

**Multifunctional actuators for butterfly valves**

- Torque 90 ... 3500 Nm
- Nominal voltage AC 230 V
- Control: modulating DC 0 ... 10 V
- Position feedback DC 0 ... 10 V
- 2 Auxiliary switches
- State at loss of signal: closed


**Overview of types**

Type	Torque (Nominal torque)	Running time	Power consumption			Current consumption	Connection flange	Weight
			In operation	At rest	For wire sizing			
SY2-230-MF-T	90 Nm <sup>1)</sup>	17 s	40 W <sup>2)</sup>	5 W	115 VA	0.5 A	ISO 5211 / F07	Approx. 11 kg
SY3-230-MF-T	150 Nm <sup>1)</sup>	26 s	40 W <sup>2)</sup>	5 W	115 VA	0.5 A	ISO 5211 / F07	Approx. 11 kg
SY4-230-MF-T	400 Nm <sup>1)</sup>	18 s	120 W <sup>2)</sup>	5 W	138 VA	0.6 A	ISO 5211 / F10	Approx. 22 kg
SY5-230-MF-T	500 Nm <sup>1)</sup>	25 s	120 W <sup>2)</sup>	5 W	161 VA	0.7 A	ISO 5211 / F10	Approx. 22 kg
SY6-230-MF-T	650 Nm <sup>1)</sup>	31 s	120 W <sup>2)</sup>	5 W	184 VA	0.8 A	ISO 5211 / F10	Approx. 22 kg
SY7-230-MF-T	1000 Nm <sup>1)</sup>	55 s	180 W <sup>2)</sup>	5 W	368 VA	1.6 A	ISO 5211 / F14	Approx. 36 kg
SY8-230-MF-T	1500 Nm <sup>1)</sup>	55 s	220 W <sup>2)</sup>	5 W	460 VA	2 A	ISO 5211 / F14	Approx. 36 kg
SY9-230-MF-T	2000 Nm <sup>1)</sup>	70 s	180 W <sup>2)</sup>	5 W	368 VA	1.6 A	ISO 5211 / F16	Approx. 72 kg
SY10-230-MF-T	2500 Nm <sup>1)</sup>	70 s	220 W <sup>2)</sup>	5 W	460 VA	2 A	ISO 5211 / F16	Approx. 72 kg
SY11-230-MF-T	3000 Nm <sup>1)</sup>	70 s	250 W <sup>2)</sup>	5 W	368 VA	1.6 A	ISO 5211 / F16	Approx. 72 kg
SY12-230-MF-T	3500 Nm <sup>1)</sup>	70 s	300 W <sup>2)</sup>	5 W	506 VA	2.2 A	ISO 5211 / F16	Approx. 72 kg

<sup>1)</sup> @ Nominal voltage

<sup>2)</sup> @ Nominal torque

**Technical data**
**Electrical data**

Nominal voltage	AC 230 V, 50/60 Hz
Nominal voltage range	AC 207 ... 253 V
Power consumption	See «Overview of types»
Current consumption	See «Overview of types»
Auxiliary switches	2 x SPDT, 5 A, AC 230 V I $\neq$ Switching points: 3° $\rightarrow$ and 87° $\rightarrow$
Connection	Terminals, 2 x 1.5 mm <sup>2</sup> or 1 x 2.5 mm <sup>2</sup>
Parallel operation	Supply voltage Controller signals
	Yes Yes

**Functional data**

			Variable	Setting
Torque (nominal torque)	See «Overview of types»			
Control	Control signal Y	DC 0 ... 10 V, input impedance 100 k $\Omega$	Starting point	DC 0.5 ... 30 V
	Operating range	DC 0.5 ... 10 V	End point	DC 2.5 ... 32 V
	Control signal Y	4 mA ... 20 mA		
Position feedback (measuring voltage U <sub>5</sub> )	DC 0 ... 10 V, max. 0.5 mA		Starting point	DC 0.5 ... 8 V
	DC 2 ... 10 V, max. 0.5 mA		End point	DC 2.5 ... 10 V
	4 mA ... 20 mA			
Position accuracy	$\pm$ 5% absolute			
Manual override	Temporary with handwheel (not revolving)			
Angle of rotation	90° $\rightarrow$ (internal limit switch)			
Angle of rotation limiting	MAX (maximum position) = 100%		MAX	= (MIN + 32°) ... 100%
	MIN (minimum position) = 0%		MIN	= 0° ... (MAX - 32° $\rightarrow$ )
	ZS (intermediate position) = 50%		ZS	= MIN ... MAX
Running time	See «Overview of types»			
Duty cycle	75% (e.g. 18 s / 6 s)			

Technical data		(continued)
<b>Functional data</b>		
Sound power level	Max. 70 dB (A)	
Position indication	Mechanical (integrated)	
<b>Safety</b>		
Protection class	I Protective earth $\perp$	
Degree of protection	IP67	
EMC	CE according to 2004/108/EC	
Low-voltage directive	CE according to 2006/95/EC	
Certification	Tested in accordance with EN 61000-6-2 : 2005 EN 61000-6-4 : 2007	
Mode of operation	Type 1	
Control pollution degree	4	
Ambient temperature	-20 ... +65°C	
Medium temperature	-20° ... +120°C (in the butterfly valve) Max. 130°C / 1 h	
Non-operating temperature	-30 ... +80°C	
Ambient humidity	95% r.h., non-condensating	
Maintenance	Maintenance-free	
<b>Mechanical data</b>		
Connection flange	See «Overview of types»	
Housing material	Cast aluminium	
<b>Dimensions / Weight</b>		
Dimensions	See «Dimensions» on page 4	
Weight	See «Overview of types»	

### 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.
- **Caution: Power supply voltage!**
- It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed during assembly.
- The device 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

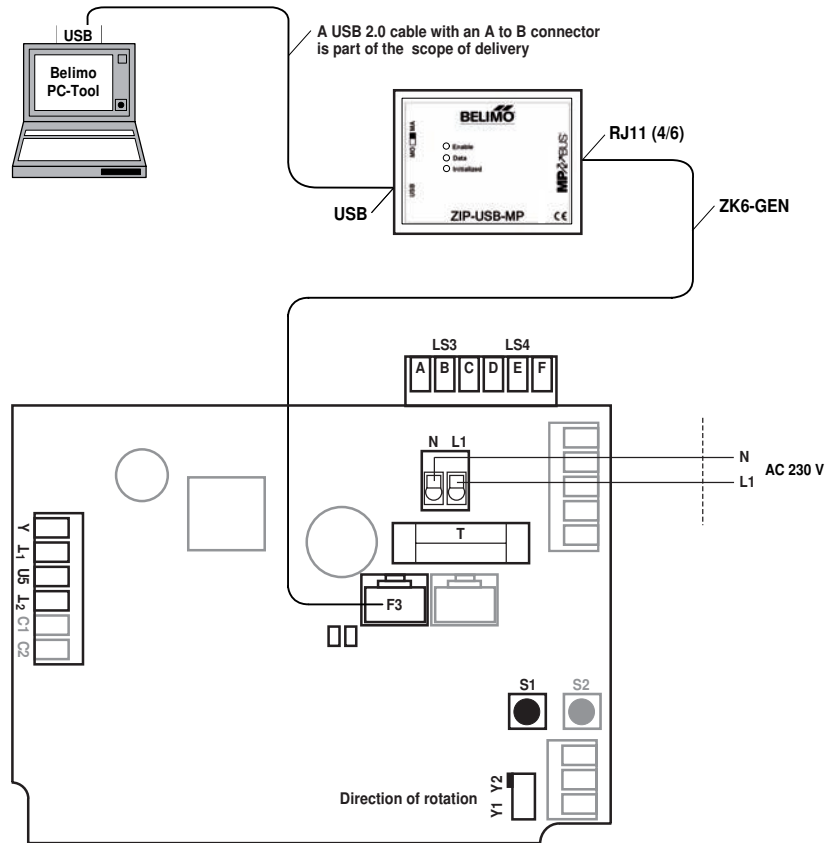
<b>Mode of operation</b>	The actuator is controlled with a standard modulating signal and travels to the position defined by the control signal. Measuring voltage U serves for the electrical display of the actuator position 0 ... 100% and as slave control signal for other actuators.
<b>Parameterisable actuators</b>	Input and output signals and other parameters can be altered with the BELIMO Service Tool, MFT-P.
<b>Simple direct mounting</b>	Simple direct mounting on the butterfly valve. The mounting position in relation to the butterfly valve can be selected in 90°-steps.
<b>Manual override</b>	The butterfly valve can be closed (turn clockwise) and opened (turn anticlockwise) with the handwheel. The handwheel does not move while the motor is running.
<b>Internal heating</b>	An internal heater prevents condensation buildup.
<b>High functional reliability</b>	Mechanical stops limit the actuator to -2° and 92°-steps. The internal limit switches interrupt the voltage supply to the motor. In addition, a motor thermostat provides overload protection because at 135°C it interrupts the voltage supply.
<b>Combination butterfly valve actuators</b>	Refer to the butterfly valve documentation for suitable butterfly valves, their permitted media temperatures and closing pressures.

Accessories

	Description
Electrical accessories	PC-Tool MFT-P, beginning with v3.3
	Cable ZK6-GEN
	Cable ZK2-GEN

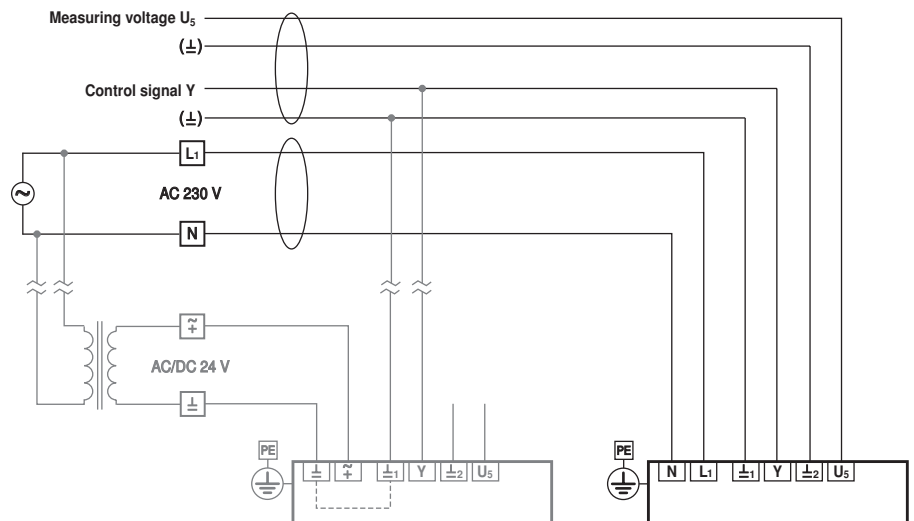
MFT-P PC-tool connection

Local connection with ZIP-USB-MP via service socket of the SY actuator.



**Note**  
The housing cover must be opened in order to access the connections.

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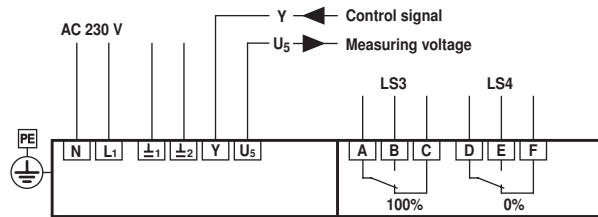
**Note**  
(⊥) of the control signal Y and (⊥) of the measuring voltage  $U_5$  can be connected together.

## Electrical installation for 4-lead connection

## Wiring diagram

## Note

Caution: Power supply voltage!

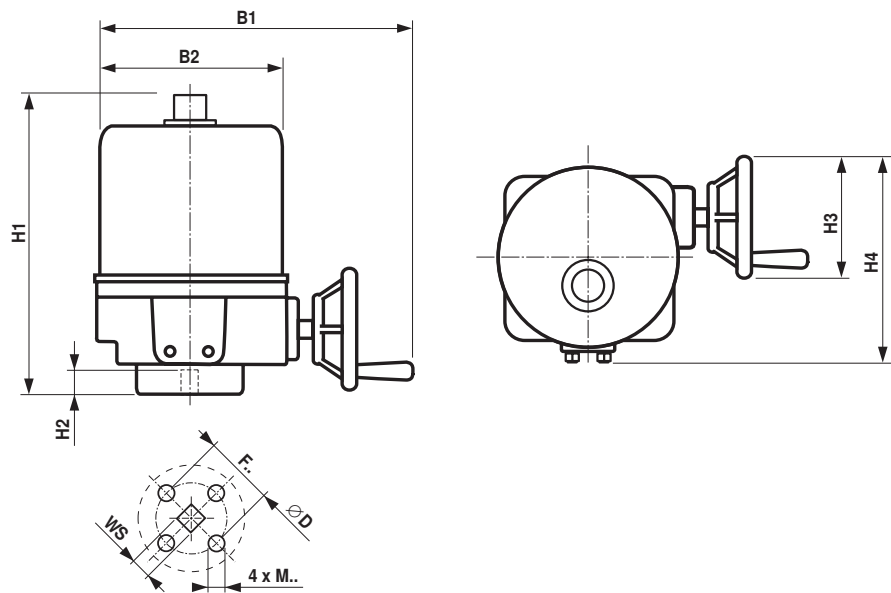


Actuator	Butterfly valve
Y1	A - AB = 100%
Y2	A - AB = 0%

Auxiliary switch	Position	Butterfly valve
LS3	100%	Open
LS4	0%	Closed

## Dimensions [mm]

## Dimensional drawings



Type	H1 [mm]	H2 [mm]	H3 [mm]	H4 [mm]	B1 [mm]	B2 [mm]	F. ISO 5211	D [mm]	WS [mm]	M..
SY2 ... 3-230-MF-T	289	30	123	203	326	180	F07	70	22	M8
SY4 ... 6-230-MF-T	317	40	194	290	394	217	F10	102	35	M10
SY7 ... 8-230-MF-T	406	45	295	336	347	217	F14	140	36	M16
SY9 ... 12-230-MF-T	554	57	398	402	455	261	F16	165	36	M20

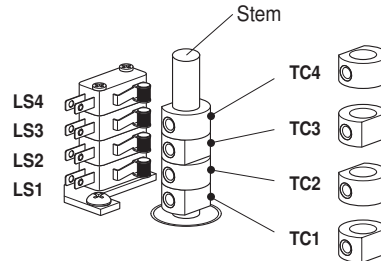
## Settings

### Setting cam

The setting cams for limit and auxiliary switches can be accessed by removing the housing cover. Optionally, auxiliary switches LS4 / LS3 can be connected for signalling. Limit switches LS2 / LS1 interrupt the voltage to the motor and are controlled by setting cams TC.. The setting cams turn with the stem. The butterfly valve closes when the stem is turning clockwise (cw) and opens when the stem is turning counterclockwise (ccw).

#### Important!

Settings are only allowed to be made by authorised specialist personnel.

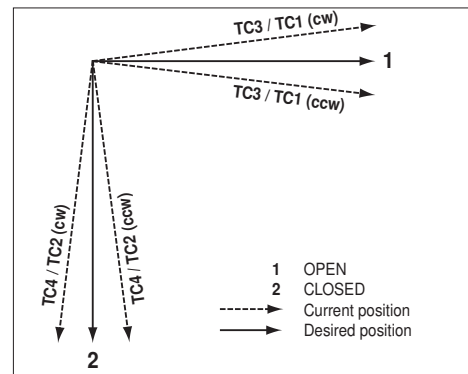


Settings of setting cams TC..

- TC4 for auxiliary switch position closed (factory setting  $3^\circ \leftarrow$ ).
- TC3 for auxiliary switch position open (factory setting  $87^\circ \leftarrow$ ).
- TC2 for limit switch closed (factory setting  $0^\circ \leftarrow$ ).
- TC1 for limit switch open (factory setting  $90^\circ \leftarrow$ ).

Adjusting setting cams

- 1 Use a 2.5 mm Allen key to unscrew the corresponding setting cams TC..
- 2 Turn the setting cam using the Allen key
- 3 Set as shown in the illustration below
- 4 Use the Allen key to tighten the corresponding setting cams



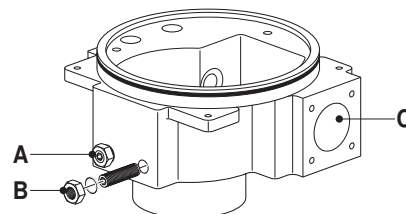
Adaption

An adaptation must take place after the TC1 and TC2 have been adjusted.

### Mechanical angle of rotation limitation

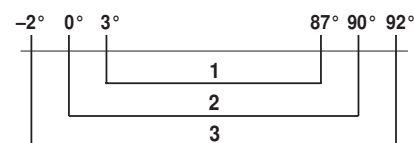
The mechanical angle of rotation is set at the factory to  $94^\circ \leftarrow$  and cannot be changed. The handwheel is rotated by means of a worm gear in a planetary gear unit. The gearing is stopped mechanically by means of two setscrews **A** and **B** ( $1\frac{1}{2}$  rotations of the setscrews correspond to  $2^\circ \leftarrow$ ).

Both limit switches LS 2 /LS 1 are set to  $90^\circ \leftarrow$  and must always switch off the motor before the mechanical angle of rotation limitation.



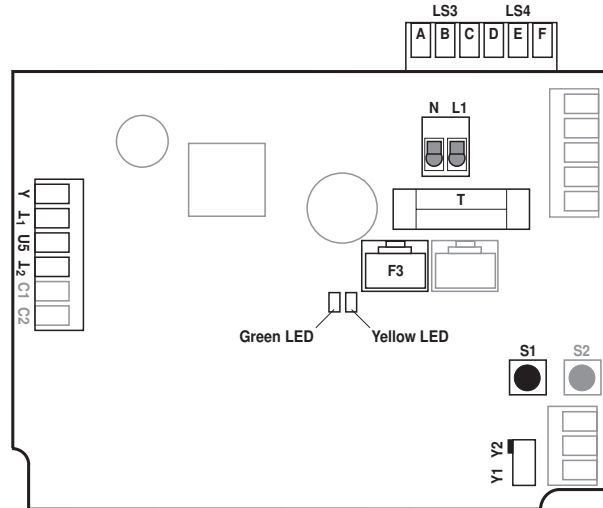
- A** Angle of rotation limiting OPEN ( $90^\circ \leftarrow$ )
- B** Angle of rotation limiting CLOSED ( $0^\circ \leftarrow$ )
- C** Connection of handwheel for angle of rotation limiting

### Relationship between mechanical angle of rotation limiting, limit and auxiliary switches



- 1 Auxiliary switch TC3 / TC4
- 2 Limit switch TC1 / TC2
- 3 Mechanical angle of rotation limitation (A + B)

## Connection and function elements

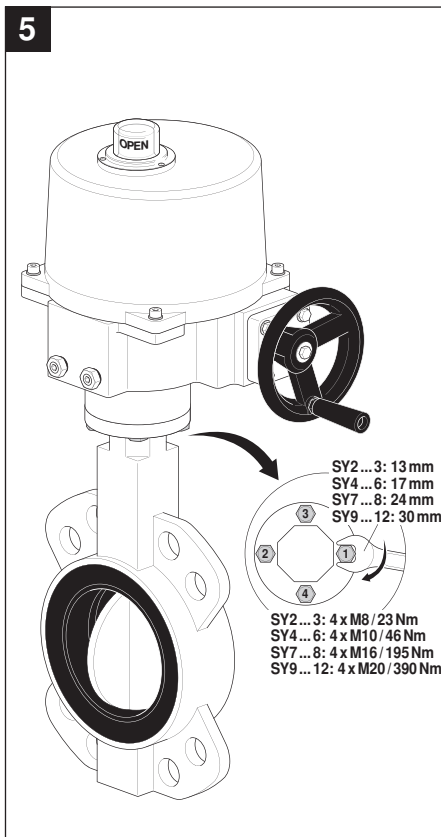
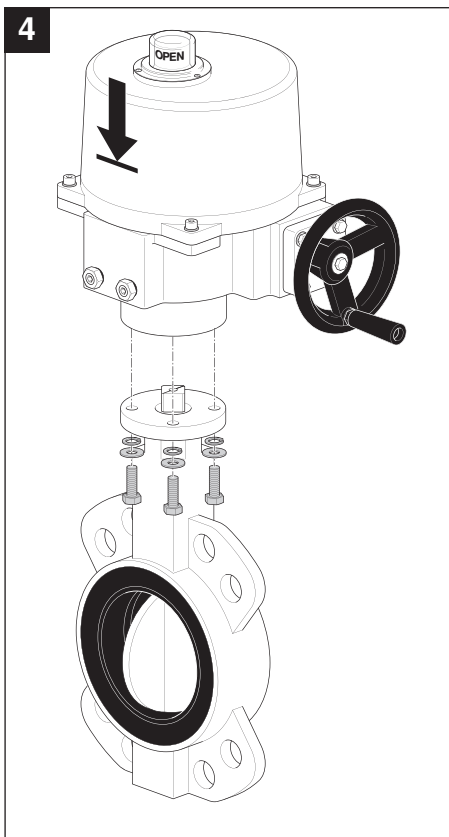
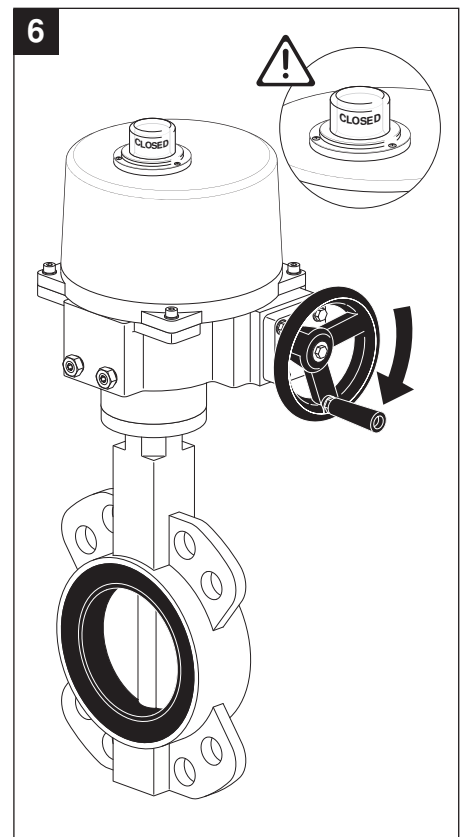
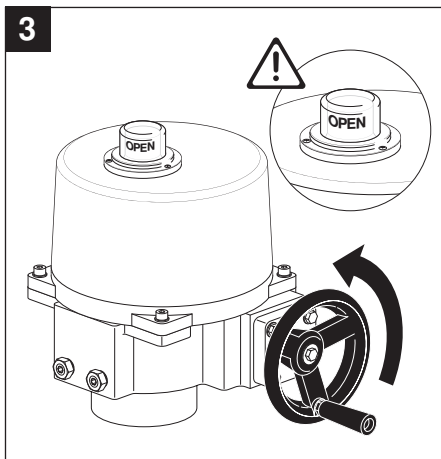
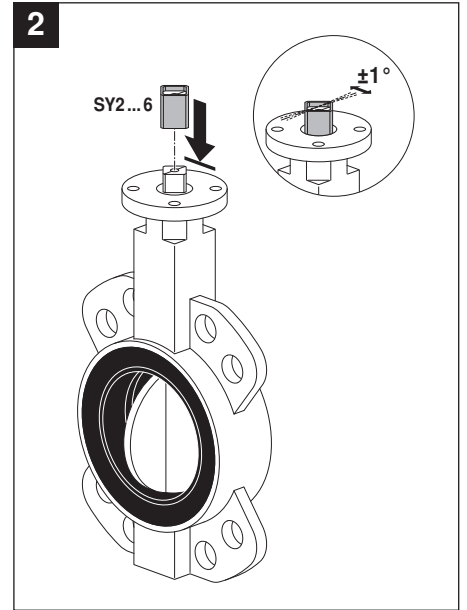
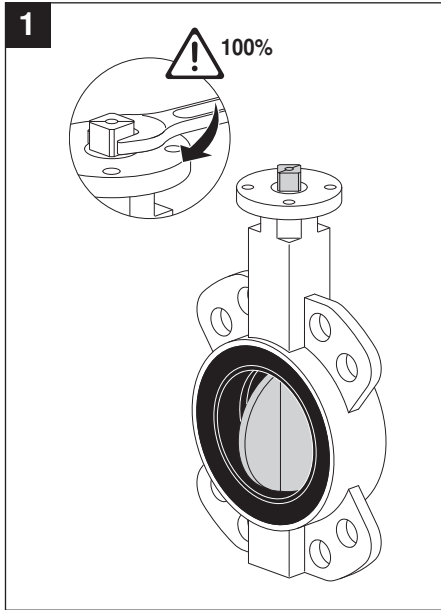
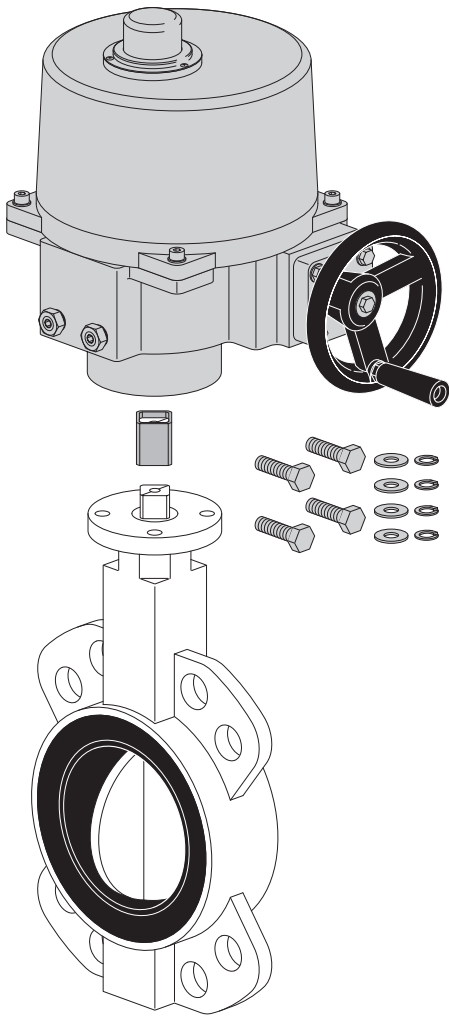


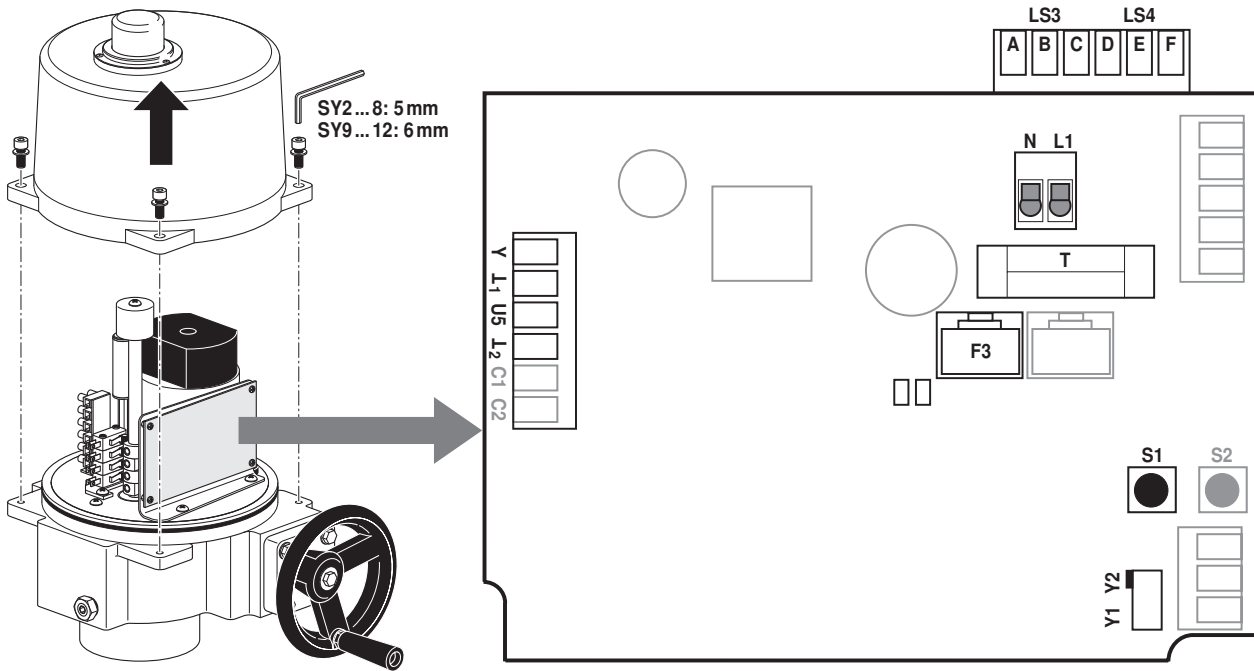
<b>N / L1</b>	Power supply voltage	
<b>Y1</b>	Direction of rotation switch	Actuator rotates anticlockwise (ccw), valve opens
<b>Y2</b>	Direction of rotation switch	Actuator rotates clockwise (cw) valve closes
<b>Y</b>	Control signal	
<b>U5</b>	Position feedback	
<b>L1 / L2</b>	Ground 24 V-side	
<b>F3</b>	PC-tool connection	
<b>S1</b>	Adaptation button	Adaptation procedure is started (press S1 for 3 s) Adaptation must take place after the TC1 and TC2 have been adjusted.
<b>Yellow LED</b>	On	Adaptation procedure activated
	Off	Standard operation
<b>Green LED</b>	On	In operation
	Off	No voltage supply or fault
<b>T</b>	Plug-in fuse	Type T10A250V
<b>LS3</b>	Auxiliary switch	Factory setting 87° ↺
<b>LS4</b>	Auxiliary switch	Factory setting 3° ↺
<b>C1 / C2</b>	Not used	
<b>S2</b>	Not used	

## Further documentations

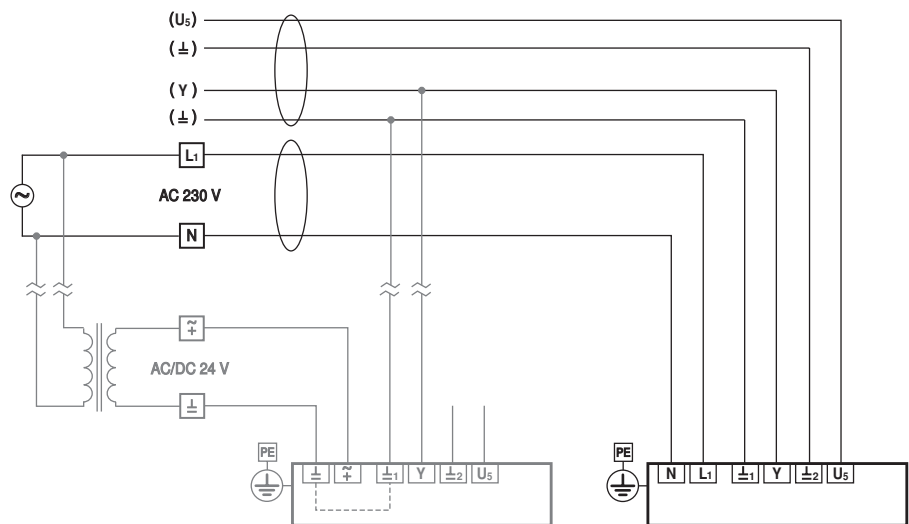
- Complete overview «The complete range of water solutions»
- Data sheets, butterfly valves
- Installation instructions for actuators and/or butterfly valves, respectively
- Notes for project planning (hydraulic characteristic curves and circuits, installation regulations, commissioning, maintenance,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

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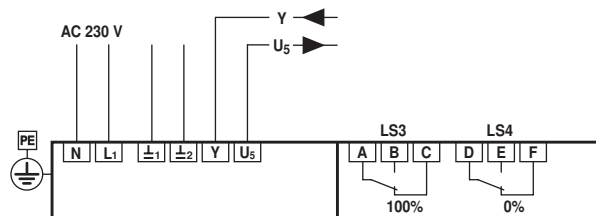




SY..-230-SR-T / SY..-230-MF-T



**AC 230 V**



Y1	A - AB = 100%
Y2	A - AB = 0%

LS3	100%	A — B
		— C
LS4	0%	D — E
		— F



