

## 2. LF-2.cd

### Product Information

### Damper actuators with spring return

**LF**

## Selection table

			LF24	LF24-S	LF230	LF230-S	LF24-3	LF24-SR
Torque	4 Nm							
Nominal voltage	AC 24 V		•	•			•	•
	DC 24 V		•	•			•	•
	AC 230 V				•	•		
Running time	motor	40...75 s	•	•	•	•		
	motor	150 s					•	•
	spring return	≈ 20 s	•	•	•	•	•	•
Control	Open/Close		•	•	•	•		
	3-point						•	
	modulating DC 0...10 V							•
Direction of rotation reversible (right/left)			•	•	•	•	•	•
Auxiliary switch potential-free (adjustable)				•		•		
Mechanical angle of rotation limiting			•	•	•	•	•	•
Continuous position feedback								•
Damper rotation with universal spindle clamp			•	•	•	•	•	•

Actuators conforming to US standards on request.

### Spring return actuators, Open/Close

LF24	4
LF24-S	4
LF230	5
LF230-S	5
Adjusting the auxiliary switch	6

### Spring return actuator, 3-point

LF24-3	7
Examples of control modes LF24-3	8

### Spring return actuator, modulating

LF24-SR	9
Control/monitoring functions LF24-SR	10

### Mechanical accessories

Mounting accessories LF...	11
General mounting accessories	12

### Mounting instructions

Direct mounting	13
Mounting with linkage	14
Mounting for tight-sealing dampers	15

## Note

### Using BELIMO damper actuators

The actuators listed in this catalogue are intended for the operation of air dampers in HVAC systems.

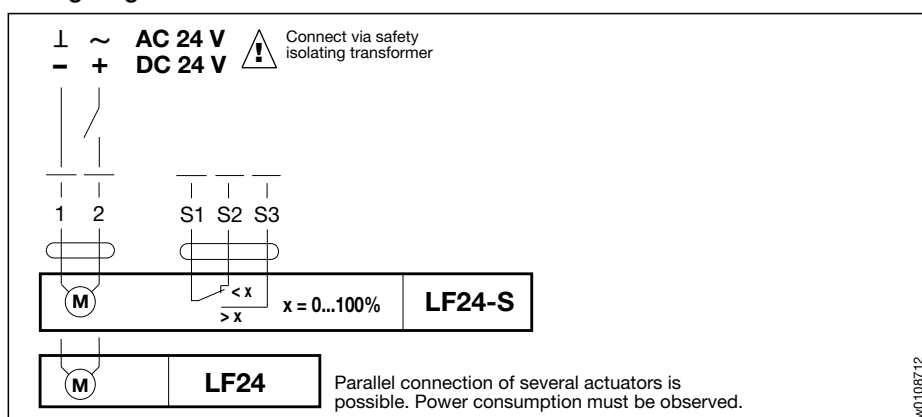
### Torque requirements

When calculating the torque required to operate dampers, it is essential to take into account all the data supplied by the damper manufacturer concerning cross sectional area, design, mounting and air flow conditions.



p.0050712

## Wiring diagram



Technical data	LF24, LF24-S
Nominal voltage	AC 24 V 50/60 Hz, DC 24 V
Nominal voltage range	AC 19.2...28.8 V, DC 21.6...28.8 V
For wire sizing	7 VA (I <sub>max</sub> 5.8 A @ 5 ms)
Power consumption	
– motoring	5 W
– holding	2.5 W
Connecting cable	– motor 1 m long, 2 x 0.75 mm <sup>2</sup> – auxiliary switch (LF24-S) 1 m long, 3 x 0.75 mm <sup>2</sup>
Auxiliary switch (LF24-S)	1 x SPDT 6 (1.5) A, AC 250 V <input type="checkbox"/>
– Switching point	adjustable 0...100% $\triangleleft$
Direction of rotation	selected by mounting L/R
Torque	– motor min. 4 Nm (at rated voltage) – spring return min. 4 Nm
Angle of rotation	max. 95° (adjustable 37...100% $\triangleleft$ with built-in mechanical stop)
Running time	– motor 40...75 s (0...4 Nm) – spring return $\approx$ 20 s @ -20...50 °C / max. 60 s @ -30 °C
Sound power level	motor max. 50 dB (A), spring $\approx$ 62 dB (A)
Service life	min. 60 000 operations
Position indication	mechanical
Protection class	$\diamond$ (safety extra-low voltage)
Degree of protection	IP 54
Ambient temp. range	-30...+ 50 °C
Non-operating temp.	-40...+ 80 °C
Humidity test	to EN 60335-1
EMC	CE according to 89/336/EEC, 92/31/EEC, 93/68/EEC
Low Voltage Directive	CE according to 73/23/EEC
Maintenance	maintenance-free
Weight	1400 g

**Dampers up to approx. 0.8 m<sup>2</sup>**

**Open/Close actuator  
(AC/DC 24 V)**

**Control by single-pole contact**

## Application

For the operation of air dampers that perform safety functions (e.g. frost and smoke protection, hygiene, etc.).

## Mode of operation

The LF... actuator moves the damper 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 damper back to its safe position.

## Product features

**Simple direct mounting** on the damper spindle by universal spindle clamp. An anti-rotation device is supplied to prevent unwanted rotation of the whole unit.

**Mechanical angle of rotation limiting** adjustable with built-in stop.

## High functional reliability

The actuator is overload proof, needs no limit switches and halts automatically at the end stop.

**Flexible signalling** 0...100%  $\triangleleft$ , with adjustable auxiliary switch (LF24-S only).

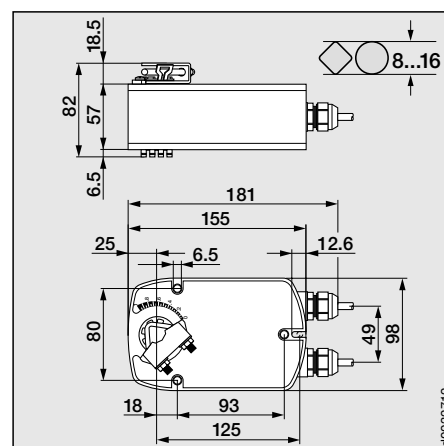
**Adjusting the auxiliary switch LF24-S**, page 6

**Mounting accessories**, page 11

**Mounting instructions**, pages 13...15

**Important:** Read the notes about the use and torque requirements of the damper actuators on page 3.

## Dimensions



d0032712



**Dampers up to approx. 0.8 m<sup>2</sup>**

**Open/Close actuator  
(AC 230 V)**

**Control by single-pole contact**

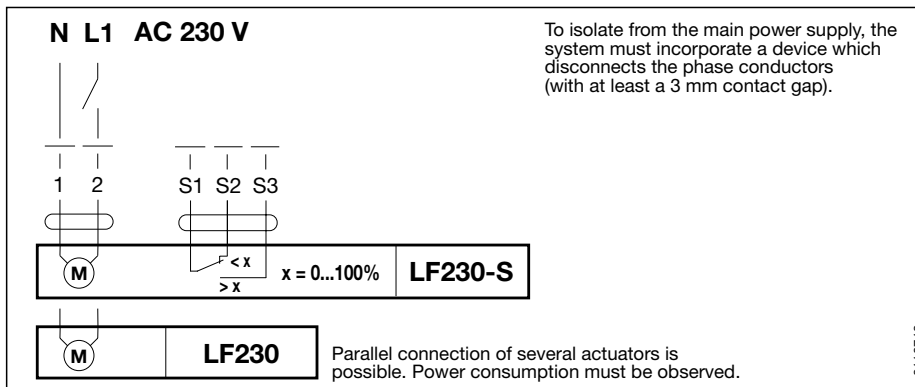
## Application

For the operation of air dampers that perform safety functions (e.g. frost and smoke protection, hygiene, etc.).

## Mode of operation

The LF... actuator moves the damper 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 damper back to its safe position.

## Wiring diagram



## Product features

**Simple direct mounting** on the damper spindle by universal spindle clamp. An anti-rotation device is supplied to prevent unwanted rotation of the whole unit.

**Mechanical angle of rotation limiting** adjustable with built-in stop.

## High functional reliability

The actuator is overload proof, needs no limit switches and halts automatically at the end stop.

**Flexible signalling** 0...100%  $\triangleleft$ , with adjustable auxiliary switch (LF230-S only).

**Adjusting the auxiliary switch LF230-S**, page 6

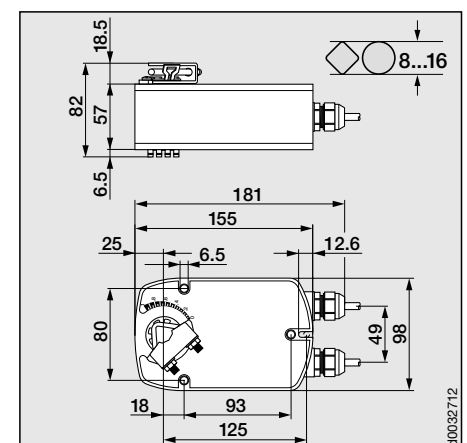
**Mounting accessories**, page 11

**Mounting instructions**, pages 13...15

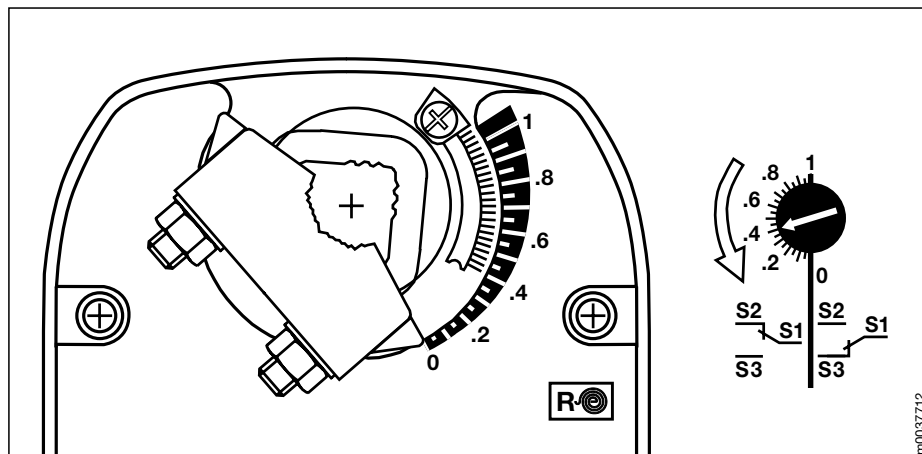
**Important:** Read the notes about the use and torque requirements of the damper actuators on page 3.

Technical data	LF230, LF230-S
Nominal voltage	AC 230 V 50/60 Hz
Nominal voltage range	AC 198...264 V
For wire sizing	7 VA (I <sub>max</sub> 150 mA @ 10 ms)
Power consumption	
– motoring	5 W
– holding	3 W
Connecting cable	– motor 1 m long, 2 x 0.75 mm <sup>2</sup> – auxiliary switch (LF230-S) 1 m long, 3 x 0.75 mm <sup>2</sup>
Auxiliary switch (LF230-S)	1 x SPDT 6 (1.5) A, AC 250 V <input type="checkbox"/>
– Switching point	adjustable 0...100% $\triangleleft$
Direction of rotation	selected by mounting L/R
Torque	– motor min. 4 Nm (at rated voltage) – spring return min. 4 Nm
Torque	max. 95° (adjustable 37...100% $\triangleleft$ with built-in mechanical stop)
Running time	– motor 40...75 s (0...4 Nm) – spring return $\approx$ 20 s @ -20...50 °C / max. 60 s @ -30 °C
Sound power level	motor max. 50 dB (A), spring $\approx$ 62 dB (A)
Service life	min. 60 000 operations
Position indication	mechanical
Protection class	II (all insulated)
Degree of protection	IP 54
Ambient temp. range	-30...+50 °C
Non-operating temp.	-40...+80 °C
Humidity test	to EN 60335-1
EMC	CE according to 89/336/EEC, 92/31/EEC, 93/68/EEC
Low Voltage Directive	CE according to 73/23/EEC
Maintenance	maintenance-free
Weight	1550 g

## Dimensions



## Mounting side R

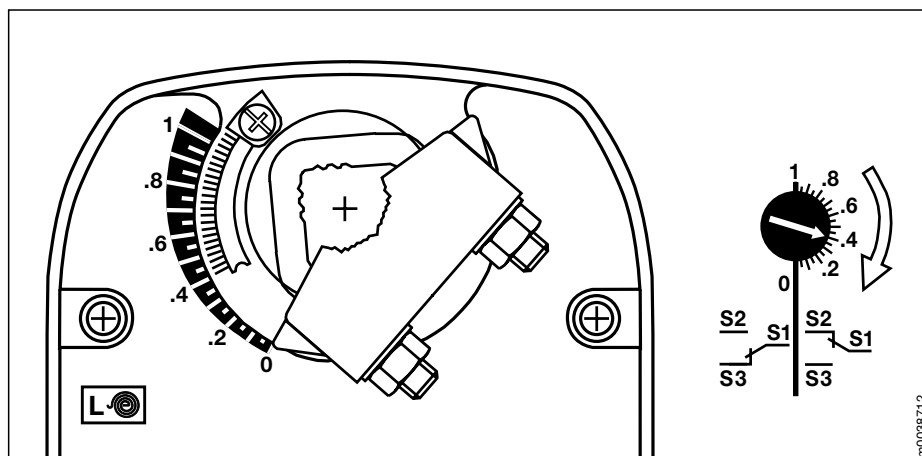


**Starting point:**  
**Actuator in safe position**

### Procedure

- Turn the knob of the auxiliary switch until the tip of the arrow is pointing to the required switching position (see left).  
Example: Switching point setting = .4 corresponds to 40% angle of rotation.
- When the actuator runs to the operating position (ccw ↺), the switch knob will also rotate counter-clockwise (ccw ↺) and the auxiliary switch will operate as the tip of the arrow passes the scale zero (S1–S3 linked).

## Mounting side L



**Starting point:**  
**Actuator in safe position**

### Procedure

- Turn the knob of the auxiliary switch until the tip of the arrow is pointing to the required switching position (see left).  
Example: Switching point setting = .4 corresponds to 40% angle of rotation.
- When the actuator runs to the operating position (cw ↻), the switch knob will also rotate clockwise (cw ↻) and the auxiliary switch will operate as the tip of the arrow passes the scale zero (S1–S3 linked).



**Dampers up to approx. 0.8 m<sup>2</sup>**

**Modulating actuator  
(AC/DC 24 V)**

**3-point control**

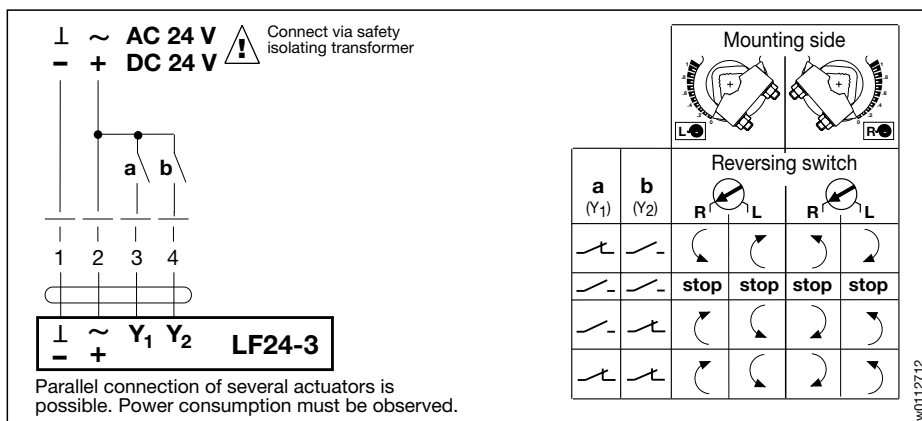
#### Application

For the operation of air dampers that perform safety functions (e.g. frost and smoke protection, hygiene, etc.).

#### Mode of operation

The LF24-3 is controlled by a 3-point signal. The actuator runs to the position specified by the control signal while tensioning the return spring at the same time. If the power supply is interrupted, the energy stored in the spring moves the damper back to its safe position.

#### Wiring diagram



Technical data	LF24-3
Nominal voltage	AC 24 V 50/60 Hz, DC 24 V
Nominal voltage range	AC 19.2...28.8 V, DC 21.6...28.8 V
For wire sizing	5 VA (I <sub>max</sub> 5.8 A @ 5 ms)
Power consumption	
– motoring	2.5 W
– holding	1 W
Connecting cable	1 m long, 4 x 0.75 mm <sup>2</sup>
Input resistance	
Control inputs Y1, Y2	1000 Ω (0.6 W)
Direction of rotation	– motor selected with switch L/R – spring return selected by L/R mounting
Torque	– motor min. 4 Nm (at rated voltage) – spring return min. 4 Nm
Angle of rotation	max. 95° (adjustable 37...100% < with built-in mechanical stop)
Running time	– motor 150 s – spring return ≈ 20 s @ –20...50 °C / max. 60 s @ –30 °C
Sound power level	motor max. 30 dB (A), spring ≈ 62 dB (A)
Service life	min. 60 000 operations
Position indication	mechanical
Protection class	⚡ (safety extra-low voltage)
Degree of protection	IP 54
Ambient temp. range	–30...+50 °C
Non-operating temp.	–40...+80 °C
Humidity test	to EN 60335-1
EMC	CE according to 89/336/EEC, 92/31/EEC, 93/68/EEC
Maintenance	maintenance-free
Weight	1400 g

#### Product features

**Simple direct mounting** on the damper spindle by universal spindle clamp. An anti-rotation device is supplied to prevent unwanted rotation of the whole unit.

**Mechanical angle of rotation limiting** adjustable with built-in stop.

#### High functional reliability

The actuator is overload proof, needs no limit switches and halts automatically at the end stop.

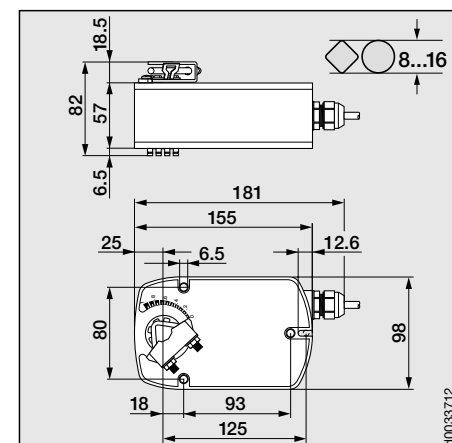
**Examples of control modes**, page 8

**Mounting accessories**, page 11

**Mounting instructions**, pages 13...15

**Important:** Read the notes about the use and torque requirements of the damper actuators on page 3.

#### Dimensions





Open/Close mode with single-wire control

⊥

~

AC 24 V

!

Connect via safety isolating transformer

-

+

DC 24 V

1

2

3

4

a

⊥

~

Y<sub>1</sub> Y<sub>2</sub>

-

+

LF24-3

Parallel connection of several actuators is possible. Power consumption must be observed.

Mounting side

Reversing switch

a (Y<sub>2</sub>)

R

L

3-point control by switch

⊥

~

AC 24 V

!

Connect via safety isolating transformer

-

+

DC 24 V

1

2

3

4

⊥

~

Y<sub>1</sub> Y<sub>2</sub>

-

+

LF24-3

Parallel connection of several actuators is possible. Power consumption must be observed.

Mounting side

Reversing switch

Y<sub>1</sub> I

R

L

3-point control by controller with triac outputs  
(reference potential ~ AC 24 V)

⊥

~

AC 24 V

!

Connect via safety isolating transformer

1

2

3

4

⊥

~

Y<sub>1</sub> Y<sub>2</sub>

-

+

LF24-3

Parallel connection of several actuators is possible. Power consumption must be observed.

Mounting side

Reversing switch

A (Y<sub>1</sub>) B (Y<sub>2</sub>)

R

L

3-point control by controller with triac outputs  
(reference potential ⊥ AC 24 V)

⊥

~

AC 24 V

!

Connect via safety isolating transformer

1

2

3

4

⊥

~

Y<sub>1</sub> Y<sub>2</sub>

-

+

LF24-3

Parallel connection of several actuators is possible. Power consumption must be observed.

Mounting side

Reversing switch

A (Y<sub>1</sub>) B (Y<sub>2</sub>)

R

L

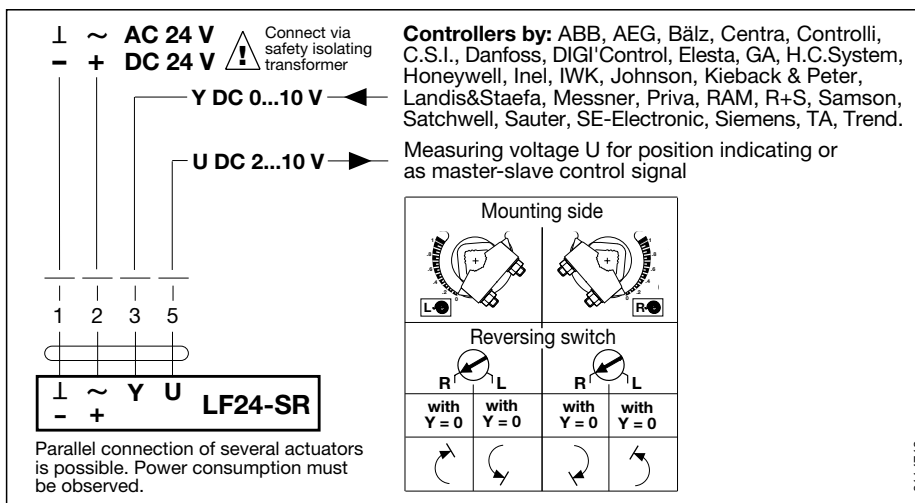
8

ENG-93001-93227-01.00 • ZSD • Subject to technical changes



p0053712

## Wiring diagram



w0114712

Technical data	LF24-SR
Nominal voltage	AC 24 V 50/60 Hz, DC 24 V
Nominal voltage range	AC 19.2...28.8 V, DC 21.6...28.8 V
For wire sizing	5 VA (I <sub>max</sub> 5.8 A @ 5 ms)
Power consumption	2.5 W motoring, 1 W at rest
Connecting cable	1 m long, 4 x 0.75 mm <sup>2</sup>
Control signal Y	DC 0...10 V @ 100 kΩ input resistance
Operating range	DC 2...10 V for 0...100% ◁
Measuring voltage U	DC 2...10 V (max. 0.7 mA) for 0...100% ◁
Direction of rotation	– motor selected with switch L/R – spring return selected by L/R mounting
Torque	– motor min. 4 Nm (at rated voltage) – spring return min. 4 Nm
Angle of rotation	max. 95° (adjustable 37...100% ◁ with built-in mechanical stop)
Running time	– motor 150 s – spring return ≈ 20 s @ –20...50 °C / max. 60 s @ –30 °C
Sound power level	motor max. 30 dB (A), spring ≈ 62 dB (A)
Service life	min. 60 000 operations
Position indication	mechanical
Protection class	◊ (safety extra-low voltage)
Degree of protection	IP 54
Ambient temp. range	–30...+50 °C
Non-operating temp.	–40...+80 °C
Humidity test	to EN 60335-1
EMC	CE according to 89/336/EEC, 92/31/EEC, 93/68/EEC
Maintenance	maintenance-free
Weight	1400 g

**Dampers up to approx. 0.8 m<sup>2</sup>**

**Modulating actuator (AC/DC 24 V)**

**Control DC 0...10 V and position feedback DC 2...10 V**

## Application

For the operation of air dampers that perform safety functions (e.g. frost and smoke protection, hygiene, etc.).

## Mode of operation

The LF24-SR is controlled by a standard DC 0...10 V signal. The actuator runs to the position specified by the control signal while tensioning the return spring at the same time. If the power supply is interrupted, the energy stored in the spring moves the damper back to its safe position.

## Product features

**Simple direct mounting** on the damper spindle by universal spindle clamp. An anti-rotation device is supplied to prevent unwanted rotation of the whole unit.

**Mechanical angle of rotation limiting** adjustable with built-in stop.

## High functional reliability

The actuator is overload proof, needs no limit switches and halts automatically at the end stop.

## Electrical accessories (see Doc. 2. Z-1)

SG..24 Positioners

ZAD24 Digital position indicator

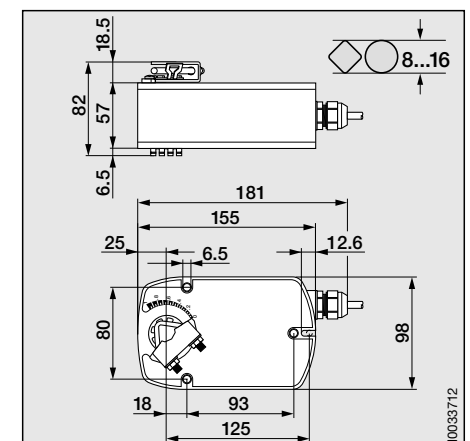
**Control/monitoring functions**, page 10

**Mounting accessories**, page 11

**Mounting instructions**, pages 13...15

**Important:** Read the notes about the use and torque requirements of the damper actuators on page 3.

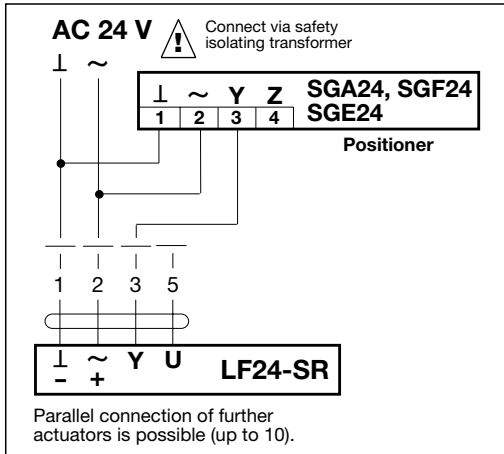
## Dimensions



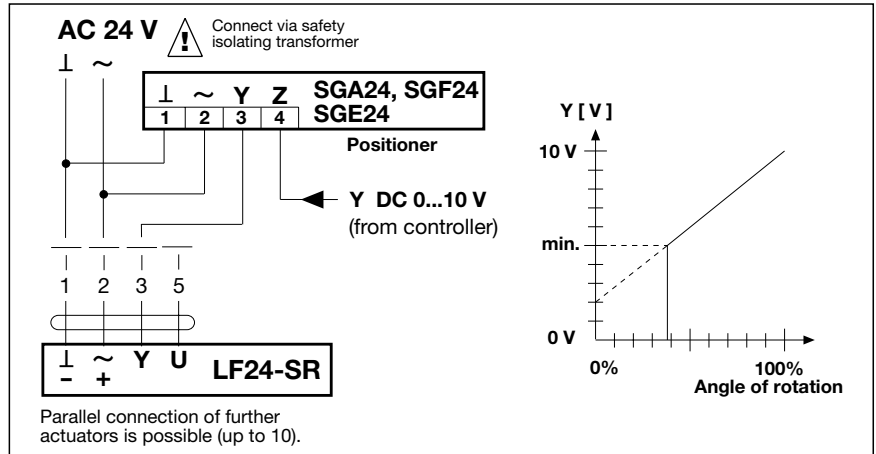
d0033712



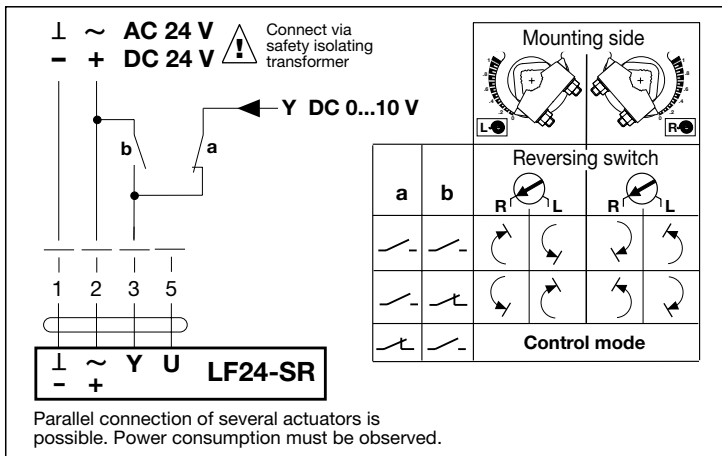
## Remote control 0...100%



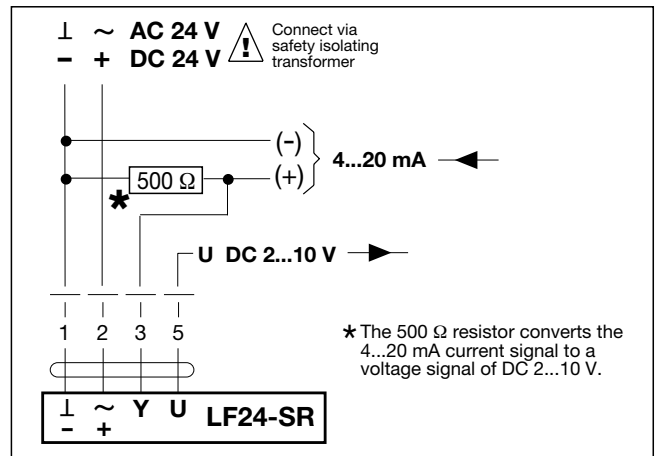
## Minimum position



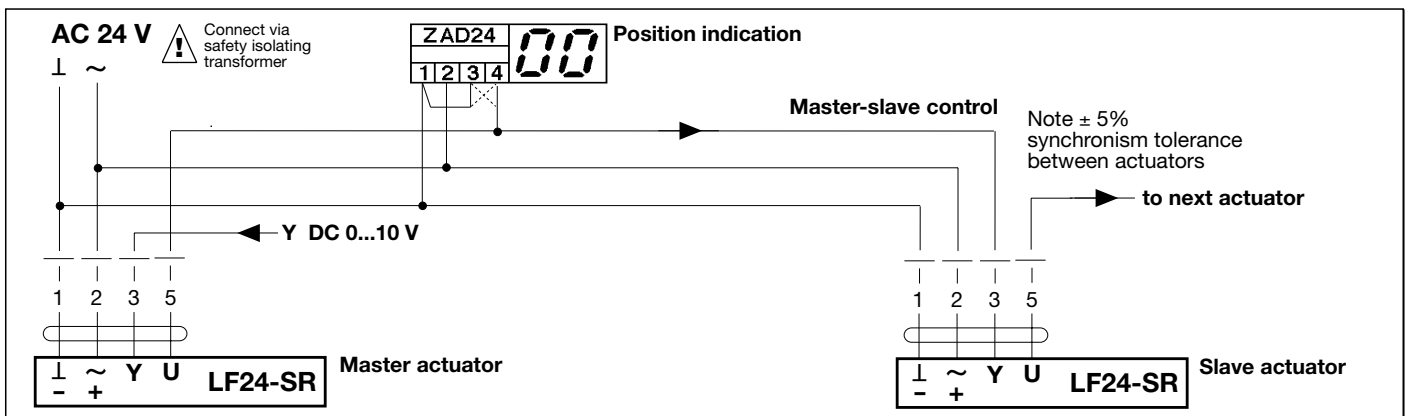
## Override control



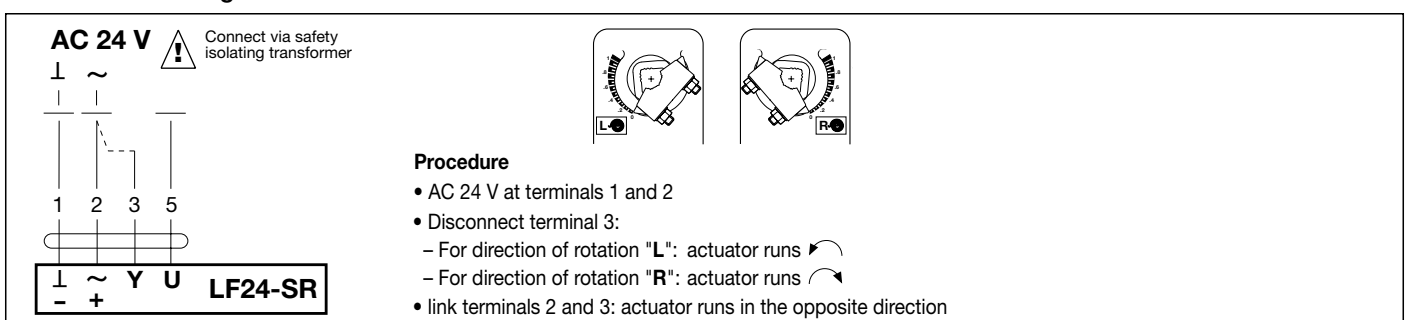
## Control by 4...20 mA via external resistor



## Position indication and / or master-slave control (depending on position)



## Function monitoring



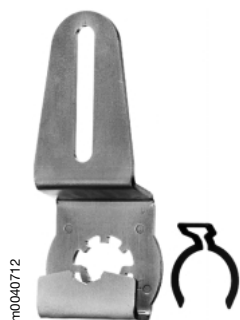
**K6-1**

**K6-1**
**Spindle clamp**

Suitable for damper spindles 16...20 mm diameter.



The spindle clamp is secured to the actuator by means of a circlip.

**KH-LF** (Application example see page 14)

**KH-LF**
**Crank arm with slot width 8.2 mm**

Suitable for damper spindles 8...16 mm diameter.



The crank arm is secured to the actuator by means of a circlip.

**KH-LF1**
**Crank arm with slot width 8.2 mm**

Suitable for damper spindles 16...20 mm diameter.

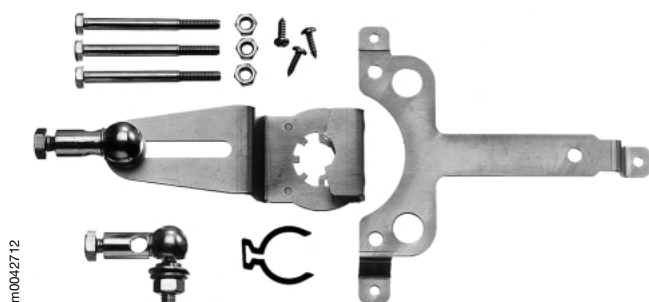
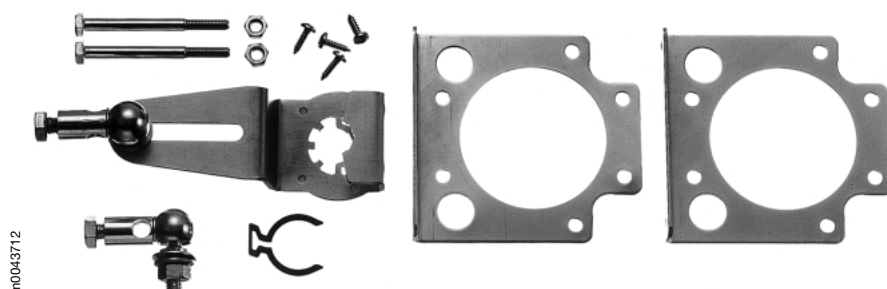


The crank arm is secured to the actuator by means of a circlip.

**ZDB-LF** (Application example see page 13)

**ZDB-LF**
**Angle of rotation limiting and pointer**

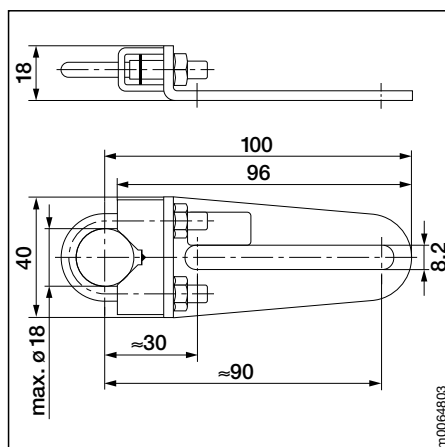
The pointer is secured to the actuator by means of a circlip.

**ZG-LF1** (Application example see page 14, fig. 1)

**ZG-LF1**
**Damper linkage kit for flat mounting (with 2 ball joints KG8)**
**ZG-LF2**
**Damper linkage kit for flat mounting (without ball joints KG8)**
**ZG-LF3** (Application example see page 14, fig. 2)

**ZG-LF3**
**Damper linkage kit for side mounting (with 2 ball joints KG8)**

## KH8



m0063803



m0064803

## KH8

### Universal crank arm

Zinc-plated steel; suitable for damper spindles

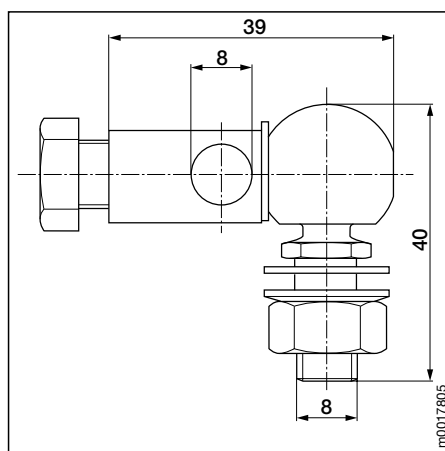
Ø 10...18 mm or

□ 10...14 mm, slot width 8.2 mm.

## KG8



m0016712



m0017805

## KG8

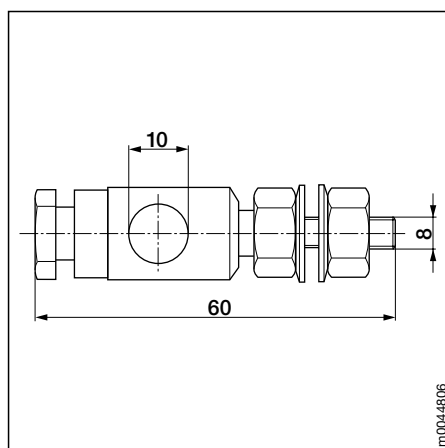
### Ball joint

Zinc-plated steel; suitable for use with KH8 universal crank arms and round steel rod Ø 8 mm.

## KG10



m0016707



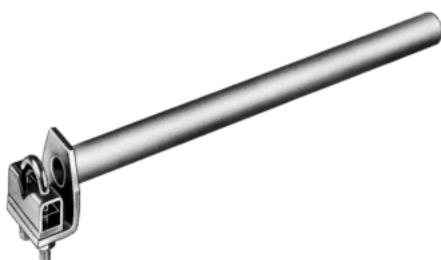
m0044806

## KG10

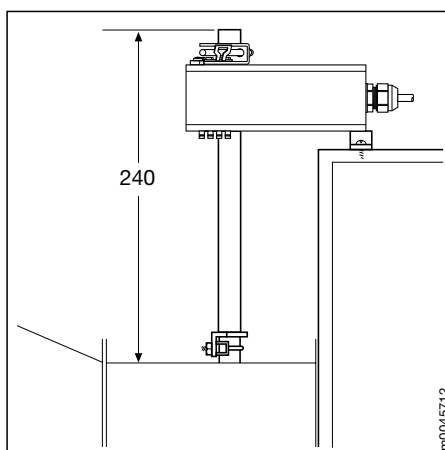
### Ball joint

Zinc-plated steel; suitable for use with KH8 universal crank arm and round steel rod Ø 10 mm.

## AV10-18



m0020707



m0045712

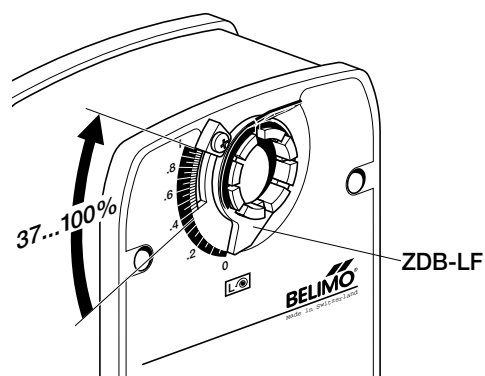
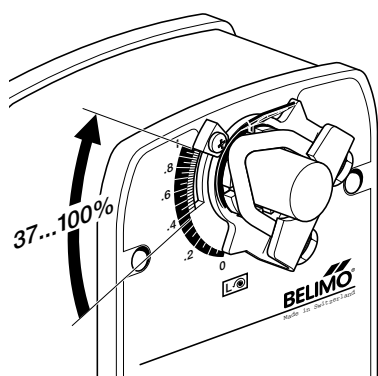
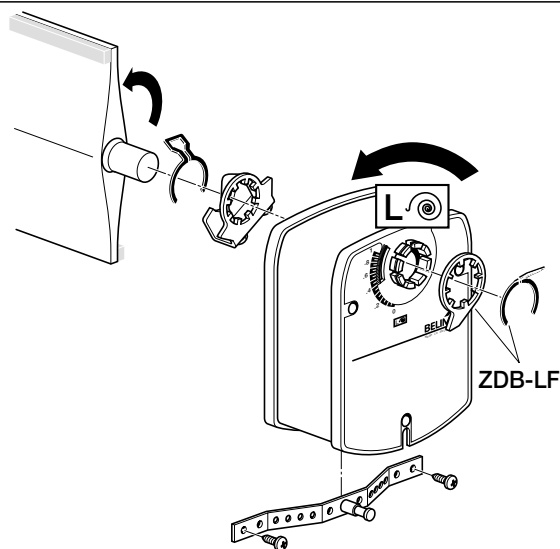
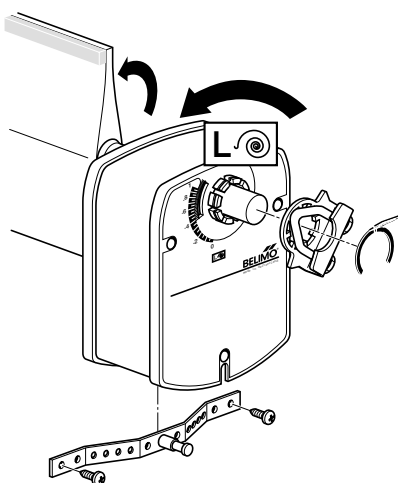
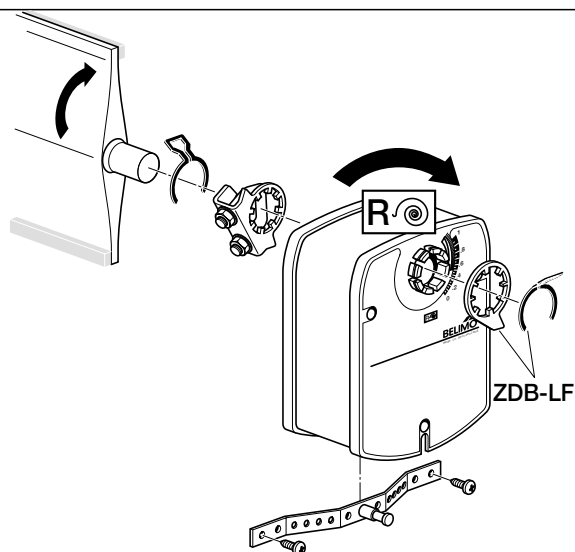
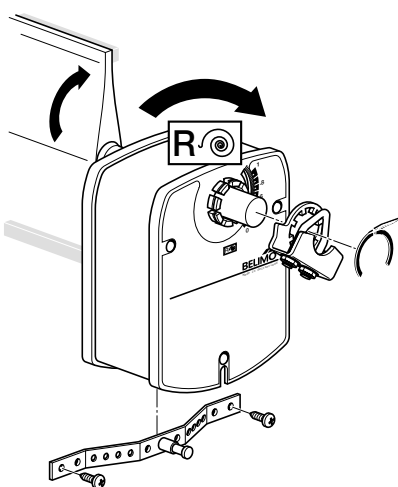
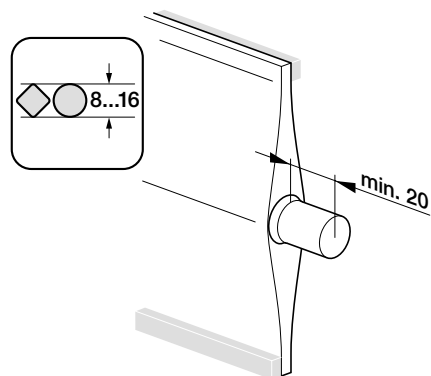
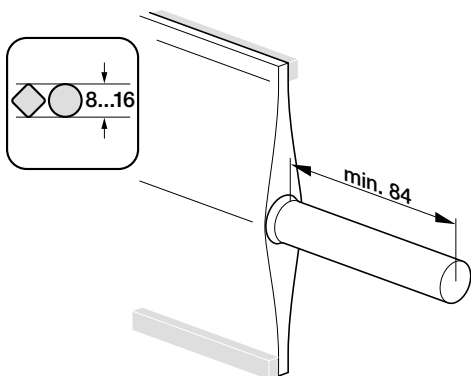
## AV10-18

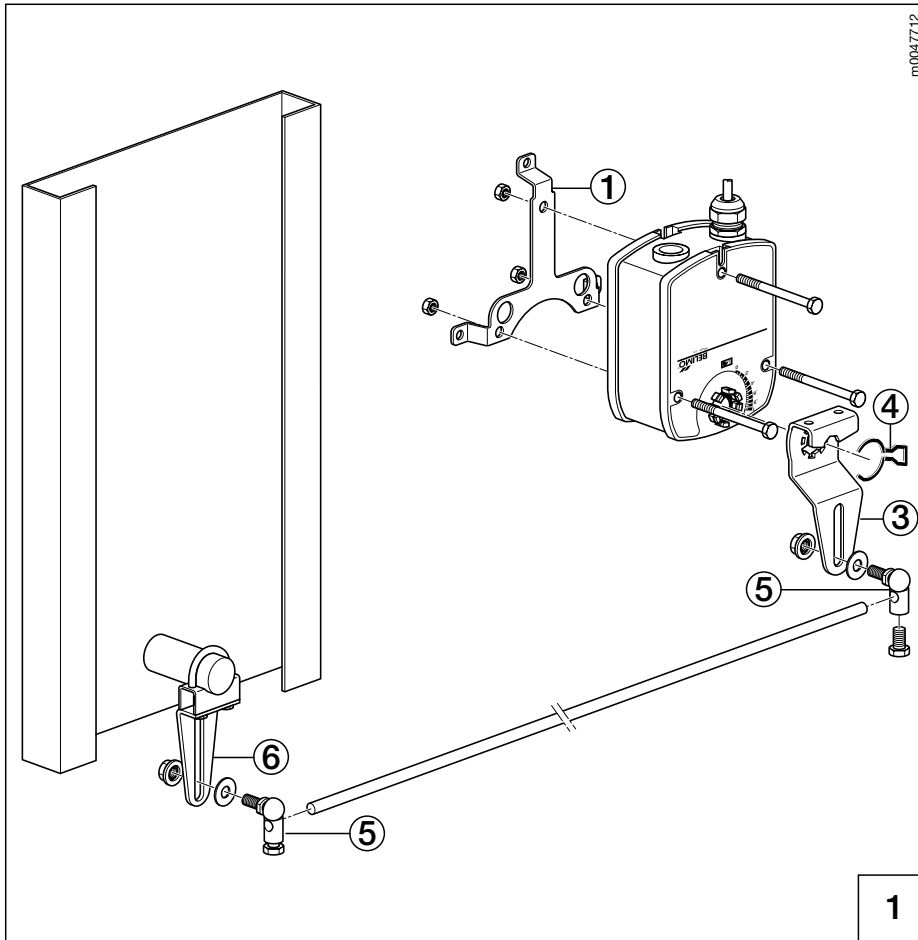
### Universal spindle extension

Suitable for damper spindles 10...18 mm diameter.



If an AV10-18 is to be used in conjunction with an LF..., the actuator must be fitted with a K6-1 spindle clamp.





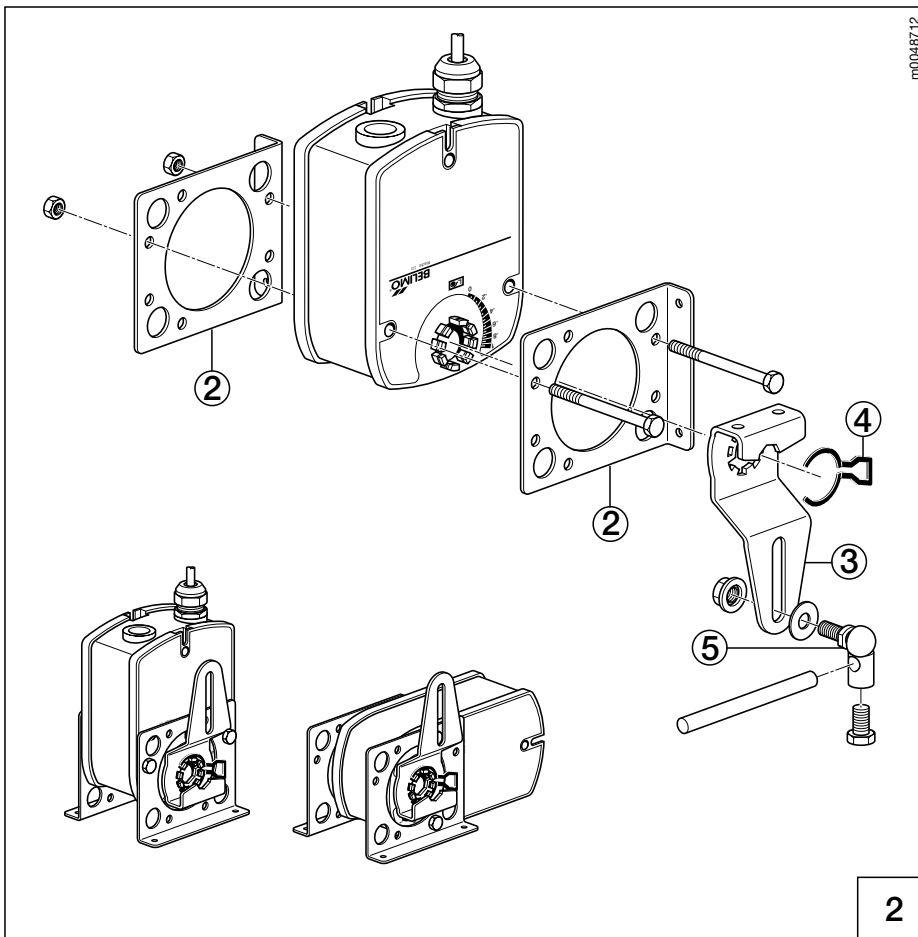
**Flat mounting (fig. 1)**

**Kit specification ZG-LF1**

- ① 1 mounting bracket LF
- ③ 1 crank arm ½"
- ④ 1 circlip LF
- ⑤ 2 ball joints KG8

3 screws M6 x 67  
3 nuts M6  
3 self-tapping screws 4.2 x 13

⑥ Universal crank arm:  
order separately, not included with the  
ZG-LF... mounting accessory.

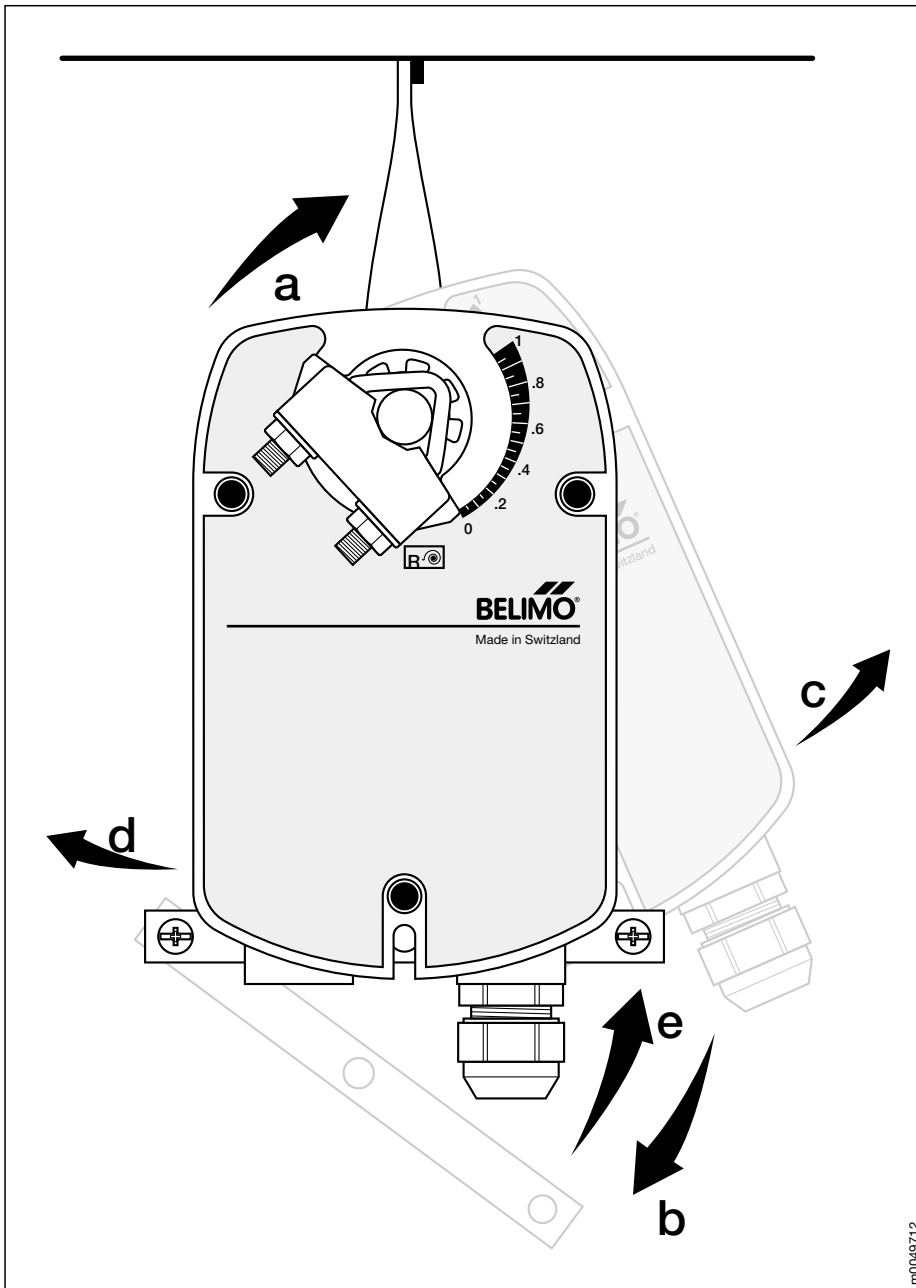


**Side mounting (fig. 2)**

**Kit specification ZG-LF3**

- ② 2 mounting brackets LF
- ③ 1 crank arm ½"
- ④ 1 circlip LF
- ⑤ 2 ball joints KG8

2 screws M6 x 67  
2 nuts M6  
4 self-tapping screws 4.2 x 13



## Installation steps as example

1. Move damper blades to the fail-safe position (a) and determine the orientation of the universal clamp.
2. Engage the actuator on the shaft as close as possible to the determined orientation. Fix the screws lightly on the V-bracket by hand. In the example the spring return has to go clockwise (cw). Therefore the actuator has to be visible with the mounting side **R**.
3. Mount the universal mounting bracket in the right position (do not tighten the screws).
4. Remove the screw at one end of the mounting bracket and pivot it away from the actuator (b).
5. Loosen the universal clamp and, making sure not to move the damper shaft, rotate the actuator approximately 5° in the direction which would open the damper (c).
6. Tighten the universal clamp to the shaft (10 mm wrench).
7. Rotate the actuator "damper closed" to apply pressure to the damper seals (d).
8. Rotate the mounting bracket in the definitive position (e) and tighten all fasteners.

m0049712