BELIMO®

Communicative rotary actuator with fail-safe for ball valves

- Torque motor 10 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)

MP BUS®

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	7 W
	Power consumption in rest position	3.5 W
	Power consumption for wire sizing	9.5 VA
	Connection supply / control	Cable 1 m, 4 x 0.75 mm²
	Parallel operation	Yes (note the performance data)
Data bus communication	Communicative control	MP-Bus
	Number of nodes	MP-Bus max. 8
Functional data	Torque motor	10 Nm
	Torque fail-safe	10 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%)
	Manual override	by means of hand crank and locking switch
	Running time motor	90 s / 90°
	Running time motor variable	40...150 s
	Running time fail-safe	<20 s @ -20...50°C / <60 s @ -30°C
	Adaptation setting range	manual (automatic on first power-up)
	Adaptation setting range variable	No action Adaptation when switched on Adaptation after using the hand crank
	Override control	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position, AC only) = 50%
	Override control variable	MAX = (MIN + 33%)...100% MIN = 0%...(MAX – 33%) ZS = MIN...MAX
	Sound power level, motor	45 dB(A)

Functional data	Position indication	Mechanical
	Service life	Min. 60'000 fail-safe positions
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
	Enclosure	UL Enclosure Type 2
	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
Weight	Weight	2.0 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 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

Conventional operation:

The actuator is connected with a standard control signal 0...10 V. The actuator moves 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.

Parametrisable 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 ball valve with only one screw. The mounting orientation in relation to the ball valve can be selected in 90° steps.
Manual override	By using the hand crank the valve can be operated manually and engaged with the locking switch at any position. Unlocking is carried out manually or automatically by applying the operating voltage.
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	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.
	The actuator then moves into the position defined by the control signal.
	Factory setting: Y2 (counter-clockwise rotation).
Adaptation and synchronisation	An adaptation can be triggered manually by pressing the "Adaptation" button or with the PC-Tool. Both mechanical end stops are detected during the adaptation (entire setting range). Automatic synchronisation after actuating the hand crank is programmed. The synchronisation is in the home position (0%).
	A range of settings can be adapted using the PC-Tool (see MFT-P documentation)

Accessories

| Gateways	Description	Type
	Gateway MP to BACnet MS/TP	UK24BAC
	Gateway MP to Modbus RTU	UK24MOD
Electrical accessories	**Description**	**Type**
	MP-Bus power supply for MP actuators	ZN230-24MP
Tools	**Description**	**Type**
	Service Tool, with ZIP-USB function, for parametrisable and communicative Belimo actuators, VAV controller and HVAC performance devices	ZTH EU
	Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P
	Adapter for Service-Tool ZTH	MFT-C
	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 installation

⚠️ **Supply from isolating transformer.**

Parallel connection of other actuators possible. Observe the performance data.
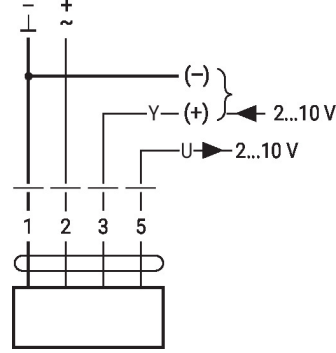
Wire colours:
1 = black
2 = red
3 = white
5 = orange
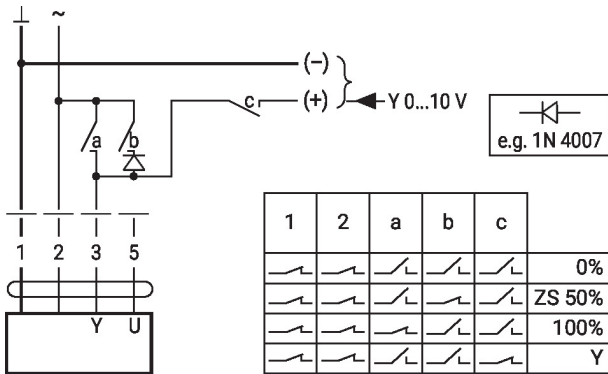
Wiring diagrams

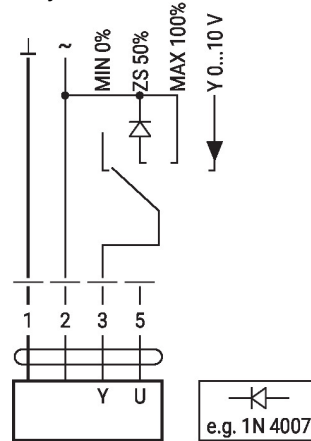Operation on the MP-Bus
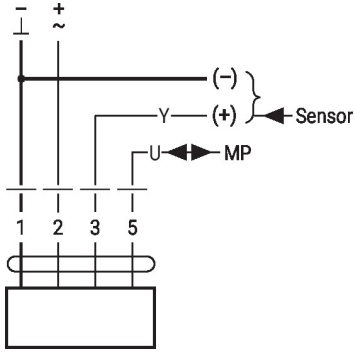
AC/DC 24 V, modulating

Functions
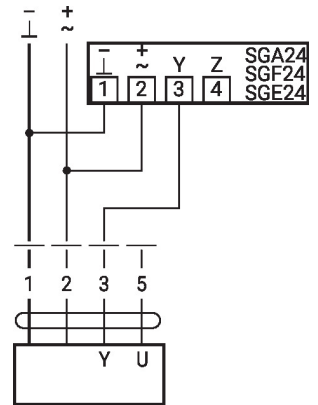
Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

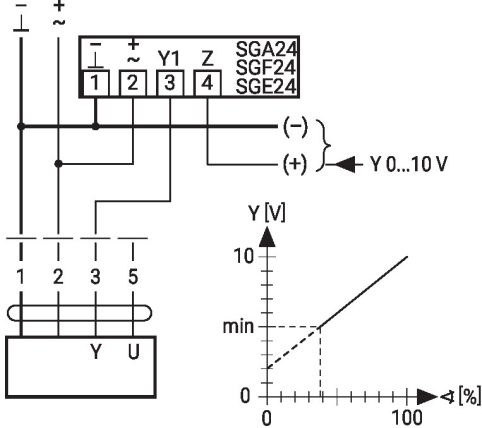| 1	2	a	b	c	
					0%
					ZS 50%
					100%
					Y

Override control with AC 24 V with rotary switch

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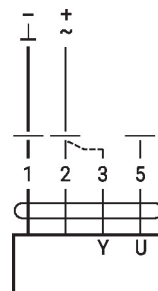

Minimum limit with positioner SG..

Primary/secondary operation (position-dependent)
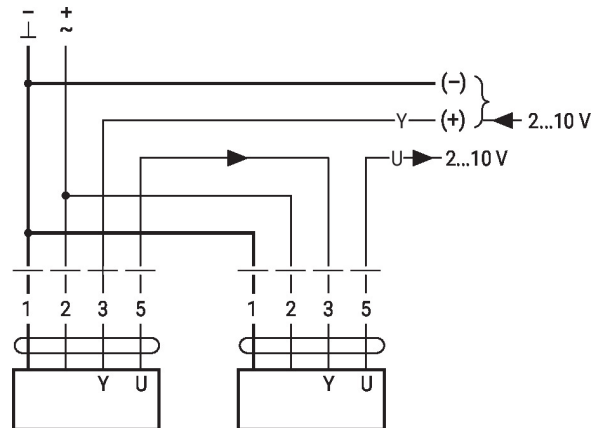
Control with 4...20 mA via external resistor
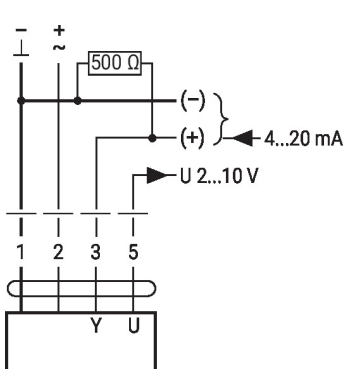
Caution:
The operating range must be set to DC 2...10 V.
The 500 Ohm resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V.

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
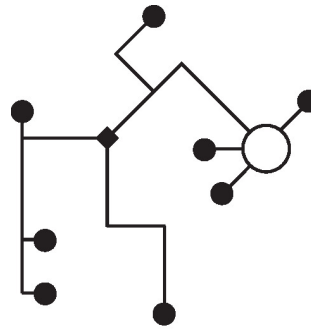3. Short-circuit connections 2 and 3:
– Actuator runs in opposite direction

Functions with specific parameters (Parametrisation necessary)
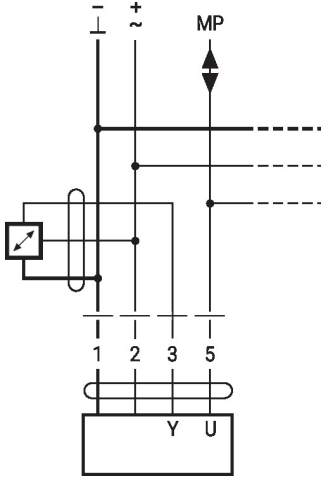
Connection on the MP-Bus
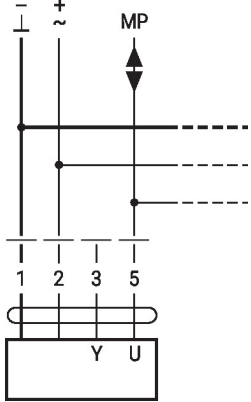
MP-Bus Network topology

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
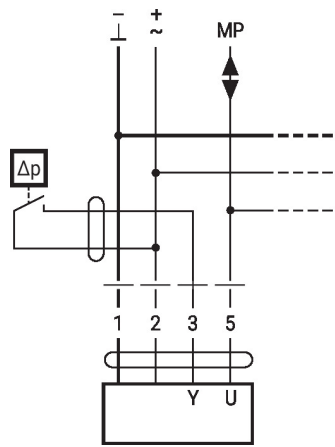• no terminating resistors required

Max. 8 additional MP-Bus nodes

Connection of active sensors

Max. 8 additional MP-Bus nodes
• Supply AC/DC 24 V
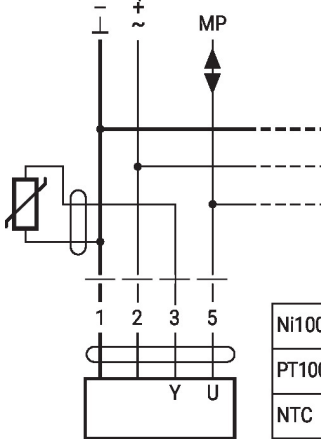• Output signal 0…10 V (max. 0…32 V)
• Resolution 30 mV

Connection of external switching contact

Max. 8 additional MP-Bus nodes
• Switching current 16 mA @ 24 V
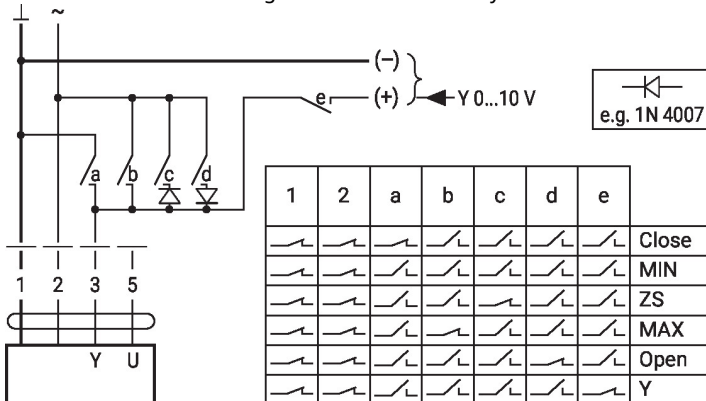• Start point of the operating range must be parametrised on the MP actuator as ≥0.5 V
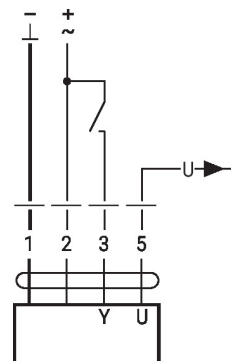
Connection of passive sensors

Ni1000	−28…+98°C	850…1600 Ω [2]
PT1000	−35…+155°C	850…1600 Ω [2]
NTC	−10…+160°C [1]	200 Ω…60 kΩ [2]

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

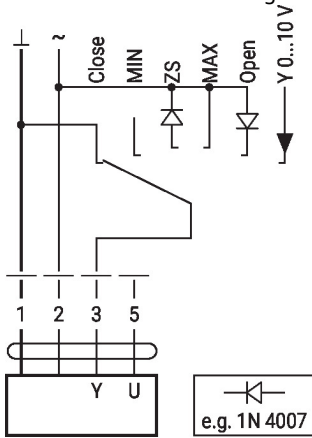Override control and limiting with AC 24 V with relay contacts

e.g. 1N 4007

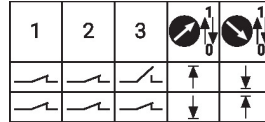| 1	2	a	b	c	d	e	
							Close
							MIN
							ZS
							MAX
							Open
							Y

Control open/close

Override control and limiting with AC 24 V with rotary switch
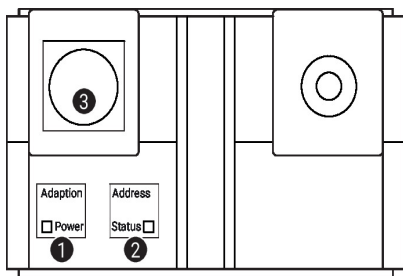
Control 3-point with AC 24 V

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

Operating controls and indicators

❶ Membrane key and LED display green

Off:	No power supply or malfunction
On:	In operation
Press button:	Triggers angle of rotation adaptation, followed by standard mode

❷ Membrane key and LED display yellow

Off:	Standard mode
On:	Adaptation or synchronisation process active
Flickering:	MP-Bus communication active
Flashing:	Request for addressing from MP client
Press button:	Confirmation of the addressing

❸ Service plug
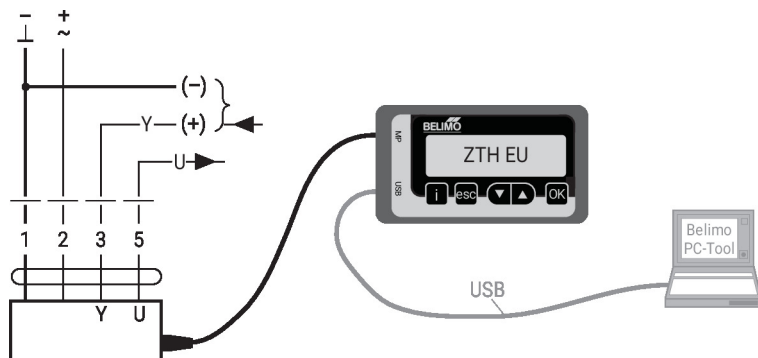For connecting parametrisation and service tools

Operating elements
The manual override, locking switch and direction of rotation switch elements are available on both sides
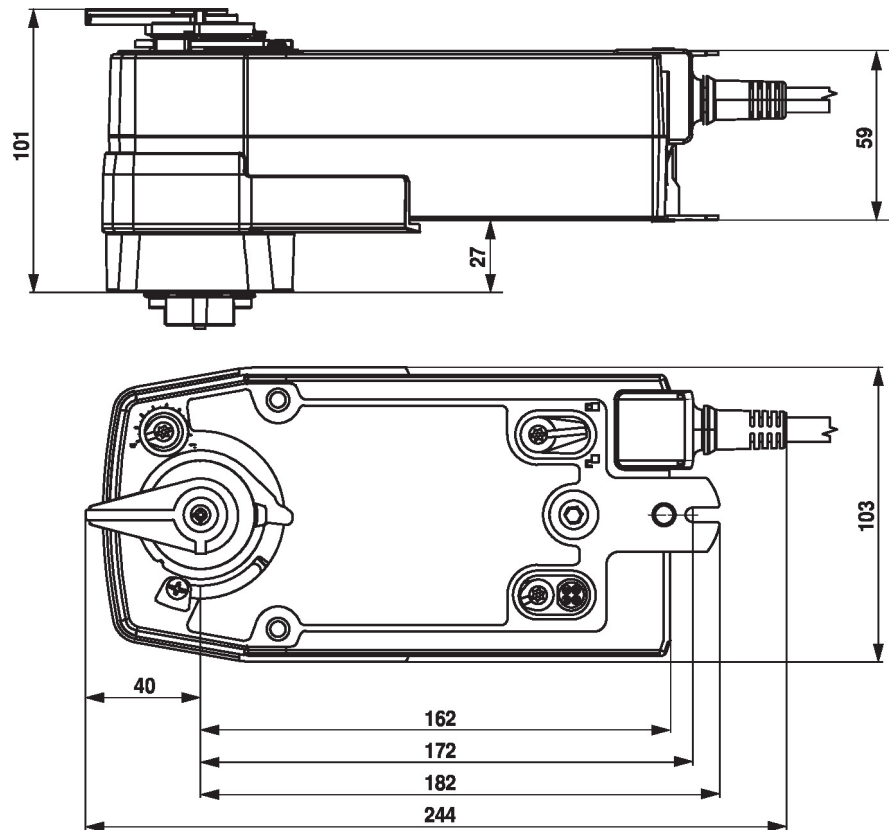
Service

Tools connection

The actuator can be parametrised by ZTH EU via the service socket.

For an extended parametrisation the PC tool can be connected.

Connection ZTH EU / PC-Tool

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