

Modulating SuperCap rotary actuator with emergency control function and extended functionalities for rotary valves and butterfly valves

- Torque motor 40 Nm
- Nominal voltage AC/DC 24 V
- Control modulating DC 2...10 V
- Position feedback DC 2...10 V
- Design life SuperCaps: 15 years


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	11 W
	Power consumption in rest position	3 W
	Power consumption for wire sizing	21 VA
	Power consumption for wire sizing note	I _{max} 20 A @ 5 ms
	Connection supply / control	Cable 1 m, 2 x 0.75 mm ²
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	40 Nm
	Operating range Y	DC 2...10 V
	Input Impedance	100 kΩ
	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
	Setting emergency setting position (POP)	NC / NO or adjustable 0...100% (POP rotary button)
	Bridging time (PF) variable	1...10 s
	Position accuracy	±5%
	Manual override	with push-button
	Running time motor	150 s / 90°
	Running time motor variable	90...150 s
	Running time emergency control position	35 s / 90°
	Running time emergency setting position note	<35 s @ 0...50 °C
	Adaption setting range	manual (automatic on first power-up)
	Sound power level, motor	52 dB(A)
	Sound power level emergency control position	61 dB(A)
	Position indication	Mechanical
Safety	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)
	Protection class UL	UL Class 2 Supply
	Degree of protection IEC/EN	IP54
	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 UL60730-1A, UL60730-2-14 and CAN/CSA E60730-1:02
	Mode of operation	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	-30...50 °C
	Non-operating temperature	-40...80 °C
	Ambient humidity	Max. 95% r.h., non-condensing
Maintenance	Maintenance-free	

Technical data

Mechanical data	Connection flange	F07
Weight	Weight	2.8 kg
Terms	Abbreviations	POP = Power off position / emergency setting position CPO = Controlled power off / controlled emergency control function PF = Power fail delay time / bridging time

Safety notes



- This device has been designed for use in stationary heating, ventilation and air conditioning systems and must not be used outside the specified field of application, especially 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 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 moves the valve to the desired operating position at the same time as the integrated capacitors are loaded. Interrupting the supply voltage causes the valve to be moved to the selected emergency setting position (POP) by means of stored electrical energy.

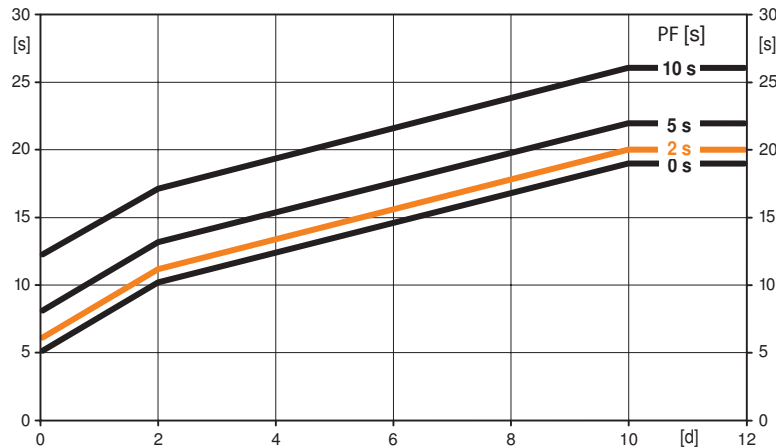
Product features

Pre-charging time (start up) The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of an electricity interruption, the actuator can move at any time from its current position into the preset emergency setting position (POP).

The duration of the pre-charging time depends mainly on following factors:

- Duration of the electricity interruption
- PF delay time (bridging time)

Typical pre-charging time



[d] = Electricity interruption in days
[s] = Pre-charging time in seconds
PF[s] = Bridging time

Calculation example: Given an electricity interruption of 3 days and a bridging time (PF) set at 5 s, the actuator requires a pre-charging time of 14 s after the electricity has been reconnected (see graphic).

PF [s]	[d]				
	0	1	2	7	≥10
0	5	8	10	15	19
2	6	9	11	16	20
5	8	11	13	18	22
10	12	15	17	22	26

[s]

Delivery condition (capacitors) The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20 s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level.

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 rotary valve or butterfly valve with mounting flange. The mounting orientation in relation to the fitting can be selected in 90° steps.

Manual override Manual control with push-button possible - temporary. The gear is disengaged and the actuator decoupled for as long as the button is pressed.

Adjustable angle of rotation Adjustable angle of rotation with mechanical end stops.

High functional reliability The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.

Combination valve/actuator For valves with the following mechanical specifications in accordance with ISO 5211 F05:

- Square stem head SW = 14 mm for form-fit coupling of the rotary actuator.
- Hole circle d = 50 mm

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 actuator then moves into the position defined by the positioning signal.

Factory setting: Y2 (counter-clockwise rotation).

Setting direction of rotation When actuated, the direction of rotation switch changes the running direction in normal operation. The direction of rotation switch has no influence on the emergency setting position (POP) which has been set.

Product features

Setting emergency setting position (POP)	The «Emergency setting position» rotary knob can be used to adjust the desired emergency setting position (POP) between 0 and 100% in 10% increments. The rotary knob always refers to the adapted angle of rotation range. In the event of an electricity interruption, the actuator will move into the selected emergency setting position (POP). Settings: The rotary knob must be set to the «Tool» position for retroactive settings of the emergency setting position (POP) with the Belimo service tool MFT-P. Once the rotary knob is set back to the range 0...100%, the manually set value will have positioning authority.
Bridging time	Electricity interruptions can be bridged up to a maximum of 10 s. In the event of an electricity interruption, the actuator will remain stationary in accordance with the set bridging time. If the electricity interruption is greater than the set bridging time, then the actuator will move into the selected emergency setting position (POP). The bridging time set ex-works is 2 s. This can be modified on site in operation with the use of the Belimo service tool MFT-P. Settings: The rotary knob must not be set to the «Tool» position! Only the values need to be entered for retroactive adjustments of the bridging time with the Belimo service tool MFT-P.
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	Auxiliary switch, add-on, 1 x SPDT	S1A
	Auxiliary switch, add-on, 2 x SPDT	S2A
	Feedback potentiometer 140 Ohm, add-on	P140A
	Feedback potentiometer 200 Ohm, add-on	P200A
	Feedback potentiometer 500 Ohm, add-on	P500A
	Feedback potentiometer 1 kOhm, add-on	P1000A
	Feedback potentiometer 2.8 kOhm, add-on	P2800A
	Feedback potentiometer 5 kOhm, add-on	P5000A
	Feedback potentiometer 10 kOhm, add-on	P10000A
	Connecting cable 5 m, A+B: RJ12 6/6, To ZTH EU	ZK1-GEN
Connection cable 5 m, A: RJ11 6/4, B: Free wire end, To ZTH EU	ZK2-GEN	
	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

Electrical installation



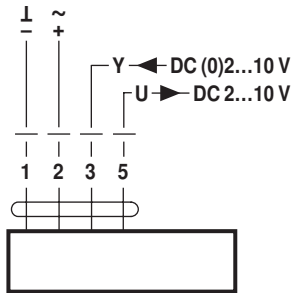
Notes

- Connection via safety isolating transformer.
- Parallel connection of other actuators possible. Observe the performance data.
- Direction of rotation switch is covered. Factory setting: Direction of rotation Y2.

Electrical installation

Wiring diagrams

AC/DC 24 V, modulating

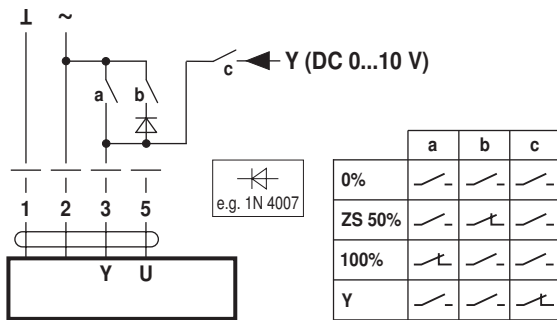


Cable colours:
 1 = black
 2 = red
 3 = white
 5 = orange

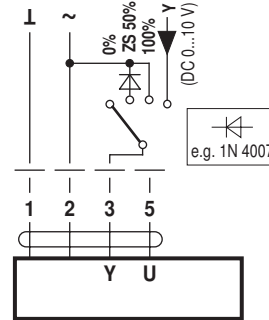
Functions

Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

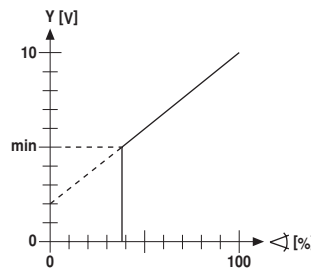
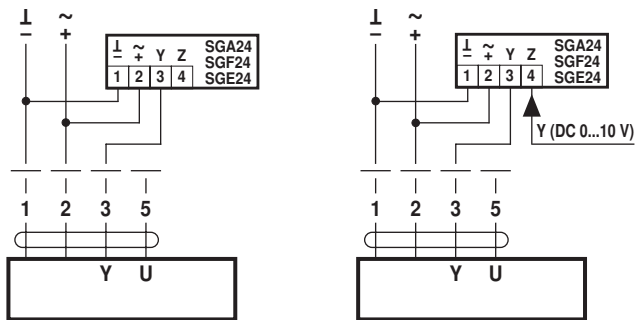


Override control with AC 24 V with rotary switch

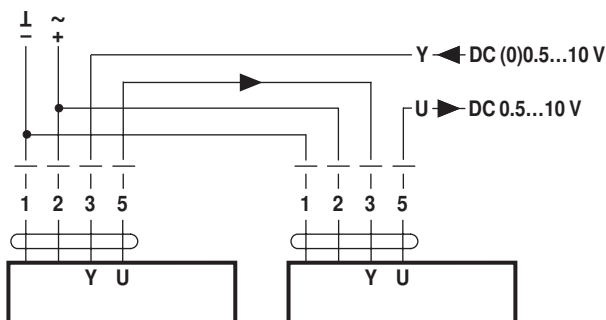


Remote control 0...100% with positioner SG..

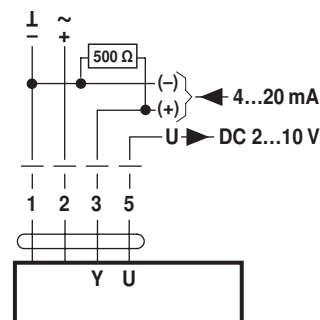
Minimum limit with positioner SG..



Follow-up control (position-dependent)



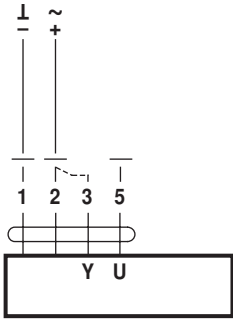
Control with 4...20 mA via external resistor



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

Functional check

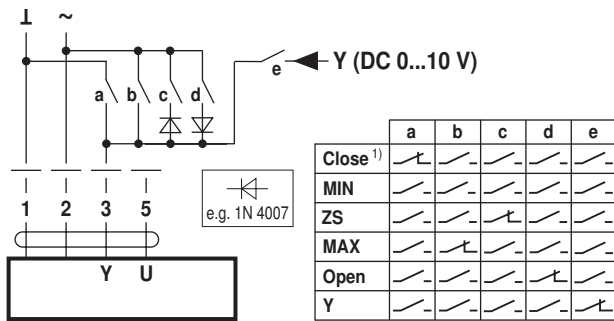


Procedure

1. Connect 24V to connections 1 and 2
2. Disconnect connection 3:
 - with direction of rotation Y1: Actuator rotates to the left
 - with direction of rotation Y2: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
 - Actuator runs in opposite direction

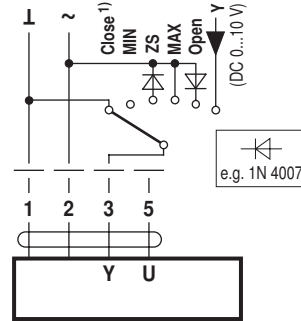
Functions for actuators with specific parameters (Parametrisation with PC-Tool necessary)

Override control and limiting with AC 24 V with relay contacts



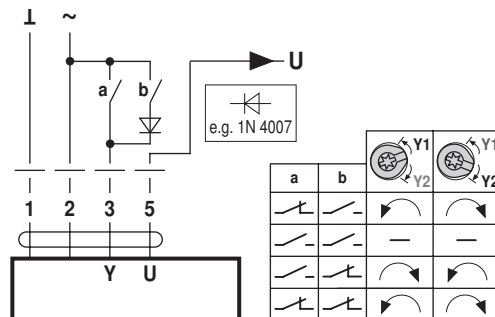
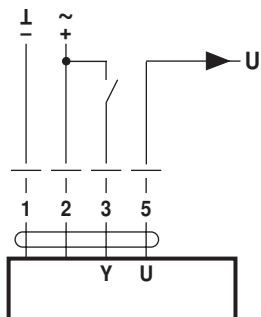
Control open-close

Override control and limiting with AC 24 V with rotary switch

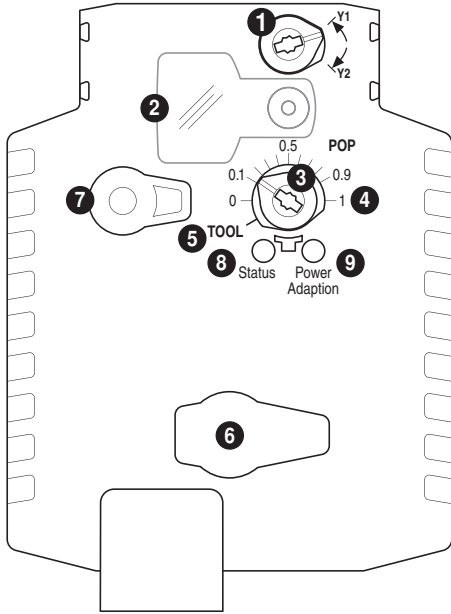


Control 3-point

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



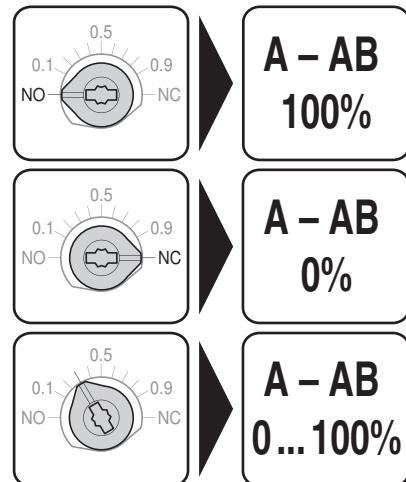
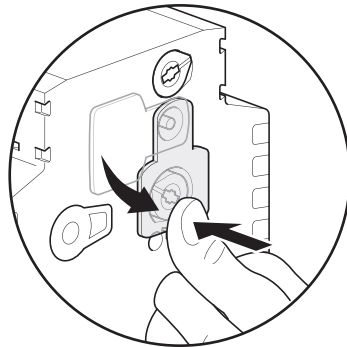
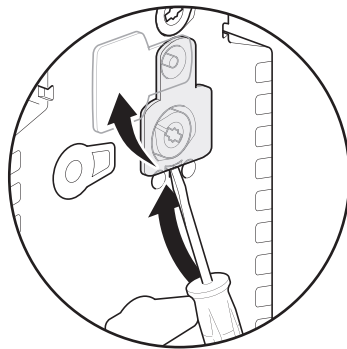
Operating controls and indicators



- 1 Direction of rotation switch
- 2 Cover, POP button
- 3 POP button
- 4 Scale for manual adjustment
- 5 Position for adjustment with tool
- 6 Tool socket
- 7 Disengagement button

LED displays		Meaning / function
8 yellow	9 green	
Off	On	Operation OK / without fault
Off	Flashing	POP function active
On	Off	Fault
Off	Off	Not in operation
On	On	Adaptation procedure running
Flashing	On	Communication

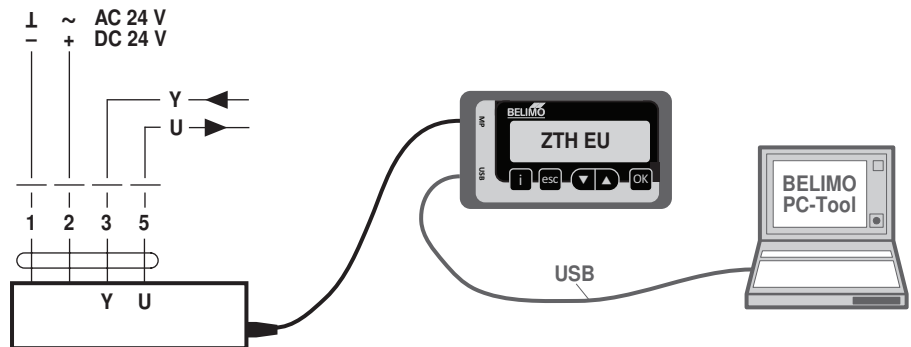
9 **Press button:** Triggers angle of rotation adaption, followed by standard operation
 Setting emergency setting position (POP)



Service

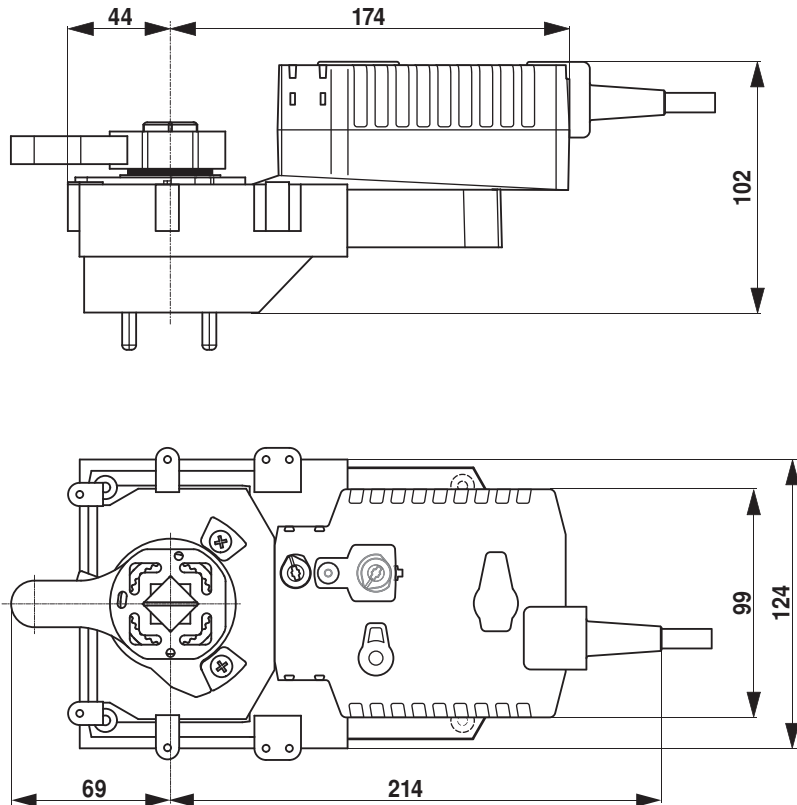
Service Tools connection The actuator can be parameterised by ZTH EU via the service socket. For an extended parameterisation the PC tool can be connected.

Connection ZTH EU / PC-Tool



Dimensions [mm]

Dimensional drawings



Further documentation

- Overview Valve-actuator combinations
- Data sheets for rotary valves and butterfly valves
- Installation instructions for actuators and/or rotary valves and butterfly valves
- General notes for project planning