BELIMO

Communicative rotary actuator with emergency control function for ball valves

- Nominal torque 4 Nm
- Nominal voltage AC/DC 24 V
- Control Modulating DC (0)2...10 V Variable
- Position feedback DC 2...10 V Variable
- Communication via BELIMO MP-Bus
- Conversion of sensor signals
- Deenergised open (NO)

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	6 W
	Power consumption in rest position	2.5 W
	Power consumption for wire sizing	10 VA
	Connection supply / control	Cable 1 m, 4 x 0.75 mm²
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	Min. 4 Nm
	Torque spring return	Min. 4 Nm
	Positioning signal Y	DC 0...10 V
	Positioning signal Y note	Input impedance 100 kΩ
	Control signal Y variable	Open-close 3-point (AC only) Modulating (DC 0...32 V)
	Operating range Y	DC 2...10 V
	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
	Position accuracy	±5%
	Direction of rotation motor	Y=0 (0V = A - AB = 0%)
	Direction of rotation spring-return	Deenergised NO, valve open (A - AB = 100%)
	Manual override	No
	Angle of rotation	95°
	Running time motor	75 s / 90°
	Motor running time variable	75...300 s
	Running time emergency control position	<20 s / 90°
	Adaption setting range	manual (automatic on first power-up)
	Adaption setting range variable	No action Adaption when switched on Adaption after using the rotation switch
	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)
	Position indication	Mechanical
	Service life	Min. 60,000 emergency positions
Safety	Protection class IEC/EN	III Safety extra-low voltage
	Degree of protection IEC/EN	IP54
	EMC	CE according to 2004/108/EC
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Mode of operation	Type 1
	Rated impulse voltage supply / control	0.8 kV

Rotary spring-return actuator, communicative, Modulating, AC/DC 24 V, 4 Nm

BELIMO®

Technical data

Safety	Control pollution degree	3
	Ambient temperature	-30...50 °C
	Non-operating temperature	-40...80 °C
	Ambient humidity	95% r.h., non-condensing
	Maintenance	Maintenance-free
Weight	Weight approx.	1.5 kg

Safety notes

⚠️

- This device has been designed for use in stationary heating, ventilation and air conditioning systems and is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- 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 is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Product features

Principle of operation
Conventional operation:
The actuator is connected with a standard modulating signal DC 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 emergency position by spring force when the supply voltage is interrupted.
Operation on the MP-Bus:
The actuator receives its digital positioning signal from the higher level controller via the MP-Bus and travels 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.

Parameterisable actuators
The factory settings cover the most common applications. Input and output signals and other parameters can be altered with the PC-Tool MFT-P or with the Service tool 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.

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 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: R (counter-clockwise rotation).

Adaption and synchronisation
An adaption 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 adaption (entire setting range). Automatic synchronisation after actuating the direction of rotation switch once 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

	Description	Type
Gateways	Gateway MP for BACnet MS/TP, AC/DC 24 V	UK24BAC
	Gateway MP to Modbus RTU, AC/DC 24 V	UK24MOD
	Gateway MP for LonWorks®, AC/DC 24 V, LonMark-certified	UK24LON
	Gateway MP to KNX/EIB, AC/DC 24 V, EIBA certified	UK24EIB

	Description	Type
Electrical accessories	Connecting cable 5 m, A+B: RJ12 6/6, To ZTH/ZIP-USB-MP	ZK1-GEN
	Connection cable 5 m, A: RJ11 6/4, B: Free wire end, To ZTH/ZIP-USB-MP	ZK2-GEN
	MP-Bus power supply for MP actuators, AC 230/24V for local power supply	ZN230-24MP
	Connecting board MP bus suitable for wiring boxes EXT-WR-FP..-MP	ZFP2-MP

	Description	Type
Service Tools	Service Tool, for MF/MP/Modbus/LonWorks actuators and VAV-Controller	ZTH EU
	Belimo PC-Tool, software for adjustments and diagnostics	MFT-P
	Adapter to Service-Tool ZTH	MFT-C

Electrical installation

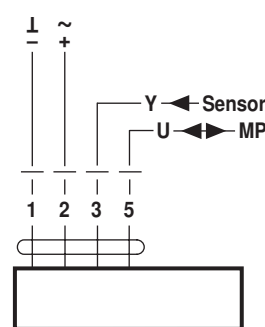| ⚠	Notes	• Connection via safety isolating transformer. • Parallel connection of other actuators possible. Observe the performance data.

Wiring diagrams

AC/DC 24 V, modulating
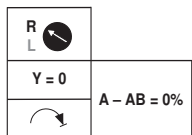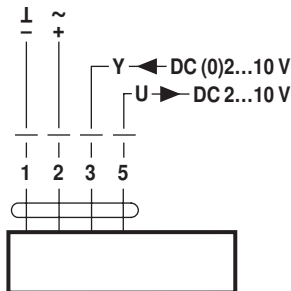
Cable colours:
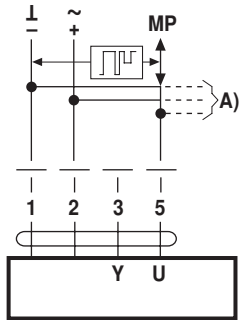1 = black
2 = red
3 = white
5 = white

Operation on the MP-Bus

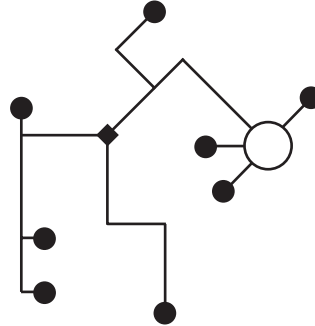Cable colours:
1 = black
2 = red
3 = white
5 = white

Functions

### Functions when operated on MP-Bus

Connection on the MP-Bus

Network topology

A) more actuators and sensors (max.8)

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
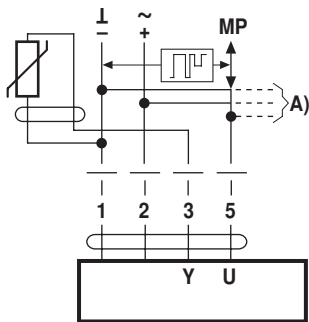
Connection of active sensors

Connection of external switching contact
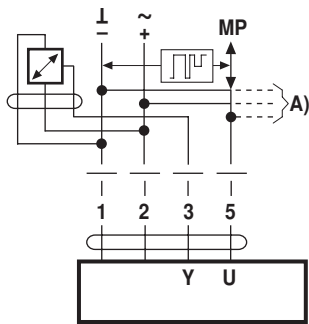
A) more actuators and sensors (max.8)
• Supply AC/DC 24 V
• Output signal DC 0...10 V (max. DC 0...32 V)
• Resolution 30 mV
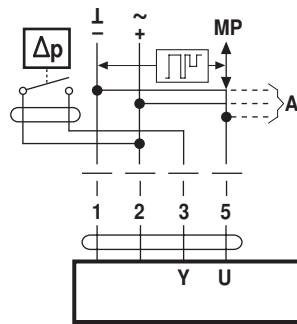
A) more actuators and sensors (max.8)
• Switching current 16 mA @ 24 V
• Start point of the operating range must be parameterised on the MP actuator as ≥ 0.5 V

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]

A) more actuators and sensors (max.8)
1) Depending on the type
2) Resolution 1 Ohm

Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

Y (DC 0...10 V)

e.g. 1N 4007

	a	b	c
0%			
ZS 50%			
100%			
Y			

Override control with AC 24 V with rotary switch

0% ZS 50% 100% Y (DC 0...10 V)

e.g. 1N 4007

Functions

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

Minimum limit with positioner SG..

| SGA24 / SGF24 / SGE24 |
| ⊥ ~ Y Z / 1 2 3 4 |

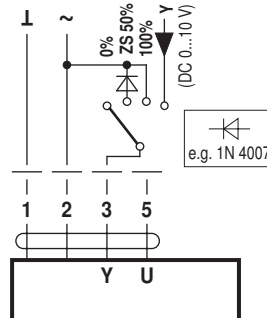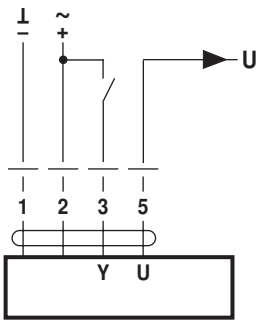Y (DC 0...10 V)

Y U

Y U

Y [V]
10
min
0
0   100
⊲ [%]

Follow-up control (position-dependent)

Y ◄ DC (0)2...10 V
U ► DC 2...10 V

Y U

Y U

Position indication

ZAD24
– + / 1 2 3 4

1)

Y U

(1) Adapting the direction of rotation

Control with 4...20 mA via external resistor

500 Ω
(–)
(+) ◄ 4...20 mA
U ► DC 2...10 V

Y U

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

Functional check

Y U

Procedure
1. Connect 24V 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 for actuators with specific parameters (Parametrisation with PC-Tool necessary)

Override control and limiting with AC 24 V with relay contacts

a \ b \ c \ d   e ◄ Y (DC 0...10 V)

e.g. 1N 4007

Y U

	a	b	c	d	e
Close 1)	⌐	/	/	/	-
MIN	/	/	/	/	-
ZS	/	/	⌐	/	-
MAX	/	⌐	/	/	-
Open	/	/	/	⌐	-
Y	/	/	/	/	⌐

Override control and limiting with AC 24 V with rotary switch

Close 1) MIN ZS MAX Open   Y (DC 0...10 V)

e.g. 1N 4007

Y U

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

Functions

Control open-close

Control 3-point

e.g. 1N 4007

	a	b	
			↱
			stop
			↷
			↰
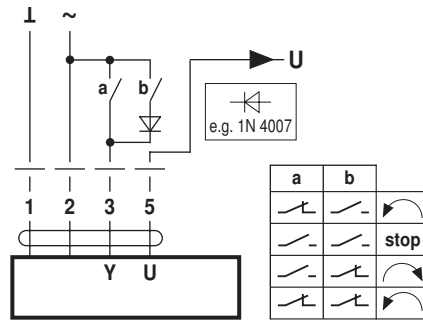
Operating controls and indicators
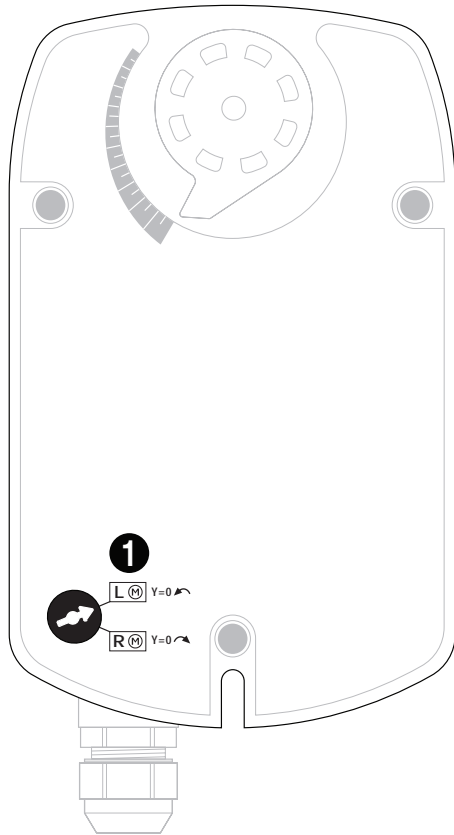
① **MP adressing**
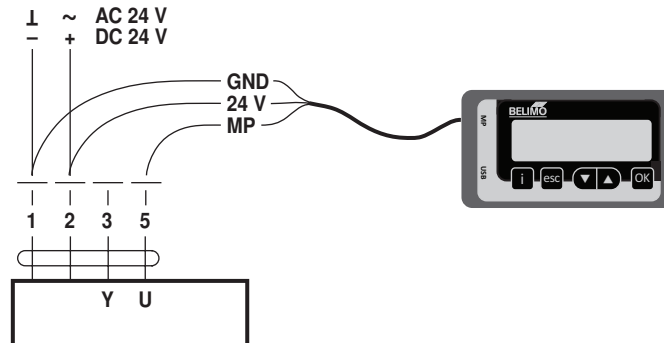Move direction of rotation switch in opposite position und backwards (within 4 sec.)

L Ⓜ Y=0

R Ⓜ Y=0

Rotary spring-return actuator, communicative, Modulating, AC/DC 24 V, 4 Nm

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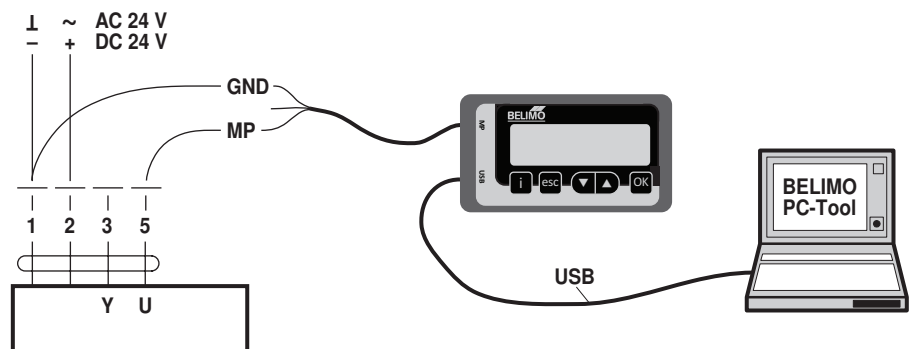## Service

⚠️   **Notes**   • The actuator can be parameterised by PC-Tool and ZTH EU via cable connection.
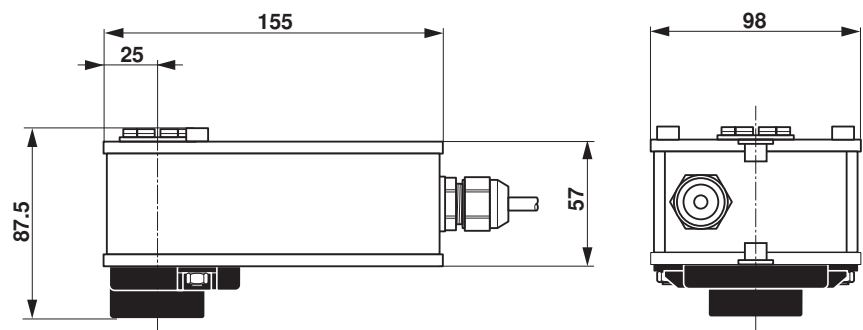
ZTH EU connection

PC-Tool connection

Dimensions [mm]

Dimensional drawings

Further documentation

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