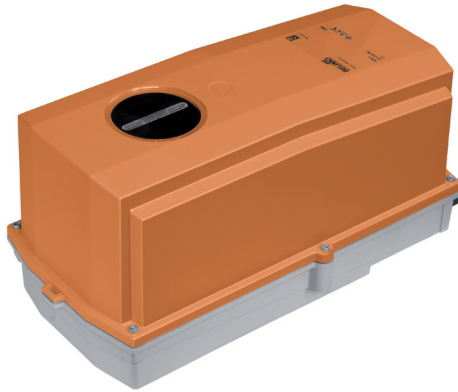


Communicative spring-return actuator with emergency control function for adjusting dampers in technical building installations

- Air damper size up to approx. 2 m<sup>2</sup>
- Nominal torque 10 Nm
- Nominal voltage AC/DC 24 V
- Control Modulating DC (0)2...10 V Variable
- Position feedback DC 2...10 V Variable
- Communication via BELIMO MP-Bus
- Conversion of sensor signals
- Optimum weather protection for use outdoors (for use in ambient temperatures up to -40°C, there is a separate actuator available with built-in heater ex works)


**Technical data**

<b>Electrical data</b>	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption in operation	7 W
	Power consumption in rest position	3.5 W
	Power consumption for wire sizing	5.5 VA
	Power consumption for wire sizing note	9.5 VA (I <sub>max</sub> 20 A @ 5 ms)
	Connection supply / control	Cable 1 m, 4 x 0.75 mm <sup>2</sup>
	Parallel operation	Yes (note the performance data)
<b>Functional data</b>	Torque motor	Min. 10 Nm
	Torque spring return	Min. 10 Nm
	Positioning signal Y	DC 0...10 V
	Positioning signal Y note	Input impedance 100 kΩ
	Control signal Y variable	Open-close 3-point (AC only) Modulating (DC 0...32 V)
	Operating range Y	DC 2...10 V
	Operating range Y variable	Start point DC 0.5...30 V End point DC 2.5...32 V
	Position feedback U	DC 2...10 V
	Position feedback U note	Max. 0.5 mA
	Position feedback U variable	Start point DC 0.5...8 V End point DC 2.5...10 V
	Position accuracy	±5%
	Direction of motion motor	Selectable with switch 0 / 1
	Direction of motion emergency control function	L (ccw)
	Direction of motion note	Y = 0 V: At switch position 0 (ccw rotation) / 1 (cw rotation)
	Direction of motion variable	Electronically reversible
	Manual override	By means of hand crank and locking switch
	Angle of rotation	Max. 90°
	Angle of rotation note	adjustable starting at 33% in 2.5% steps (with mechanical end stop)
	Running time motor	150 s / 90°
	Motor running time variable	40...150 s
	Running time emergency control position	<20 s / 90°
Adaption setting range	manual (automatic on first power-up)	
Adaption setting range variable	No action Adaption when switched on Adaption after pushing the gear disengagement button	
Override control	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position) = 50%	

## Technical data

<b>Functional data</b>	Override control variable	MAX = (MIN + 32%)...100% MIN = 0%...(MAX - 32%) ZS = MIN...MAX
	Sound power level motor	40 dB(A)
	Spindle driver	Universal spindle clamp 12...26.7 mm
	Position indication	Mechanically, pluggable
	Service life	Min. 60,000 emergency positions
<b>Safety</b>	Protection class IEC/EN	III Safety extra-low voltage
	Protection class UL	UL Class 2 Supply
	Degree of protection IEC/EN	IP66
	Degree of protection NEMA/UL	NEMA 4, UL Enclosure Type 4
	EMC	CE according to 2004/108/EC
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Certification UL	cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1:02
	Mode of operation	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	4
<b>Weight</b>	Ambient temperature	-30...50 °C
	Ambient temperature note	-40...50 °C for actuator with integrated heating
	Non-operating temperature	-40...80 °C
	Ambient humidity	100% r.h.
	Maintenance	Maintenance-free
	Weight approx.	2.6 kg

## Safety notes



- The device must not be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- Junction boxes must at least correspond with enclosure IP degree of protection!
- The cover of the protective housing may be opened for adjustment and servicing. When it is closed afterwards, the housing must seal tight (see installation instructions).
- The device on the inside may only be opened in the manufacturer's factory. It does not contain any parts that can be replaced or repaired by the user.
- The cables must not be removed from the device installed in the interior.
- When calculating the torque required, the specifications supplied by the damper manufacturers (cross-section, construction, place of installation), and the ventilation conditions must be observed.
- 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.
- The actuator is not designed for applications where chemical influences (gases, fluids) are present or for utilisation in corrosive environments in general.
- The actuator may not be used in plenary applications (e.g. suspended ceilings or raised floors).
- The materials used may be subjected to external influences (temperature, pressure, construction fastening, effect of chemical substances, etc.), which cannot be simulated in laboratory tests or field trials. In case of doubt, we definitely recommend that you carry out a test. This information does not imply any legal entitlement. BELIMO will not be held liable and will provide no warranty.
- If cables which are not authorised for UL (NEMA) Type 4 applications are guided out of the unit, then flexible metallic cable conduits or suitable threaded cable conduits of equal value are to be used.
- flexible metallic cable conduits or threaded cable conduits of equal value are to be used for UL (NEMA) Type 4 applications.

## Product features

<b>Fields of application</b>	The actuator is particularly suitable for utilisation in outdoor applications and is protected against the following weather conditions: <ul style="list-style-type: none"> <li>- UV radiation</li> <li>- rain / snow</li> <li>- dirt / dust</li> <li>- Humidity</li> <li>- Changing atmosphere / frequent and severe temperature fluctuations</li> </ul> (recommendation: use the actuator with integrated factory-installed heating which can be ordered separately to prevent internal condensation)
<b>Mode of operation</b>	Conventional operation: The actuator is connected with a standard modulating signal of DC 0 ... 10 V and moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the emergency position by spring force when the supply voltage is interrupted. Operation on the MP-Bus: The actuator receives its digital positioning signal from the higher level controller via the MP-Bus and travels to the position defined. Connection U serves as communication interface and does not supply an analogue measuring voltage.
<b>Converter for sensors</b>	Connection option for a sensor (passive or active sensor or switching contact). The MP actuator serves as an analogue/digital converter for the transmission of the sensor signal via MP-Bus to the higher level system.
<b>Parameterisable actuators</b>	The factory settings cover the most common applications. Input and output signals and other parameters can be altered with the PC-Tool MFT-P or with the Service tool ZTH EU.
<b>Direct mounting</b>	Simple direct mounting on the damper spindle with a universal spindle clamp, supplied with a universal mounting bracket to prevent the actuator from rotating.
<b>Manual override</b>	Manual actuation of the damper with manual elevator crank, engagement with the locking switch at any position. Unlocking is manual or automatic by applying the operating voltage. The housing cover must be removed for manual override.
<b>High functional reliability</b>	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
<b>Adjustable angle of rotation</b>	Adjustable angle of rotation with mechanical end stops.
<b>Home position</b>	The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out an adaption, which is when the operating range and position feedback adjust themselves to the mechanical setting range. The actuator then moves into the position defined by the positioning signal.
<b>Adaption and synchronisation</b>	An adaption can be triggered manually by pressing the „Adaption“ button or with the PC-Tool. Both mechanical end stops are detected during the adaption (entire setting range). Automatic synchronisation after actuating the hand crank is programmed. The synchronisation is in the home position (0%). The actuator then moves into the position defined by the positioning signal. A range of settings can be adapted using the PC-Tool (see MFT-P documentation)

## Accessories

	<b>Description</b>	<b>Type</b>
<b>Gateways</b>	Gateway MP for BACnet MS/TP, AC/DC 24 V	UK24BAC
	Gateway MP to Modbus RTU, AC/DC 24 V	UK24MOD
	Gateway MP for LonWorks®, AC/DC 24 V, LonMark-certified	UK24LON
	Gateway MP to KNX/EIB, AC/DC 24 V, EIBA certified	UK24EIB
	<b>Description</b>	<b>Type</b>
<b>Electrical accessories</b>	Connecting cable 5 m, A+B: RJ12 6/6, To ZTH/ZIP-USB-MP	ZK1-GEN
	Connection cable 5 m, A: RJ11 6/4, B: Free wire end, To ZTH/ZIP-USB-MP	ZK2-GEN
	MP-Bus power supply for MP actuators, AC 230/24V for local power supply	ZN230-24MP
	Connecting board MP bus suitable for wiring boxes EXT-WR-FP...-MP	ZFP2-MP

Accessories

	Description	Type
<b>Mechanical accessories</b>	Feedback potentiometer, 200 Ohm, incl. installation accessories	P200A-F
	Auxiliary switch, 2 x SPDT	S2A-F
	<b>Description</b>	<b>Type</b>
	Shaft extension 250 mm, length approx. 250 mm	AV8-25
	Form fit insert 15x15 mm, for spring return actuators NG	ZF15-NSA-F
	Various accessories (spindle clamps, shaft extensions, etc.)	IND-AFB
		K7-2
		KG10A
	Straight ball joint with M8, suitable for damper crank arms KH8	KG8
	Angled ball joint with M8, suitable for damper crank arms KH8	KH8
Damper crank arm, for damper spindles	KH-AFB	
Form fit insert 10x10 mm, for spring return actuators NG	ZF10-NSA-F	
Form fit insert 16x16 mm, for spring return actuators NG	ZF12-NSA-F	
	ZF16-NSA-F	
	ZG-AFB	
	Z-SF	
<b>Service Tools</b>	<b>Description</b>	<b>Type</b>
	Service Tool, for MF/MP/Modbus/LonWorks actuators and VAV-Controller	ZTH EU
	Belimo PC-Tool, software for adjustments and diagnostics	MFT-P
	Adapter to Service-Tool ZTH	MFT-C

Electrical installation

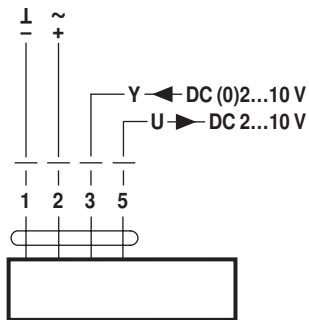


Notes

- Connection via safety isolating transformer.
- Parallel connection of other actuators possible. Observe the performance data.

Wiring diagrams

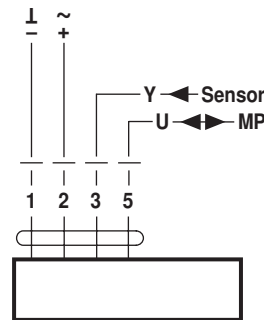
AC/DC 24 V, modulating



Cable colours:

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

Operation on the MP-Bus



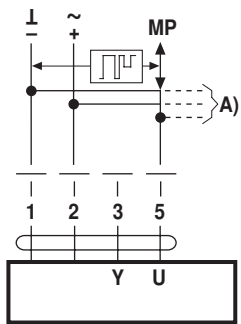
Cable colours:

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

Functions

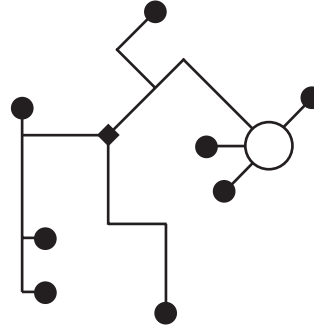
Functions when operated on MP-Bus

Connection on the MP-Bus



A) more actuators and sensors (max.8)

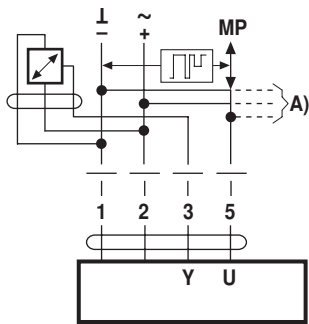
Network topology



There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted). Supply and communication in one and the same 3-wire cable

- no shielding or twisting necessary
- no terminating resistors required

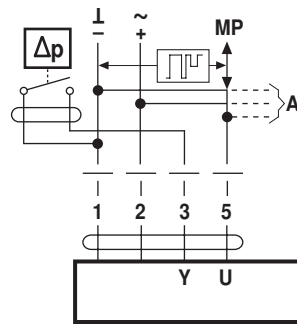
Connection of active sensors



A) more actuators and sensors (max.8)

- Supply AC/DC 24 V
- Output signal DC 0...10 V (max. DC 0...32 V)
- Resolution 30 mV

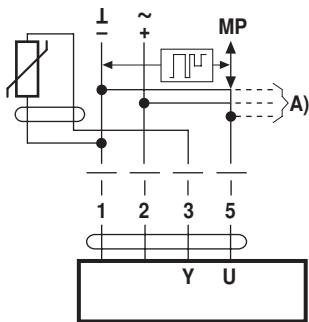
Connection of external switching contact



A) more actuators and sensors (max.8)

- Switching current 16 mA @ 24 V
- Start point of the operating range must be parameterised on the MP actuator as  $\geq 0.5$  V

Connection of passive sensors



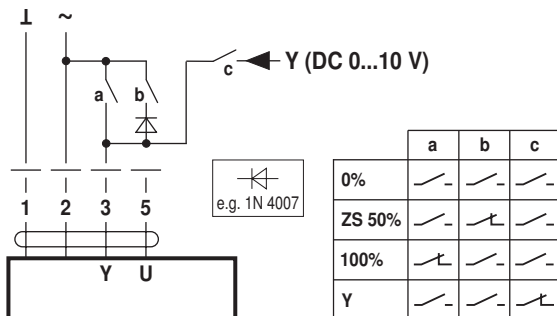
Ni1000	-28...+98 °C	850...1600 $\Omega^2$
PT1000	-35...+155 °C	850...1600 $\Omega^2$
NTC	-10...+160 °C <sup>1)</sup>	200 $\Omega$ ...60 k $\Omega^2$

A) more actuators and sensors (max.8)

- 1) Depending on the type
- 2) Resolution 1 Ohm

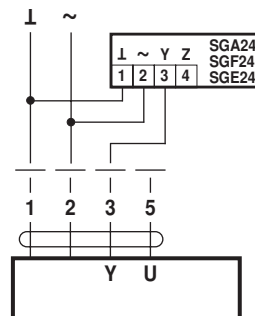
Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts



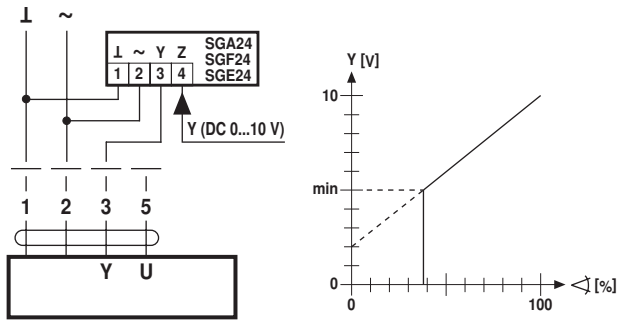
	a	b	c
0%	—	—	—
ZS 50%	—	—	—
100%	—	—	—
Y	—	—	—

Remote control 0...100% with positioner SG..

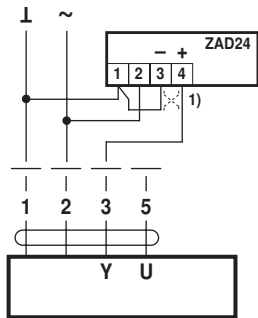


**Functions**

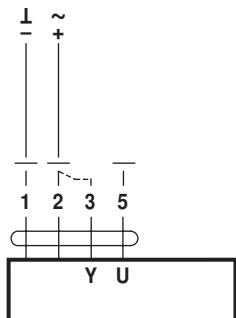
Minimum limit with positioner SG..



Position indication



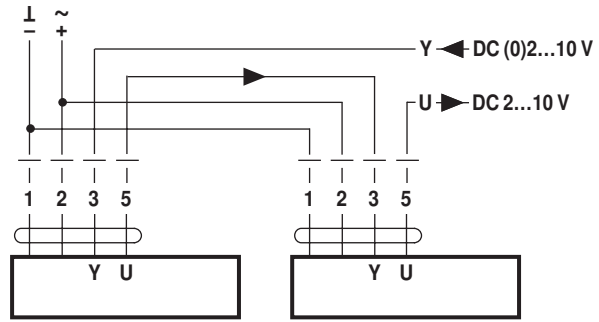
Functional check



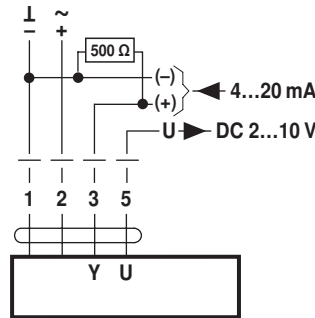
**Procedure**

1. Connect 24V to connections 1 and 2
2. Disconnect connection 3:
  - with direction of rotation 0: Actuator rotates to the left
  - with direction of rotation 1: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
  - Actuator runs in opposite direction

Follow-up control (position-dependent)



Control with 4...20 mA via external resistor

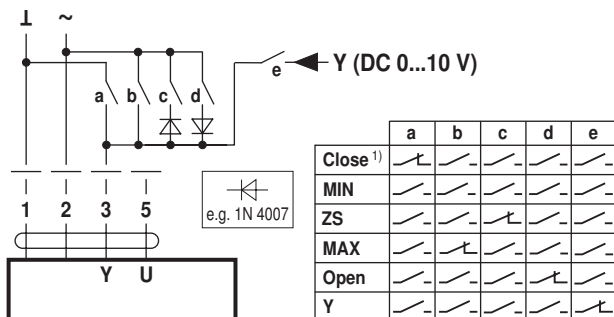


**Caution:**

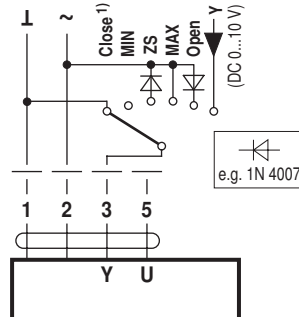
The operating range must be set to DC 2...10 V.  
The 500 Ω resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V

**Functions for actuators with specific parameters (Parametrisation with PC-Tool necessary)**

Override control and limiting with AC 24 V with relay contacts



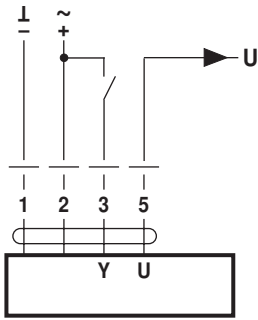
Override control and limiting with AC 24 V with rotary switch



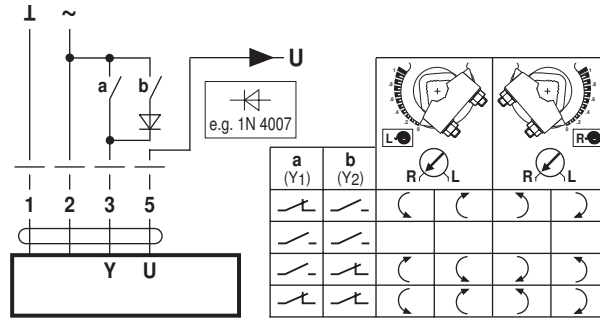
**1) Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

Functions

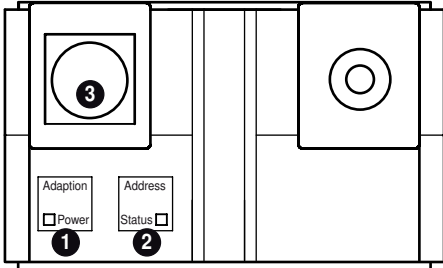
Control open-close



Control 3-point



Operating controls and indicators



- 1 Membrane key and LED display green**  
 Off: No power supply or malfunction  
 On: In operation  
 Press button: Triggers angle of rotation adaptation, followed by standard mode
- 2 Membrane key and LED display gelb**  
 Off: Standard mode  
 Flickering: MP communication active  
 On: Adaptation and synchronising process active  
 Flashing: Request for addressing from MP master  
 Press button: Confirmation of the addressing
- 3 Service plug**  
 For connecting parameterisation and service tools

Operating elements

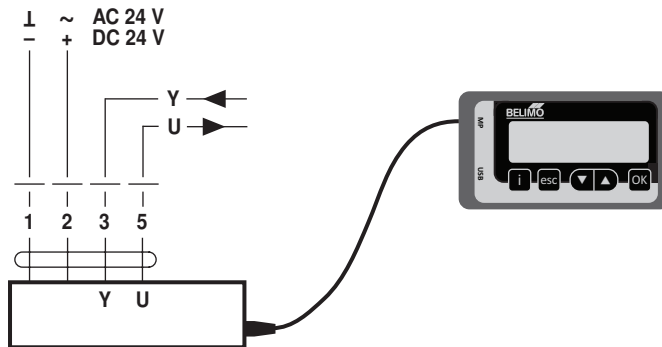
The manual override, locking switch and direction of rotation switch elements are available on both sides

Service

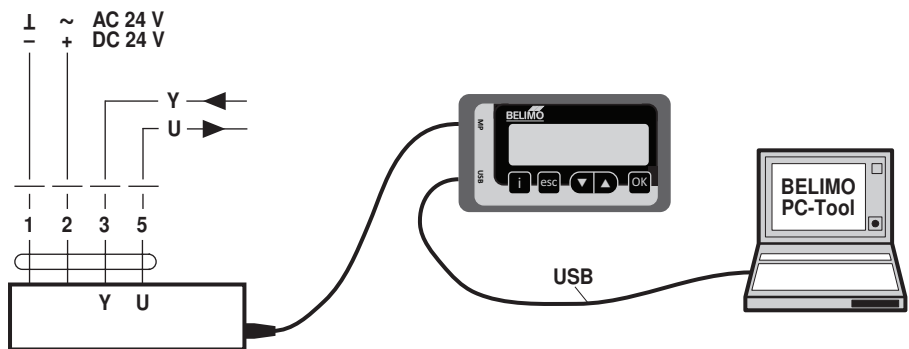


- Notes**
- The actuator can be parameterised by PC-Tool and ZTH EU via the service socket.

ZTH EU connection



PC-Tool connection





Dimensions [mm]

Spindle length

		16...105 (Ø 12...19)
		16...45 (Ø 19...26.7)
		-

Clamping range

	12...22	10	14...25.4
	19...25.5 (26.7)	12...18	

Dimensional drawings

