

Communicative rotary actuator fail-safe for adjusting dampers in technical building installations

- Air damper size up to approx. 4 m²
- Torque motor 20 Nm
- Nominal voltage AC/DC 24 V
- Control modulating, communicative 2...10 V variable
- Position feedback 2...10 V variable
- Communication via Belimo MP-Bus
- Conversion of sensor signals



Picture may differ from product

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, 4x 0.75 mm ²
	Parallel operation	Yes (note the performance data)
Data bus communication	Communicative control	MP-Bus
	Number of nodes	MP-Bus max. 8
Functional data	Torque motor	20 Nm
	Torque fail-safe	20 Nm
	Operating range Y	2...10 V
	Input impedance	100 kΩ
	Operating range Y variable	Start point 0.5...30 V End point 2.5...32 V
	Operating modes optional	Open/close 3-point (AC only) Modulating (DC 0...32 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 2.5...10 V
	Position accuracy	±5%
	Direction of motion motor	selectable with switch L/R
	Direction of motion variable	electronically reversible
	Direction of motion fail-safe	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 fail-safe	<20 s @ -20...50°C, <60 s @ -30°C
	Sound power level, motor	40 dB(A)
	Adaptation setting range	manual
	Adaptation setting range variable	No action Adaptation when switched on Adaptation after using the hand crank

Technical data

Functional data	Override control	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position, AC only) = 50%
	Override control variable	MAX = (MIN + 32%)...100% MIN = 0%...(MAX – 32%) ZS = MIN...MAX
	Mechanical interface	Universal shaft clamp 10...25.4 mm
	Position indication	Mechanical
	Service life	Min. 60'000 fail-safe positions
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
	Type of action	Type 1.AA
	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	2.2 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 with 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.
- 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.
- Cables must not be removed from the device.

Product features

Operating mode	<p>Conventional operation:</p> <p>The actuator is connected with an analogue control signal Y (note the operating range) and drives to the position defined. The measuring voltage U serves for the electrical display of the damper position 0...100% and as control signal for other actuators.</p> <p>Operation on Bus:</p> <p>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.</p>
Converter for sensors	<p>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.</p>
Configurable device	<p>The factory settings cover the most common applications. Single parameters can be modified with Belimo Assistant 2.</p>
Simple direct mounting	<p>Simple direct mounting on the damper shaft with a universal shaft clamp, supplied with an anti-rotation mechanism to prevent the actuator from rotating.</p>
Manual override	<p>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.</p>
Adjustable angle of rotation	<p>Adjustable angle of rotation with mechanical end stops.</p>
High functional reliability	<p>The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.</p>
Home position	<p>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%).</p> <p>The actuator then moves into the position defined by the control signal.</p>
Adaptation and synchronisation	<p>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 actuating the hand crank is programmed. The synchronisation is in the home position (0%).</p> <p>The actuator then moves into the position defined by the control signal.</p> <p>A range of settings can be made using Belimo Assistant 2.</p>

Accessories

Tools	Description	Type
	Service tool for wired and wireless setup, on-site operation and troubleshooting.	Belimo Assistant 2
	Belimo Assistant Link Bluetooth and USB to NFC and MP-Bus converter for configurable and communicative devices	LINK.10
	Connecting cable 5 m, A: RJ11 6/4 LINK.10, B: 6-pin for connection to service socket	ZK1-GEN
	Connecting cable 5 m, A: RJ11 6/4 LINK.10, B: free wire end for connection to MP/PP terminal	ZK2-GEN
Electrical accessories	Description	Type
	Auxiliary switch 2x SPDT	S2A-F
	Feedback potentiometer 1 kΩ	P1000A-F
	Signal converter voltage/current 100 kΩ 4...20 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	Type
	Gateway MP to BACnet MS/TP	UK24BAC

Accessories

Mechanical accessories

Description	Type
Gateway MP to Modbus RTU	UK24MOD
Description	Type
Shaft extension 240 mm \varnothing 20 mm for damper shaft \varnothing 8...22.7 mm	AV8-25
End stop indicator	IND-AFB
Shaft clamp reversible, for central mounting, for damper shafts \varnothing 12.7 / 19.0 / 25.4 mm	K7-2
Ball joint suitable for damper crank arm KH8 / KH10	KG10A
Ball joint suitable for damper crank arm KH8	KG8
Damper crank arm Slot width 8.2 mm, clamping range \varnothing 10...18 mm	KH8
Actuator arm, for 3/4" shafts, clamping range \varnothing 10...22 mm, Slot width 8.2 mm	KH-AFB
Form fit insert 10x10 mm, Multipack 20 pcs.	ZF10-NSA-F
Form fit insert 12x12 mm, Multipack 20 pcs.	ZF12-NSA-F
Form fit insert 15x15 mm, Multipack 20 pcs.	ZF15-NSA-F
Form fit insert 16x16 mm, Multipack 20 pcs.	ZF16-NSA-F
Mounting kit for linkage operation for flat and side installation	ZG-AFB
Baseplate extension	Z-SF
Anti-rotation mechanism 230 mm, Multipack 20 pcs.	Z-ARS230L
Hand crank 63 mm	ZKN2-B

Electrical installation



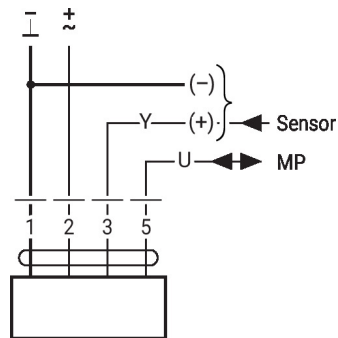
Supply from isolating transformer.

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

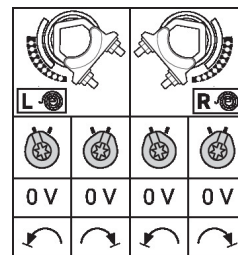
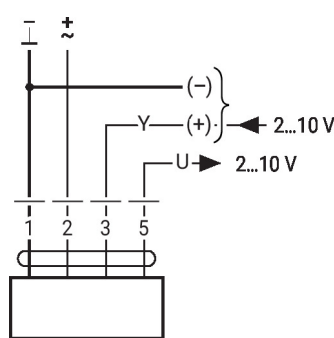
Wire colours:

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

MP-Bus

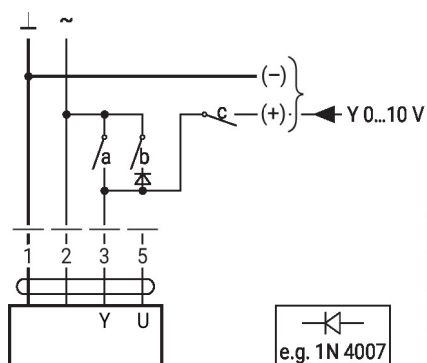


AC/DC 24 V, modulating



Further electrical installations
Functions with basic values (conventional mode)

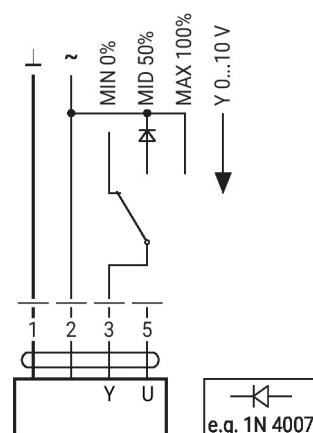
Override control with AC 24 V with relay contacts



1	2	a	b	c	
					0 %
					ZS 50%
					100%
					Y

e.g. 1N 4007

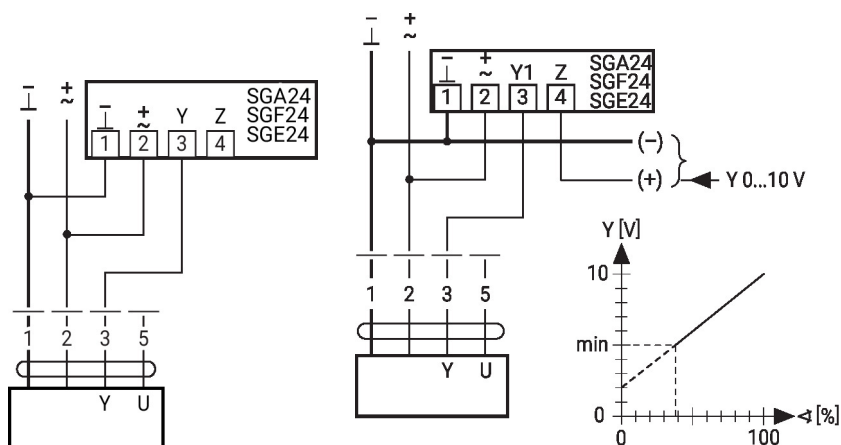
Override control with AC 24 V with rotary switch



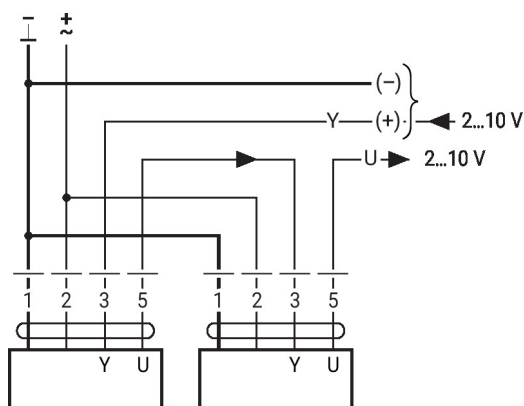
e.g. 1N 4007

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

Minimum limit with positioner SG..



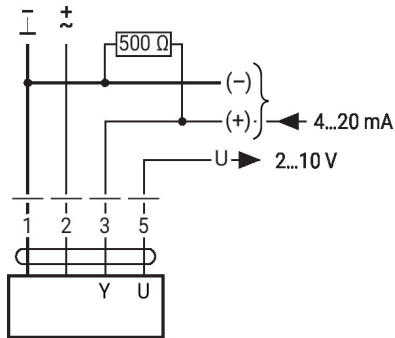
Primary/secondary operation (position-dependent)



Further electrical installations

Functions with basic values (conventional mode)

Control with 4...20 mA via external resistor

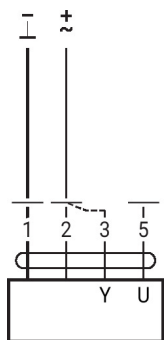


Caution:

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.

Functional check

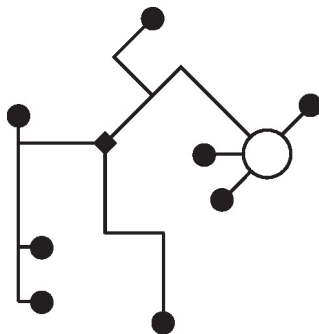


Procedure

1. Connect 24 V to connections 1 and 2
2. Disconnect connection 3:
 - With direction of rotation 0: Actuator rotates to the left
 - With direction of rotation 1: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
 - Actuator runs in opposite direction

MP-Bus

MP-Bus Network topology

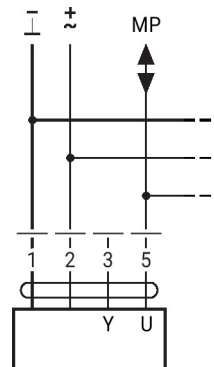


There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).

Supply and communication in one and the same 3-wire cable

- no shielding or twisting necessary
- no terminating resistors required

Connection on the MP-Bus

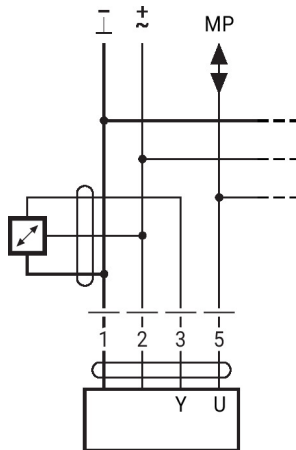


Max. 8 MP-Bus nodes

Further electrical installations

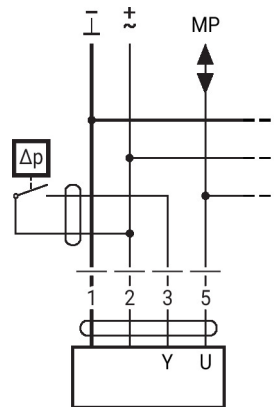
MP-Bus

Connection of active sensors



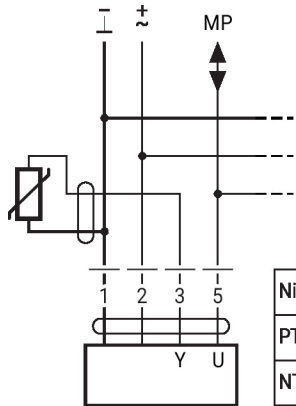
- Supply AC/DC 24 V
- Output signal 0...10 V (max. 0...32 V)
- Resolution 30 mV

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

Connection of passive sensors

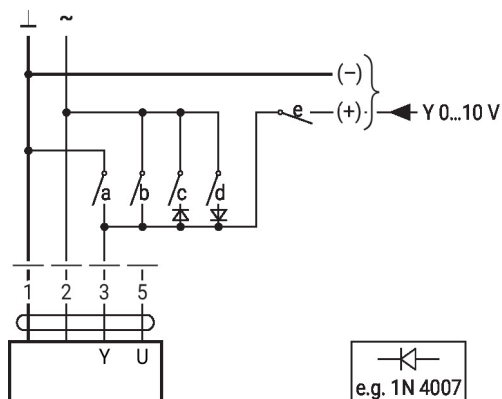


Ni1000	-28...+98°C	850...1600 Ω ²⁾
PT1000	-35...+155°C	850...1600 Ω ²⁾
NTC	-10...+160°C ¹⁾	200 Ω ...60 k Ω ²⁾

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

Functions with specific parameters (configuration necessary)

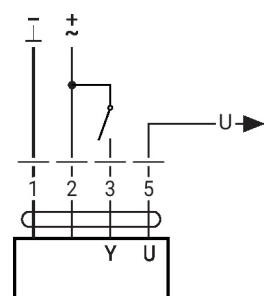
Override control and limiting with AC 24 V with relay contacts



e.g. 1N 4007

1	2	a	b	c	d	e	
							Close
							MIN
							ZS
							MAX
							Open
							Y

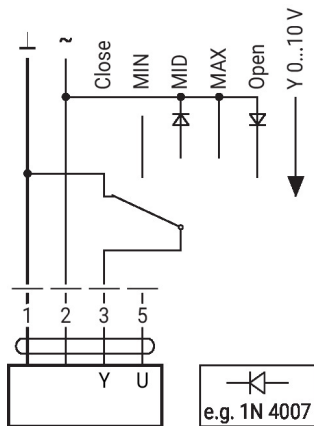
Control open/close



Further electrical installations

Functions with specific parameters (configuration necessary)

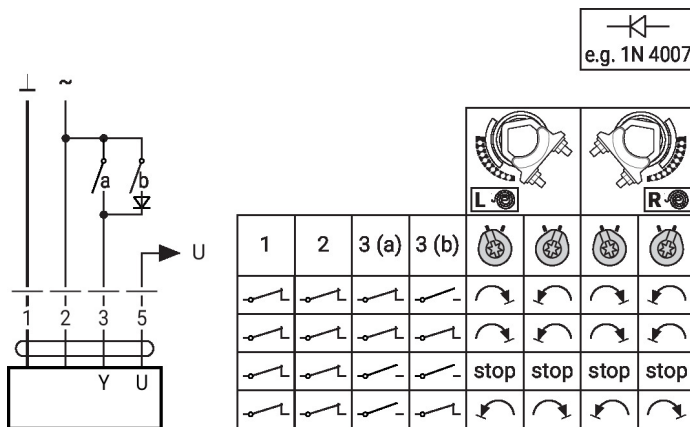
Override control and limiting with AC 24 V with rotary switch



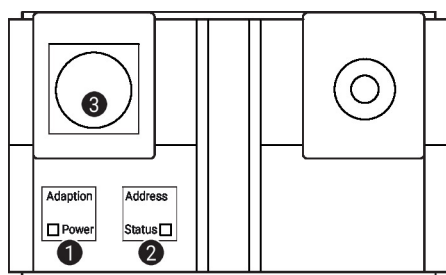
Caution:

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

Control 3-point with AC 24 V



Operating controls and indicators



1 Membrane key and LED display green

Off: No power supply or malfunction

On: In operation

Press button: Triggers angle-of-rotation adaptation, followed by standard mode

2 Membrane key and LED display yellow

Off: Standard mode

On: Adaptation or synchronisation process active

Flickering: MP-Bus communication active

Flashing: Request for addressing from MP client

Press button: Confirmation of the addressing

3 Service plug

For connecting configuration and service tools

Operating elements

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

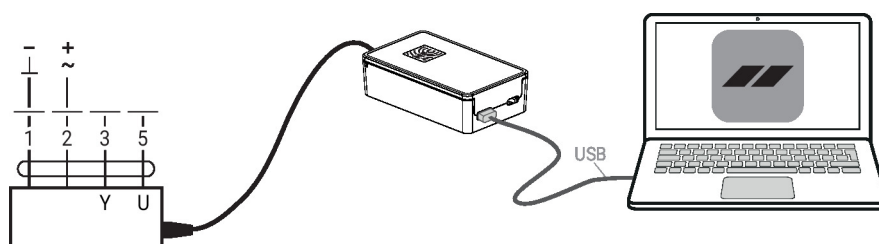
Service

Using Belimo Assistant 2, device parameters can be modified. Belimo Assistant 2 can operate on a smartphone, tablet or PC. The available connection options vary depending on the hardware on which Belimo Assistant 2 is installed.

For more information about Belimo Assistant 2, refer to the Quick Guide – Belimo Assistant 2.


Wired connection

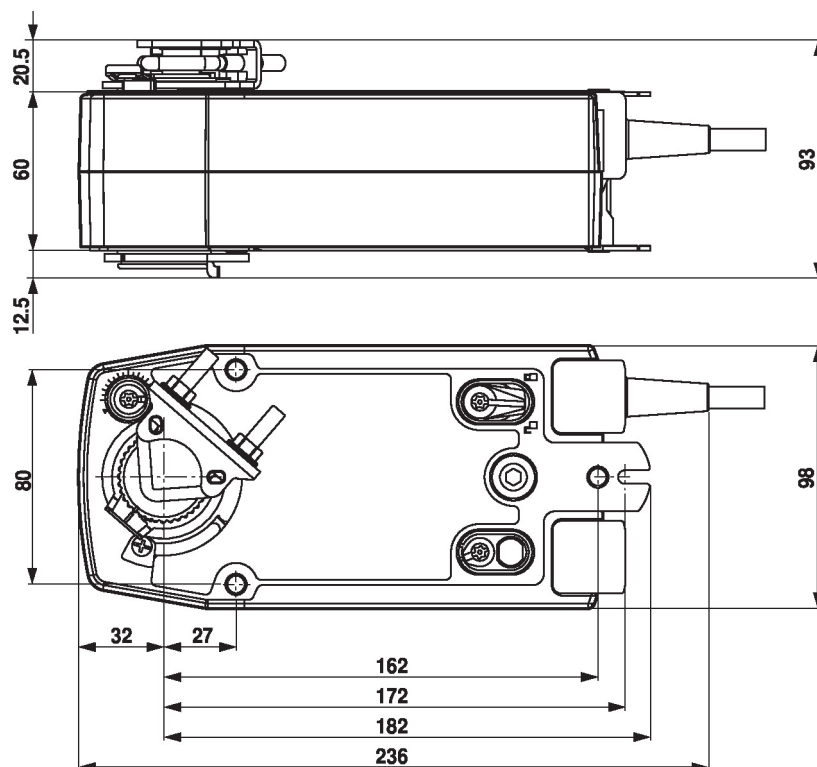
Belimo devices can be accessed by connecting Belimo Assistant Link to the USB port on a PC or laptop and to the Service Socket or MP-Bus wire on the device.


Dimensions
Shaft length

		Min. 85
		Min. 15

Clamping range

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


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.