

Communicative rotary actuator with fail-safe for ball valves

- Torque motor 4 Nm
- Nominal voltage AC/DC 24 V
- Control modulating, communicative 2...10 V variable
- Position feedback 2...10 V variable
- Communication via Belimo MP-Bus
- Conversion of sensor signals
- Deenergised closed (NC)



Picture may differ from product

## Technical data

<b>Electrical data</b>	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	6 W
	Power consumption in rest position	2.5 W
	Power consumption for wire sizing	10 VA
	Connection supply / control	Cable 1 m, 4x 0.75 mm <sup>2</sup>
	Parallel operation	Yes (note the performance data)
<b>Data bus communication</b>	Communicative control	MP-Bus
	Number of nodes	MP-Bus max. 8
<b>Functional data</b>	Torque motor	4 Nm
	Torque fail-safe	4 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
	Operating modes optional	Open/close 3-point (AC only) Modulating (DC 0...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
	Position accuracy	±5%
	Direction of motion motor	Y = 0 (0 V = A – AB = 0%)
	Direction of motion fail-safe	Deenergised NC, valve closed (A – AB = 0%)
	Direction of motion note	for valves with L-bore (A – AB = 100%)
	Manual override	No
	Running time motor	75 s / 90°
	Running time motor variable	75...300 s
	Running time fail-safe	<20 s @ -20...50°C, <60 s @ -30°C
	Sound power level, motor	45 dB(A)
	Adaptation setting range	manual (automatic on first power-up)
	Adaptation setting range variable	No action Adaptation when switched on Adaptation after using the rotation switch
	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 + 33%)...100% MIN = 0%...(MAX – 33%) ZS = MIN...MAX
	Position indication	Mechanical
	Service life	Min. 60'000 fail-safe positions
Safety data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Degree of protection IEC/EN	IP54
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Type of action	Type 1
	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
Weight	Weight	1.5 kg

## 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 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	Conventional operation: The actuator is connected with an analogue control signal Y (note the operating range). The actuator drives the valve to the operating position at the same time as tensioning the return spring. The valve is turned back to the fail-safe position by spring force when the supply voltage is interrupted.
	Operation on Bus: The actuator receives its digital control signal from the higher level controller via the MP-Bus and drives to the position defined. Connection U serves as communication interface and does not supply an analogue measuring voltage.
Converter for sensors	Connection option for a sensor (passive or active sensor or switching contact). The MP actuator serves as an analogue/digital converter for the transmission of the sensor signal via MP-Bus to the higher level system.
Configurable device	The factory settings cover the most common applications. Single parameters can be modified with Belimo Assistant 2.
Simple direct mounting	Simple direct mounting on the ball valve with only one screw. The mounting orientation in relation to the ball valve can be selected in 90° steps.

## Product features

<b>High functional reliability</b>	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
<b>Home position</b>	<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: R (counter-clockwise rotation).</p>
<b>Adaptation and synchronisation</b>	<p>An adaptation can be triggered manually by switching the direction of rotation switch from the left to the right twice within 5s or with the PC-Tool. Both mechanical end stops are detected during the adaptation (entire setting range). Automatic synchronisation after actuating the direction of rotation switch once is programmed. The synchronisation is in the home position (0%).</p> <p>A range of settings can be made using Belimo Assistant 2.</p>

## Accessories

Tools	Description	Type
	Service tool for wired and wireless setup, on-site operation and troubleshooting.	Belimo Assistant 2
	Belimo Assistant Link Bluetooth and USB to NFC and MP-Bus converter for configurable and communicative devices	LINK.10
	Connecting cable 5 m, A: RJ11 6/4 LINK.10, B: 6-pin for connection to service socket	ZK1-GEN
	Connecting cable 5 m, A: RJ11 6/4 LINK.10, B: free wire end for connection to MP/PP terminal	ZK2-GEN
Electrical accessories	Description	Type
	MP-Bus power supply for MP actuators	ZN230-24MP
	Room temperature controller with 3 sequences	CR24-A3
	Room temperature controller with 3 sequences	CR24-B3
	Room temperature controller	CRK24-B1
Gateways	Description	Type
	Gateway MP to BACnet MS/TP	UK24BAC
	Gateway MP to Modbus RTU	UK24MOD

## Electrical installation



Supply from isolating transformer.

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

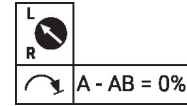
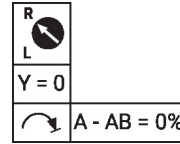
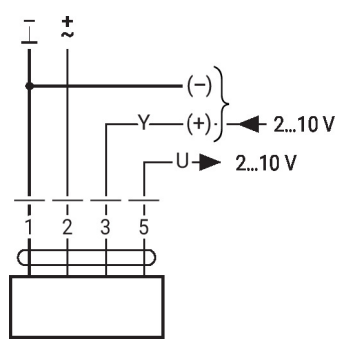
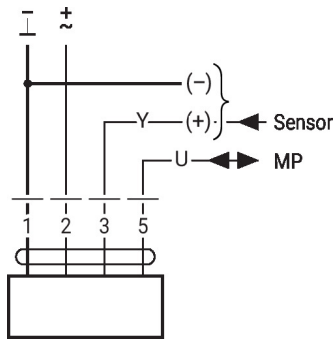
## Wire colours:

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

### Electrical installation

MP-Bus

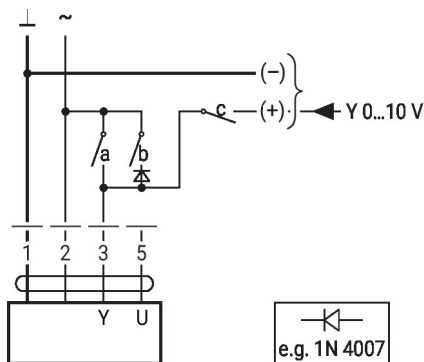
AC/DC 24 V, modulating



### Further electrical installations

#### Functions with basic values (conventional mode)

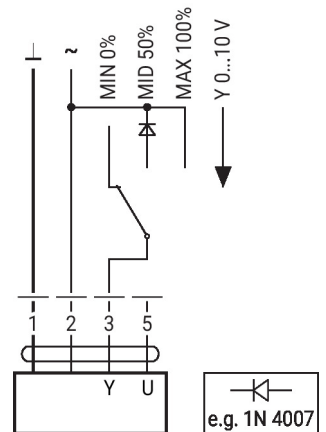
Override control with AC 24 V with relay contacts



1	2	a	b	c	
					0 %
					ZS 50%
					100%
					Y

e.g. 1N 4007

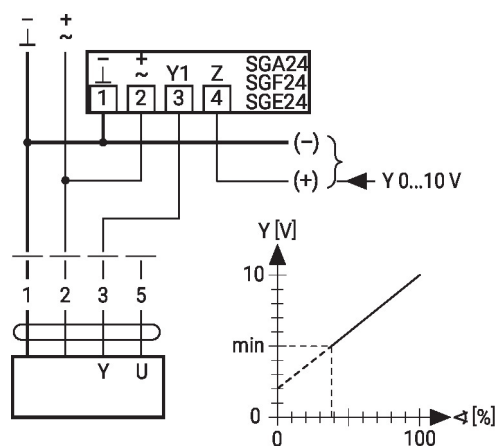
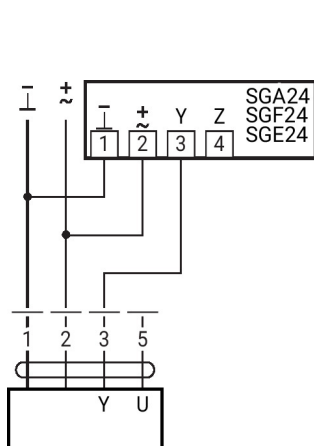
Override control with AC 24 V with rotary switch



e.g. 1N 4007

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

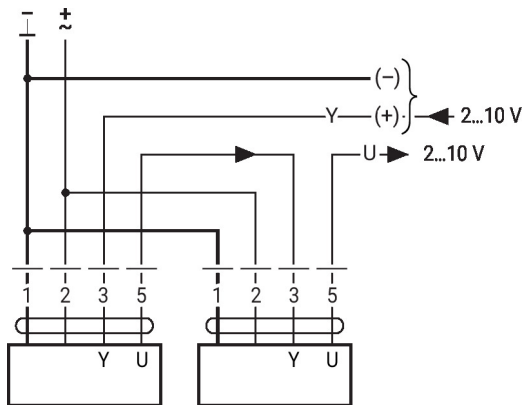
Minimum limit with positioner SG..



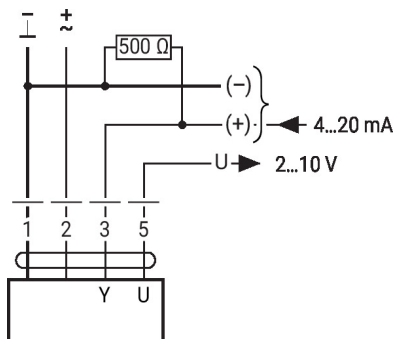
### Further electrical installations

#### Functions with basic values (conventional mode)

Primary/secondary operation (position-dependent)



Control with 4...20 mA via external resistor

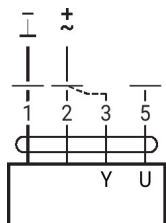


#### Caution:

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.

Functional check

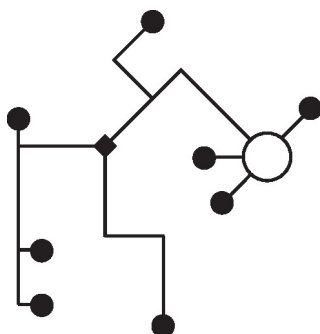


#### Procedure

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

### MP-Bus

MP-Bus Network topology

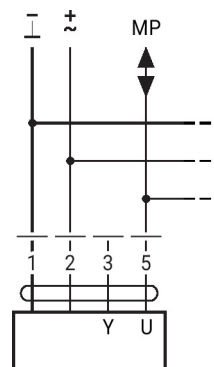


There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).

Supply and communication in one and the same 3-wire cable

- no shielding or twisting necessary
- no terminating resistors required

Connection on the MP-Bus

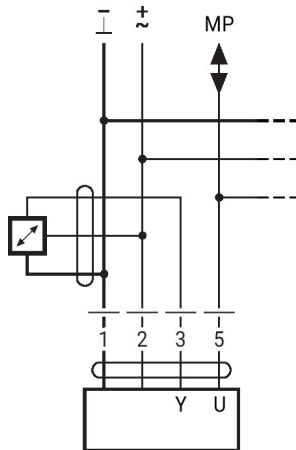


Max. 8 MP-Bus nodes

### Further electrical installations

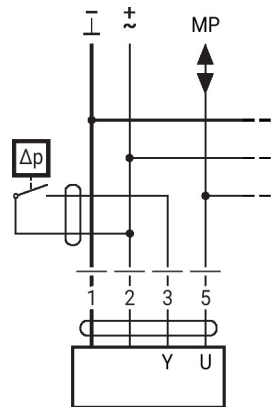
#### MP-Bus

##### Connection of active sensors



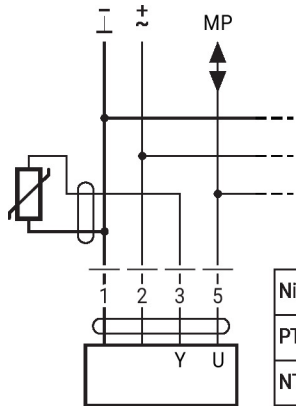
- Supply AC/DC 24 V
- Output signal 0...10 V (max. 0...32 V)
- Resolution 30 mV

##### Connection of external switching contact



- Switching current 16 mA @ 24 V
- Start point of the operating range must be configured on the MP actuator as  $\geq 0.5$  V

##### Connection of passive sensors

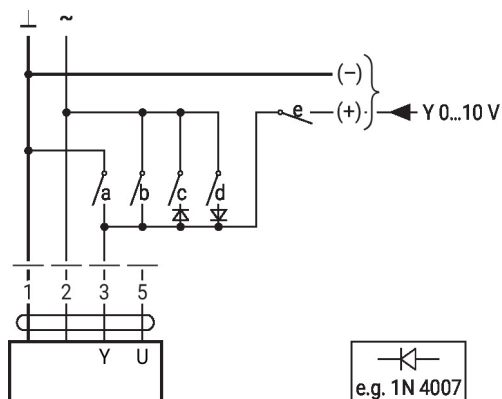


Ni1000	-28...+98°C	850...1600 $\Omega$ <sup>2)</sup>
PT1000	-35...+155°C	850...1600 $\Omega$ <sup>2)</sup>
NTC	-10...+160°C <sup>1)</sup>	200 $\Omega$ ...60 k $\Omega$ <sup>2)</sup>

- 1) Depending on the type
  - 2) Resolution 1 Ohm
- Compensation of the measured value is recommended

### Functions with specific parameters (configuration necessary)

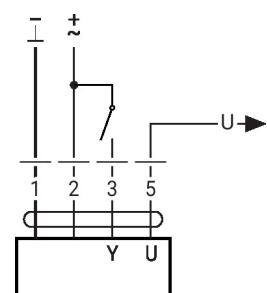
#### Override control and limiting with AC 24 V with relay contacts



e.g. 1N 4007

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

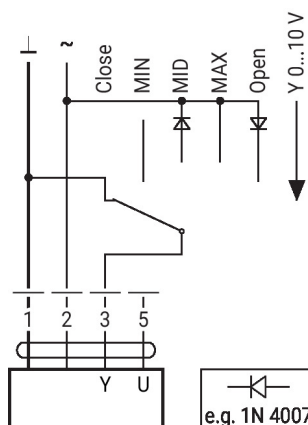
#### Control open/close



### Further electrical installations

#### Functions with specific parameters (configuration necessary)

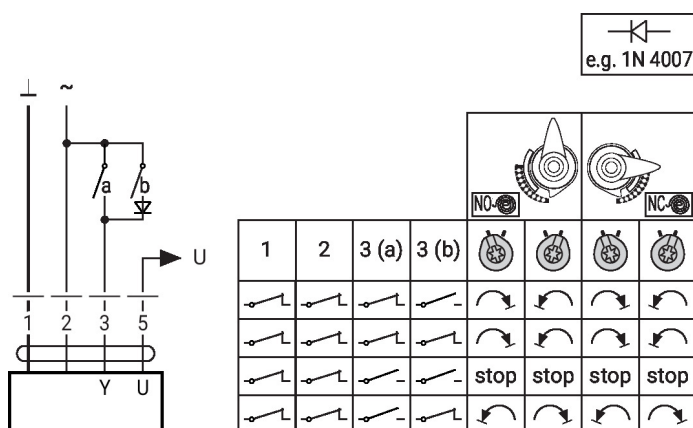
Override control and limiting with AC 24 V with rotary switch

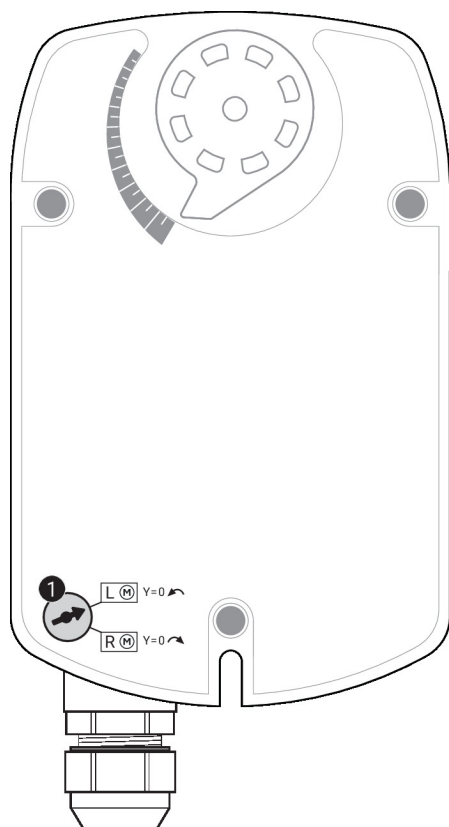


#### Caution:

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 MP addressing**

Move direction of rotation switch in opposite position and backwards (within 4 seconds)

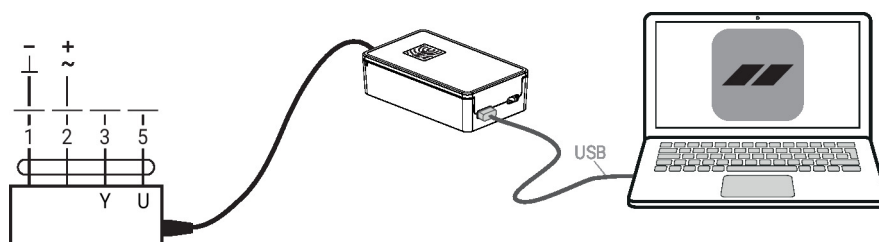
**Service**

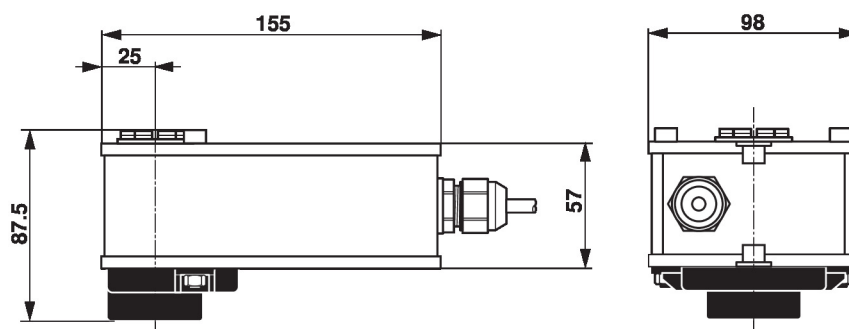
Using Belimo Assistant 2, device parameters can be modified. Belimo Assistant 2 can operate on a smartphone, tablet or PC. The available connection options vary depending on the hardware on which Belimo Assistant 2 is installed.

For more information about Belimo Assistant 2, refer to the Quick Guide – Belimo Assistant 2.


**Wired connection**

Belimo devices can be accessed by connecting Belimo Assistant Link to the USB port on a PC or laptop and to the Service Socket or MP-Bus wire on the device.



**Dimensions****Further documentation**

- Overview MP Cooperation Partners
- Tool connections
- Introduction to MP-Bus Technology
- The complete product range for water applications
- Data sheets for ball valves
- Installation instructions for actuators and/or ball valves
- General notes for project planning
- Quick Guide – Belimo Assistant 2