

Communicative spring-return actuator with emergency control function for adjusting dampers in technical building installations

- Torque motor 20 Nm
- Nominal voltage AC/DC 24 V
- Control modulating, communicative, hybrid mode
- Conversion of sensor signals
- Communication via BACnet MS/TP, Modbus RTU, Belimo-MP-Bus or conventional control


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	8.5 W
	Power consumption in rest position	3.5 W
	Power consumption for wire sizing	11 VA
	Connection supply / control	Cable 1 m, 6 x 0.75 mm ²
Functional data	Nominal torque	Min. 20 Nm
	Torque spring return	20 Nm
	Communicative control	BACnet MS/TP Modbus RTU (ex works) MP-Bus
	Operating range Y	DC 2...10 V
	Operating range Y variable	DC 0.5...10 V
	Position feedback U	DC 2...10 V
	Position feedback U note	Max. 1 mA
	Position feedback U variable	Start point DC 0.5...8 V End point DC 2...10 V
	Position accuracy	±5%
	Direction of motion motor	selectable with switch L / R
	Direction of motion emergency control function	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	70...220 s
	Running time emergency control position	<20 s / 90°
	Running time emergency setting position note	@ -20...50 °C / <60 s @ -30 °C
	Adaption setting range	manual
	Adaption setting range variable	No action Adaption when switched on Adaption after pushing the gear disengagement button
Override control, controllable via bus communication	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position) = 50%	
Override control variable	MAX = (MIN + 32%)...100% MIN = 0%...(MAX - 32%) ZS = MIN...MAX	
Sound power level Motor	40 dB(A)	
Damper spindle	Universal spindle clamp 10...25.4 mm	
Position indication	Mechanical	
Service life	Min. 60,000 emergency positions	
Safety	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)
	Protection class UL	UL Class 2 Supply
	Degree of protection IEC/EN	IP54

Technical data

Safety	Degree of protection NEMA/UL	NEMA 2, 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 E60730-1:02
	Mode of operation	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	-30...50 °C
	Non-operating temperature	-40...80 °C
	Ambient humidity	Max. 95% r.h., non-condensing
Maintenance	Maintenance-free	
Weight	Weight	2.4 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 is fitted with an integrated interface for BACnet MS/TP, Modbus RTU and MP-Bus. It receives the digital positioning signal from the control system and returns the current status.
Converter for sensors	Connection option for a sensor (passive, active or with switching contact). In this way, the analogue sensor signal can be easily digitised and transferred to the bus systems BACnet, Modbus or MP-Bus.
Parameterisable actuators	The factory settings cover the most common applications. Single parameters can be modified with the Belimo Service Tools MFT-P or ZTH EU. The communication parameters of the bus systems (address, baud rate etc.) are set with the ZTH EU. Pressing the "Address" button on the actuator while connecting the supply voltage, resets the communication parameters to the factory setting. Quick addressing: The BACnet and Modbus address can alternatively be set using the buttons on the actuator and selecting 1 to 16. The value selected is added to the «Basic address» parameter and results in the effective BACnet and Modbus address.
Combination analogue - communicative (hybrid mode)	With conventional control by means of an analogue positioning signal, BACnet or Modbus can be used for the communicative position feedback
Simple direct mounting	Simple direct mounting on the damper spindle with an universal spindle 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.

Product features

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
Electrical accessories	Auxiliary switch, 2 x SPDT	S2A-F
	Feedback potentiometer, 200 Ohm, incl. installation accessories	P200A-F
	Feedback potentiometer 1 kOhm, incl. installation accessories	P1000A-F
	Connecting cable 5 m, A+B: RJ12 6/6, To ZTH EU	ZK1-GEN
	Connection cable 5 m, A: RJ11 6/4, B: Free wire end, To ZTH EU	ZK2-GEN
Mechanical accessories	Description	Type
	Shaft extension 240 mm, for damper spindles Ø 8...25 mm or Ø 10...25 mm	AV8-25
	End stop indicator for NF..A / SF..A	IND-AFB
	Spindle clamp set for NF..A/SF..A (1", 3/4", 1/2")	K7-2
	Straight ball joint with M8, suitable for damper crank arm KH8	KG10A
	Angled ball joint with M8, suitable for damper crank arm KH8	KG8
	Damper crank arm, for damper spindles	KH8
	Damper crank arm for NF..A / SF..A, for 3/4" spindles	KH-AFB
	Form fit insert 10x10 mm, for NF..A / SF..A	ZF10-NSA-F
	Form fit insert 12x12 mm, for NF..A / SF..A	ZF12-NSA-F
	Form fit insert 16x16 mm, for NF..A / SF..A	ZF16-NSA-F
	Damper crank arm, for spring return actuators NG	ZG-AFB
	Base plate extension for NF..A / SF..A	Z-SF
	Anti-rotation mechanism 230 mm	Z-ARS230L
	Hand crank 63 mm for BFL, BFN, NF..A / SF..A / EF..A	ZKN2-B
Service Tools	Description	Type
	Service tool 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 to Service Tool ZTH	MFT-C	

Electrical installation



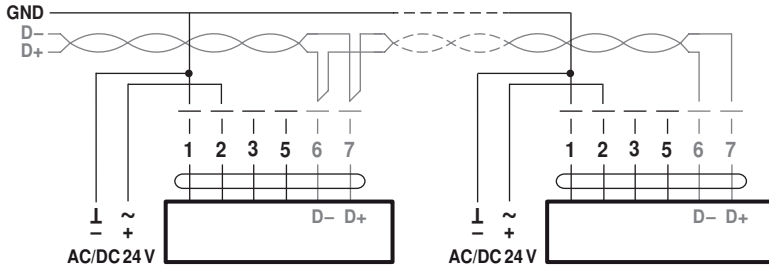
Notes

- Connection via safety isolating transformer.
- The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS485 regulations.
- Modbus / BACnet: Supply and communication are not galvanically isolated. Connect earth signal of the devices with one another.

Electrical installation

Wiring diagrams

BACnet MS/TP / Modbus RTU



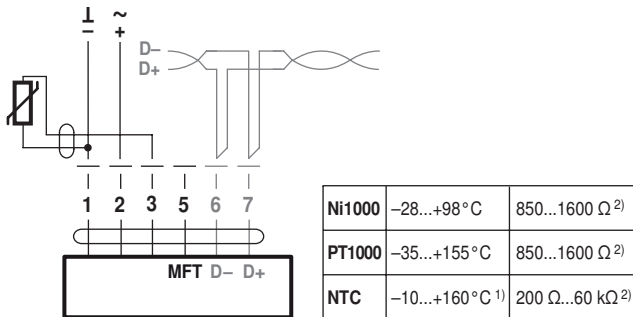
Cable colours:

- 1 = black
- 2 = red
- 3 = white
- 5 = orange
- 6 = pink
- 7 = grey

Signal assignment Modbus:

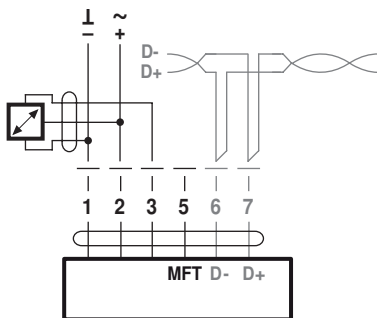
- C1 = D- = A
- C2 = D+ = B

Connection with passive sensor, e.g. Pt1000, Ni1000, NTC



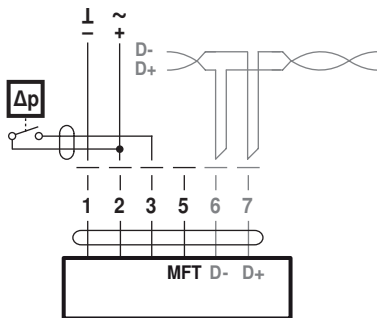
- 1) depending on type
- 2) Resolution 1 Ohm

Connection with active sensor, e.g. 0...10 V @ 0...50°C



Possible voltage range:
0...32 V (resolution 30 mV)

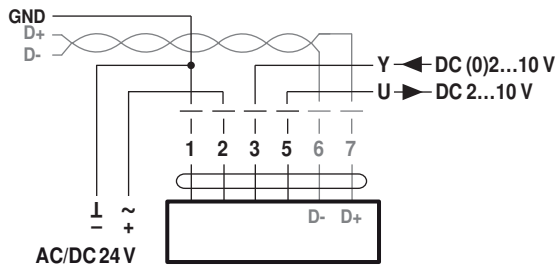
Connection with switching contact, e.g. Δp monitor



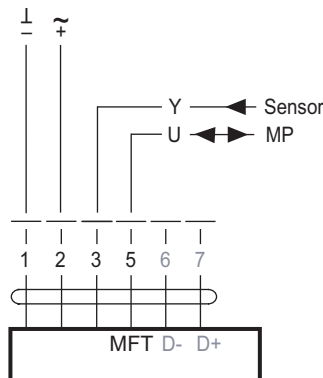
Requirements for switching contact:
The switching contact must be able to accurately switch a current of 16 mA @ 24 V.

Electrical installation

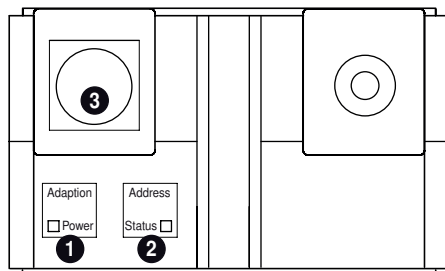
Modbus RTU / BACnet MS/TP with analog setpoint (hybrid mode)



Operation on the MP-Bus



Operating controls and indicators



1 Membrane key and LED display green

- Off: No power supply or malfunction
- On: In operation
- Flashing: In address mode: Pulses according to set address (1...16)
When starting: Reset to factory setting (Communication)
- Press button: In standard mode: Triggers angle of rotation adaptation
In address mode: Confirmation of set address (1...16)

2 Push-button and LED display yellow

- Off: Standard mode
- On: Adaptation or synchronising process active
or actuator in address mode (LED display green flashing)
- Flickering: BACnet / Modbus communication active
- Press button: In operation (>3 s): Switch address mode on and off
In address mode: Address setting by pressing several times
When starting (>5 s): Reset to factory setting (Communication)

3 Service plug

- For connecting parameterisation and service tools

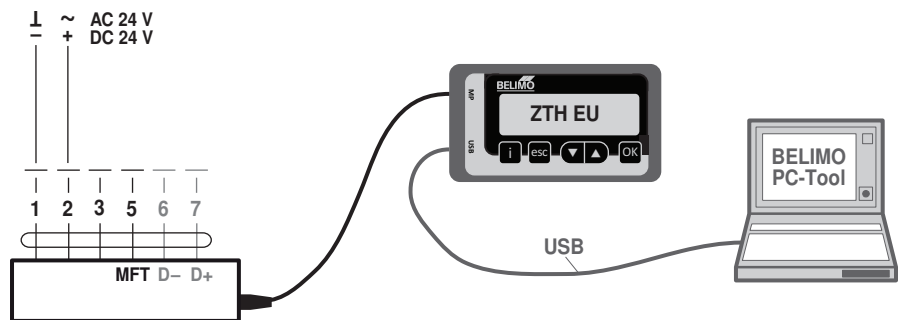
Operating elements

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

Service

- Quick addressing**
1. Press the "Address" button until the green "Power" LED is no longer illuminated. LED flashes in accordance with the previously set address.
 2. Set the address by pressing the "Address" button the corresponding number of times (1-16).
 3. The green LED flashes in accordance with address that has been entered (1-16). If the address is not correct, then this can be reset in accordance with Step 2.
 4. Confirm the address setting by pressing the green "Adaption" button. If no confirmation occurs for 60 seconds, then the address procedure is ended. Any address change that has already been started will be discarded. The resulting BACnet MS/TP and Modbus RTU address is made up of the set basic address plus the short address (e.g. 100+7=107).

Service Tools connection The actuator can be parameterised by ZTH EU via the service socket. For an extended parameterisation the PC tool can be connected.



Dimensions [mm]

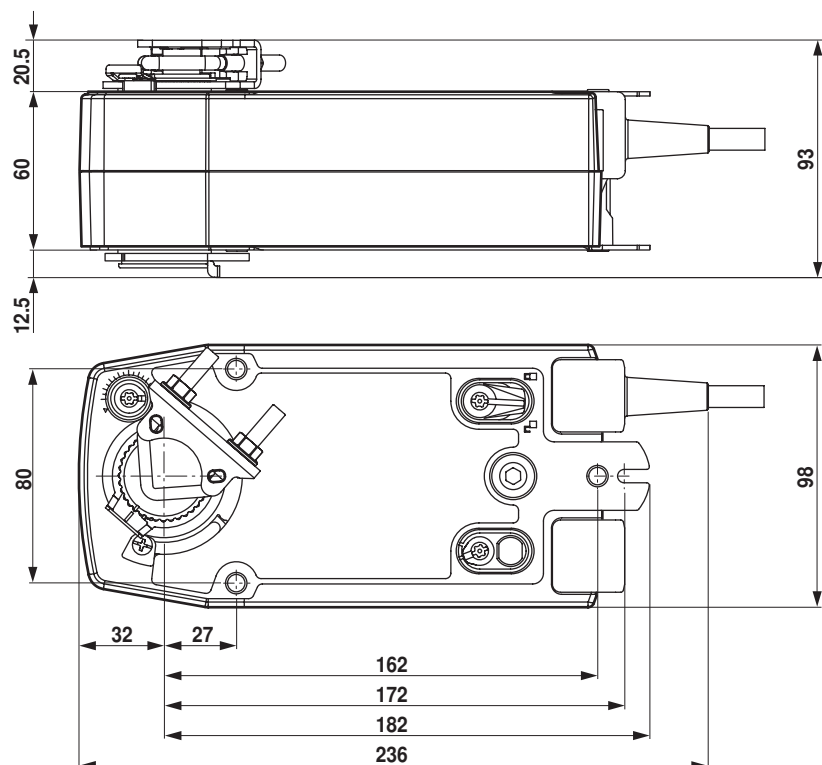
Spindle length

	Min. 85
	Min. 15

Clamping range

	10...22	10	14...25.4
	19...25.4	12...18	

Dimensional drawings



Further documentation

- Tool connections
- Description Protocol Implementation Conformance Statement PICS
- Description Modbus register
- Overview MP Cooperation Partners
- MP Glossary
- Introduction to MP-Bus Technology