



# SH24A-MP200

MP/27BUS

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

- Air damper size up to approx. 3 m<sup>2</sup>
- Actuating force 450 N
- Nominal voltage AC/DC 24 V
- Control modulating, communicative 2...10 V variable
- Position feedback 2...10 V variable
- Length of Stroke Max. 200 mm, adjustable in 20 mm increments
- Communication via Belimo MP-Bus
- Conversion of sensor signals

Picture may differ from product

Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.228.8 V / DC 21.628.8 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, 4x 0.75 mm <sup>2</sup>
	Parallel operation	Yes (note the performance data)
Data bus communication	Communicative control	MP-Bus
	Number of nodes	MP-Bus max. 8
Functional data	Actuating force motor	450 N
	Actuating force variable	25%, 50%, 75% reduced
	Operating range Y	210 V
	Input impedance	100 kΩ
	Operating range Y variable	Start point 0.530 V
		End point 2.532 V
	Operating modes optional	Open/close
		3-point (AC only) Modulating (DC 0 22.V)
	Position feedback I	
	Position recuback o variable	End point 2.510 V
	Position accuracy	±5%
	Direction of motion motor	selectable with switch
	Direction of motion variable	electronically reversible
	Direction of motion note	Y = 0 V: with switch 0 (retracted) / 1 (extended)
	 Manual override	with push-button, can be locked
	Stroke	200 mm
	Length of Stroke	Max. 200 mm, adjustable in 20 mm
	5	increments
	Stroke limitation	can be limited on both sides with mechanical
		end stops
	Running time motor	150 s / 100 mm
	Running time motor variable	150600 s / 100 mm

#### Technical data



Technical data sheet

Functional data	Sound power level, motor	52 dB(A)		
	Adaptation setting range	manual		
	Adaptation setting range variable	No action		
		Adaptation when switched on		
		Adaptation after pushing the manual override		
		button		
	Override control	MAX (maximum position) = 100%		
		MIN (minimum position) = $0\%$		
		25 (intermediate position, AC only) = 50%		
	Override control variable	MAX = (MIN + 32%)100%		
		MIN = 0%(MAX = 52%) $7S = MIN MAX$		
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		
	Housing	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		
	Hygiene test	According to VDI 6022 Part 1 / SWKI VA 104-01, cleanable and disinfectable, low		
		emission		
	Type of action	Туре 1		
	Rated impulse voltage supply / control	0.8 kV		
	Pollution degree	3		
	Ambient humidity	Max. 95% RH, non-condensing		
	Ambient temperature	-3050°C [-22122°F]		
	Storage temperature	-4080°C [-40176°F]		
	Servicing	maintenance-free		
Weight	Weight	1.2 kg		



# Safety notes

Product features	<ul> <li>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.</li> <li>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.</li> <li>Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.</li> <li>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.</li> <li>Cables must not be removed from the device.</li> <li>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»).</li> <li>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.</li> <li>If not installed horizontally, the maual override button may only be actuated when there is no pressure on the gear rod.</li> <li>To calculate the actuating force required for air dampers and slide valves, the specifications supplied by the damper manufacturers concerning the cross- section and the design, as well as the installation situation and the ventilation conditions must be observed.</li> <li>If a rotary support and/or coupling piece is used, actuation force losses are to be expected.</li> <li>The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regul</li></ul>
Operating mode	Conventional operation:
	range) and drives to the position defined by the control signal. Measuring voltage U serves for the electrical display of the damper position 0100% and as control signal for other actuators.
	Operation on Bus:
	The actuator receives its digital control 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.
	The actuator has a seal closing function. The mechanical end stop is actively approached as soon as the control signal < DC 2.1 V or > DC 9.9 V. As soon as the control signal is again > DC 2.2 V or < DC 9.8 V, the actuator drives to the position defined by the control signal in the adapted range.
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.
Configurable device	The factory settings cover the most common applications. Single parameters can be modified with Belimo Assistant 2 or ZTH EU.
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.



Accessories

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 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 control signal.
	$ \begin{array}{c}             Y = 0 V \\             Y = 10 V \\             Y = 10 V                                   $
Adaptation and synchronisation	An adaptation can be triggered manually by pressing the "Adaptation" button or with Belimo Assistant 2. 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 made using Belimo Assistant 2.

Tools	Description	Туре
	Service tool, with ZIP-USB function, for configurable and communicative Belimo actuators, VAV controller and HVAC performance devices	ZTH EU
	Service tool for wired and wireless setup, on-site operation and troubleshooting.	Belimo Assistant 2
	Adapter for Service-Tool ZTH	MFT-C
	Connecting cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin for connection to service socket	ZK1-GEN
	Connecting cable 5 m, A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal	ZK2-GEN
Electrical accessories	Description	Туре
	Signal converter voltage/current 100 kΩ 420 mA, Supply AC/DC 24 V	Z-UIC
	Positioner for wall mounting	SGA24
	Positioner for built-in mounting	SGE24
	Positioner for front-panel mounting	SGF24
	Positioner for wall mounting	CRP24-B1
	MP-Bus power supply for MP actuators	ZN230-24MP
Gateways	Description	Туре
	Gateway MP to BACnet MS/TP	UK24BAC
	Gateway MP to Modbus RTU	UK24MOD
Mechanical accessories	Description	Туре
	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

# Electrical installation



Supply from isolating transformer.

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



3 2 V

10 V

Υ

Ā

# Wire colours:

- 1 = black
- 2 = red
- 3 = white
- 5 = orange



# Further electrical installations

#### Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts



Override control with AC 24 V with rotary switch





#### Functions with basic values (conventional mode)

Control remotely 0...100% with Minimum positioner SG..

Minimum limit with positioner SG..





#### Primary/secondary operation (position-dependent)



Control with 4...20 mA via external resistor



## Caution:

The operating range must be set to DC 2...10 V. The 500 Ohm resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V.



### Functions with basic values (conventional mode)

#### Functional check



#### **MP-Bus**





# Procedure

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

• Supply AC/DC 24 V

Resolution 30 mV

0...32 V)

• Output signal 0...10 V (max.





Max. 8 MP-Bus nodes



Connection of external switching contact



• Switching current 16 mA @ 24 V

• Start point of the operating range must be configured on the MP actuator as ≥0.5 V



**Technical data sheet** 

# Further electrical installations

# MP-Bus

Connection of passive sensors



## Functions with specific parameters (configuration necessary)

Override control and limiting with AC 24 V with relay contacts



Override control and limiting with AC 24 V with rotary switch

# Control 3-point with AC 24 V

1) Depending on the type 2) Resolution 1 Ohm

value is recommended

Compensation of the measured



### Caution:

The "Close" function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.



				—k e.g. 11	∫— ∎4007
1	2	3 (a)	3 (b)		
~~L	<b>~</b> ∟	-~~L	-~	¥	Ŧ
~	-~~L	-~L	~ ↓	¥	Ŧ
~	<b>⊸</b> ∟	-~-		stop	stop
-~	→ L	-~-	-~~L	Ŧ	¥



## **Operating controls and indicators**

Þ		Direction of stroke switch		
		Switch over:	Direction of stroke changes	
Adaption → Power		2 Push-button and LED display green		
	Address → <b>3</b> 5tatus	Off:	No power supply or malfunction	
4		On:	In operation	
<u> </u>	$\frown$	Press button:	Triggers stroke adaptation, followed by standard mode	
	6	3 Push-button and	I LED display yellow	
		Off:	Standard mode	
		On:	Adaptation or synchronisation process active	
U I		Flickering:	MP-Bus communication active	
		Flashing:	Request for addressing from MP client	
		Press button:	Confirmation of the addressing	
		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	
		<b>5</b> Service plug For connecting c	onfiguration and service tools	
		Check power sup	oply connection	
		2 Off and 3	On Possible wiring error in power supply	
Installation notes				
		If a rotany support	and/or coupling piece is used losses in the actuation force losses are to be	
	À	expected.	and/or coupling piece is used, losses in the actuation force losses are to be	

Applications without transverse forces

Applications with 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).

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

Wired connection

**ction** The device can be configured by ZTH EU via the service socket. For an extended configuration, Belimo Assistant 2 can be connected.

Connection ZTH EU / Belimo Assistant 2



## Dimensions





## **Further documentation**

- Overview MP Cooperation Partners
- Tool connections
- Introduction to MP-Bus Technology
- Quick Guide Belimo Assistant 2

## **Application notes**

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