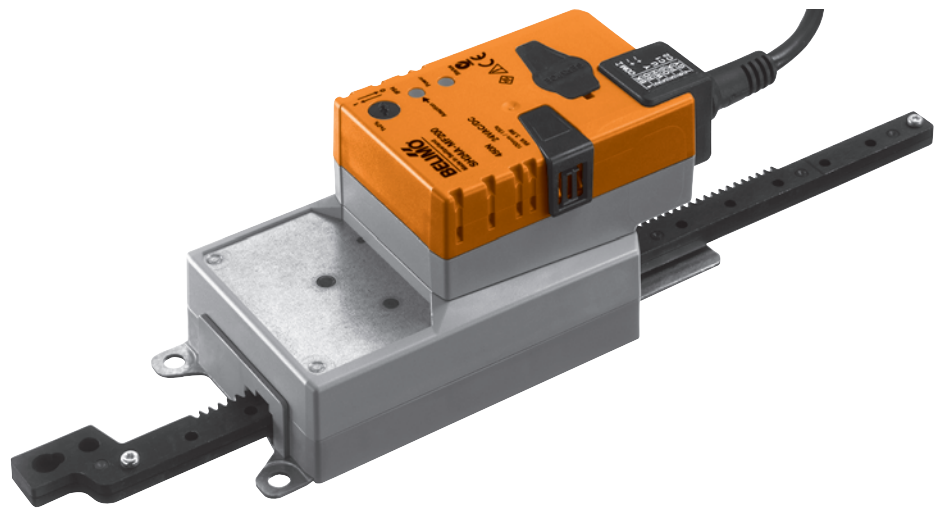


Multifunctional linear actuators for adjusting air dampers and slide valves in ventilation and air-conditioning systems for building services installations

- For air control dampers up to approx. 3 m<sup>2</sup>
- Actuating force 450 N
- Nominal voltage AC/DC 24 V
- Control: modulating DC 0 ... 10 V or variable
- Position feedback DC 2 ... 10 V or variable
- Length of stroke 100, 200 or 300 mm


**Overview of types**

Type	Stroke (adjustable in steps of 20 mm)	Operating range	Weight
SH24A-MF100	Up to max. 100 mm	DC 2 ... 10 V ≈ 0 ... 100 mm	1.1 kg
SH24A-MF200	Up to max. 200 mm	DC 2 ... 10 V ≈ 0 ... 200 mm	1.17 kg
SH24A-MF300	Up to max. 300 mm	DC 2 ... 10 V ≈ 0 ... 300 mm	1.24 kg

**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	3.5 W @ nominal force
At rest	1.3 W
For wire sizing	6 VA

Connection	Cable 1 m, 4 x 0.75 mm <sup>2</sup>
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Functional data	Factory settings	Variable	Settings
Actuating force	Min. 450 N @ nominal voltage	25%, 50%, 75% reduced	.....
Control Control signal Y	DC 0 ... 10 V, input impedance 100 kΩ	Open-close, 3-point (AC only), modulating (DC 0 ... 32 V)	.....
Operating range	DC 2 ... 10 V (See also «Overview of types»)	Start point DC 0.5 ... 30 V End point DC 2.5 ... 32 V	.....
Position feedback (Measuring voltage U)	DC 2 ... 10 V, max. 0.5 mA	Start point DC 0.5 ... 8 V End point DC 2.5 ... 10 V	.....
Position accuracy	±5%		
Stroke	See «Overview of types»		
Direction of stroke at Y = 0 V	Reversible with switch 1↑ resp. 0↓	Electronically reversible	.....
Manual override	Gearing latch disengaged with pushbutton, can be locked		
Stroke adjustment	Max. 100, 200 or 300 mm, adjustable in steps of 20 mm, can be limited at both ends with mechanical adjustable end stops		
Running time	150 s / 100 mm	150 ... 600 s / 100 mm	.....
Automatic adjustment of the operating range and the measuring signal U to match the mechanical stroke adjustment	Manual triggering of the adaption by pressing the «Adaption» button or with the PC-Tool	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, AC only) = 50%	MAX = (MIN + 32%) ... 100% MIN = 0% ... (MAX - 32%) ZS = MIN ... MAX	.....
Sound power level	Max. 50 dB (A)	With a 150 s = 50 dB (A) running time 600 s = 35 dB (A)	.....

**Safety**

Protection class	III Safety extra-low voltage / UL Class 2 Supply
Degree of protection	IP54 in any mounting position NEMA2, UL Enclosure Type 2
EMC	CE according to 2004/108/EC

**Technical data**
*(Continued)*
**Safety**

Certification	cULus according to UL 60730-1A and UL 60730-2-14 and CAN/CSA E60730-1:02 Certified to IEC/EN 60730-1 and IEC/EN 60730-2-14
Mode of operation	Type 1
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 5
Weight	See «Overview of types» on page 1

**Safety notes**


- The actuator is not allowed to be used outside the specified field of application, especially not in aircraft or any other form of air transport.
- Assembly must be carried out by 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
- When calculating the required actuating force, the specifications supplied by the damper or slide valve manufacturers (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 are to be expected.
- 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**

<b>Mode of operation</b>	The actuator is controlled with a standard modulating signal of DC 0 ... 10 V and travels to the position defined by the control signal. Measuring voltage U serves for the electrical display of the damper position 0 ... 100% and as slave control signal for other actuators.
<b>Parameterisable actuators</b>	The factory settings cover the most common applications. Input and output signals and other parameters can be altered with the MFT-H parameterising device or the BELIMO Service Tool, MFT-P.
<b>Simple direct mounting</b>	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-KS1 coupling piece provided.
<b>Manual override</b>	Manual operation is possible with the pushbutton (the gearing latch remains disengaged as long as the pushbutton is pressed or detented).
<b>Stroke adjustment</b>	The stroke of the gear rack can be adjusted on both sides in increments of 20 mm by means of mechanical end stops.
<b>High functional reliability</b>	The actuator is overload-proof, requires no limit switches and automatically stops when the end stop is reached.

## Product features

(Continued)

**Home position** When the supply voltage is switched on for the first time, i.e. at commissioning or after pressing the «gear disengagement» switch, the actuator travels to the home position.

Pos. direction of stroke switch	Home position
 Y = 0	extended 
 Y = 0	retracted 

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


## Accessories

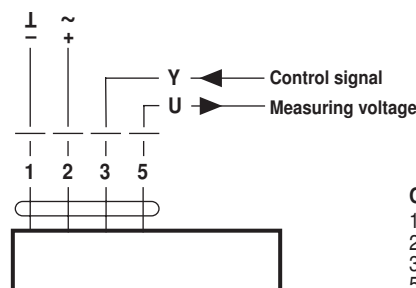
	Description	Data sheet
<b>Electrical accessories</b>	Parameterising device MFT-H	T2 - MFT-H
	PC-Tool MFT-P	T2 - MFT-P
	Position sensor SGA24, SGE24 and SGF24	T2 - SG..24
	Digital position indication ZAD24	T2 - ZAD24
<b>Mechanical accessories</b>	Rotary support to compensate lateral forces Z-DS1	T2 - Z-SH..A..
	Coupling piece Z-KS1	T2 - Z-SH..A..
	Mechanical limiter set Z-AS1	T2 - Z-SH..A..

## Electrical installation

## Wiring diagram

## Notes

- Connection via safety isolating transformer! 
- Other actuators can be connected in parallel. Please note the performance data!



## Assembly notes


**Application without lateral 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 lateral forces**

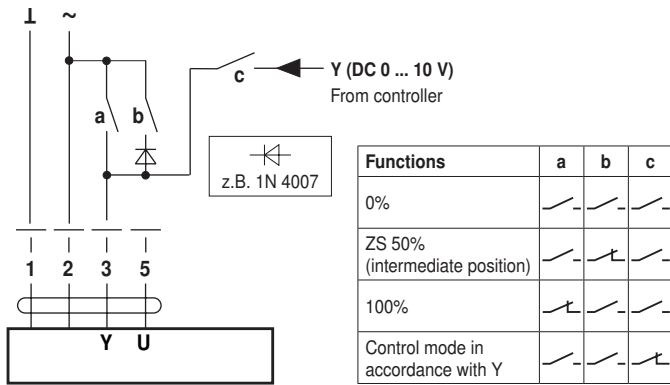
The coupling piece with the internal thread (Z-KS1) is connected to the head of the gear rod. The rotary support (Z-DS1) is screwed to the ventilation application. Afterwards, the linear actuator is screwed to the previously mounted rotary support with the enclosed screw. Afterwards, the coupling piece, which is mounted to the head of the gear rod, is attached to the moving part of the 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° ↙, laterally and upwards.

## Caution

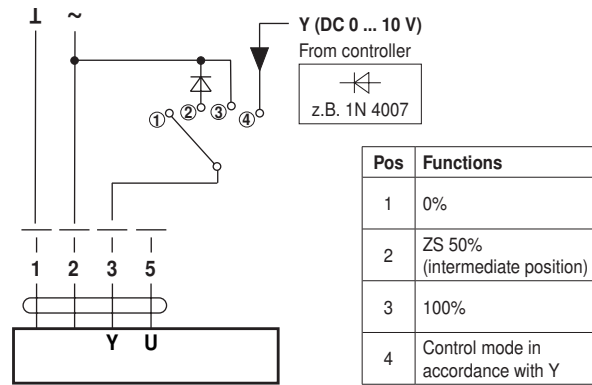
If a rotary support and/or coupling piece is used, losses in the actuation force are to be expected. 

Functions with basic values

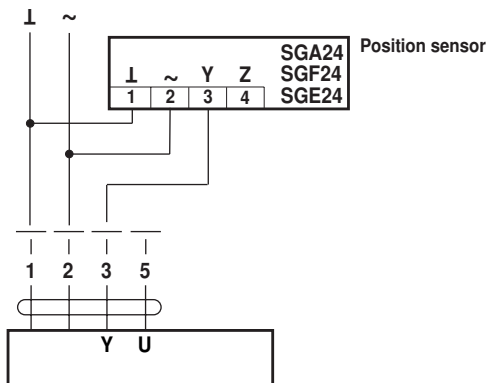
Override control with AC 24 V with relay contacts



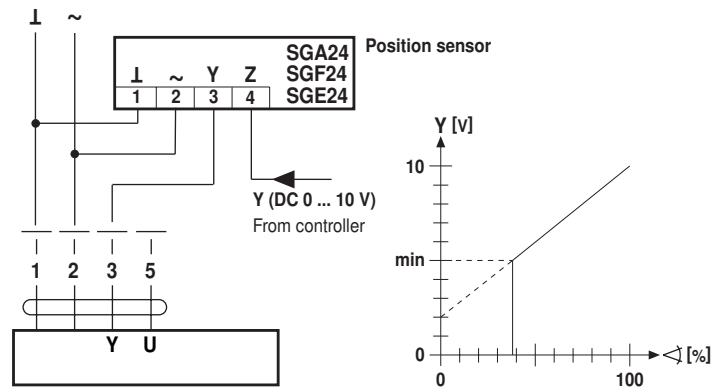
Override control with AC 24 V with rotary control switch



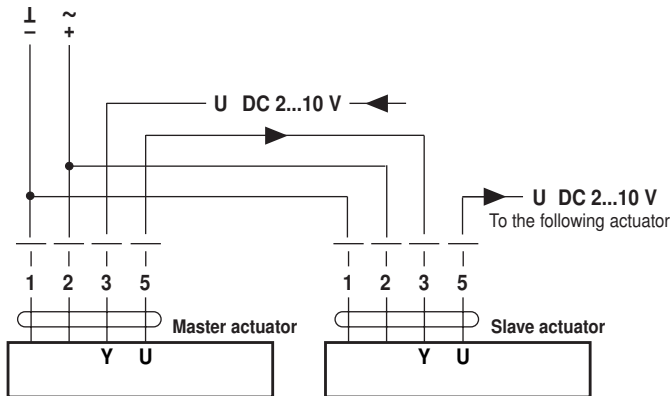
Remote control 0 ... 100 %



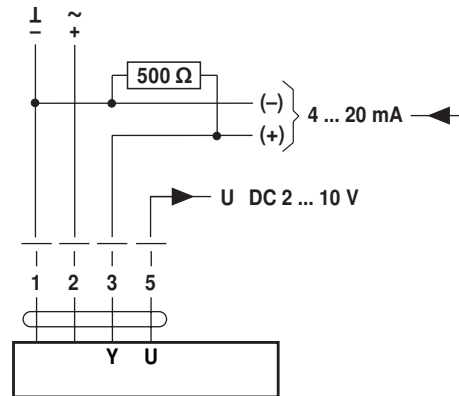
Minimum limit



Master/Slave control (position-dependent)

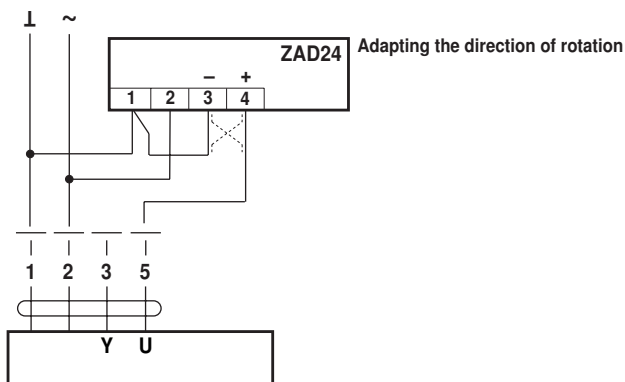


Control with 4 ... 20 mA via external resistance

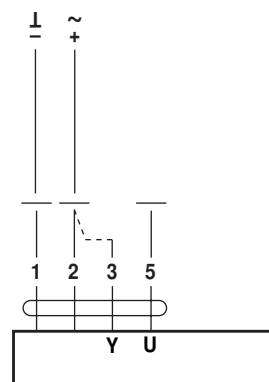


The 500 Ω resistor converts the 4 ... 20 mA current signal to a voltage signal DC 2 ... 10 V

Position indication



Functional check

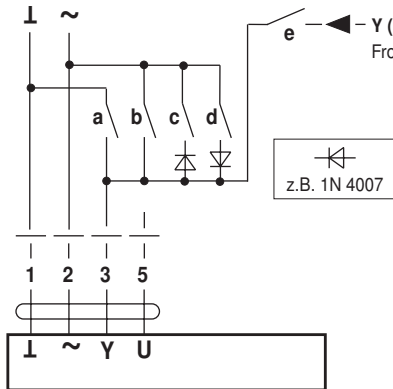


Procedure

- 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 travels in the opposite direction

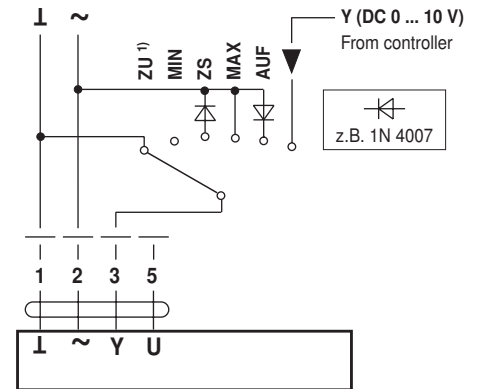
Functions for actuators with specific parameters

Override control and limiting with AC 24 V with relay contacts



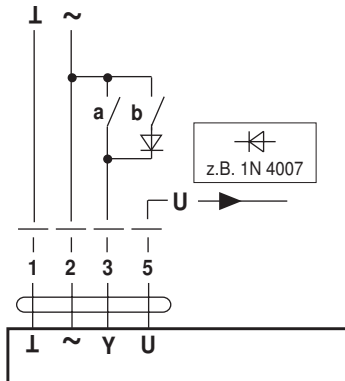
Functions	a	b	c	d	e
CLOSE <sup>1)</sup>	—	—	—	—	—
MIN	—	—	—	—	—
ZS (intermediate position)	—	—	—	—	—
MAX	—	—	—	—	—
OPEN	—	—	—	—	—
Control mode in accordance with Y	—	—	—	—	—

Override control and limiting with AC 24 V with rotary switch



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

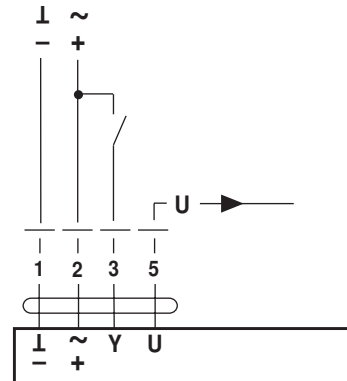
3-point control



Direction of stroke switch

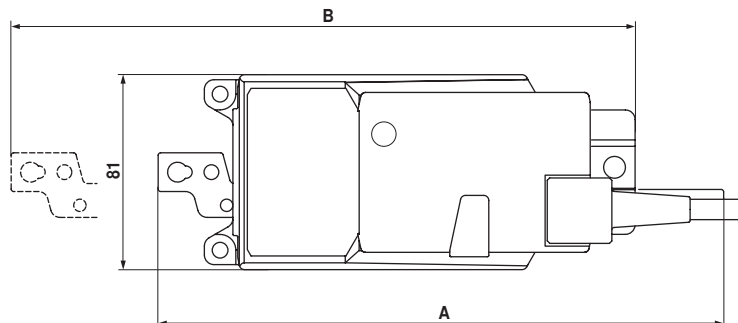
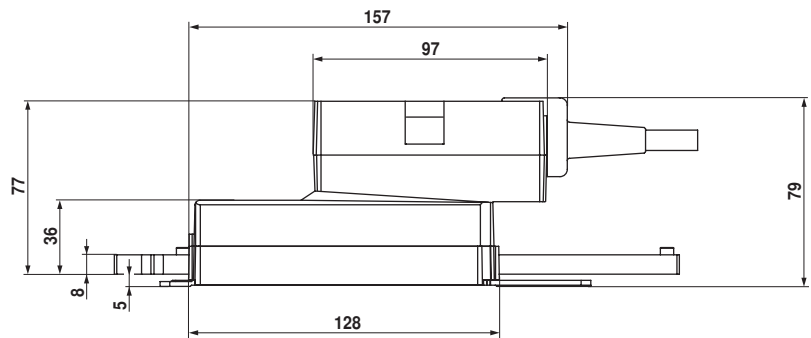
a	b	0	1
—	—	↓	↑
—	—	stop	stop
—	—	↑	↓
—	—	↓	↑

Open-close control



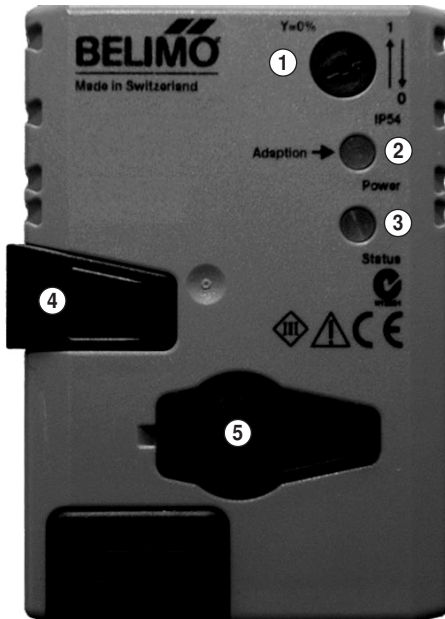
Dimensions [mm]

Dimensional drawings



Type	Max. stroke	A	B
SH24A-MP100	100	233.5	294.7
SH24A-MP200	200	333.5	394.7
SH24A-MP300	300	433.5	494.7

## Operating controls and indicators



### ① Direction of stroke switch

Switching over: Direction of stroke changes

### ② Pushbutton and green LED display

Off: No voltage supply or malfunction

On: Operation

Press button: Switches on stroke adaption followed by standard operation

### ③ Pushbutton and yellow LED display

Off: Standard operation

On: Adaption or synchronising process active

Press button: No function

### ④ Gear disengagement switch

Press button: Gear disengaged, motor stops, manual operation possible

Release button: Gear engaged, synchronisation starts, followed by standard operation

### ⑤ Service plug

For connecting parameterising and service tools

### Check voltage supply connection

- |    |                           |  |
|----|---------------------------|--|
| a) | ② Off and ③ On            | } Check the supply connections.<br>Possibly $\perp$ and $\nabla$ are swapped over. |
| b) | ② Blinking and ③ Blinking |  |