MP BUS

Communicative rotary actuator fail-safe for adjusting dampers in technical building installations

- Air damper size up to approx. 6 m²
- Torque motor 30 Nm
- Nominal voltage AC/DC 24 V
- Control modulating, communicative 2...10 V variable
- Position feedback 2...10 V variable
- Conversion of sensor signals
- Communication via Belimo 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	9.5 W
	Power consumption in rest position	4.5 W
	Power consumption for wire sizing	16 VA
	Connection supply / control	Cable 1 m, 4 x 0.75 mm² (halogen-free)
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	30 Nm
	Torque fail-safe	30 Nm
	Communicative control	MP-Bus
	Operating range Y	2...10 V
	Input Impedance	100 kΩ
	Options positioning signal	Open/close 3-point (AC only) Modulating (DC 0...32 V)
	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
	Position accuracy	±5%
	Direction of motion motor	selectable with switch L/R
	Direction of motion variable	electronically reversible
	Direction of motion fail-safe	selectable by mounting L/R
	Manual override	by means of hand crank and locking switch
	Angle of rotation	Max. 95°
	Angle of rotation note	adjustable starting at 33% in 5% steps (with mechanical end stop)
	Running time motor	150 s / 90°
	Running time motor variable	60...150 s
	Running time fail-safe	<20 s / 90°
	Running time fail-safe note	@ -20...50°C / <60 s @ -30°C
	Adaptation setting range	manual
	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 + 32%)...100% MIN = 0%...(MAX − 32%) ZS = MIN...MAX
	Sound power level, motor	45 dB(A)
	Sound power level, fail-safe	71 dB(A)
	Mechanical interface	Universal shaft clamp 12...26.7 mm
	Position indication	Mechanical
	Service life	Min. 60'000 fail-safe positions

Rotary actuator fail-safe, modulating, communicative,
AC/DC 24 V, 30 Nm, Communication via Belimo MP-Bus

BELIMO®

Technical data

Safety	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
	Mode of operation	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	-30...50°C
	Storage temperature	-40...80°C
	Ambient humidity	Max. 95% r.H., non-condensing
	Servicing	maintenance-free
Weight	Weight	5.2 kg

Safety notes

⚠️

- The device must not be used outside the specified field of application, especially not 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.

- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation site and the ventilation conditions must be observed.

- 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 damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the fail-safe position by spring force when the supply voltage is interrupted. Conventional operation: The actuator is connected with a standard modulating signal of 0...10 V and drives to the position defined by the positioning signal. Measuring voltage U serves for the electrical display of the damper position 0.5...100% and as slave control signal for other actuators. Operation on Bus: The actuator receives its digital positioning 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 damper shaft with a universal shaft clamp, supplied with an anti-rotation device to prevent the actuator from rotating.
Spindle stabiliser	The shaft clamp of the spring-return actuator is factory-equipped with an axis stabiliser for the stabilisation of the combination of damper, damper shaft and actuator. This is comprised of two plastic support rings and must be left in place, partially, or completely removed, depending on the installation situation and the axis diameter.

Product features

Manual override	By using the hand crank the damper can be actuated 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 a synchronisation. The synchronisation is in the home position (0%). The actuator then moves into the position defined by the positioning signal.
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 actuating the hand crank is programmed. 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
Gateways	Gateway MP to Modbus RTU	UK24MOD
	Gateway MP zu BACnet MS/TP	UK24BAC
	Gateway MP to LonWorks	UK24LON
	Gateway MP to KNX	UK24EIB

	Description	Type
Electrical accessories	Signal converter voltage/current 100 kΩ Supply AC/DC 24 V	Z-UIC
	Range controller for wall mounting	SBG24
	Positioner for wall mounting	SGA24
	Positioner for built-in mounting	SGE24
	Positioner for front-panel mounting	SGF24
	Positioner for wall mounting	CRP24-B1
	Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin service socket for Belimo device	ZK1-GEN
	Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal	ZK2-GEN
	Connecting board MP-Bus for wiring boxes EXT-WR-FP..-MP	ZFP2-MP
	MP-Bus power supply for MP actuators	ZN230-24MP

	Description	Type
Mechanical accessories	End stop indicator	IND-EFB
	Shaft clamp reversible, clamping range Ø12...26.7 mm	K9-2
	Damper crank arm Slot width 8.2 mm, clamping range Ø14...25 mm	KH10
	Actuator arm Slot width 8.2 mm	KH-EFB
	Mounting kit for linkage operation for flat and side installation	ZG-EFB
	Anti-rotation mechanism 230 mm, Multipack 20 pcs.	Z-ARS230
	Hand crank 63 mm	ZKN2-B

	Description	Type
Service Tools	Service Tool, with ZIP-USB function	ZTH EU
	Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P
	Adapter for Service-Tool ZTH	MFT-C

Electrical installation

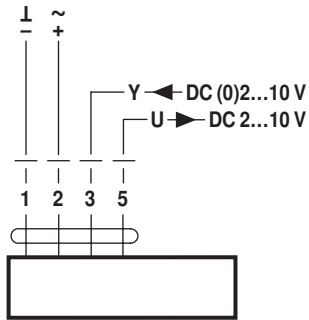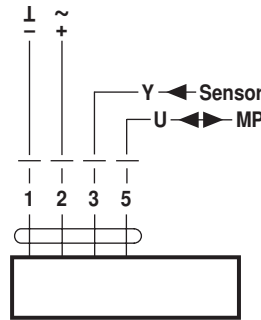| ⚠️	**Notes**	• Connection via safety isolating transformer. • Parallel connection of other actuators possible. Observe the performance data.

Electrical installation

Wiring diagrams

AC/DC 24 V, modulating

Y ◄— DC (0)2...10 V
U ►— DC 2...10 V

| 1 | 2 | 3 | 5 |

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

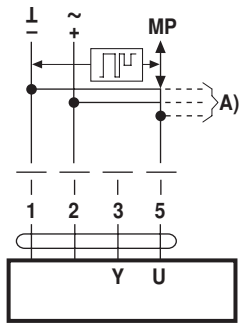Operation on the MP-Bus

Y ◄— Sensor
U ◄►— MP

| 1 | 2 | 3 | 5 |

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

Functions

Functions when operated on MP-Bus

Connection on the MP-Bus

| 1 | 2 | 3 | 5 |
Y   U

A) more actuators and sensors
(max.8)

MP-Bus Network topology
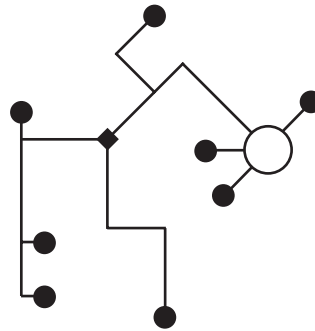
There are no restrictions for the
network topology (star, ring, tree or
mixed forms are permitted).
Supply and communication in one
and the same 3-wire cable
• no shielding or twisting necessary
• no terminating resistors required

Connection of active sensors

| 1 | 2 | 3 | 5 |
Y   U
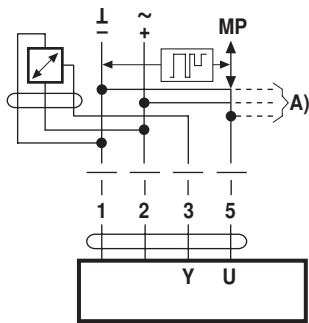
A) more actuators and sensors
(max.8)
• Supply AC/DC 24 V
• Output signal DC 0...10 V
  (max. DC 0...32 V)
• Resolution 30 mV

Connection of external switching contact

| 1 | 2 | 3 | 5 |
Y   U
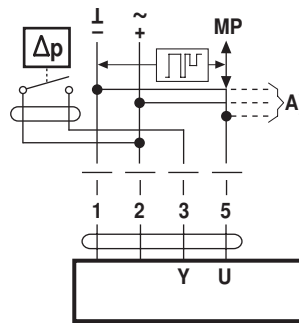
A) more actuators and sensors
(max.8)
• Switching current 16 mA @ 24 V
• Start point of the operating range
must be parameterised on the MP
actuator as ≥ 0.5 V

Connection of passive sensors

| 1 | 2 | 3 | 5 |
Y   U
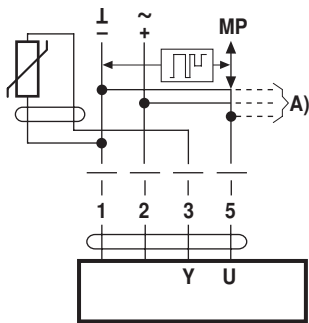
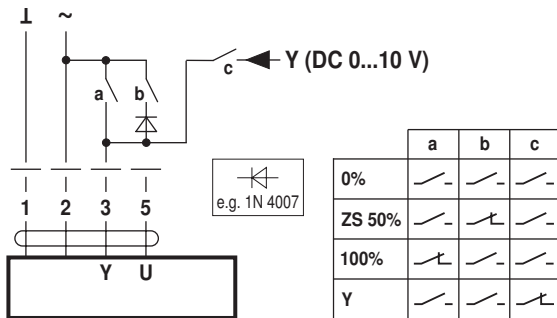| Ni1000 | −28...+98 °C | 850...1600 Ω [2] |
| PT1000 | −35...+155 °C | 850...1600 Ω [2] |
| NTC | −10...+160 °C [1] | 200 Ω...60 kΩ [2] |

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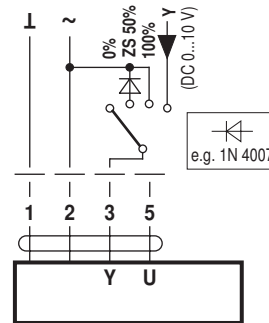1) Depending on the type
2) Resolution 1 Ohm

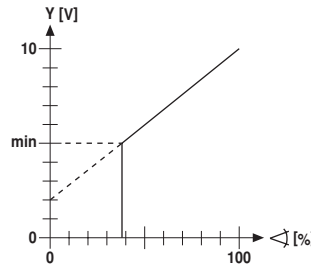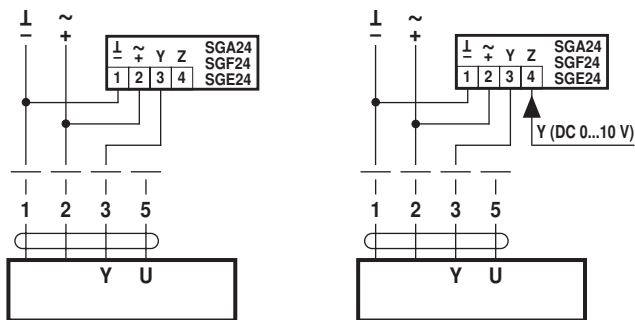## Functions

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

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

SGA24 SGF24 SGE24

Minimum limit with positioner SG..

SGA24 SGF24 SGE24

Y (DC 0...10 V)

Follow-up control (position-dependent)

Y ◄ DC (0)2...10 V
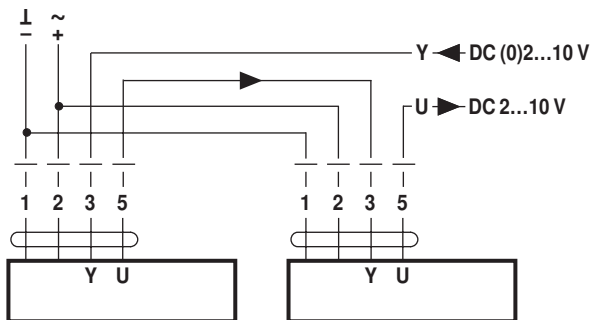
U ► DC 2...10 V

Control with 4...20 mA via external resistor
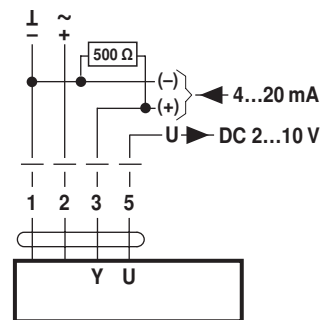
500 Ω

(−) 4...20 mA
(+)

U ► DC 2...10 V

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
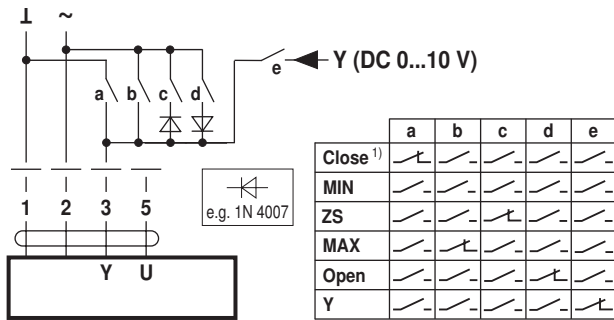
Functional check
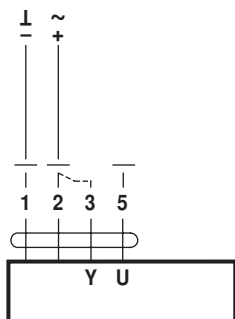
Procedure
1. Connect 24V to connections 1 and 2
2. Disconnect connection 3:
– with direction of rotation 0: Actuator rotates to the left
– with direction of rotation 1: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
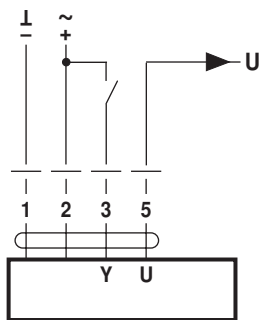– Actuator runs in opposite direction

Functions

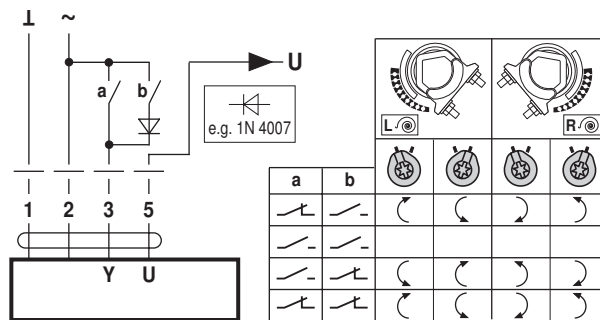**Functions for devices with specific parameters (Parametrisation necessary)**

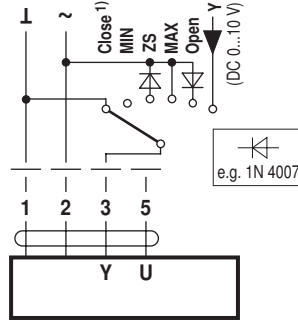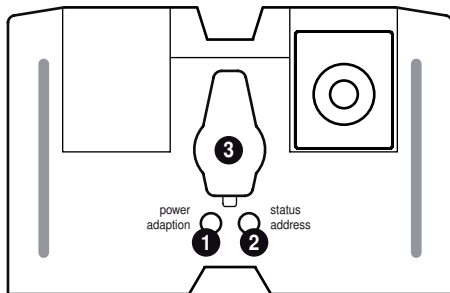Override control and limiting with AC 24 V with relay contacts

Override control and limiting with AC 24 V with rotary switch

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

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

Control open/close

Control 3-point

Operating controls and indicators

① Push-button and LED display green

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

② Push-button and LED display yellow

Off:	Standard mode
Flickering:	MP communication active
On:	Adaptation or synchronising process active
Flashing:	Request for addressing from MP master
Press button:	Press button: Confirmation of the addressing

③ Service plug

For connecting the parameterisation and service tools

Check power supply connection

① Off and ② On   Possible wiring error in power supply

Installation notes

⚠	**Notes**	• The shaft stabiliser must nevertheless be used with installation of the anti-rotation device on the opposite side of the shaft clamp and a shaft diameter <20 mm.

Spindle stabiliser long spindle mounting

In the case of long shaft installation the use of the shaft stabiliser at a shaft diameter of
• 12...20 mm is necessary
• 21...26.7 mm is not necessary and can be removed

Spindle stabiliser short spindle mounting

In the case of short spindle installation, the necessity of the shaft stabiliser is dispensed with. It can be removed or – if the spindle length permits this – left in the clamp.

Service

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.
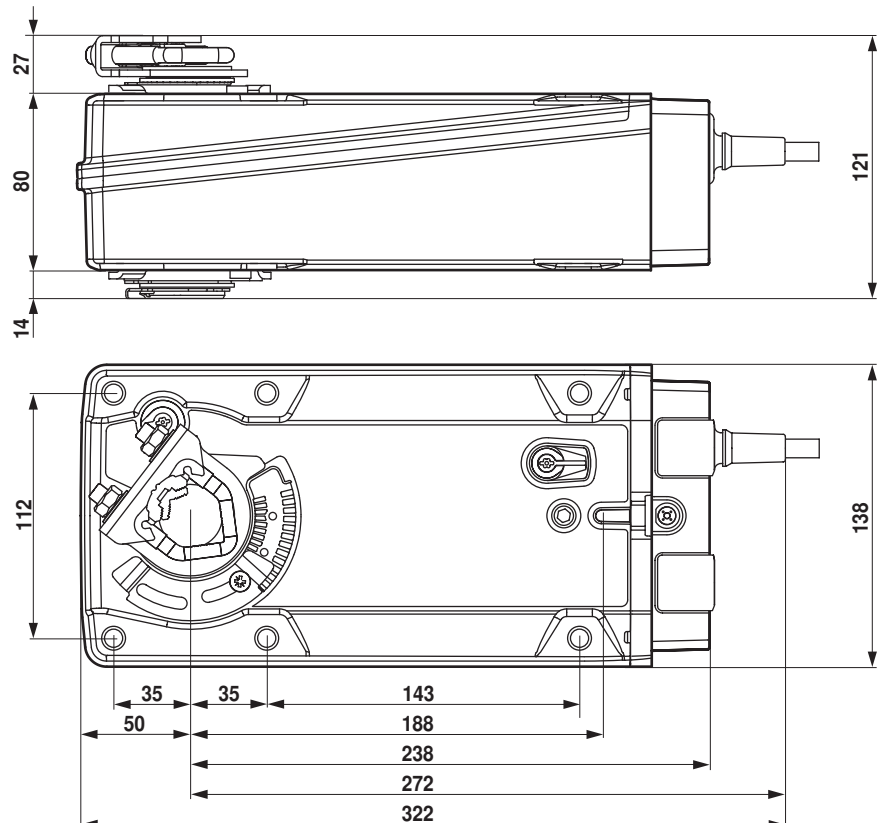
Connection ZTH EU / PC-Tool
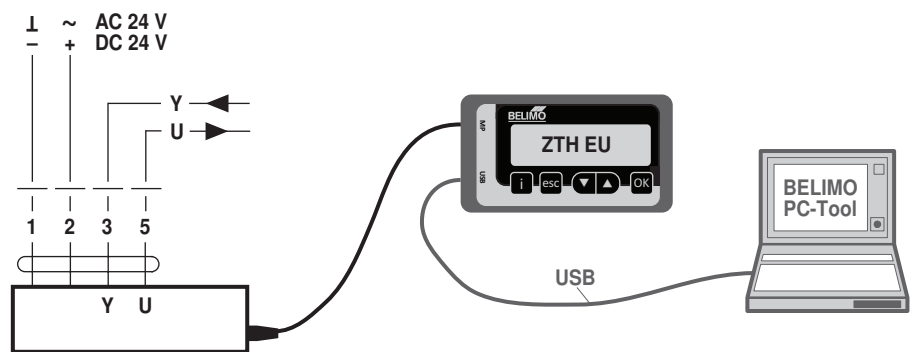
Dimensions [mm]

Spindle length

		Min. 117
		Min. 20

Clamping range

	⭕ ↕	◆ ↘
	12...22	12...18
	⭕ ↕	▢ ↕
	22...26.7	12...18

Dimensional drawings

27
80
14
121
112
138
35   35   143
50   188
         238
         272
         322

Further documentation

- Overview MP Cooperation Partners
- Tool connections
- Introduction to MP-Bus Technology