BELIMO

Technical data sheet LH24A-MOD200

Communicative linear actuator adjusting dampers and slide valves in technical building installations

- Actuating force 150 N
- Nominal voltage AC/DC 24 V
- Control modulating, communicative, hybrid
- Length of Stroke Max. 200 mm, 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 mm²
	Parallel operation	Yes (note the performance data)
Data bus communication	Communicative control	BACnet MS/TP Modbus RTU (default setting) MP-Bus
	Number of nodes	BACnet / Modbus see interface description MP-Bus max. 8
Functional data	Actuating force motor	150 N
	Actuating force variable	25%, 50%, 75% reduziert
	Operating range Y	2...10 V
	Input Impedance	100 kΩ
	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
	Stroke	200 mm
	Length of Stroke	Max. 200 mm, 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 manual override button
	Override control, controllable via bus communication	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position) = 50%

Functional data	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)
	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
	UL Approval	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
	Rated impulse voltage supply / control	0.8 kV
	Pollution degree	3
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	-30...50°C [-22...122°F]
	Storage temperature	-40...80°C [-40...176°F]
	Servicing	maintenance-free
Weight	Weight	0.61 kg

Safety notes

- This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application, especially 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.
- Cables must not be removed from the device.
- The rotary supports and coupling pieces available as accessories 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 maual override 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 situation 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 control 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.

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.

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 control 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 train 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.

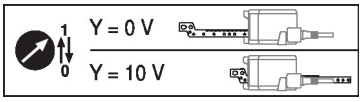
High functional reliability

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 control signal.



Adaptation and synchronisation

An adaptation can be triggered manually by pressing the "Adaptation" button or with the PC-Tool. Both mechanical end stops are detected during the adaptation (entire setting range).

Automatic synchronisation after pressing the manual override button is configured. The synchronisation is in the home position (0%).

The actuator then moves into the position defined by the control signal.

A range of settings can be adapted using the PC-Tool (see MFT-P documentation)

Accessories

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

Tools

Description	Type
Service Tool, with ZIP-USB function, 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 for Service-Tool ZTH	MFT-C
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

Electrical installation

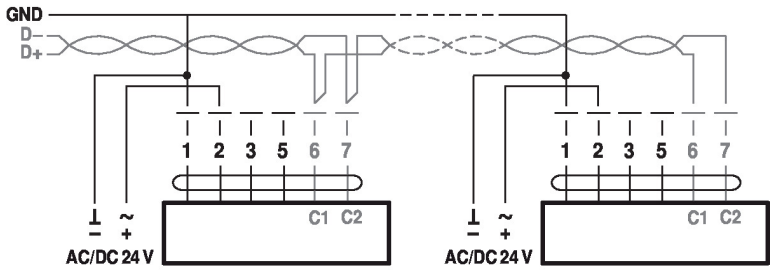
Supply from isolating transformer.

The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS-485 regulations.

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

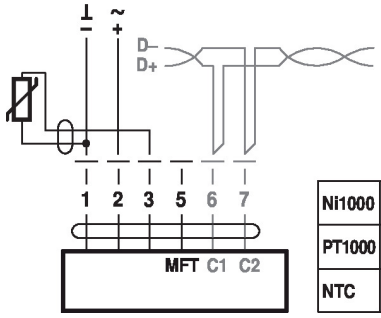
Wiring diagrams

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

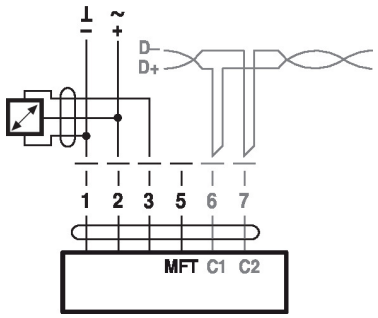
Connection with passive sensor, e.g. Pt1000, Ni1000, NTC



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)

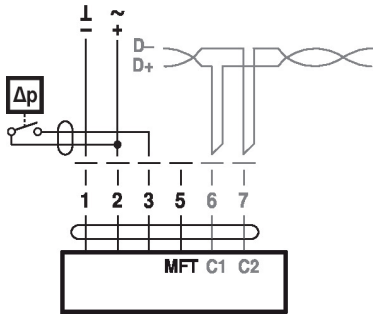
1) depending on type
2) Resolution 1 Ohm
Compensation of the measured value is recommended

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



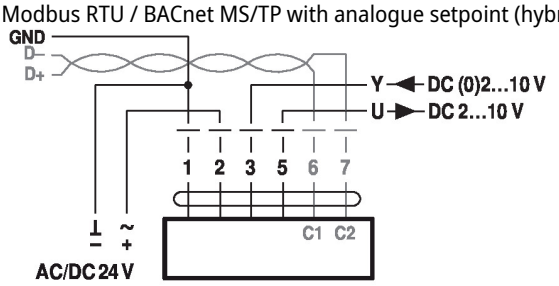
Possible voltage range:
0...32 V (resolution 30 mV)

Connection with switching contact, e.g. Δp monitor

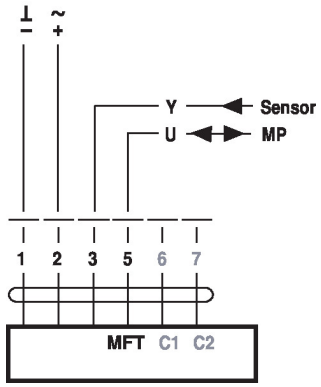


Requirements for switching contact:
The switching contact must be able to accurately switch a current of 16 mA @ 24 V.

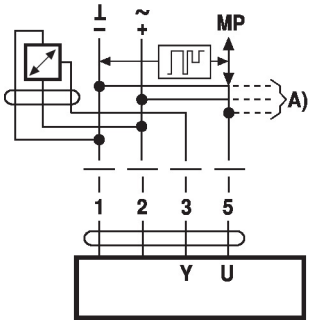
Modbus RTU / BACnet MS/TP with analogue setpoint (hybrid mode)



Operation on the MP-Bus

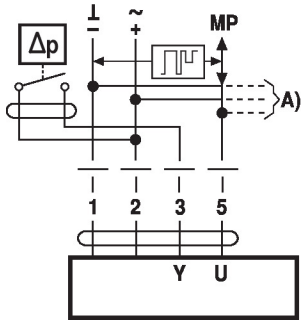


Connection of active sensors



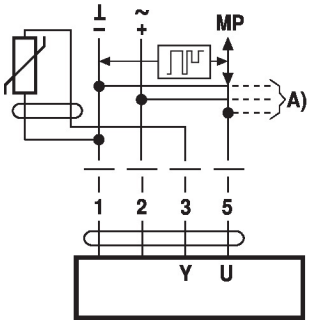
A) additional MP-Bus nodes (max. 8)
• Supply AC/DC 24 V
• Output signal DC 0...10 V (max. DC 0...32 V)
• Resolution 30 mV

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



A) additional MP-Bus nodes (max. 8)

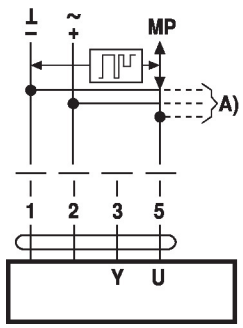
Ni1000	–28...+98°C	850...1600 Ω 2)
PT1000	–35...+155°C	850...1600 Ω 2)
NTC	–10...+160°C 1)	200 Ω...60 kΩ 2)

1) Depending on the type
2) Resolution 1 Ohm
Compensation of the measured value is recommended

Functions

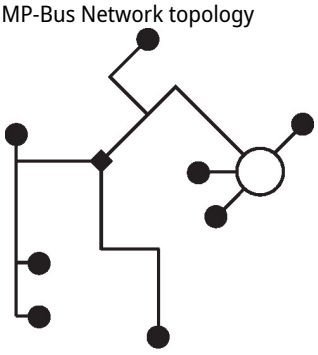
Functions when operated on MP-Bus

Connection on the MP-Bus



A) additional MP-Bus nodes (max. 8)

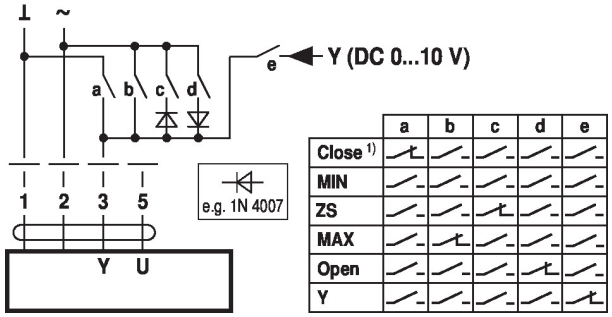
MP-Bus Network topology



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

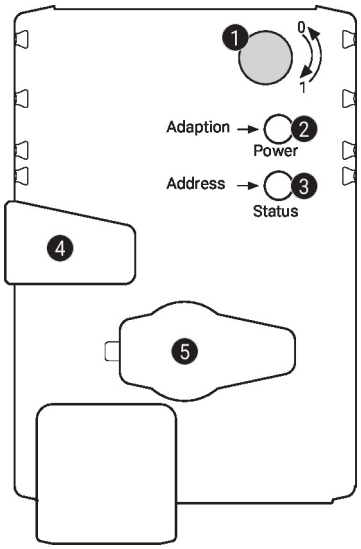
Functions with specific parameters (parametrisation necessary)

Override control and limiting with AC 24 V with relay contacts



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

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 synchronisation 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 Manual override button

Press button:	Gear train disengages, motor stops, manual override possible
Release button:	Gear train engages, synchronisation starts, followed by standard mode

5 Service plug

For connecting parametrisation 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 "Adaptation" 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.

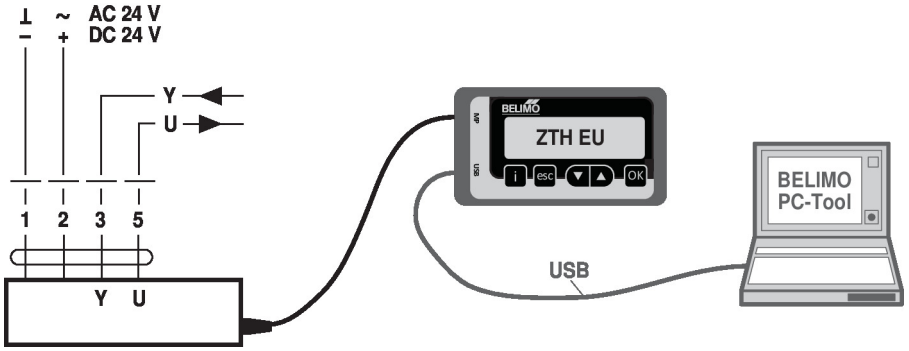
The resulting BACnet MS/TP and Modbus RTU address is made up of the set basic address plus the short address (e.g. 100+7=107).

Tools connection

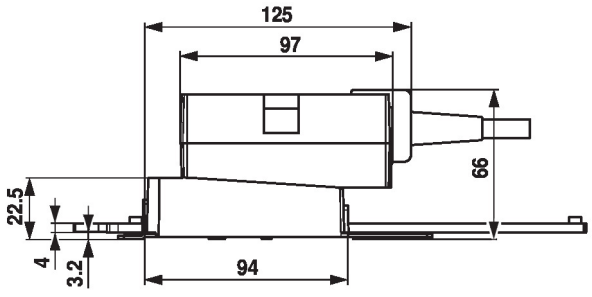
The actuator can be parametrised by ZTH EU via the service socket.

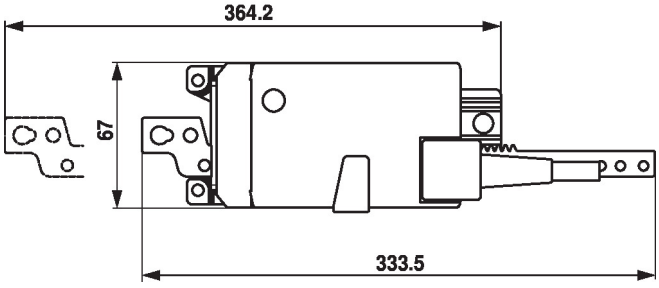
For an extended parametrisation the PC tool can be connected.

Connection ZTH EU / PC-Tool



Dimensions





Further documentation

- Tool connections
- BACnet Interface description
- Modbus Interface description
- 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.