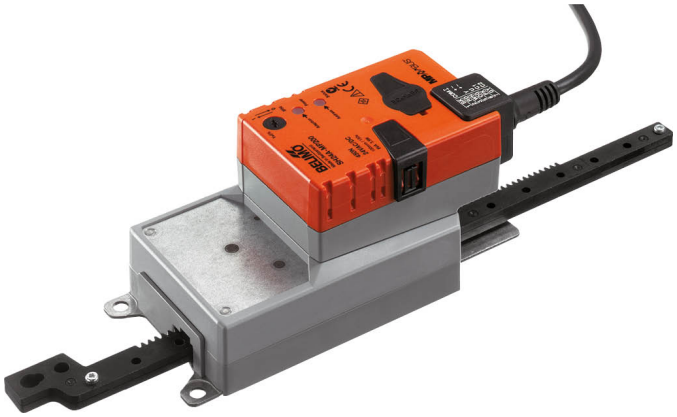
BELIMO

# Technical data sheet SH24A-MOD200

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

- **Air damper size up to approx. 3 m²**
- **Actuating force 450 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**



BACnet Modbus 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 | 3.5 W |
| | Power consumption in rest position | 1.4 W |
| | Power consumption for wire sizing | 6 VA |
| | Connection supply / control | Cable 1 m, 6 x 0.75 mm² |
| | Parallel operation | Yes (note the performance data) |
| **Functional data** | Actuating force motor | 450 N |
| | Communicative control | BACnet MS/TP<br>Modbus RTU (default setting)<br>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<br>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 | 150...600 s / 100 mm |
| | Adaptation setting range | manual |
| | Adaptation setting range variable | No action<br>Adaptation when switched on<br>Adaptation after pushing the gear disengagement button |
| | Override control, controllable via bus communication | MAX (maximum position) = 100%<br>MIN (minimum position) = 0%<br>ZS (intermediate position) = 50% |
| | Override control variable | MAX = (MIN + 32%)...100%<br>MIN = 0%...(MAX – 32%)<br>ZS = MIN...MAX |
| | Sound power level, motor | 52 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 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 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 | 1.2 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 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 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.

**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 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-KS1 coupling piece provided for this purpose.

**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 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 the mechanical end stops Z-AS1.

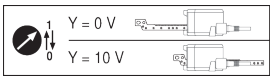
**High functional reliability**

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-AS1 |
| Rotary support, for linear actuator, for compensation of transverse forces | Z-DS1 |
| Coupling piece M8 | Z-KS1 |

**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 parametrisable and communicative Belimo actuators, VAV controller and HVAC performance devices | ZTH EU |

## Electrical installation

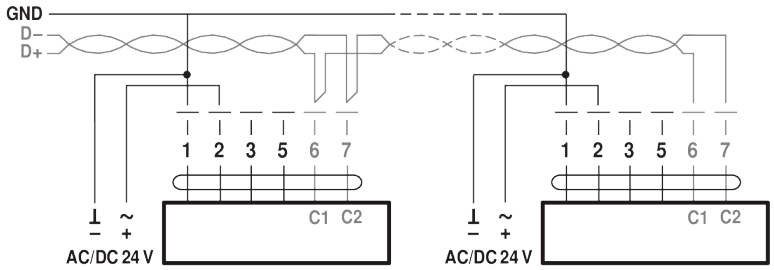
**Supply from isolating transformer.**

**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.**

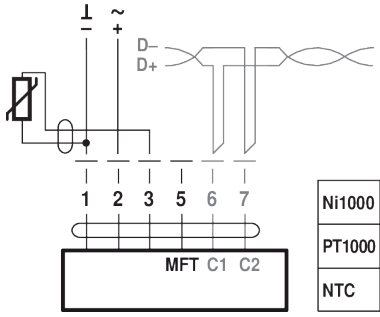
## Wiring diagrams

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

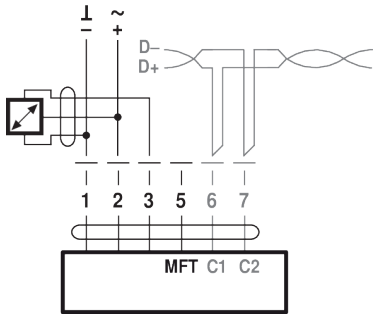
Connection with passive sensor, e.g. Pt1000, Ni1000, NTC




| | | |
|---|---|---|
| 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) |

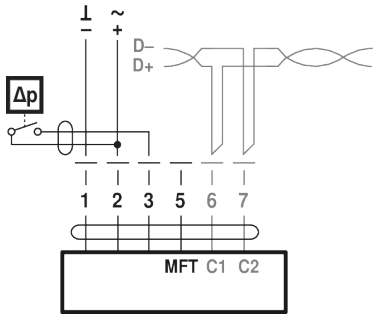
1) depending on type
2) Resolution 1 Ohm
Compensation of the measured value is recommended

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



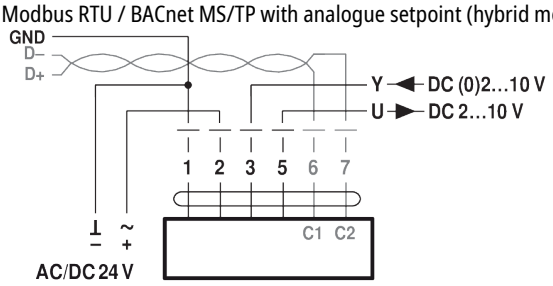

Possible voltage range:
0...32 V (resolution 30 mV)

Connection with switching contact, e.g. Δp monitor

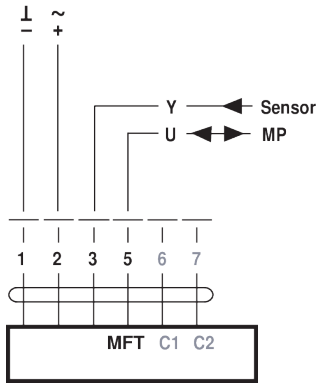



Requirements for switching contact:
The switching contact must be able to accurately switch a current of 16 mA @ 24 V.

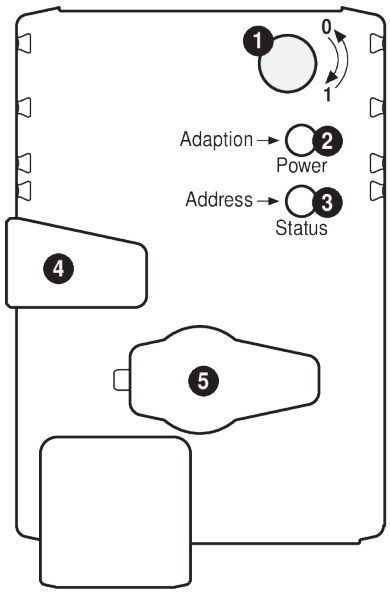
Modbus RTU / BACnet MS/TP with analogue setpoint (hybrid mode)




Operation on the MP-Bus




## 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 malfuntion |
| On: | In operation |
| Flashing: | In address mode: Pulses according to set address (1...16)<br>When starting: Reset to factory setting (Communication) |
| Press button: | In standard mode: Triggers stroke adaptation<br>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<br>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<br>In address mode: Address setting by pressing several times<br>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**

The coupling piece with the internal thread (Z-KS1) is connected to the head of the gear rod. The rotary support (Z-DS1) is screwed to the ventilation application. Afterwards, the linear actuator is screwed to the previously mounted rotary support with the enclosed screw. Afterwards, 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° (angle), 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.

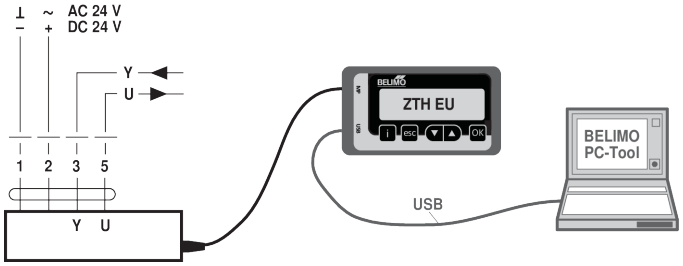
The resulting BACnet MS/TP and Modbus RTU address is made up of the set basic address plus the short address (e.g. 100+7=107).

**Service Tools connection**

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

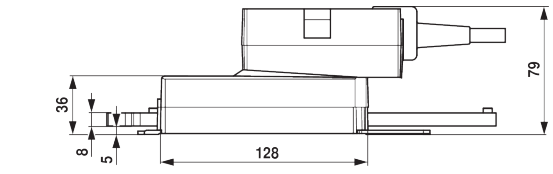
For an extended parametrisation the PC tool can be connected.

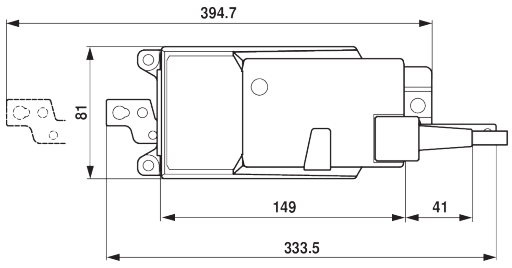
### Connection ZTH EU / PC-Tool




## 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.