

Modulating rotary actuator fail-safe for rotary valves and butterfly valves

- Torque motor 40 Nm
- Nominal voltage AC/DC 24 V
- Control modulating 2...10 V
- Position feedback 2...10 V



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	Imax 20 A @ 5 ms
	Connection supply / control	Cable 1 m, 4x 0.75 mm ²
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	40 Nm
	Operating range Y	2...10 V
	Input impedance	100 kΩ
	Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V
	Position feedback U	2...10 V
	Position feedback U note	Max. 0.5 mA
	Position feedback U variable	Start point 0.5...8 V End point 2.5...10 V
	Setting fail-safe position	NC/NO or adjustable 0...100% (POP rotary knob)
	Bridging time (PF)	2 s
	Bridging time (PF) variable	0...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 fail-safe	35 s / 90°
	Sound power level, motor	52 dB(A)
	Sound power level, fail-safe	61 dB(A)
	Adaptation setting range	manual (automatic on first power-up)
	Position indication	Mechanical
Safety data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Power source UL	Class 2 Supply
	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 2
	Housing	UL Enclosure Type 2

Technical data

Safety data	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	UL Approval	cULus according to UL60730-1A, UL60730-2-14 and CAN/CSA E60730-1 The UL marking on the actuator depends on the production site, the device is UL-compliant in any case
	Type of action	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Pollution degree	3
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	-30...50°C [-22...122°F]
	Storage temperature	-40...80°C [-40...176°F]
	Servicing	maintenance-free
Mechanical data	Connection flange	F05
Weight	Weight	2.9 kg
Terms	Abbreviations	POP = Power off position / fail-safe position CPO = Controlled power off / controlled fail-safe 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 device and that it is ensured that the ambient conditions remain within the thresholds according to the data sheet at any time.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.
- The switch for changing the direction of rotation may only be operated by authorised specialists. The direction of rotation must not in particular be reversed in a frost protection circuit.
- 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

- | | |
|-----------------------|--|
| Operating mode | 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 fail-safe position by means of stored electrical energy. |
|-----------------------|--|

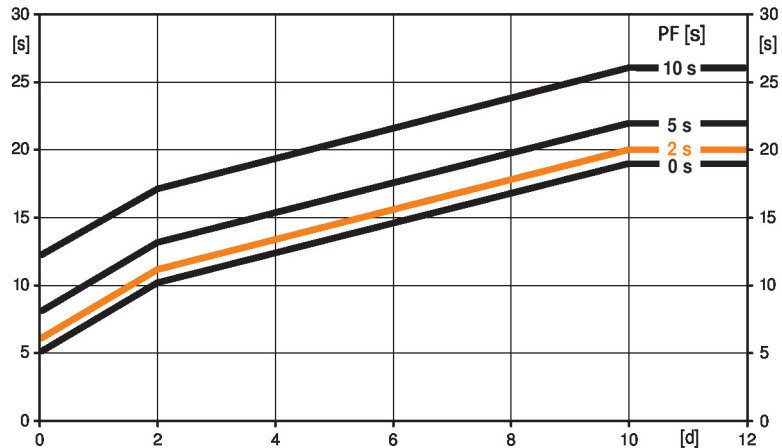
Pre-charging time (start up)

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 a power failure, the actuator can move at any time from its current position into the preset fail-safe position.

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

- Duration of the power failure
- PF delay time (bridging time)

Typical pre-charging time



[d] = Power failure in days

[s] = Pre-charging time in seconds

PF[s] = Bridging time

Calculation example: Given a power failure of 3 days and a bridging time (PF) set at 5 s, the actuator requires a pre-charging time of 14 s after the power 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

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.

Bridging time

Power failures can be bridged up to a maximum of 10 s.

In the event of a power failure, the actuator will remain stationary in accordance with the set bridging time. If the power failure is greater than the set bridging time, the actuator will move into the selected fail-safe position.

The bridging time set at the factory is 2 s. It can be modified on site in operation by means of the Belimo service tool MFT-P.

Settings: The rotary knob must not be set to the "Tool" position!

For retroactive adjustments of the bridging time with the Belimo service tool MFT-P or with the ZTH EU adjustment and diagnostic device only the values need to be entered.

Setting fail-safe position (POP)

The rotary knob fail-safe position can be used to adjust the desired fail-safe position 0...100% in 10% increments. The rotary knob always refers to the adapted angle of rotation range. In the event of a power failure, the actuator will move into the selected fail-safe position.

Settings: The rotary knob must be set to the «Tool» position for retroactive settings of the fail-safe position 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.

Parametrisable actuators

The factory settings cover the most common applications. Single parameters can be modified with Belimo Assistant 2 or ZTH EU.

Product features

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 train 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.
Home position	<p>The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out an adaptation, which is when the operating range and position feedback adjust themselves to the mechanical setting range.</p> <p>The actuator then moves into the position defined by the control signal.</p> <p>Factory setting: Y2 (counter-clockwise rotation).</p>
Adaptation and synchronisation	<p>An adaptation can be triggered manually by pressing the "Adaptation" button or with Belimo Assistant 2. Both mechanical end stops are detected during the adaptation (entire setting range).</p> <p>Automatic synchronisation after pressing the manual override button is parametrised. The synchronisation is in the home position (0%).</p> <p>The actuator then moves into the position defined by the control signal.</p> <p>A range of settings can be made using Belimo Assistant 2.</p>
Setting direction of motion	When actuated, the direction of the rotation switch changes the running direction in normal operation. The direction of the rotation switch has no influence on the fail-safe position which has been set.

Accessories

Tools	Description	Type
	Service tool, with ZIP-USB function, for parametrisable and communicative Belimo actuators, VAV controller and HVAC performance devices	ZTH EU
	Service tool for wired and wireless setup, on-site operation, and troubleshooting.	Belimo Assistant 2
	Connecting cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin for connection to service socket	ZK1-GEN
	Connecting cable 5 m, A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal	ZK2-GEN
Electrical accessories	Description	Type
	Auxiliary switch 1x SPDT add-on	S1A
	Auxiliary switch 2x SPDT add-on	S2A
	Feedback potentiometer 140 Ω add-on	P140A
	Feedback potentiometer 1 kΩ add-on	P1000A
	Feedback potentiometer 10 kΩ add-on	P10000A

Electrical installation



Supply from isolating transformer.

Parallel connection of other actuators possible. Observe the performance data.

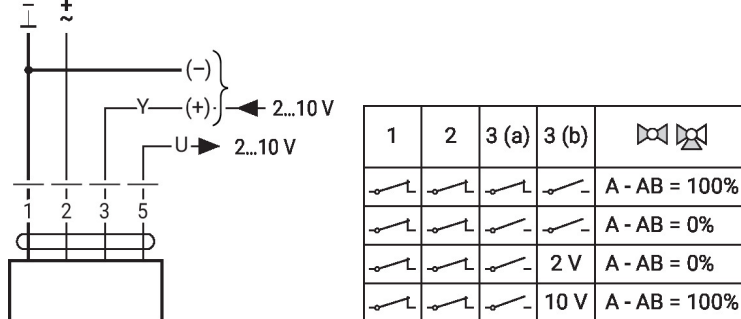
Direction of rotation switch Factory setting: Direction of rotation Y2.

Electrical installation

Wire colours:

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

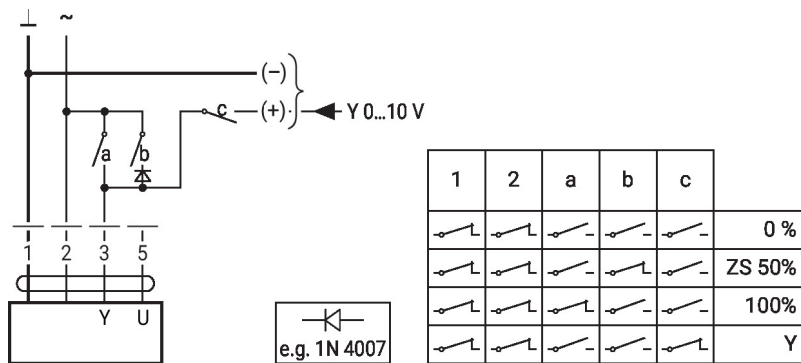
AC/DC 24 V, modulating



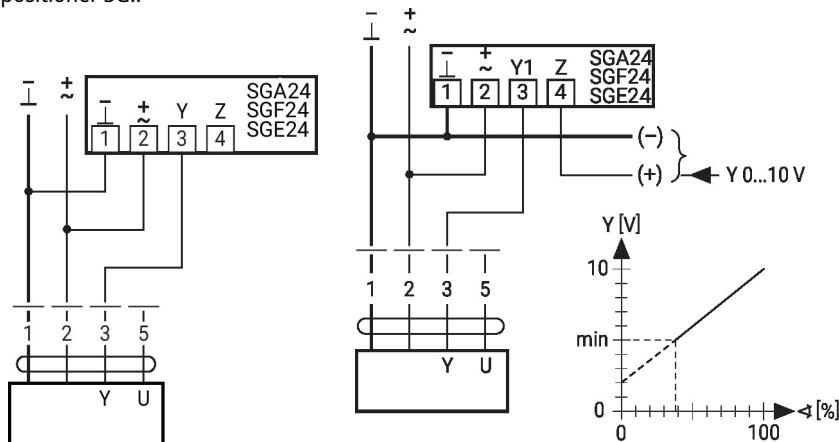
Further electrical installations

Functions with basic values (conventional mode)

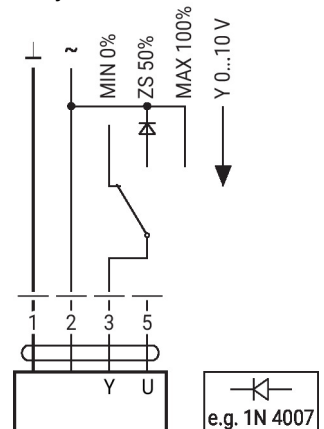
Override control with AC 24 V with relay contacts



Control remotely 0...100% with positioner SG..

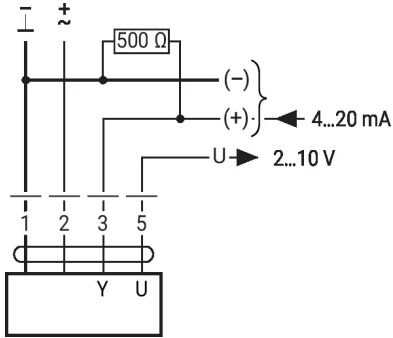


Override control with AC 24 V with rotary switch



Functions with basic values (conventional mode)

Control with 4...20 mA via external resistor



Functional check

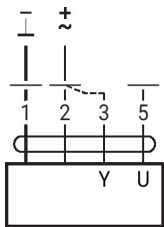
Caution:

The operating range must be set to DC 2...10 V.

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

Procedure

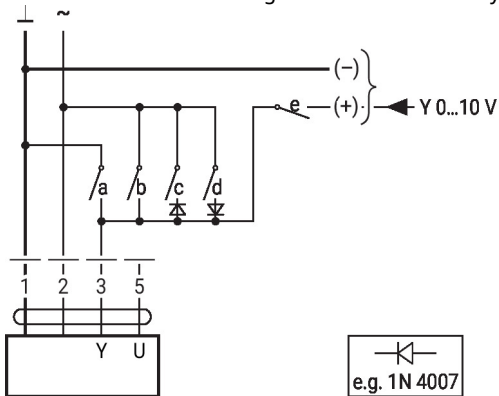
1. Connect 24 V to connections 1 and 2
2. Disconnect connection 3:
 - with direction of rotation L: Actuator rotates to the left
 - with direction of rotation R: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
 - Actuator runs in opposite direction



Functions with specific parameters (Parametrisation necessary)

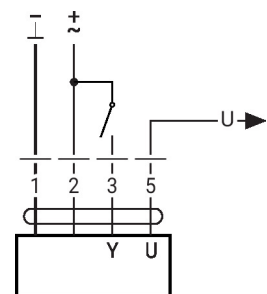
Override control and limiting with AC 24 V with relay contacts

Control open/close



e.g. 1N 4007

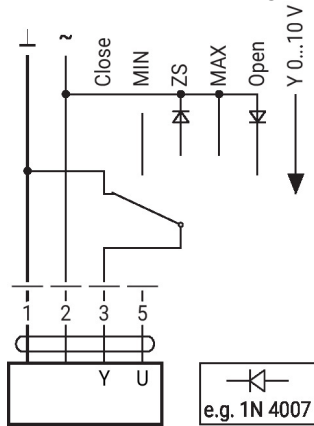
1	2	a	b	c	d	e	
							Close
							MIN
							ZS
							MAX
							Open
							Y



Further electrical installations

Functions with specific parameters (Parametrisation necessary)

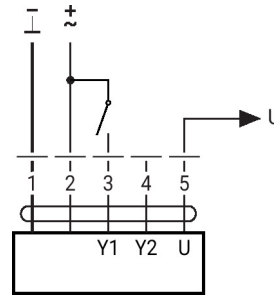
Override control and limiting with AC 24 V with rotary switch



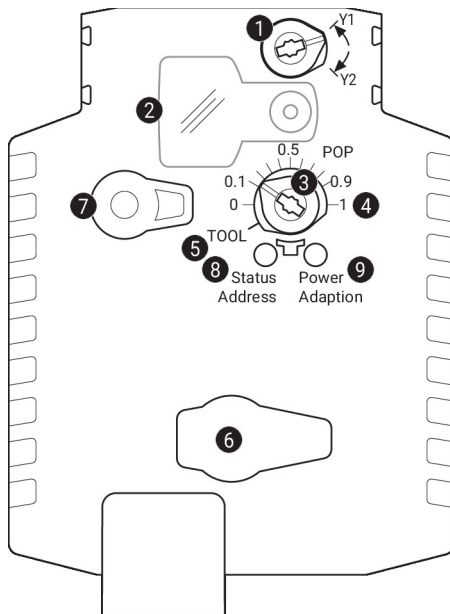
Caution:

The "Close" function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

Control 3-point with AC 24 V



Operating controls and indicators



1 Direction of rotation switch

Switch over:

Direction of rotation changes

2 Cover, POP button

3 POP button

4 Scale for manual adjustment

5 Position for adjustment with tool

6 Service plug

For connecting parametrisation and service tools

7 Manual override button

Press button: Gear train disengages, motor stops, manual override possible

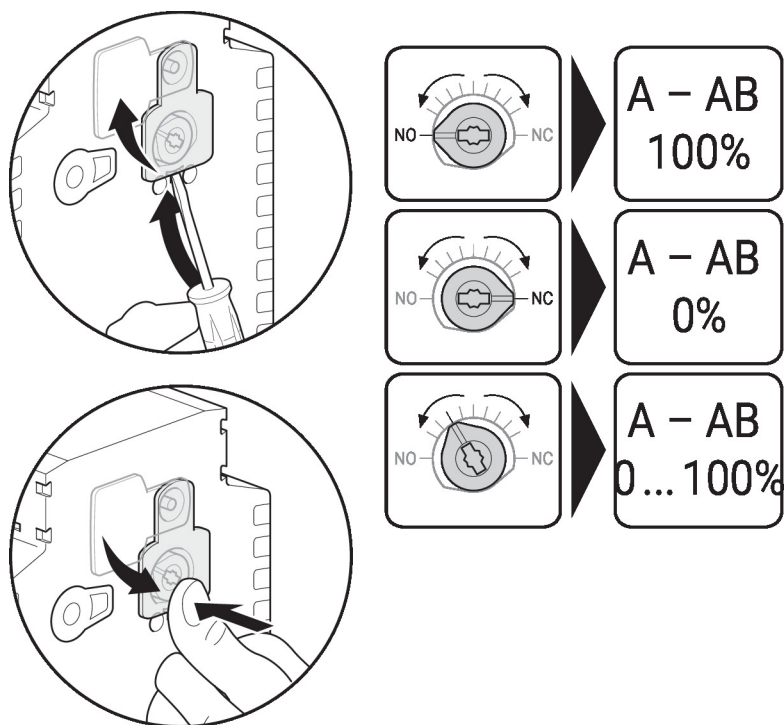
Release button: Gear train engages, standard mode

9 Push-button (LED green)

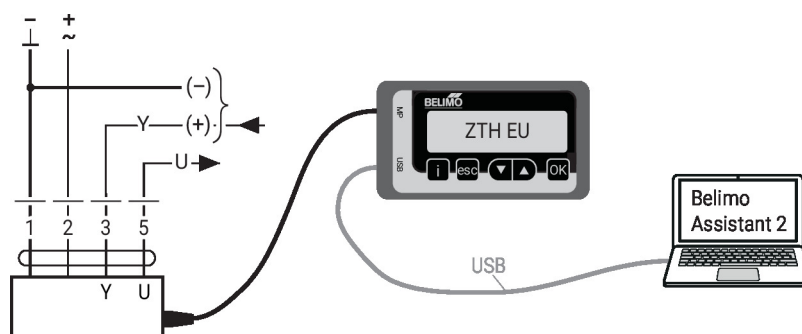
Press button: Triggers angle of rotation adaptation, followed by standard mode

LED displays

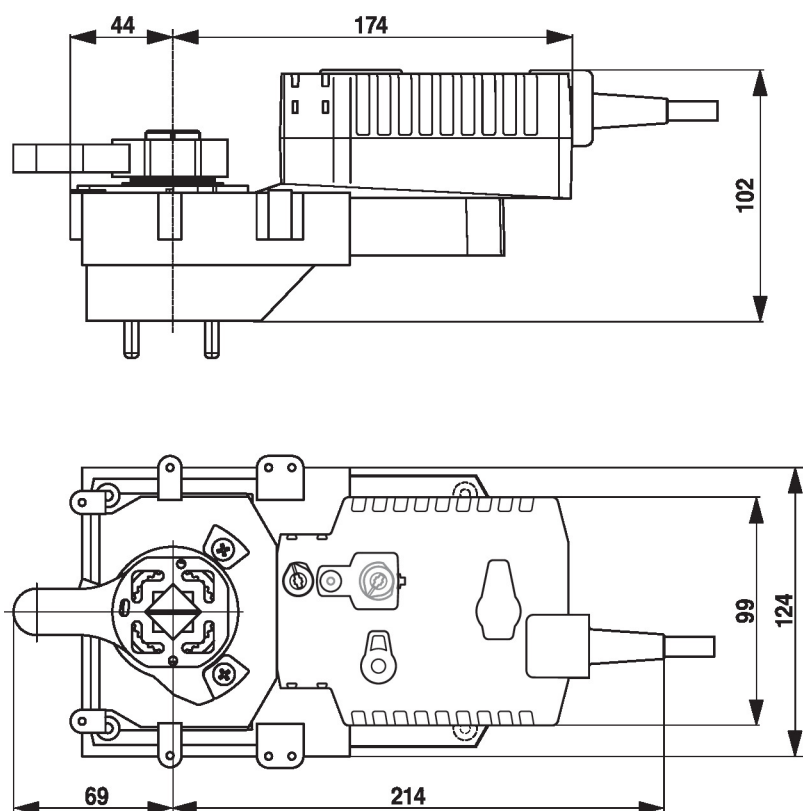
yellow 8	green 9	Meaning / function
Off	On	Operation OK
Off	Flashing	POP function active
On	Off	Fault
Off	Off	Not in operation
On	On	Adaptation or synchronisation process active
Flickering	On	Communication with programming tool

Operating controls and indicators
Setting fail-safe position (POP)

Service

Wired connection The device can be parametrised by ZTH EU via the service socket. For an extended parametrisation, Belimo Assistant 2 can be connected.

Connection ZTH EU / Belimo Assistant 2


Dimensions



Further documentation

- The complete product range for water applications
- Data sheets for rotary valves and butterfly valves
- Installation instructions for actuators and/or rotary valves and butterfly valves
- General notes for project planning
- Quick Guide – Belimo Assistant 2