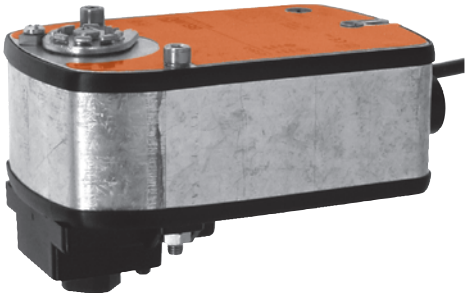
Communication-capable rotary actuator with emergency control function for 2- and 3-way ball valves

- **Torque 4 Nm**
- **Nominal voltage AC/DC 24 V**
- **Control: Modulating DC 0 ... 10 V or variable**
- **Position feedback DC 2 ... 10 V or variable**
- **Communication via BELIMO MP-Bus**
- **Conversion of sensor signals**
- **LRF24-MP: Deenergised NC**
  LRF24-MP-O: Deenergised NO



Technical data

Electrical data

Nominal voltage		AC 24 V, 50/60 Hz / DC 24 V
Power supply range		AC 19.2 ... 28.8 V / DC 21.6 ... 28.8 V
Power consumption	In operation	6 W at nominal torque
	At rest	2.5 W
	For wire sizing	10 VA
Connection		Cable 1 m, 4 x 0.75 mm^2
Parallel connection		Yes

Functional data		Factory settings	Variable	Settings
Torque (nominal torque)	Motor	Min. 4 Nm at nominal voltage		
	Spring return	Min. 4 Nm		
Control	Control signal Y	DC 0 ... 10 V, input impedance 100 kΩ	Open-close, 3-point (AC only)	.....
	Working range	DC 2 ... 10 V	Start point DC 0.5 ... 30 V	
			End point DC 2.5 ... 32 V	.....
Position feedback (measuring voltage U)		DC 2 ... 10 V, max. 0.5 mA	Start point DC 0.5 ... 8 V	
			End point DC 2.5 ... 10 V	.....
Uni-rotation		±5%		
Direction of rotation	Motor LRF24-MP	Can be selected R / L		
	Spring return LRF24-MP-O	Deenergised NC, ball valve closed (A – AB = 0%)		
		Deenergised NO, ball valve open (A – AB = 100%)		
Direction of motion at Y = 0 V		In switch position L ↶ or R ↷	Electronically reversible	.....
Manual override		With hand crank, can be fixed in any position		
Angle of rotation		Max. 95°∢, can be limited with mechanical adjustable end stops		
Running time	Motor	150 s / 90°∢	75 ... 300 s	.....
	Spring return	~16 s at –20 ... 50°C / max. 60 s at –30°C		
Adjustment of running time, operating range and measuring signal U to match the mechanical angle of rotation		Manual triggering of the adaption by switching from L to R twice within 5 s or with PC-Tool.	Automatic adaption whenever the supply voltage is switched on, or manual triggering	.....
Override control		MAX (maximum position) = 100%	MAX = (MIN + 30°∢) ... 100%	
		MIN (minimum position) = 0%	MIN = 0% ... (MAX – 30°∢)	
		ZS (intermediate position, AC only) = 50%	ZS = MIN ... MAX	.....
Sound power level	Motor	Max. 45 dB (A)		
	Spring return	~ 62 dB (A)		
Service life		Min. 60'000 emergency settings		
Position indication		Mechanical		

Safety

Protection class	**III** Safety extra-low voltage
Degree of protection	IP54 in all mounting positions
EMC	CE according to 89/336/EEC
Mode of operation	Type 1 (to EN 60730-1)
Rated impulse voltage	0.8 kV (to EN 60730-1)
Control pollution degree	3 (to EN 60730-1)
Ambient temperature range	–30 ... +50°C
Media temperature	+5° ... +100° C (in ball valve)
Non-operating temperature	–40° .... +80°C
Ambient humidity range	95% r.H., non-condensating (to EN 60730-1)
Maintenance	Maintenance-free

Technical data *(Continued)*

Dimensions/weight

Dimensions	See «Dimensions» on page 6
Weight	Approx. 1.5 kg (without ball valve)

Safety notes

- **The actuator has been designed for use in stationary heating, ventilation and air conditioning systems and is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.**
- **It may only be installed by suitably trained personnel.**
  All applicable legal or institutional installation regulations must be complied with.
- **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 is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.**

Product features

Mode of operation
The actuator moves the ball valve to its normal working position while tensioning the return spring at the same time. If the power supply is interrupted, the energy stored in the spring moves the ball valve back to its safe position.
Conventional operation: The actuator is controlled with a standard modulating signal of DC 0 ... 10 V and travels to the position defined by the control signal. Measuring voltage U serves for the electrical display of the ball valve position 0 ... 100% and as slave control signal for other actuators.
Operation on the MP-Bus: The actuator receives its digital positioning signal from the higher level controller via the MP-Bus and travels to the position defined. Connection U serves as communication interface and does not supply an analogue measuring voltage.

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.

Parameterisable actuators
The factory settings cover the most common applications. Input and output signals and other parameters can be altered with the MFT-H parameterising device or the BELIMO Service Tool, MFT-P.

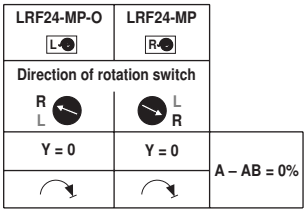
Simple direct mounting
Simple direct mounting on the ball valve with only one screw. The mounting position in relation to the ball valve can be selected in 90°◁ steps.

Manual override
The ball valve can be manually operated and fixed in any position using a hand crank. Release of the locking mechanism can be achieved manually or automatically by applying the supply voltage.

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

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

Home position
When the supply voltage is switched on, the actuator automatically detects its safety position (zero initialisation). This process, which takes place with the actuator stationary, lasts approximately 15 s.



Combination valve actuators
Refer to the valve documentation for suitable valves, their permitted media temperatures and closing pressures.

Accessories

Electrical accessories

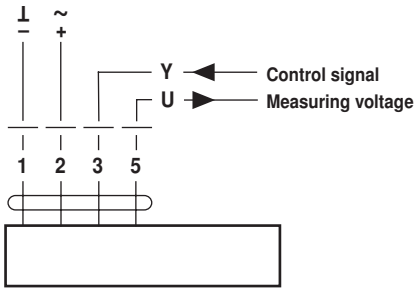
Description	Data sheet
Manual parameterising device MFT-H	T2 - MFT-H
PC-Tool MFT-P	T2 - MFT-P
Position sensor SG..24 (only in conventional operation)	T2 - SG..24
Digital position indication ZAD24 (only in conventional operation)	T2 - ZAD24

Electrical installation

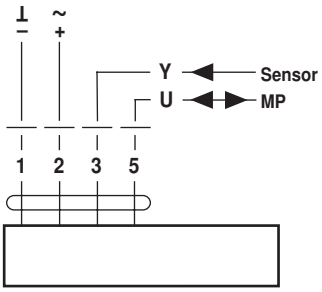
Wiring diagram

Note
- Connect via safety isolation transformer.
- Parallel connection of other actuators possible. Note performance data for supply.

Conventional operation

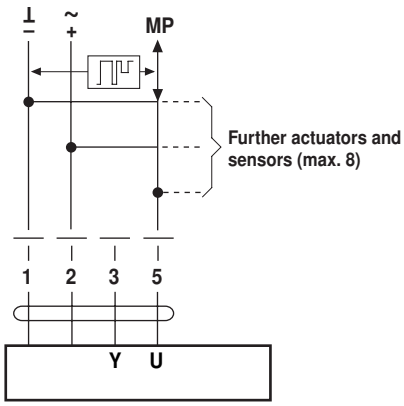


Operation on the MP-Bus



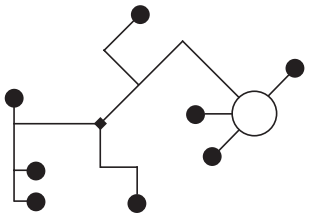
Functions when operated on MP-Bus

Connection on the MP-Bus

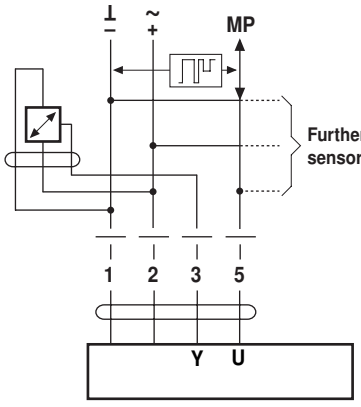


Supply and communication
in one and the same 3-wire cable
- no shielding or twisting necessary
- no terminating resistors required

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

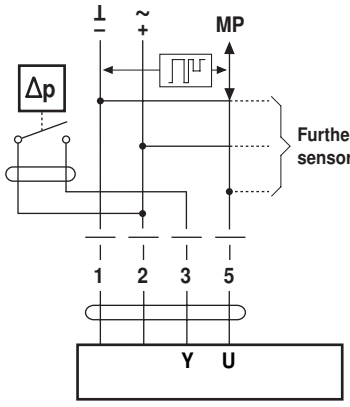


Connection of active sensors



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

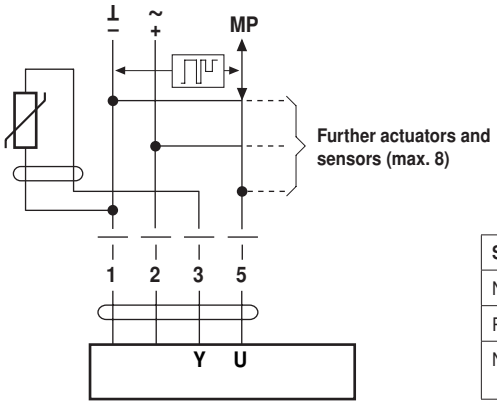
Connection of external switching contact



- Switching current 16 mA @ 24 V
- Start point of the operating range must be parameterised on the MP actuator as ≥ 0.6 V

Functions when operated on MP-Bus *(Continuedzz)*

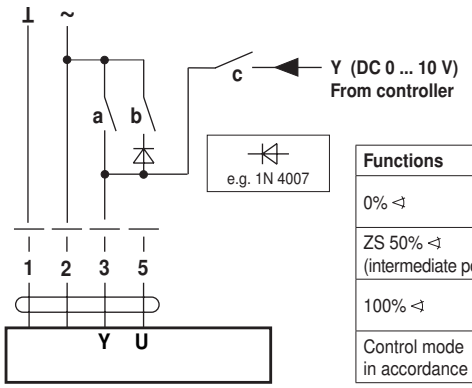
Connection of passive sensors



Sensor	Temperature range	Resistance range	Resolution
Ni1000	–28 ... +98°C	850 ... 1600 Ω	1 Ω
PT1000	–35 ... +155°C	850 ... 1600 Ω	1 Ω
NTC	–10 ... +160°C (depending on type)	200 Ω ... 60 kΩ	1 Ω

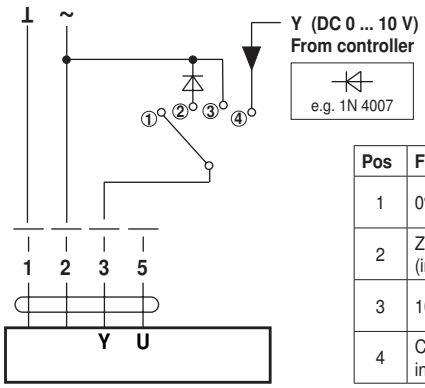
Functions with basic values (only in conventional mode)

Override control with AC 24 V with relay contacts



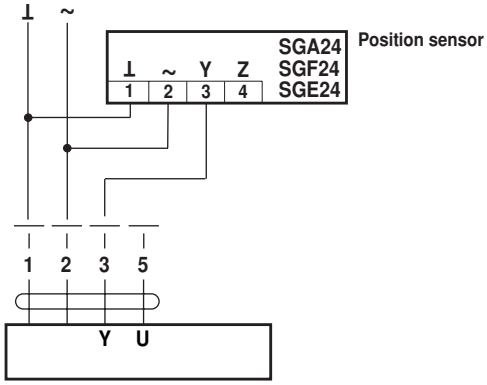
Functions	a	b	c
0% ◁	⌐	⌐	⌐
ZS 50% ◁ (intermediate position)	⌐	⌐	⌐
100% ◁	⌐	⌐	⌐
Control mode in accordance with Y	⌐	⌐	⌐

Override control with AC 24 V with rotary control switch

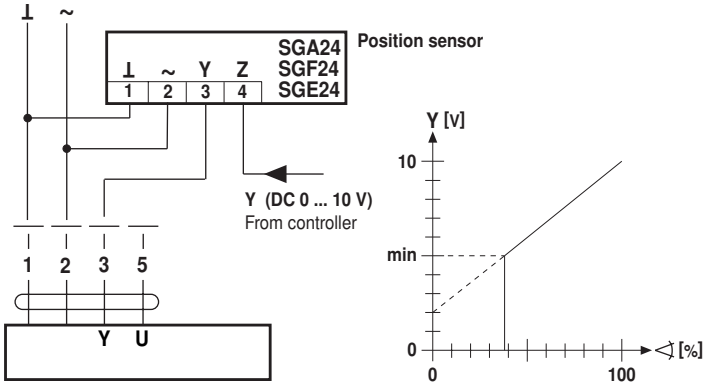


Pos	Functions
1	0% ◁
2	ZS 50% ◁ (intermediate position)
3	100% ◁
4	Control mode in accordance with Y

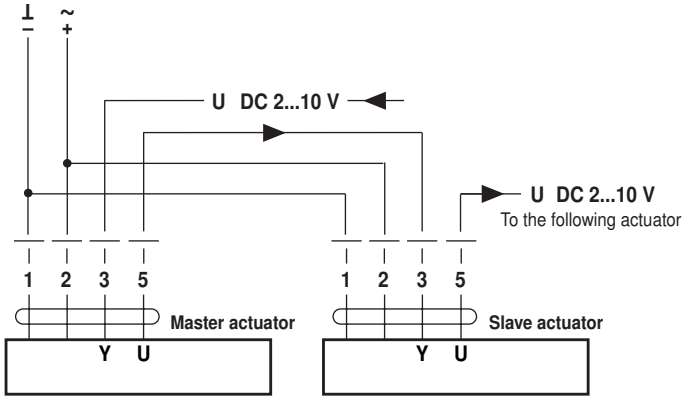
Remote control 0 ... 100 %



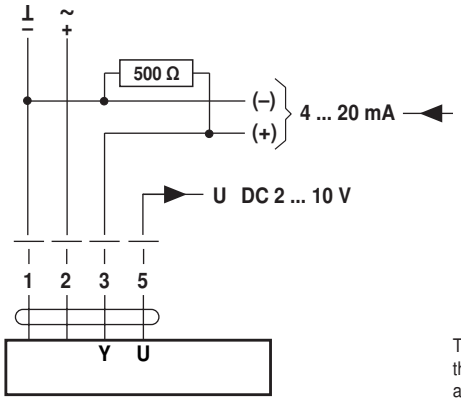
Minimum limit



Master/Slave control (position-dependent)



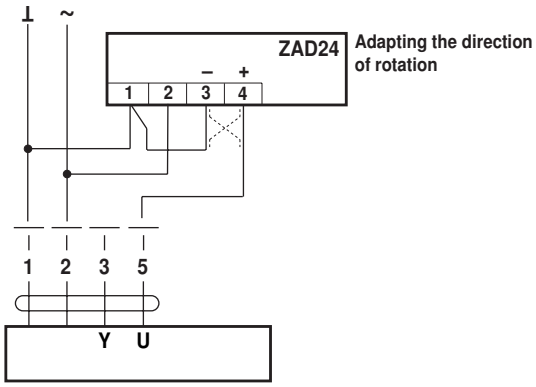
Control with 4 ... 20 mA via external resistance



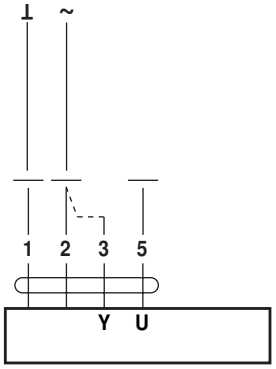
The 500 Ω resistor converts the 4 ... 20 mA current signal to a voltage signal DC 2 ... 10 V

Functions with basic values *(Continued)*

Position indication



Functional check

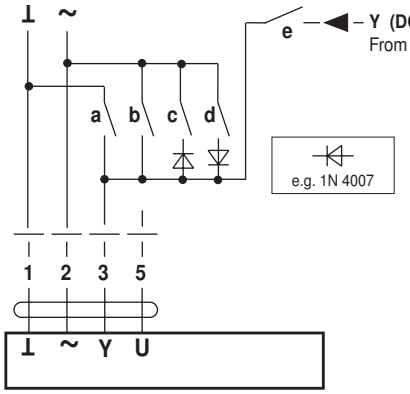


Procedure

- Apply AC 24 A to connection 1 and 2
- Disconnect connection 3:
  - – For direction of rotation L:
    Actuator turns in the direction of ↶
  - – For direction of rotation R:
    Actuator turns in the direction of ↷
- Short circuit connections 2 and 3:
  - – Actuator runs in the opposite direction

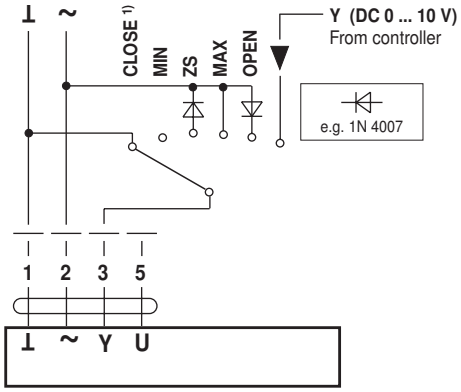
Functions for actuators with specific parameters

Override control and limiting with AC 24 V with relay contacts



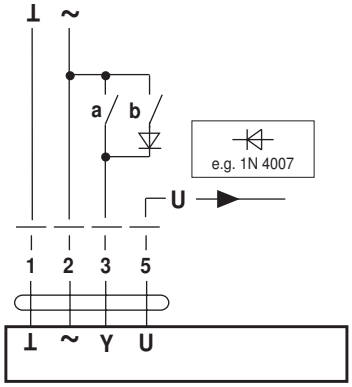
Functions	a	b	c	d	e
CLOSE [1]	⌐	_	_	_	_
MIN	_	_	_	_	_
ZS (intermediate position)	_	_	⌐	_	_
MAX	_	⌐	_	_	_
OPEN	_	_	_	⌐	_
Control mode in accordance with Y	_	_	_	_	⌐

Override control and limiting with AC 24 V with rotary switch



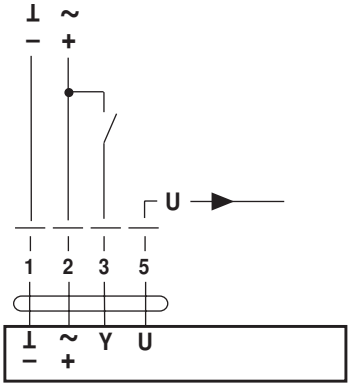
[1] **Caution!** This function is only guaranteed if the start point of the operating range is defined as min. 0.6 V.

3-point control



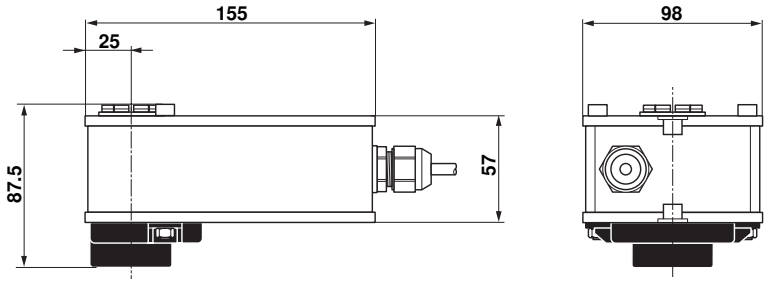
a	b	ARF24-MP-O (L) Direction of rotation switch R L	ARF24-MP (R) Direction of rotation switch L R	
⌐	_	1 ↶	1 ↶	A – AB = 100%
_	_	stop	stop	
_	⌐	↘ 0	↘ 0	A – AB = 0%
⌐	⌐	↘ 0	↘ 0	

Open/close control



Dimensions [mm]

Dimensional diagrams



Further documentations

- Complete overview of actuators for water solutions
- Data sheets for ball valves
- Installation instructions for actuators and/or ball valves
- Notes for project planning (hydraulic characteristic curves and circuits, installation regulations, commissioning, maintenance etc.)

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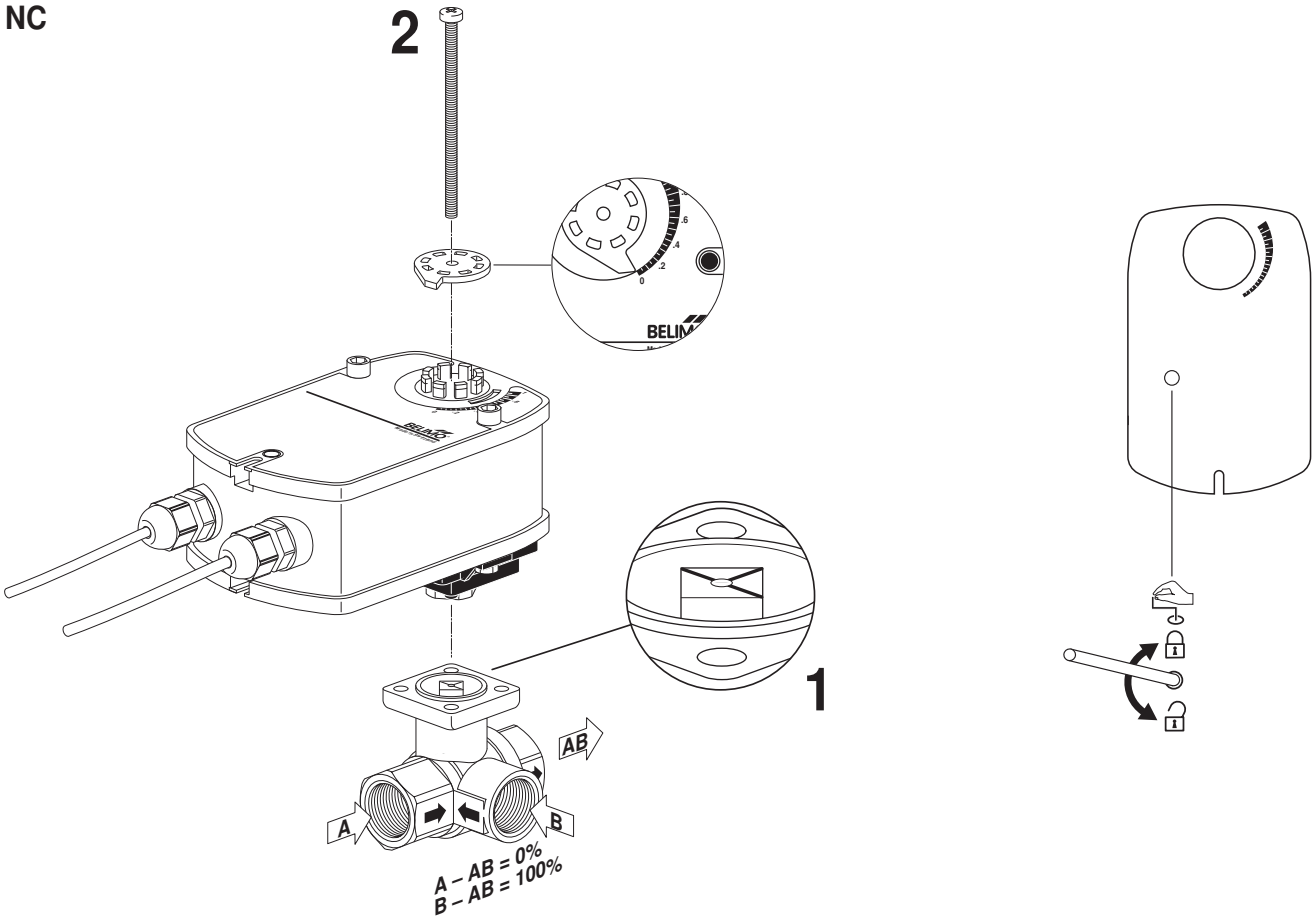
NC



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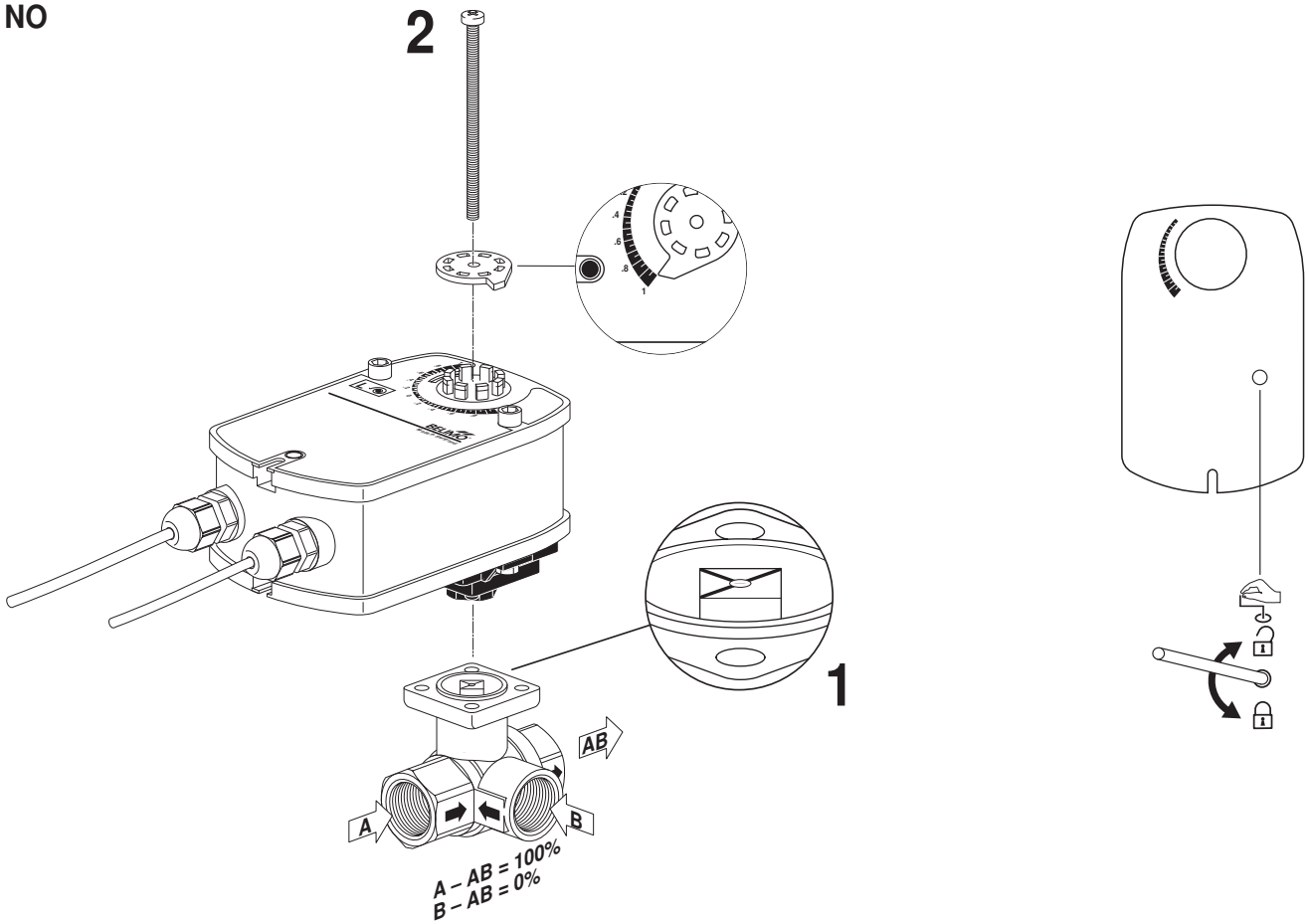
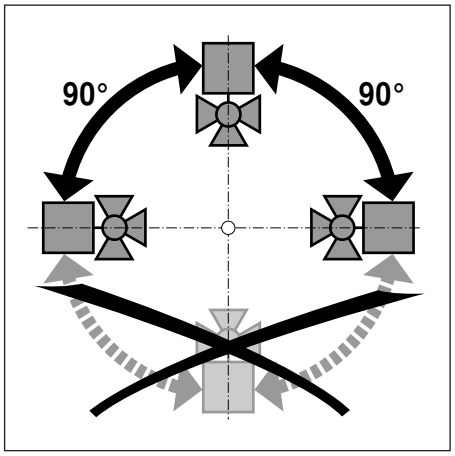
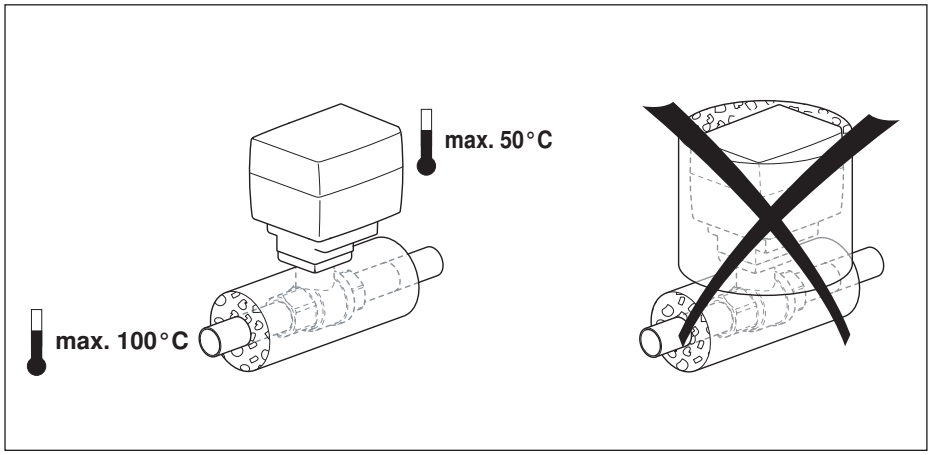
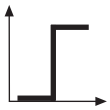
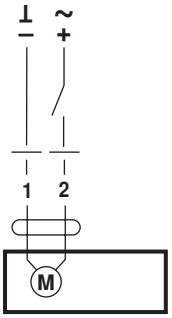




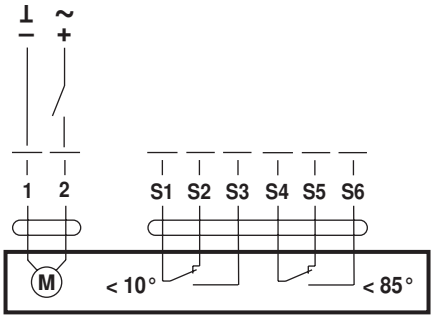




AC 24 V

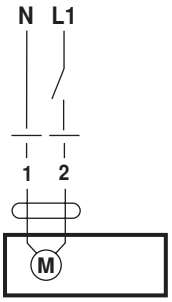


LRF24 (-O)

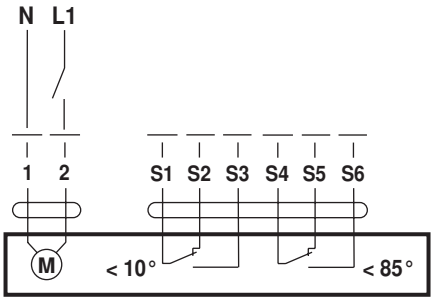


LRF24-S (-O)

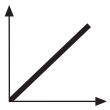
AC 230 V ⚠



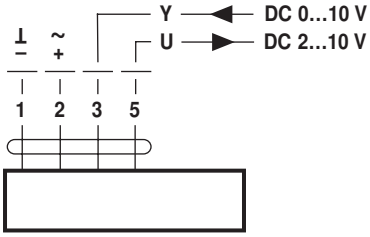
LRF230 (-O)



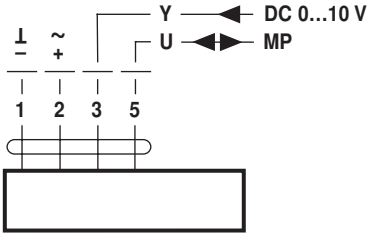
LRF230-S (-O)



AC 24 V / DC 24 V



LRF24-SR (-O)



LRF24-MP (-O)