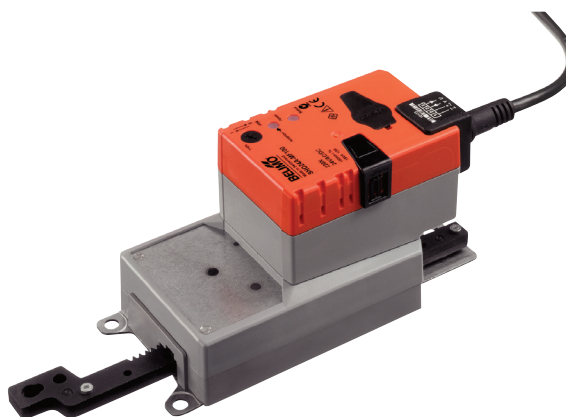**BELIMO**®

Parmeterisable linear actuator for adjusting dampers and slide valves in technical building installations

- Air damper size up to approx. 1.3 m²
- Actuating force 200 N
- Nominal voltage AC/DC 24 V
- Control modulating DC (0)2...10 V Variable
- Position feedback DC 2...10 V Variable
- Length of Stroke Max. 100 mm, adjustable in 20 mm increments
- Running time motor 7 s Variable

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	13 W
	Power consumption in rest position	2 W
	Power consumption for wire sizing	23 VA
	Power consumption for wire sizing note	Imax 20 A @ 5 ms
	Connection supply / control	Cable 1 m, 4 x 0.75 mm²
	Parallel operation	Yes (note the performance data)
Functional data	Torque variable	25%, 50%, 75% reduced
	Actuating force motor	Min. 200 N
	Modifiable actuating force	25%, 50%, 75% reduziert
	Positioning signal Y	DC 0...10 V
	Positioning signal Y note	Input impedance 100 kΩ
	Control signal Y variable	Open-close 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
	Direction of motion note	Y = 0 V: with switch 0 (retracted) / 1 (extended)
	Direction of motion variable	Electronically reversible
	Manual override	With push-button, can be locked
	Length of Stroke	Max. 100 mm, adjustable in 20 mm increments
	Minimum stroke	40 mm
	Stroke limitation	can be limited on both sides with mechanical end stops
	Running time motor	7 s / 100 mm
	Motor running time variable	7...30 s / 100mm
	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, AC only) = 50%
	Override control variable	MAX = (MIN + 32%)...100% MIN = 0%...(MAX − 32%) ZS = MIN...MAX
	Sound power level motor	56 dB(A)
Safety	Protection class IEC/EN	III Safety extra-low voltage
	Protection class UL	UL Class 2 Supply
	Degree of protection IEC/EN	IP54

Linear actuator, parameterisable, modulating, AC/DC 24 V, 200 N, Running time motor 7 s

BELIMO

Technical data
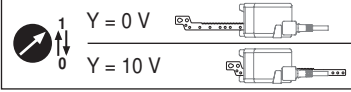
Safety	Degree of protection NEMA/UL	NEMA 2, UL Enclosure Type 2
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Certification UL	cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1:02
	Mode of operation	Type 1
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	-30...40°C
	Ambient temperature note	Caution: +40...+50°C utilisation possible only under certain restrictions. Please contact your supplier.
	Non-operating temperature	-40...80°C
	Ambient humidity	95% r.h., non-condensing
	Maintenance	Maintenance-free
Weight	Weight	1.4 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.
- Outdoor application: only possible in case that no (sea)water, snow, ice, insolation or aggressive gases interfere directly with the actuator and that is ensured that the ambient conditions remain at any time within the thresholds according to the data sheet.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied 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.
- Cables must not be removed from the device.
- The rotary supports and coupling pieces available as accessories must always be used if transverse 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 actuator is exposed to severely contaminated ambient air, appropriate precautions must be taken on the system side. Excessive deposits of dust, soot etc. can prevent the gear rod 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 cross section, the design, the installation site and the ventilation conditions must be observed.
- If a rotary support and/or coupling piece is used, actuation force losses are to be expected.
- Self adaptation is necessary when the system is commissioned or whenever the stroke limiting is adjusted (press the adaptation push-button).
- 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.

Product features

Mode of operation	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	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 ventilating application individually on the mounting side or with the Z-KS1 coupling piece provided for this purpose.
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	If a stroke limitation will be adjusted, the operating range on this side of the gear rod can be used starting with an extension length of 20 mm and then can be limited respectively in increments of 20 mm by means of the mechanical end stops Z-AS1. A minimum permissible stroke of 40 mm must be allowed for.
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 an adaption, which is when the operating range and position feedback adjust themselves to the mechanical setting range. The detection of the mechanical end stops enables a gentle approach to the end positions, thus protecting the actuator mechanics. 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 pressing the gearbox disengagement button is configured. 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	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
	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

	Description	Type
Mechanical accessories	End stop set for SH	Z-AS1
	Rotary support for compensation of transverse forces	Z-DS1
	Coupling piece M8 for SH, galvanised steel	Z-KS1

Accessories

|	Description	Type
Service Tools	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.
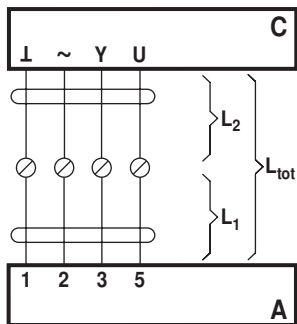• Parallel connection of other actuators possible. Observe the performance data.

Wiring diagrams

AC/DC 24 V, modulating

Y ← DC (0)2...10 V
U → DC 2...10 V
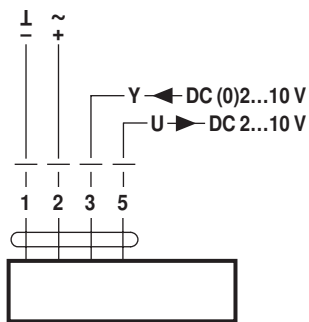
Cable colours:
1 = black
2 = red
3 = white
5 = orange

Signal cable lengths

L_2	$L_{tot} = L_1 + L_2$	
$\perp / \sim$	**AC**	**DC**
0.75 mm^2	≤30 m	≤5 m
1.00 mm^2	≤40 m	≤8 m
1.50 mm^2	≤70 m	≤12 m
2.50 mm^2	≤100 m	≤20 m

A = actuator
C = control unit
L1 = actuator connecting cable
L2 = customer cable
Ltot = maximum signal cable length

Note:
In the event of several actuators switched in parallel, the maximum signal cable length is to be divided by the number of actuators.
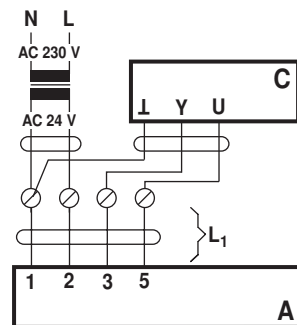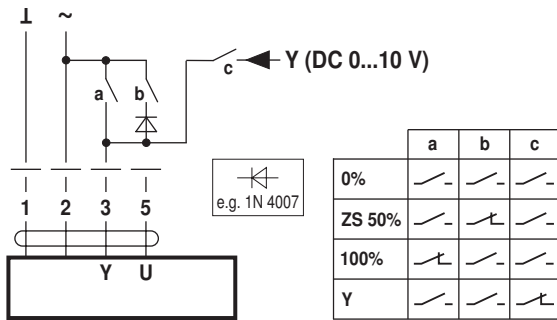

A = actuator
C = control unit
L1 = actuator connecting cable

Note:
If supply and data line are handled separately, then no special limitations apply for the installation.
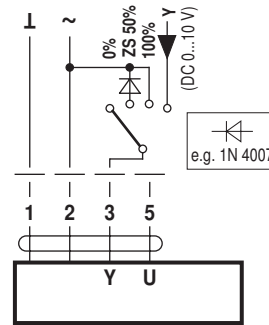
Functions

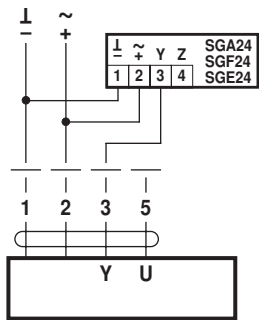### Functions with basic values (conventional mode)

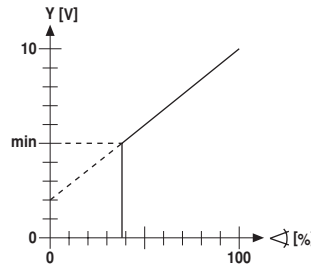**Override control with AC 24 V with relay contacts**

e.g. 1N 4007

Y (DC 0...10 V)

	a	b	c
0%			
ZS 50%			
100%			
Y			

Override control with AC 24 V with rotary switch

0% ZS 50% 100% Y (DC 0...10 V)

e.g. 1N 4007

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

SGA24 / SGF24 / SGE24

Minimum limit with positioner SG..

SGA24 / SGF24 / SGE24

Y (DC 0...10 V)

Y [V]

10

min

0

0   100   [%]
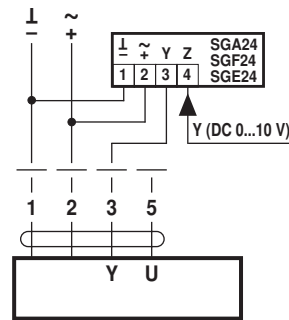
Position indication

ZAD24

(1)
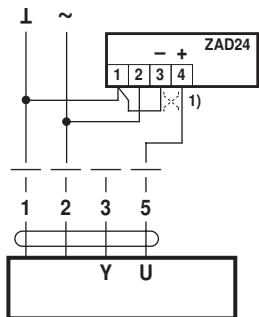
Control with 4...20 mA via external resistor

500 Ω

(−)

(+)   4...20 mA

U   DC 2...10 V

(1) Adapting the direction of rotation
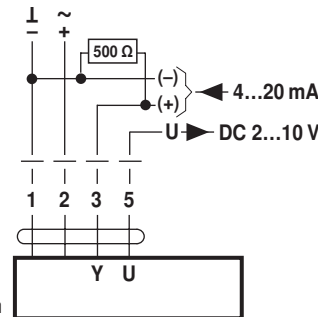
Caution:
The operating range must be set to DC 2...10 V.
The 500 Ω resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V

Functional check
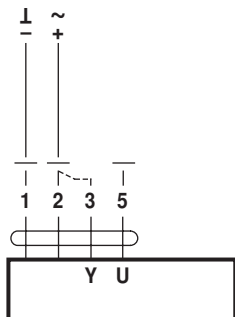
Procedure
1. Apply 24 V to connection 1 and 2
2. Disconnect connection 3:
- for direction of stroke 0: Actuator travels in the direction "retracted"
- for direction of stroke 1: Actuator travels in the direction "extended"
3. Short circuit connections 2 and 3:
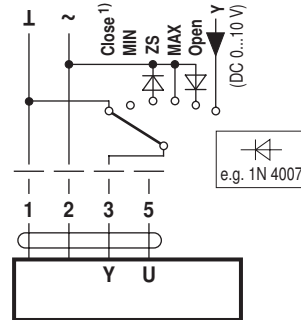- Actuator runs in the opposite direction

Functions

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

Override control and limiting with AC 24 V with relay contacts

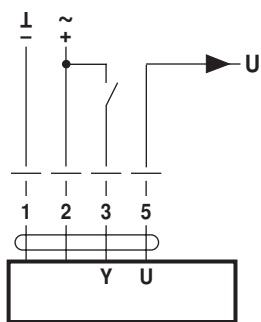|	a	b	c	d	e
Close [1]					
MIN					
ZS					
MAX					
Open					
Y					
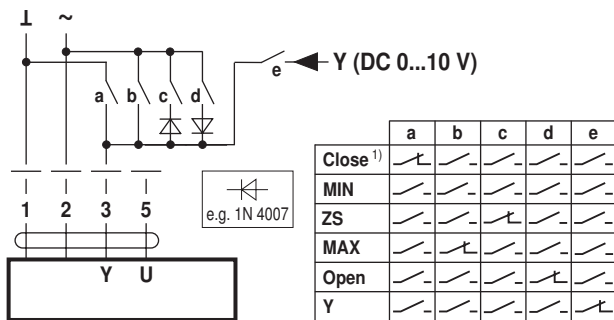
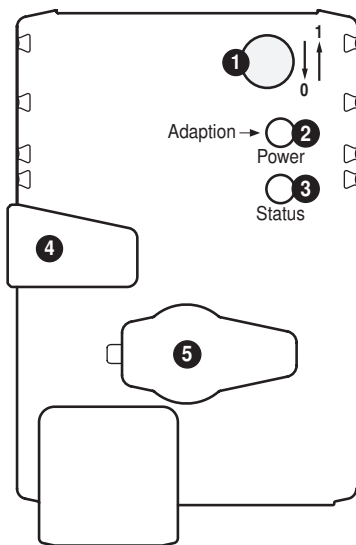Override control and limiting with AC 24 V with rotary switch

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

Control open-close

Operating controls and indicators

❶ Direction of stroke switch
Switch over: Direction of stroke changes

❷ Push-button and LED display green
Off: No power supply or malfunction
On: In operation
Press button: Triggers stroke adaptation, followed by standard mode

❸ Push-button and LED display yellow
Off: Standard mode
On: Adaptation or synchronising process active
Press button: No function

❹ Gear disengagement button
Press button: Gear disengages, motor stops, manual override possible
Release button: Gear engages, synchronisation starts, followed by standard mode

❺ Service plug
For connecting parameterisation and service tools

Check power supply connection
❷ Off and ❸ On   Possible wiring error in power supply

Installation notes

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

Applications without transverse force 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).

Applications with transverse forces The coupling piece with the internal thread (Z-KS1) 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 ventilating 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° (angle), laterally and upwards.
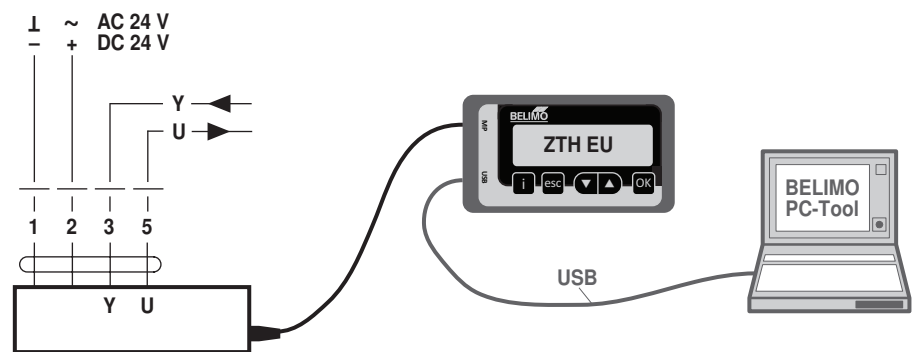
Negative torque max. 50% of the actuating force (Caution: Application possible only under certain restrictions. Please contact your supplier.)

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.

Dimensions [mm]

Dimensional drawings