Excessive deposits of dust, soot etc. can prevent the gear rack from being extended and retracted correctly.
- If not installed horizontally, the gear disengagement pushbutton may only be actuated when there is no pressure on the gear rod.
- To calculate the actuating force required for air dampers and slide valves, the specifications supplied by the damper manufacturers concerning the surface, cross section, design, installation site and the air flow conditions must be observed.
- If a rotary support and/or coupling piece is used, losses in the actuation force losses are to be expected.
- Adaptation is necessary when the system is commissioned or whenever the stroke limiting is adjusted (press the adaption pushbutton once).
- 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 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% and as slave control signal for other actuators.
Simple direct mounting	The actuator can be directly connected with the application using the enclosed screws. The head of the gear rod is connected to the moving part of the ventilation application individually on the mounting side or with the Z-KS2 coupling piece provided.
Manual override	Manual override with push-button possible (the gear is disengaged for as long as the button is pressed or remains locked).
Adjustable stroke	The stroke of the gear rack can be adjusted on both sides in increments of 20 mm by means of mechanical end stops. A minimum permissible stroke of 40 mm must be allowed for.
High functional reliability	The actuator is overload-proof, requires no limit switches and automatically stops when the end stop is reached.
Home position	The first time the supply voltage is switched on, i.e. during initial startup, the actuator carries out an adaptation. After pressing the «gear disengagement» pushbutton, the actuator moves to the home position at the end stop.

Pos.	Direction of stroke	Home position
	Y = 0	extended 
	Y = 0	retracted 

The actuator then moves into the position defined by the control signal.

Product features

(continued)

Adaption and synchronisation During adaptation, the upper and lower spindle end stop is recorded and deposited in the actuator. Detection of the mechanical end stops enables a gentle approach to the end positions and thus protects the actuator mechanism.
 During synchronisation, the actuator moves to the home position for angle referencing. This ensures correct position regulation.

Accessories

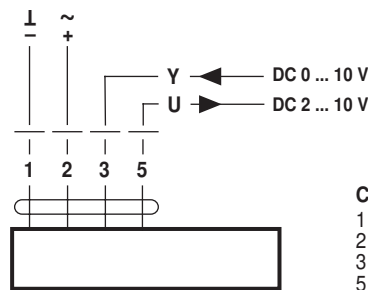
	Description	Data sheet
Electrical accessories	Positioner SG..24	T2 - SG..24
	Range controller SBG24	T2 - SBG24
	Digital position indication ZAD24	T2 - ZAD24
Mechanical accessories	Rotary support to compensate lateral forces Z-DS1	T2 - Z-LH..A..
	Coupling piece Z-KS2	T2 - Z-LH..A..
	End stop set Z-AS2	T2 - Z-LH..A..

Electrical installation

Wiring diagram

Note

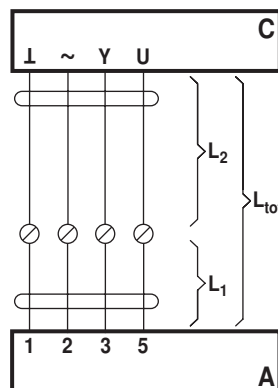
- Connect via safety isolation transformer.
- Parallel connection of other actuators possible. Note performance data for supply.



Cable colours:

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

Cable lengths

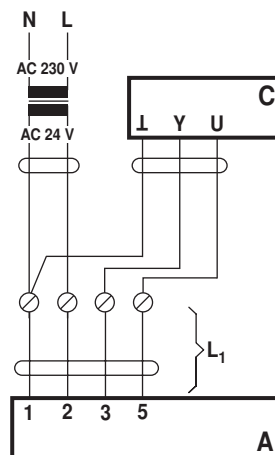


- A = Actuator
- C = Control unit
- L₁ = Belimo connecting cable, 1 m (4 x 0.75 mm²)
- L₂ = Customer cable
- L_{tot} = Maximum cable length

Cross section L ₂	Max. cable length L _{tot} = L ₁ + L ₂		Example for DC
	AC	DC	
0.75 mm ²	≤30 m	≤5 m	1 m (L ₁) + 4 m (L ₂)
1.00 mm ²	≤40 m	≤8 m	1 m (L ₁) + 7 m (L ₂)
1.50 mm ²	≤70 m	≤12 m	1 m (L ₁) + 11 m (L ₂)
2.50 mm ²	≤100 m	≤20 m	1 m (L ₁) + 19 m (L ₂)

Note

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



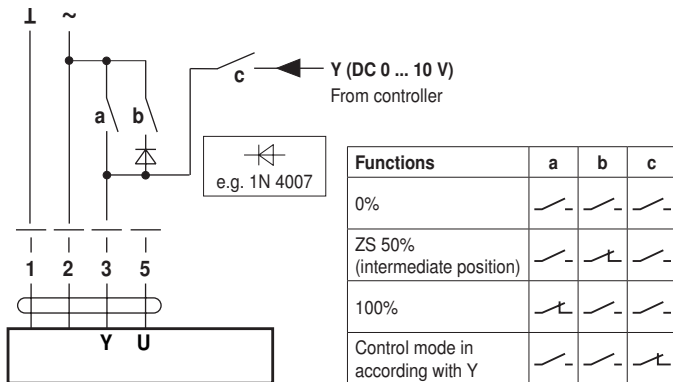
- A = Actuator
- C = Control unit
- L₁ = Belimo connecting cable, 1 m (4 x 0.75 mm²)

Note

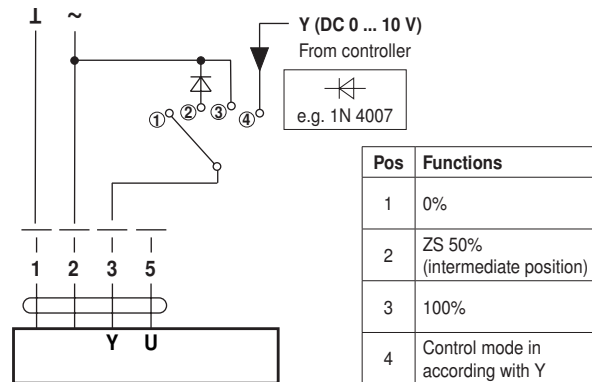
There are no special restrictions on installation if the supply and data cable are routed separately.

Functions with basic values

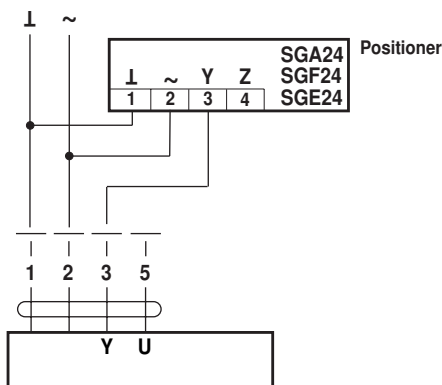
Override control with AC 24 V with relay contacts



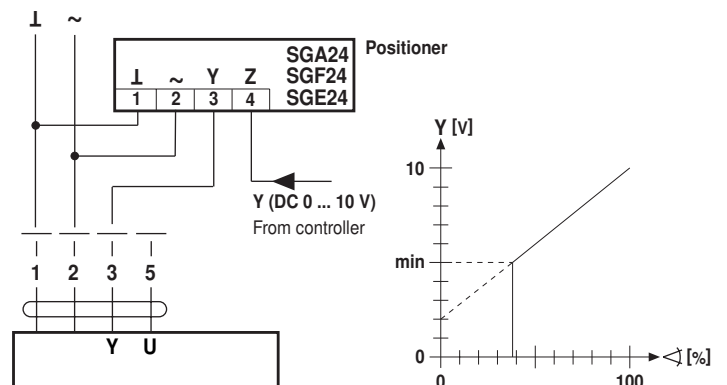
Override control with AC 24 V with rotary control switch



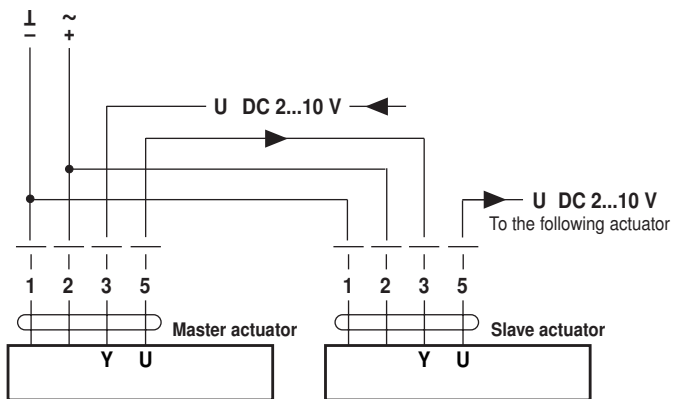
Remote control 0 ... 100%



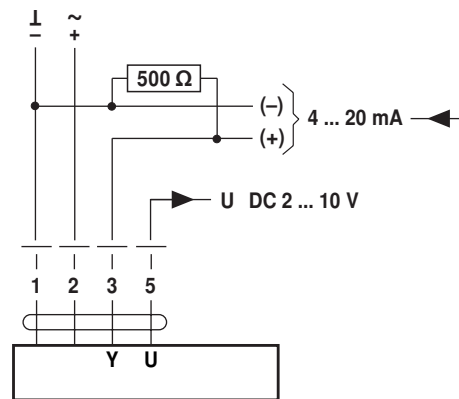
Minimum limit



Master/Slave control (position-dependent)

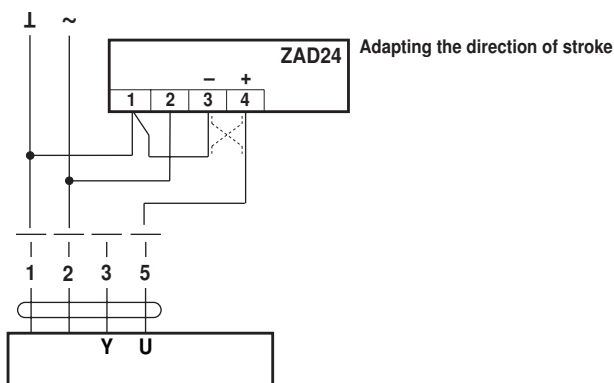


Control with 4 ... 20 mA via external resistance

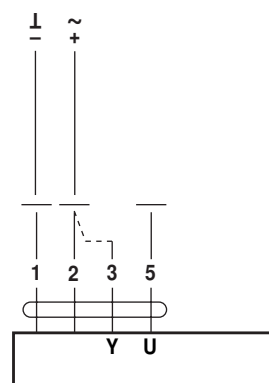


The 500 Ω resistor converts the 4 ... 20 mA current signal into a voltage signal DC 2 ... 10 V

Position indication



Functional check

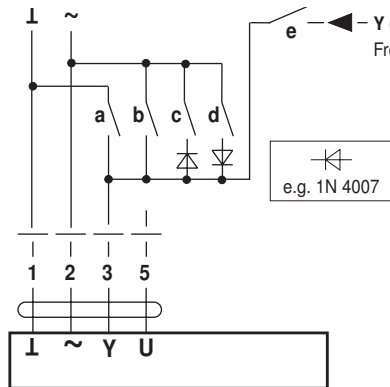


Procedure

- Apply 24 V to connection 1 and 2
- Disconnect connection 3:
 - For direction of stroke 0: Actuator travels in the direction of ↓
 - For direction of stroke 1: Actuator travels in the direction of ↑
- Short circuit connections 2 and 3:
 - Actuator runs in the opposite direction

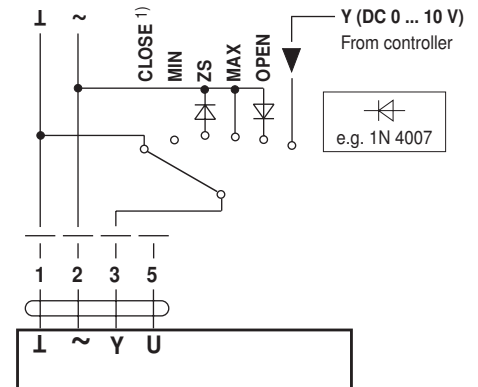
Functions for actuators with specific parameters

Override control and limiting with AC 24 V with relay contacts



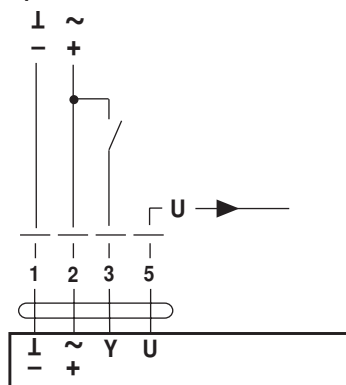
Functions	a	b	c	d	e
CLOSE ¹⁾					
MIN					
ZS (intermediate position)					
MAX					
OPEN					
Control mode in acc. with Y					

Override control and limiting with AC 24 V with rotary control switch



¹⁾ **Caution!** This function is only guaranteed if the start point of the operating range is defined as min. 0.6 V.

Open-close control



Assembly notes

Application without transverse forces

The linear actuator is screwed directly to the housing at three points. Afterwards, the head of the gear rod is fastened to the moving part of the ventilation application (e.g. damper or slide valve).

Application with transverse forces

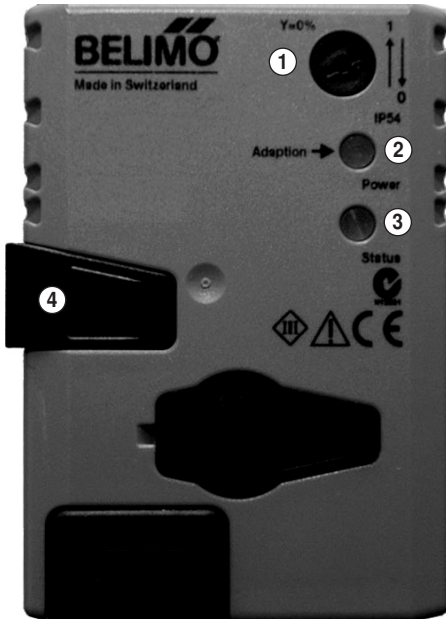
The coupling piece with the internal thread (Z-KS2) is connected to the head of the gear rod. The rotary support (Z-DS1) is screwed to the ventilation application. Afterwards, the linear actuator is screwed to the previously mounted rotary support with the enclosed screw. Afterwards, the coupling piece, which is mounted to the head of the gear rod, is attached to the moving part of the ventilation application (e.g. damper or slide valve). The transverse forces can be compensated for to a certain limit with the rotary support and/or coupling piece. The maximum permissible swivel angle of the rotary support and coupling piece is 10° \triangleleft, laterally and upwards.

Caution

If a rotary support and/or coupling piece is used, losses in the actuation force losses are to be expected.



Operating controls and indicators



- ① **Direction of stroke switch**
Switching over: Direction of stroke changes
- ② **Push-button and green LED display**
Off: No voltage supply or fault
On: In operation
Press button: Switches on stroke adaption, followed by standard operation
- ③ **Push-button and yellow LED display**
Off: Standard operation
On: Adaptation or synchronising process active
Press button: No function
- ④ **Gear disengagement switch**
Press button: Gear disengaged, motor stops, manual override possible
Release button: Gear engaged, synchronisation starts, followed by standard operation

Check voltage supply connection

- a) ② Off and ③ On } Check the supply connections.
b) ② Blinking and ③ Blinking } Possibly \perp and ∇ are swapped over.

Dimensions [mm]

Dimensional drawings

