**Parameterisable spring-return actuator with emergency control function in the IP66 protective housing for adjusting dampers in industrial plants and in technical building installations**

- Air damper size up to approx. 4 m²
- Nominal torque 20 Nm
- Nominal voltage AC/DC 24 V
- Control modulating DC (0)2...10 V Variable
- Position feedback DC 2...10 V Variable
- 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)
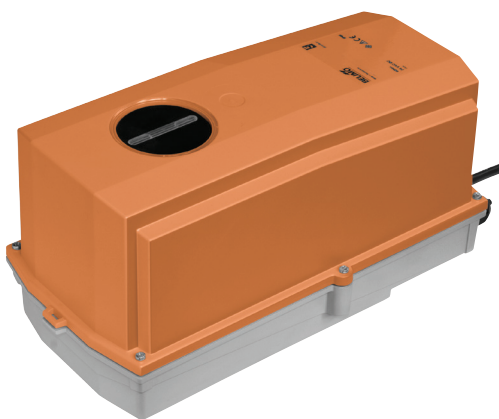
Technical data

Electrical data	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	8.5 W
	Power consumption in rest position	3.5 W
	Power consumption for wire sizing	11 VA
	Connection supply / control	Cable 1 m, 4 x 0.75 mm² (halogen-free)
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	Min. 20 Nm
	Torque spring return	Min. 20 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 L / R
	Direction of motion note	Y = 0 V: At switch position 0 (ccw rotation) / 1 (cw rotation)
	Direction of motion variable	electronically reversible
	Direction of motion emergency control function	L (ccw)
	Manual override	by means of hand crank and locking switch
	Angle of rotation	Max. 95°
	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	70...220 s
	Running time emergency control position	<20 s / 90°
	Running time emergency setting position note	<20 s @ -20...50°C / <60 s @ -30°C
	Adaption setting range	manual
	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, AC only) = 50%

Technical data

Functional data	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
Safety	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)
	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 2014/30/EU
	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
	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	Weight	5.1 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 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.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation site and the ventilation conditions must be observed.
- The device contains electrical and electronic components and must not 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

Fields of application	The actuator is particularly suitable for utilisation in outdoor applications and is protected against the following weather conditions: - UV radiation - rain / snow - dirt / dust - Humidity - Changing atmosphere / frequent and severe temperature fluctuations (recommendation: use the actuator with integrated factory-installed heating which can be ordered separately to prevent internal condensation)
Mode of operation	The actuator 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. The actuator is connected with a standard modulating signal of DC 0...10V and drives to the position defined by the positioning signal. Measuring voltage U serves for the electrical display of the damper position 0...100% and as slave control signal for other actuators.
Parameterisable actuators	The factory settings cover the most common applications. Single parameters can be modified with the Belimo Service Tools MFT-P or ZTH EU.
Simple direct mounting	Simple direct mounting on the damper spindle with an universal spindle clamp, supplied with an anti-rotation device to prevent the actuator from rotating.
Manual override	By using the hand crank the damper can be actuated manually and engaged with the locking switch at any position. Unlocking is carried out manually or automatically by applying the operating voltage. The housing cover must be removed for manual override.
Adjustable angle of rotation	Adjustable angle of rotation with mechanical end stop. The housing cover must be removed to set the angle of rotation.
High functional reliability	The actuator is overload protected, 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. at the time of commissioning, the actuator carries out a synchronisation. The synchronisation is in the home position (0%). The actuator then moves into the position defined by the positioning signal.
Adaption and synchronisation	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

	Description	Type
Electrical accessories	Auxiliary switch, 2 x SPDT	S2A-F
	Feedback potentiometer, 200 Ohm, incl. installation accessories	P200A-F
	Feedback potentiometer 1 kOhm, incl. installation accessories	P1000A-F
	Signal converter voltage/current, supply AC/DC 24V	Z-UIC
	Digital position indicator for front-panel mounting, 0...99%, front mass 72 x 72 mm	ZAD24
	Range controller for wall mounting, adjustable electron. Min./max. angle of rotation limitation	SBG24
	Positioner for wall mounting, range 0...100%	SGA24
	Positioner in a conduit box, range 0...100%	SGE24
	Positioner for front-panel mounting, range 0...100%	SGF24
	Positioner for wall mounting, range 0...100%	CRP24-B1
	Connection 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

Accessories

Description	Type
Mechanical accessories Cable gland, for cable diameter 4-10 mm	Z-KB-PG11

Description	Type
Service Tools Service tool for parametrisable and communicative Belimo actuators / VAV controller and HVAC performance devices	ZTH EU
Belimo PC-Tool, software for adjustments and diagnostics	MFT-P
Adapter to Service Tool ZTH	MFT-C

- Combination with auxiliary switch only on request. Please contact your Belimo representative!
- Combination with feedback potentiometer only on request. Please contact your Belimo representative!

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

Y ◄ DC (0)2...10 V
U ► DC 2...10 V

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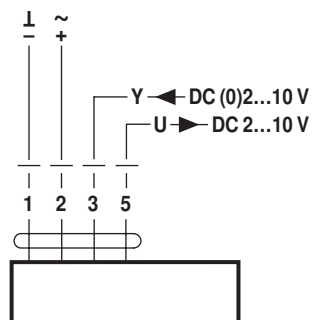
Functions

Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

Y (DC 0...10 V)

e.g. 1N 4007

	a	b	c
0%			
ZS 50%			
100%			
Y			
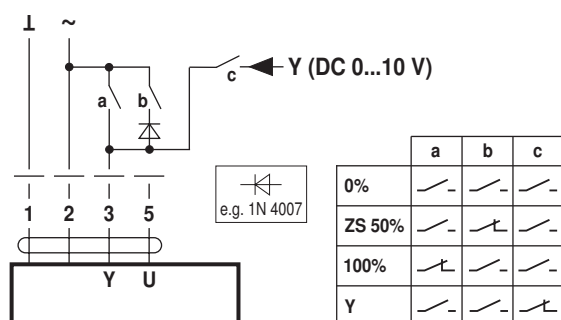
Override control with AC 24 V with rotary switch

e.g. 1N 4007
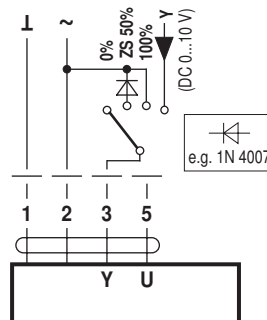
Functions

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

```
  ⊥  ~
  –  +
```
⊥	~	Y	Z	SGA24
–	+			SGF24
1	2	3	4	SGE24

| 1 | 2 | 3 | 5 |
| Y | U |

Minimum limit with positioner SG..

```
  ⊥  ~
  –  +
```
⊥	~	Y	Z	SGA24
–	+			SGF24
1	2	3	4	SGE24

Y (DC 0...10 V)

| 1 | 2 | 3 | 5 |
| Y | U |

Y [V]

10

min

0

0   100   ◁ [%]

Position indication

```
  ⊥  ~
```
| – | + | ZAD24 |
| 1 | 2 | 3 | 4 |

(1)

| 1 | 2 | 3 | 5 |
| Y | U |
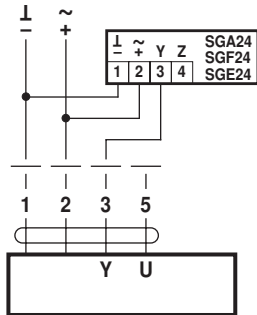
(1) Adapting the direction of rotation
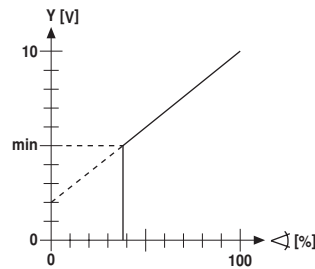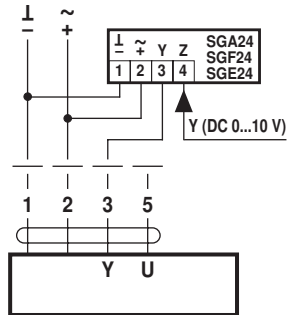
Control with 4...20 mA via external resistor

```
  ⊥  ~
  –  +
```
500 Ω

(–) ◀ 4...20 mA
(+)

U ▶ DC 2...10 V

| 1 | 2 | 3 | 5 |
| Y | U |
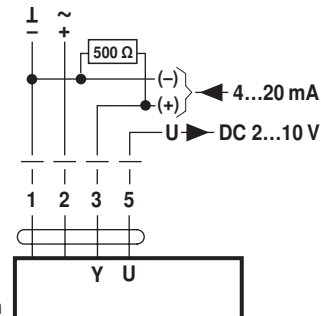
Caution:
The operating range must be set to DC 2...10 V.
The 500 Ω resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V

Functional check

```
  ⊥  ~
  –  +
```

| 1 | 2 | 3 | 5 |
| Y | U |
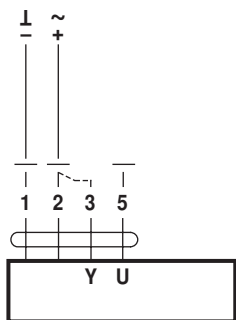
Procedure
1. Connect 24V to connections 1 and 2
2. Disconnect connection 3:
– with direction of rotation 0:
Actuator rotates to the left
– with direction of rotation 1:
Actuator rotates to the right
3. Short-circuit connections 2 and 3:
– Actuator runs in opposite direction

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

**Override control and limiting with AC 24 V with relay contacts**

```
  ⊥  ~
```
a   b   c   d   e ◀ Y (DC 0...10 V)

e.g. 1N 4007

| 1 | 2 | 3 | 5 |
| Y | U |

	a	b	c	d	e
Close[1]	⌐	–	–	–	╱ –
MIN	╱	–	–	–	–
ZS	╱	–	⌐	–	–
MAX	╱	⌐	–	–	–
Open	╱	–	–	⌐	–
Y	╱	–	–	–	⌐

Override control and limiting with AC 24 V with rotary switch

```
  ⊥  ~
```
Close[1] MIN ZS MAX Open   Y (DC 0...10 V)
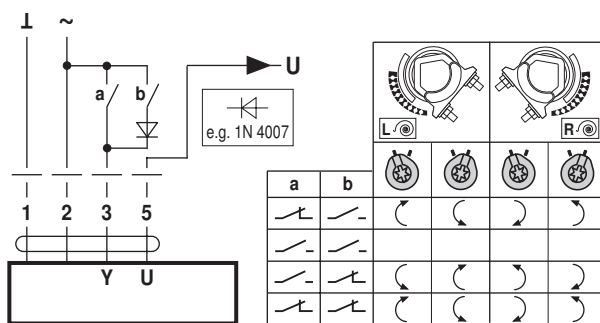
e.g. 1N 4007

| 1 | 2 | 3 | 5 |
| Y | U |
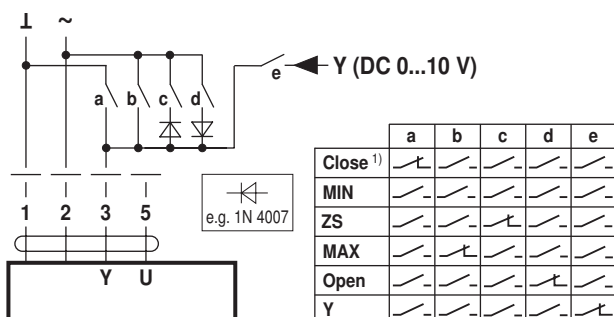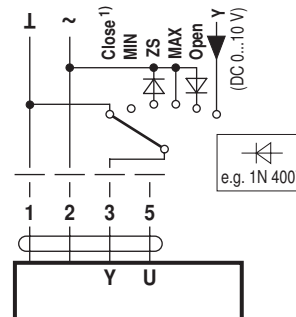
1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.
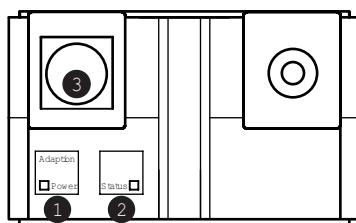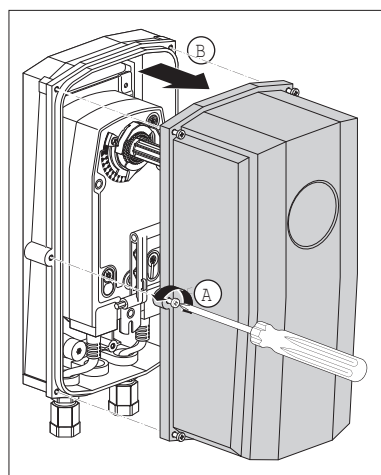
Functions

Control open-close
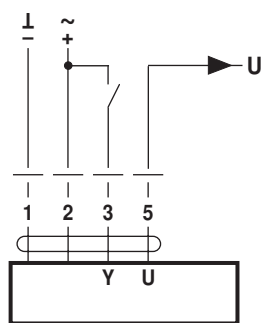
Control 3-point

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 |
| On: | Adaptation and synchronising process active |
| Press button: | No function |

③ Service plug

For connecting parameterisation and service tools

Operating elements

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

Service

Service Tools connection   The actuator can be parameterised by ZTH EU via the service socket.
For an extended parameterisation the PC tool can be connected.
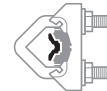
Connection ZTH EU / PC-Tool
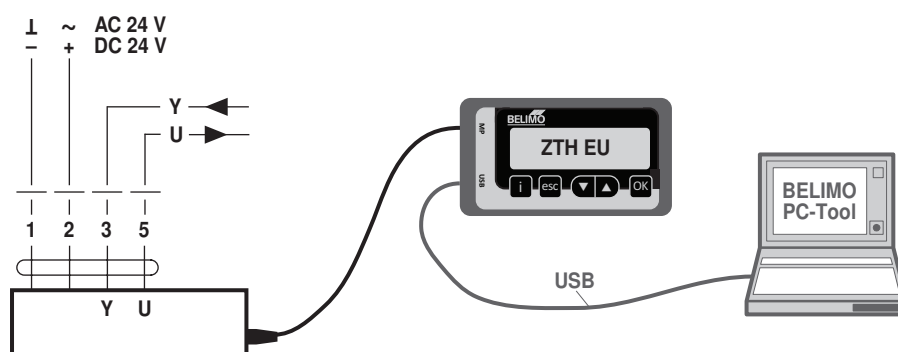
Dimensions [mm]

Spindle length

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

Clamping range

	12...22	12...18
	22...26.7	12...18

Dimensional drawings