

- Air damper size up to approx. 1 m²
- Actuating force 150 N
- Nominal voltage AC/DC 24 V
- Control modulating, communicative, hybrid
- Length of Stroke Max., adjustable in 20 mm increments
- 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	2.5 W
	Power consumption in rest position	1.3 W
	Power consumption for wire sizing	5 VA
	Connection supply / control	Cable 1 m, 6 x 0.75 mm ²
	Parallel operation	Yes (note the performance data)
Functional data	Actuating force motor	150 N
	Communicative control	BACnet MS/TP Modbus RTU (default setting) MP-Bus
	Operating range Y	2...10 V
	Operating range Y variable	0.5...10 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...10 V
	Position accuracy	±5%
	Direction of motion motor	selectable with switch
	Direction of motion note	Y = 0 V: with switch 0 (retracted) / 1 (extended)
	Direction of motion variable	electronically reversible
	Manual override	with push-button, can be locked
	Length of Stroke	Max. , adjustable in 20 mm increments
	Stroke limitation	can be limited on both sides with mechanical end stops
	Running time motor	150 s / 100 mm
	Running time motor variable	70...270 s / 100 mm
	Adaptation setting range	manual
	Adaptation setting range variable	No action Adaptation when switched on Adaptation 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	45 dB(A)	
Safety data	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)

Protection class UL	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 E60730-1:02
Certification UL note	The UL marking on the actuator depends on the production site, the device is UL-compliant in any case
Mode of operation	Type 1
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 0.61 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, insulation 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 rotary supports and coupling pieces available as accessories and must always be used if transverse forces are likely. In addition, the actuator must not be tightly bolted to the application. It must remain movable via the rotary support (refer to «Installation notes»).
- If the actuator is exposed to severely contaminated ambient air, appropriate precautions must be taken on the system side. Excessive deposits of dust, soot etc. can prevent the gear rod from being extended and retracted correctly.
- If not installed horizontally, the gear disengagement push-button may only be actuated when there is no pressure on the gear rod.
- To calculate the actuating force required for air dampers and slide valves, the specifications supplied by the damper manufacturers concerning the cross section, the design, the installation site and the ventilation conditions must be observed.
- If a rotary support and/or coupling piece is used, actuation force losses are to be expected.
- 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.

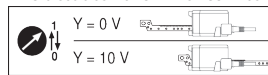
Product features

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.
Configurable 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...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** The actuator can be directly connected with the application using the enclosed screws. The head of the gear rod is connected to the moving part of the ventilating application individually on the mounting side or with the Z-KS2 coupling piece provided.
- Manual override** Manual override with push-button possible (the gear is disengaged for as long as the button is pressed or remains locked).
- Adjustable stroke** If a stroke limitation will be adjusted, the mechanical operating range on this side of the gear rod can be used starting with an extension length of 20 mm and then can be limited respectively in increments of 20 mm by means of mechanical end stops Z-AS2.
- High functional reliability** The actuator is overload protected, requires no limit switches in intermediate positions and automatically stops when the end stop is reached (at rest).
- 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 pressing the gearbox disengagement button is configured. 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

Electrical accessories	Description	Type
	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
Mechanical accessories	Description	Type
	End stop kit, Multipack 20 pcs.	Z-AS2
	Rotary support, for linear actuator, for compensation of transverse forces	Z-DS1
	Coupling piece M6	Z-KS2
Service tools	Description	Type
	Adapter for Service-Tool ZTH	MFT-C
	Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P
	Service Tool, with ZIP-USB function, for configurable and communicative Belimo actuators, VAV controller and HVAC performance devices	ZTH EU

Electrical installation



Supply from isolating transformer.

The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS485 regulations.

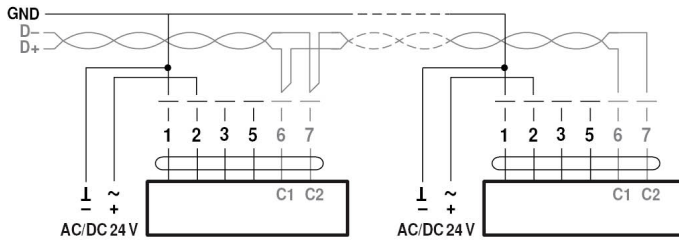
Modbus / BACnet: Supply and communication are not galvanically isolated. Connect earth signal of the devices with one another.

Wiring diagrams

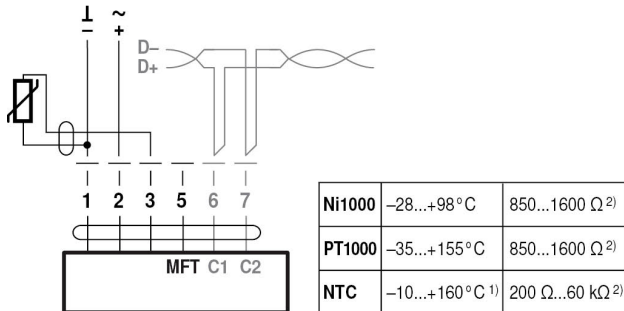
BACnet MS/TP / Modbus RTU

Cable colours:

- 1 = black
 - 2 = red
 - 3 = white
 - 5 = orange
 - 6 = pink
 - 7 = grey
- BACnet / Modbus signal assignment:
 C1 = D- = A
 C2 = D+ = B

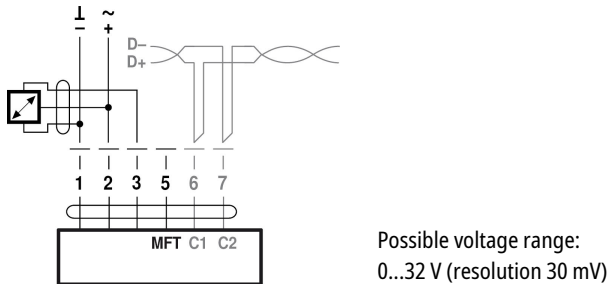


Connection with passive sensor, e.g. Pt1000, Ni1000, NTC

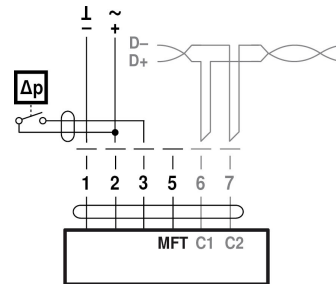


- 1) depending on type
- 2) Resolution 1 Ohm

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

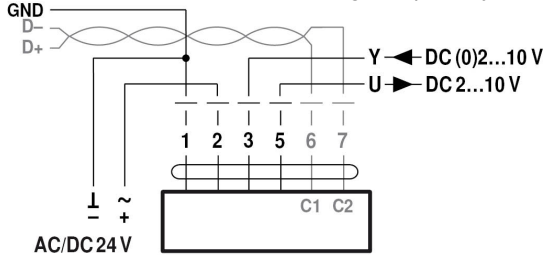


Connection with switching contact, e.g. Δp monitor

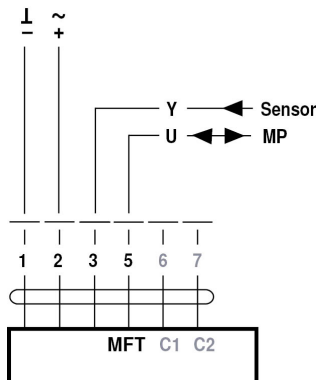


Requirements for switching contact:
 The switching contact must be able to accurately switch a current of 16 mA @ 24 V.

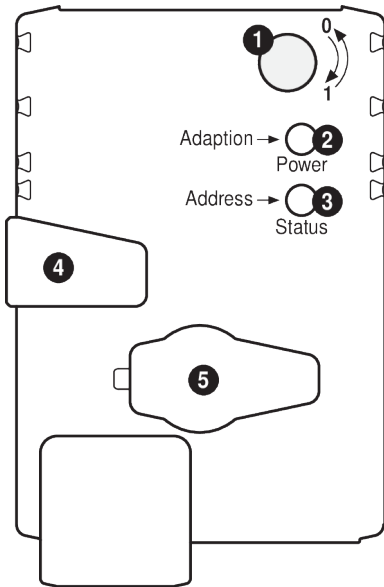
Modbus RTU / BACnet MS/TP with analogue setpoint (hybrid mode)



Operation on the MP-Bus



Operating controls and indicators



- 1 Direction of stroke switch**
Switch over: Direction of stroke changes
 - 2 Push-button 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 stroke adaptation
In address mode: Confirmation of set address (1...16)
 - 3 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)
 - 4 Gear disengagement button**
Press button: Gear disengages, motor stops, manual override possible
Release button: Gear engages, synchronisation starts, followed by standard mode
 - 5 Service plug**
For connecting parameterisation and service tools
- Check power supply connection**
 2 Off and 3 On Possible wiring error in power supply

Installation notes



If a rotary support and/or coupling piece is used, losses in the actuation force losses are to be expected.

Applications without transverse forces

The linear actuator is screwed directly to the housing at three points. Afterwards, the head of the gear rod is fastened to the moving part of the ventilation application (e.g. damper or slide valve).

Applications with transverse forces

Connect the coupling piece with the internal thread (Z-KS2) to the head of the gear rod. Screw the rotary support (Z-DS1) to the ventilation application. Afterwards, the linear actuator is screwed to the previously mounted rotary support with the enclosed screw. Then, the coupling piece, which is mounted to the head of the gear rod, is attached to the moving part of the ventilating application (e.g. damper or slide valve). The transverse forces can be compensated for to a certain limit with the rotary support and/or coupling piece. The maximum permissible swivel angle of the rotary support and coupling piece is 10°, laterally and upwards.

Service

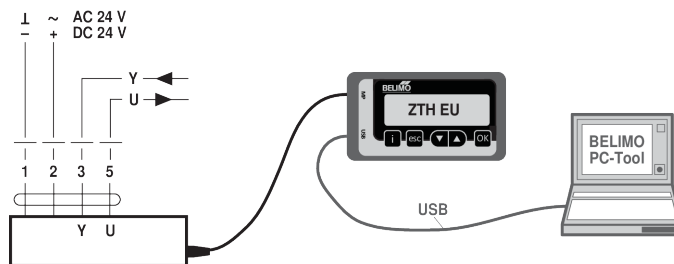
Quick addressing

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 the address that has been entered (...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

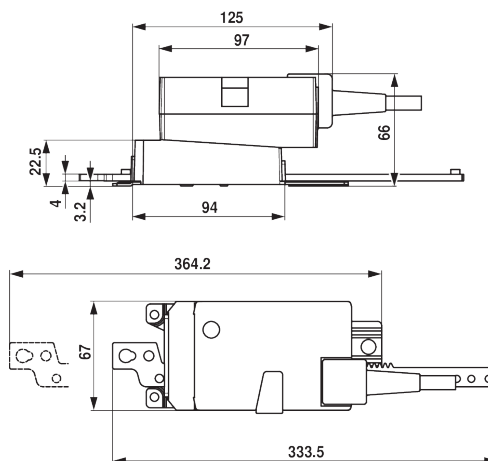
The actuator can be parametrised by ZTH EU via the service socket.
For an extended parametrisation the PC tool can be connected.

Connection ZTH EU / PC-Tool



Dimensions

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

Application notes

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