BELIMO®

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

MP BUS®

• Air damper size up to approx. 2 m²
• Torque motor 10 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	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)
Functional data	Torque motor	10 Nm
	Torque fail-safe	10 Nm
	Communicative control	MP-Bus
	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
	Options positioning signal	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	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 2.5% steps (with mechanical end stop)
	Running time motor	150 s / 90°
	Running time motor variable	40…150 s
	Running time fail-safe	<20 s / 90° <20 s @ -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%

Functional data	Override control variable	MAX = (MIN + 32%)...100% MIN = 0%...(MAX – 32%) ZS = MIN...MAX
	Sound power level, motor	40 dB(A)
	Mechanical interface	Universal shaft clamp 10...25.4 mm
	Position indication	Mechanically, pluggable
	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
	Certification UL	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
	Mode of operation	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Pollution degree	3
	Ambient temperature	-30...50°C
	Storage temperature	-40...80°C
	Ambient humidity	Max. 95% RH, non-condensing
	Servicing	maintenance-free
Weight	Weight	2.0 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 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.
- 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.
- Cables must not be removed from the device.

Product features

Mode of operation

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.
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.
Adaptation 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

Gateways	Description	Type
	Gateway MP zu BACnet MS/TP	UK24BAC
	Gateway MP to Modbus RTU	UK24MOD

Electrical accessories	Description	Type
	Positioner for wall mounting	CRP24-B1
	Feedback potentiometer 1 kΩ	P1000A-F
	Feedback potentiometer 200 Ω	P200A-F
	Auxiliary switch 2 x SPDT	S2A-F
	Positioner for wall mounting	SGA24
	Positioner for built-in mounting	SGE24
	Positioner for front-panel mounting	SGF24
	Signal converter voltage/current 100 kΩ Supply AC/DC 24 V	Z-UIC
	MP-Bus power supply for MP actuators	ZN230-24MP

Mechanical accessories	Description	Type
	Shaft extension 240 mm Ø20 mm for damper shaft Ø 8...22.7 mm	AV8-25
	End stop indicator	IND-AFB
	Shaft clamp reversible, for central mounting, for damper shafts Ø12.7 / 19.0 / 25.4 mm	K7-2
	Ball joint suitable for damper crank arm KH8 / KH10	KG10A
	Ball joint suitable for damper crank arm KH8	KG8
	Actuator arm, for 3/4" shafts, clamping range Ø10...22 mm, Slot width 8.2 mm	KH-AFB
	Damper crank arm Slot width 8.2 mm, clamping range Ø10...18 mm	KH8
	Anti-rotation mechanism 230 mm, Multipack 20 pcs.	Z-ARS230L
	Base plate extension	Z-SF
	Form fit insert 10x10 mm, Multipack 20 pcs.	ZF10-NSA-F
	Form fit insert 12x12 mm, Multipack 20 pcs.	ZF12-NSA-F
	Form fit insert 15x15 mm, Multipack 20 pcs.	ZF15-NSA-F
	Form fit insert 16x16 mm, Multipack 20 pcs.	ZF16-NSA-F
	Mounting kit for linkage operation for flat and side installation	ZG-AFB
	Hand crank 63 mm	ZKN2-B

Service tools	Description	Type
	Adapter for Service-Tool ZTH	MFT-C
	Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P
	Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin for connection to service socket	ZK1-GEN
	Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal	ZK2-GEN
	Service Tool, with ZIP-USB function, for parametrisable and communicative Belimo actuators, VAV controller and HVAC performance devices	ZTH EU

Electrical installation

⚠️ **Supply from isolating transformer.**

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

Wiring diagrams

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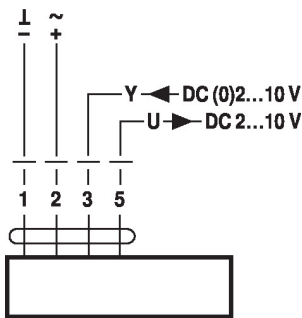
Cable colours:
1 = black
2 = red
3 = white
5 = orange

Operation on the MP-Bus
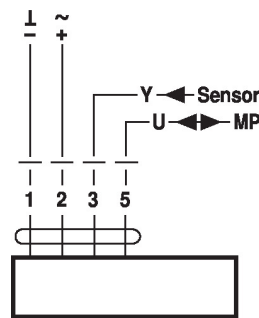
Cable colours:
1 = black
2 = red
3 = white
5 = orange

Functions

Functions when operated on MP-Bus

Connection on the MP-Bus
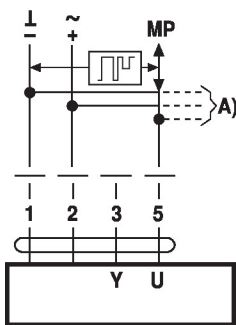
A) additional MP-Bus nodes (max. 8)

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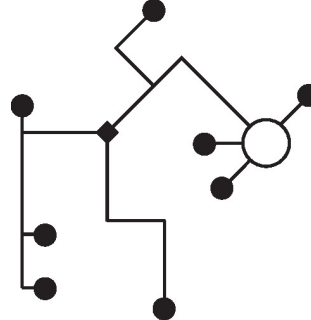
There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).
Supply and communication in one and the same 3-wire cable
• no shielding or twisting necessary
• no terminating resistors required

Connection of active sensors
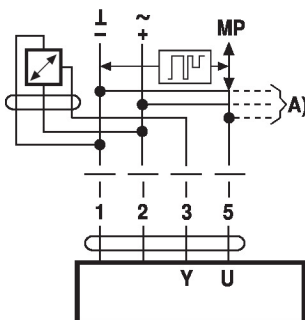
A) additional MP-Bus nodes (max. 8)
• Supply AC/DC 24 V
• Output signal DC 0...10 V (max. DC 0...32 V)
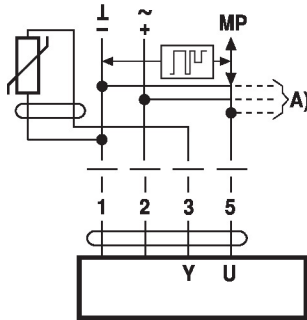• Resolution 30 mV

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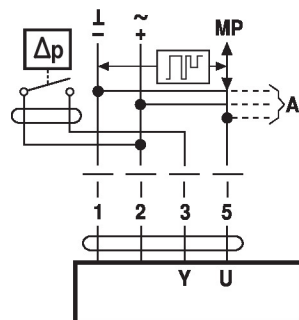
A) additional MP-Bus nodes (max. 8)
• Switching current 16 mA @ 24 V
• Start point of the operating range must be parametrised on the MP actuator as ≥ 0.5 V
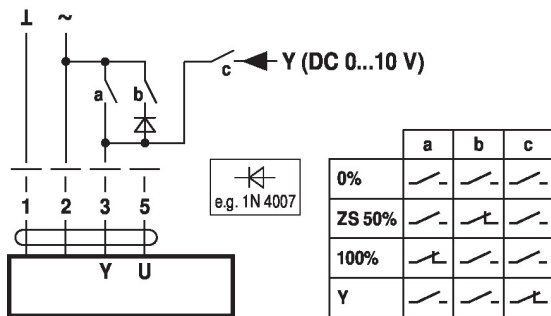
Connection of passive sensors

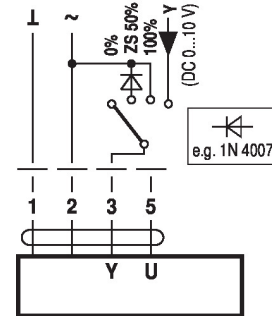| Ni1000	−28...+98°C	850...1600 Ω [2]
PT1000	−35...+155°C	850...1600 Ω [2]
NTC	−10...+160°C [1]	200 Ω...60 kΩ [2]

A) additional MP-Bus nodes (max. 8)
1) Depending on the type
2) Resolution 1 Ohm
Compensation of the measured value is recommended
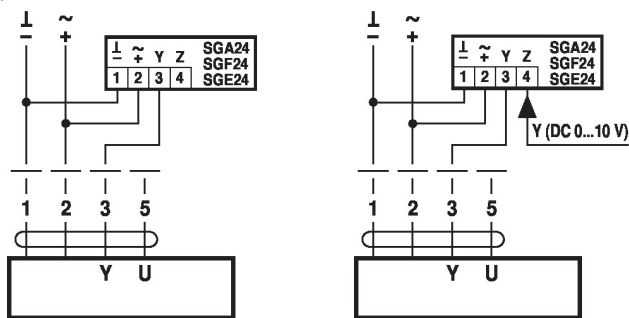
Functions with basic values (conventional mode)
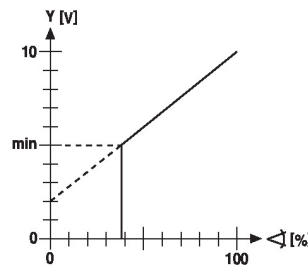
Override control with AC 24 V with relay contacts

	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..
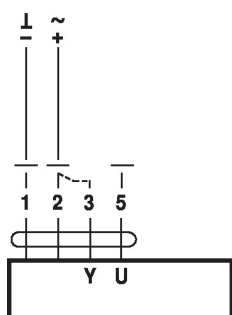

Follow-up control (position-dependent)
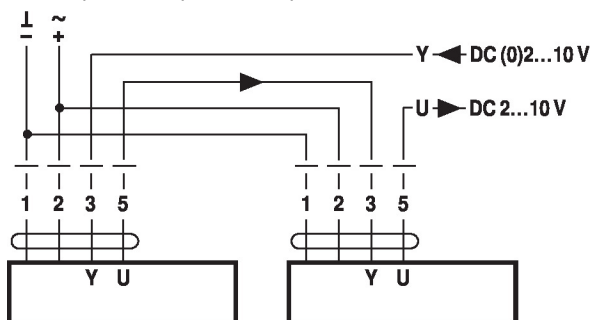
Control with 4...20 mA via external resistor
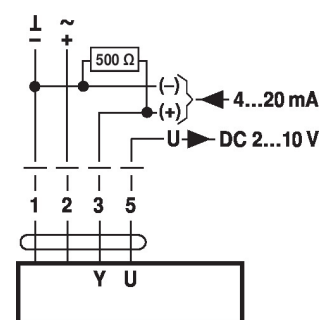
Caution:
The operating range must be set to DC 2...10 V.
The 500 Ω resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V
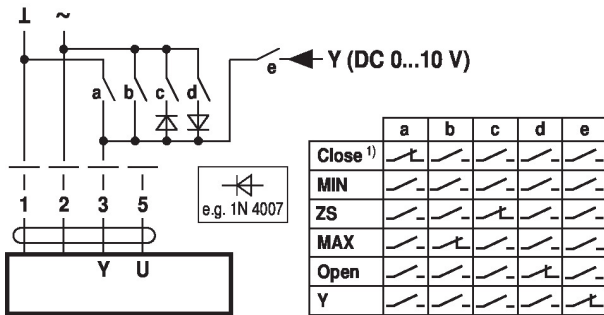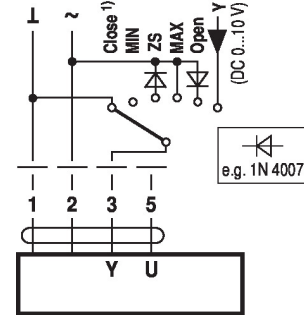
Functional check

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

Override control and limiting with AC 24 V with relay contacts

Y (DC 0...10 V)

e.g. 1N 4007

	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

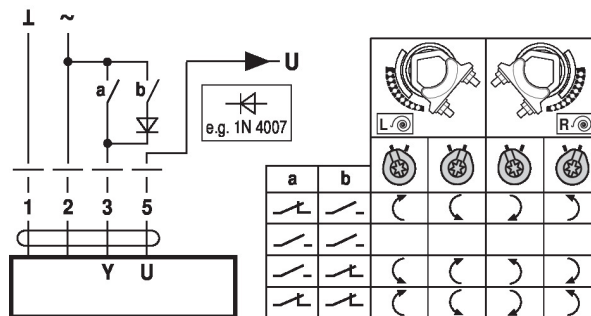Y (DC 0...10 V)

e.g. 1N 4007

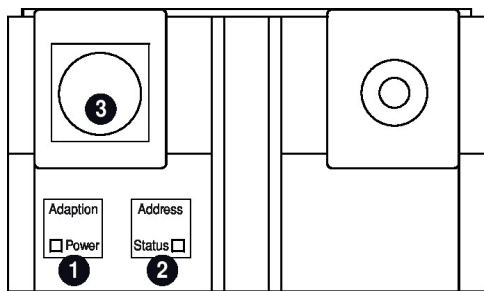1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

Control open/close

U

Control 3-point

U

e.g. 1N 4007

a	b
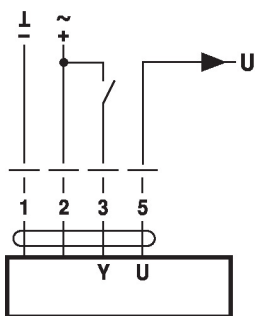
Operating controls and indicators

1 **Membrane key 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 **Membrane key and LED display gelb**

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

3 **Service plug**

For connecting parameterisation and service tools

Operating elements

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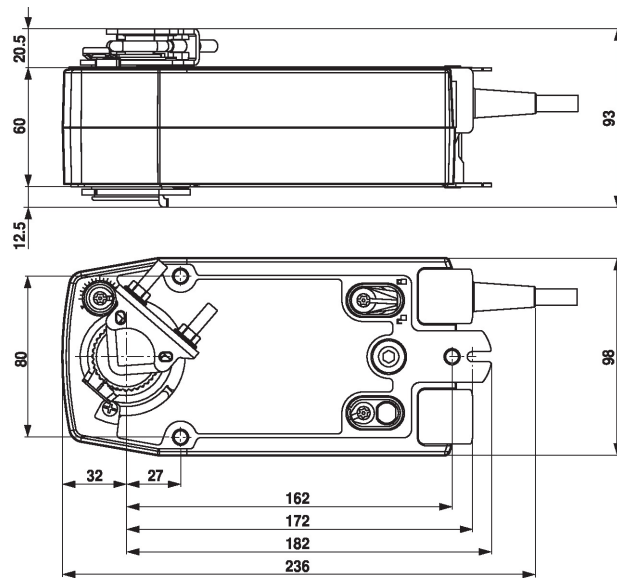
Service

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.
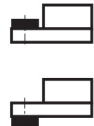
Connection ZTH EU / PC-Tool

AC 24 V
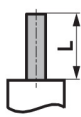DC 24 V

ZTH EU

BELIMO
PC-Tool

USB
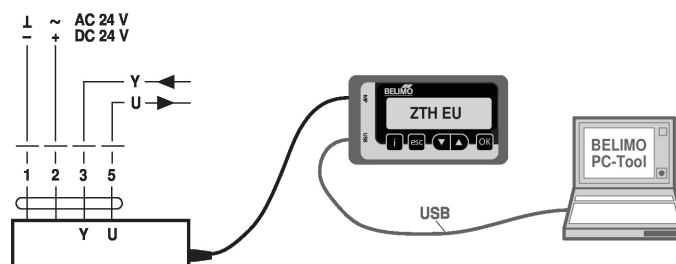
Dimensions

Dimensional drawings

Clamping range

	⬤ ↕	◼ ↕	◆ ↕
	10...22	10	14...25.4
	⬤ ↕	◼ ↕	
	19...25.4	12...18	

Shaft length

Min. 85

Min. 15

Further documentation

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

Application notes

- For digital control of actuators in VAV applications patent EP 3163399 must be considered.