Technical data sheet LF24-SR

Rotary actuator fail-safe for adjusting dampers in technical building installations

- **Torque motor 4 Nm**
- **Nominal voltage AC/DC 24 V**
- **Control modulating, Open/close, 3-point, communicative via MP-Bus**
- **Running time motor 150 s (75...300 s)**



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...35.0 V
	Power consumption in operation	2 W
	Power consumption in rest position	0.8 W
	Power consumption for wire sizing	3.5 VA
	Connection supply / control	Cable 1 m, 4x 0.75 mm²
	Parallel operation	Yes (note the performance data)
Data bus communication	Communicative control	MP-Bus
	Number of nodes	MP-Bus max. 16
Functional data	Torque motor	4 Nm
	Torque fail-safe	4 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 communicative
	Position feedback U	2...10 V
	Position feedback U note	Max. 1 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 fail-safe	selectable by mounting L/R
	Manual override	No
	Angle of rotation	Max. 95°
	Angle of rotation note	Adjustable 37...100% with integrated mechanical limitation
	Running time motor	150 s / 90°
	Running time motor variable	75...300 s
	Running time fail-safe	<20 s @ -20...50°C, <60 s @ -30°C
	Sound power level motor	36 dB(A)
	Adaptation setting range	with Belimo Assistant 2
	Override control	MIN (minimum position) = 0% MID (intermediate position, AC only) = 50% MAX (maximum position) = 100%

Technical data

Functional data	Override control variable	MIN = 0%...(MAX – 32%) MID = MIN...MAX MAX = (MIN + 32%)...100%
	Mechanical interface	Universal shaft clamp 8...16 mm
	Position indication	Mechanical
	Service life	Min. 60'000 fail-safe positions
Safety data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Degree of protection IEC/EN	IP54
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	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	1.5 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 if no (sea) water, snow, ice, sunlight or aggressive gases act directly on the device and if it is ensured that the ambient conditions remain within the limit values specified in the data sheet at all times.
- 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.
- Cables must not be removed from the device.
- To calculate the torque required, 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.
- 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

Operating mode

Conventional operation:

The actuator is controlled with a control signal Y (note the operating range) and drives to the position defined.

The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the fail-safe position by spring force when the supply voltage is interrupted.

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.

Converter for sensors

Connection option for an active sensor. The actuator serves as an analogue/digital converter for the transmission of the sensor signal via MP-Bus to the higher-level system.

Additional material may be required for the sensor connection. See "Electrical accessories".

Product features

Configurable device
The factory settings cover the most common applications. Single parameters can be modified via a wired connection using Belimo Assistant 2. Writing configuration parameters will cause the actuator to move to its fail-safe position.

Simple direct mounting
Simple direct mounting on the damper shaft with a universal shaft clamp, supplied with an anti-rotation mechanism to prevent the actuator from rotating.

Adjustable angle of rotation
Adjustable angle of rotation with mechanical end stops.

High functional reliability
The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.

Innovative motorisation
The actuator uses the powerful Belimo M600 microchip in combination with the INFORM method. It provides the full starting torque from a standstill with high precision (sensorless INFORM-Drive by Prof. Schrödl).

Adaptation
An adaptation can be triggered manually by switching the direction-of-rotation switch from the left to the right twice within 5 s or with Belimo Assistant 2. Both mechanical end stops are detected during the adaptation (entire setting range).

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

A range of settings can be made using Belimo Assistant 2.

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: 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

Mechanical accessories

Description	Type
Shaft extension 170 mm ø10 mm for damper shaft ø6...16 mm	AV6-20
Shaft clamp reversible, clamping range ø16..20 mm [5/8...3/4"]	K6-1
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 ø10..18 mm [3/8...3/4"]	KH8
Actuator arm, clamping range ø8..16 mm [3/8...5/8"], Slot width 8.2 mm	KH-LF
Angle of rotation limiter, with end stop	ZDB-LF
Form fit adapter 8x8 mm	ZF8-LF
Mounting kit for linkage operation for flat installation	ZG-LF1
Mounting kit for linkage operation for side installation Slot width 6.2 mm	ZG-LF3
Anti-rotation mechanism 180 mm, Multipack 20 pcs.	Z-ARS180L

Electrical installation

Supply from isolating transformer.

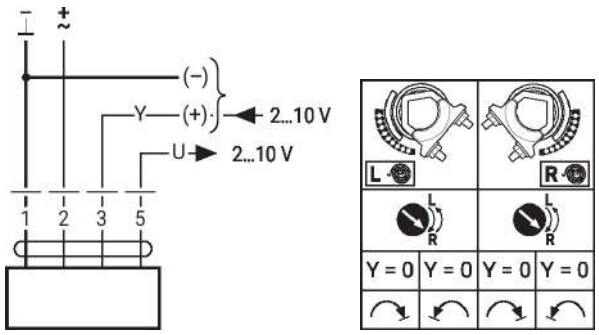
Parallel connection of other actuators possible. Observe the performance data.

The cable cross-section (mm²) must be determined on the basis of the actuator performance data (VA, W), the cable resistance, the number of actuators, and the total cable length according to electrotechnical principles. High voltage drops across the installation cables can affect the function of the actuator if, for example, the nominal voltage range (AC/DC) is not respected.

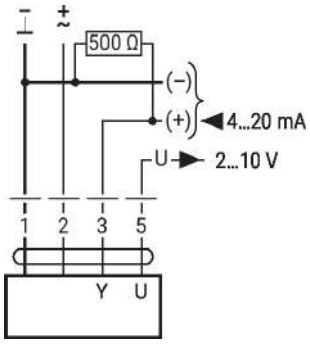
High voltage drops across the control signal and position feedback lines (Y/U) with respect to ground affect the signal values (0.5/2...10 V) and can change the actuator position.

Wire colours:
1 = black
2 = red
3 = white
5 = white

AC/DC 24 V, modulating



Control with 4...20 mA via external resistor

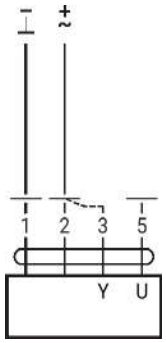


Caution:
The operating range must be set to DC 2...10 V.
The 500 Ohm resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V.

Further electrical installations

Functions with basic values (conventional mode)

Functional check

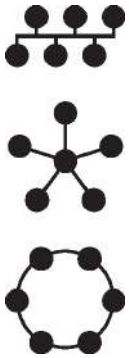


Procedure
1. Connect 24 V to connections 1 and 2
2. Disconnect connection 3:
– With direction of rotation 0: Actuator rotates to the left
– With direction of rotation 1: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
– Actuator runs in opposite direction

Further electrical installations

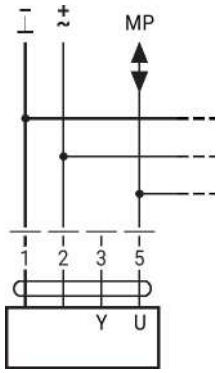
MP-Bus

MP-Bus network topology



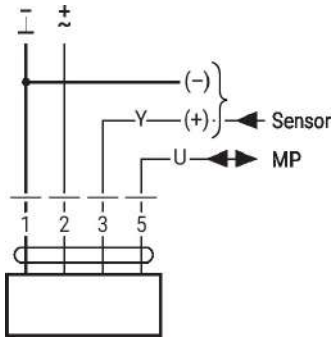
There are no restrictions regarding the network topology (bus, star, ring or mixed forms are permitted).
Supply and communication in one and the same 3-wire cable
• no shielding or twisting necessary
• no terminating resistors required

Connection on the MP-Bus

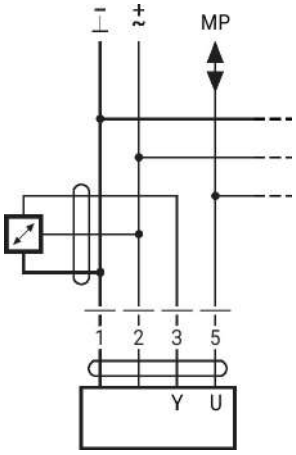


Max. 16 MP-Bus nodes

MP-Bus



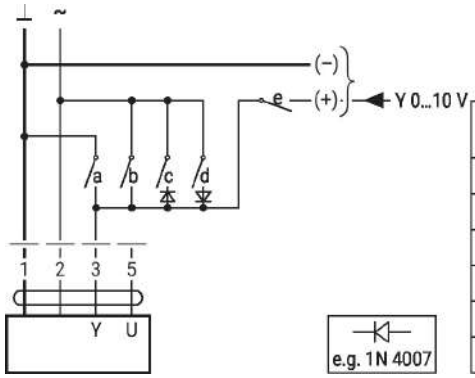
Connection of active sensors



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

Functions with specific parameters (configuration necessary)

Override control and limiting with AC 24 V with relay contacts



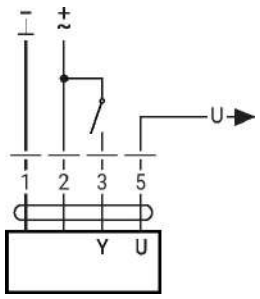
1	2	a	b	c	d	e	M	B
⌐	⌐	⌐	_	_	_	_	Close	Close
⌐	⌐	_	_	_	_	_	MIN	-
⌐	⌐	_	_	⌐	_	_	MID	MID
⌐	⌐	_	⌐	_	_	_	MAX	MAX
⌐	⌐	_	_	_	⌐	_	Open	Open
⌐	⌐	_	_	_	_	⌐	Y	Y

M = modulating
B = Bus

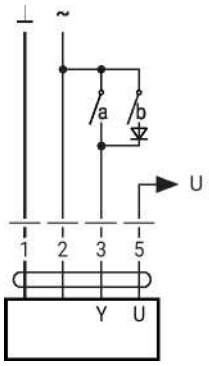
Further electrical installations

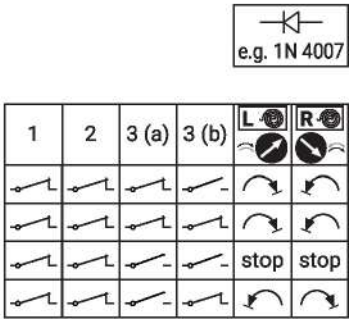
Functions with specific parameters (configuration necessary)

Control open/close

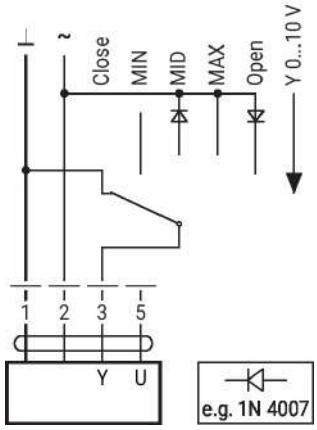


Control 3-point with AC 24 V



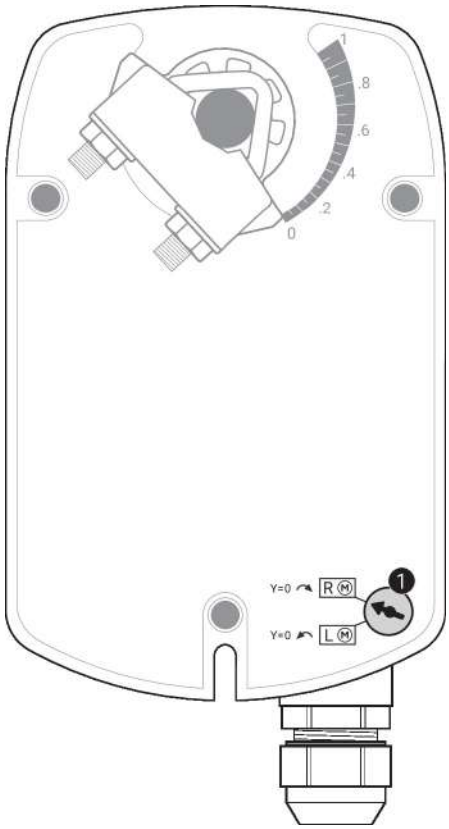


Override control and limiting with AC 24 V with rotary switch



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

Operating controls and indicators



1 **MP addressing**
Move direction of rotation switch in opposite position and backwards (within 4 seconds)

Service

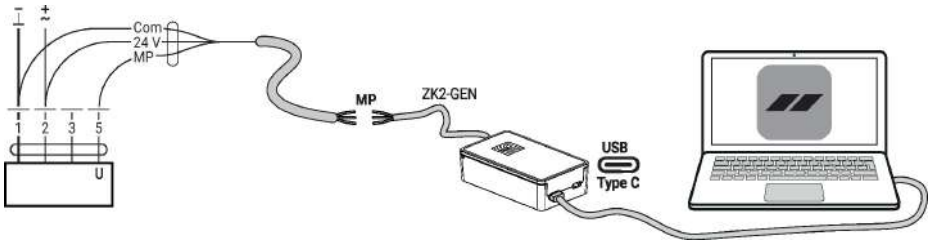
Using Belimo Assistant 2, device parameters can be modified. Belimo Assistant 2 can operate on a smartphone, tablet or PC. The available connection options vary depending on the hardware on which Belimo Assistant 2 is installed.

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

Wired connection

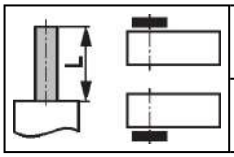
Belimo devices can be accessed by connecting Belimo Assistant Link to the USB port on a PC or laptop and to the service socket or MP-Bus wire on the device.

Belimo Assistant 2 acts as MP client. Therefore, no other MP client shall be connected to the device.



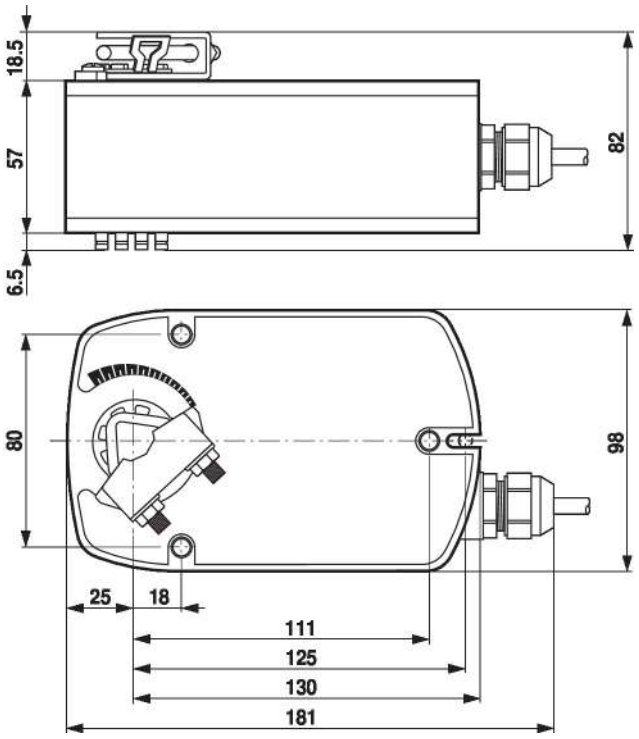
Dimensions

Shaft length

	Min. 84
	Min. 20 mm [0.75"]

Clamping range

	
8...16	8...16



Further documentation

- Description Data-Pool Values
- Introduction to MP-Bus Technology
- Overview MP Cooperation Partners
- Tool connections
- Quick Guide – Belimo Assistant 2