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

### Technical data sheet SY..-230-MF-T

#### Overview of types

<table>
<thead>
<tr>
<th>Type</th>
<th>Torque (Nominal torque)</th>
<th>Running time</th>
<th>Power consumption</th>
<th>Current consumption</th>
<th>Connection flange</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SY2-230-MF-T</td>
<td>90 Nm ¹)</td>
<td>17 s</td>
<td>40 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F07</td>
<td>Approx. 11 kg</td>
</tr>
<tr>
<td>SY3-230-MF-T</td>
<td>150 Nm ¹)</td>
<td>26 s</td>
<td>40 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F07</td>
<td>Approx. 11 kg</td>
</tr>
<tr>
<td>SY4-230-MF-T</td>
<td>400 Nm ¹)</td>
<td>18 s</td>
<td>120 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F10</td>
<td>Approx. 22 kg</td>
</tr>
<tr>
<td>SY5-230-MF-T</td>
<td>500 Nm ¹)</td>
<td>25 s</td>
<td>120 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F10</td>
<td>Approx. 22 kg</td>
</tr>
<tr>
<td>SY6-230-MF-T</td>
<td>650 Nm ¹)</td>
<td>31 s</td>
<td>120 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F10</td>
<td>Approx. 22 kg</td>
</tr>
<tr>
<td>SY7-230-MF-T</td>
<td>1000 Nm ¹)</td>
<td>55 s</td>
<td>180 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F14</td>
<td>Approx. 36 kg</td>
</tr>
<tr>
<td>SY8-230-MF-T</td>
<td>1500 Nm ¹)</td>
<td>55 s</td>
<td>220 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F14</td>
<td>Approx. 36 kg</td>
</tr>
<tr>
<td>SY9-230-MF-T</td>
<td>2000 Nm ¹)</td>
<td>70 s</td>
<td>180 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F16</td>
<td>Approx. 72 kg</td>
</tr>
<tr>
<td>SY10-230-MF-T</td>
<td>2500 Nm ¹)</td>
<td>70 s</td>
<td>220 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F16</td>
<td>Approx. 72 kg</td>
</tr>
<tr>
<td>SY11-230-MF-T</td>
<td>3000 Nm ¹)</td>
<td>70 s</td>
<td>250 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F16</td>
<td>Approx. 72 kg</td>
</tr>
<tr>
<td>SY12-230-MF-T</td>
<td>3500 Nm ¹)</td>
<td>70 s</td>
<td>300 W ²)</td>
<td>5 W</td>
<td>ISO 5211 / F16</td>
<td>Approx. 72 kg</td>
</tr>
</tbody>
</table>

¹) @ Nominal voltage
²) @ 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 ⊥
  Switching points: 3°<0 and 87°<0
- Connection Terminals, 2 x 1.5 mm² or 1 x 2.5 mm²
- Parallel operation
- Supply voltage Yes
- Controller signals Yes

#### Functional data
- Torque (nominal torque) See «Overview of types»
- Control signal Y
  - Operating range DC 0 ... 10 V, input impedance 100 kΩ
  - Control signal Y DC 0.5 ... 10 V
- Position feedback (measuring voltage U₅)
  - DC 0 ... 10 V, max. 0.5 mA
  - DC 2 ... 10 V, max. 0.5 mA
- Position accuracy ±5% absolute
- Manual override Temporary with handwheel (not revolving)
- Angle of rotation 90°±4 (internal limit switch)
- Angle of rotation limiting MAX (maximum position) = 100%
  MIN (minimum position) = 0%
  ZS (intermediate position) = 50%
- Running time See «Overview of types»
- Duty cycle 75% (e.g. 18 s / 6 s)
Multifunctional rotary actuators, AC 230 V, 90 ... 3500 Nm

Technical data (continued)

Functional data
Sound power level Max. 70 dB (A)
Position indication Mechanical (integrated)

Safety
Protection class I
Protective earth 

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 °C ... +120 °C (in the butterfly valve)
Non-operating temperature –30 ... +80 °C
Ambient humidity 95% r.h., non-condensating

Mechanical data
Connection flange See «Overview of types»
Housing material Cast aluminium

Dimensions / Weight
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

Mode of operation
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.

Parameterisable actuators
Input and output signals and other parameters can be altered with the BELIMO Service Tool, MFT-P.

Simple direct mounting
Simple direct mounting on the butterfly valve. The mounting position in relation to the butterfly valve can be selected in 90° steps.

Manual override
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.

Internal heating
An internal heater prevents condensation buildup.

High functional reliability
Mechanical stops limit the actuator to –2° and 92°. 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.

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

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical accessories</td>
</tr>
<tr>
<td>PC-Tool MFT-P, beginning with v3.3</td>
</tr>
<tr>
<td>Cable ZK5-GEN</td>
</tr>
<tr>
<td>Cable ZK2-GEN</td>
</tr>
</tbody>
</table>

**MFT-P PC-tool connection**

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

![Diagram of the connection](image)

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

**4-Leiter-Systemanschluss**

![Diagram of the connection](image)

**Note**
$(Y)$ of the control signal $Y$ and $(U)$ of the measuring voltage $U_l$ can be connected together.
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Electrical installation for 4-lead connection

Wiring diagram

Note
Cautions: Power supply voltage!

Dimensions [mm]

Dimensions [mm]

---|---|---|---|---|---|---|---|---|---|---
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**

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°<).  
- TC3 for auxiliary switch position open (factory setting 87°<).  
- TC2 for limit switch closed (factory setting 0°<).  
- TC1 for limit switch open (factory setting 90°<).

**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°< 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 (1½ rotations of the setscrews correspond to 2°<). Both limit switches LS2 / LS1 are set to 90°< and must always switch off the motor before the mechanical angle of rotation limitation.

**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 limiting (A + B)
Multifunctional rotary actuators, AC 230 V, 90 ... 3500 Nm

Connection and function elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N / L1</td>
<td>Power supply voltage</td>
</tr>
<tr>
<td>Y1</td>
<td>Direction of rotation switch</td>
</tr>
<tr>
<td></td>
<td>Actuator rotates anticlockwise (ccw), valve opens</td>
</tr>
<tr>
<td>Y2</td>
<td>Direction of rotation switch</td>
</tr>
<tr>
<td></td>
<td>Actuator rotates clockwise (cw) valve closes</td>
</tr>
<tr>
<td>Y</td>
<td>Control signal</td>
</tr>
<tr>
<td>U5</td>
<td>Position feedback</td>
</tr>
<tr>
<td>T1 / T2</td>
<td>Ground 24 V-side</td>
</tr>
<tr>
<td>F3</td>
<td>PC-tool connection</td>
</tr>
<tr>
<td>S1</td>
<td>Adaptation button</td>
</tr>
<tr>
<td></td>
<td>Adaptation procedures is started (press S1 for 3 s)</td>
</tr>
<tr>
<td></td>
<td>Adaptation must take place after the TC1 and TC2 have been adjusted.</td>
</tr>
<tr>
<td>Yellow LED</td>
<td>On: Adaptation procedure activated</td>
</tr>
<tr>
<td></td>
<td>Off: Standard operation</td>
</tr>
<tr>
<td>Green LED</td>
<td>On: In operation</td>
</tr>
<tr>
<td></td>
<td>Off: No voltage supply or fault</td>
</tr>
<tr>
<td>T</td>
<td>Plug-in fuse</td>
</tr>
<tr>
<td></td>
<td>Type T10A250V</td>
</tr>
<tr>
<td>LS3</td>
<td>Auxiliary switch</td>
</tr>
<tr>
<td></td>
<td>Factory setting 87°</td>
</tr>
<tr>
<td>LS4</td>
<td>Auxiliary switch</td>
</tr>
<tr>
<td></td>
<td>Factory setting 3°</td>
</tr>
<tr>
<td>C1 / C2</td>
<td>Not used</td>
</tr>
<tr>
<td>S2</td>
<td>Not used</td>
</tr>
</tbody>
</table>

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.)