

- **General Large Torque Actuators for operation of:**
- **Torque:**
- **Open/Close or 3-point control:**
- **Modulating control:**

DN50...600 Butterfly Valves
35...3500Nm
SY...24-3-T, SY...230-3-T
SY1U24-SR-T, SY1U230-SR-T
SY...U24-MF-T, SY...U230-MF-T



Technical data

| | |
|----------------------------|--|
| Nominal voltage | AC 24V ± 10% |
| SY...-3-T, SY...-SR-T | AC 230V ± 10% |
| Nominal voltage range | AC 21.6...26.4V |
| SY...-3-T, SY...-SR-T | 207...253V |
| Connecting cable | ½" cable connector, screw terminals |
| Motor protection | H class insulation (SY1), F class insulation (SY2...12) |
| Gear train | High alloy steel gear sets |
| Control signal Y | DC (0)2...10V |
| Sensitivity | 200mV |
| Position feedback signal U | DC (0)2...10V |
| Angle of rotation | Electrically limited to 90°, Max. 95° for manual operation |
| Position indicator | Top mounted domed indication |
| Auxiliary switches | 2xSPDT 3A, AC 230V(SY1); 2xSPDT 5A, AC 230V(SY2...12) |
| Ambient temp. | -20...+60°C |
| Humidity | 5...95% RH, non-condensing |
| Degree of protection | IP67 |
| Housing material | Die Cast Aluminium Alloy |
| EMC | CE according to 2004/108/EC |
| Low voltage directive | CE according to 2006/95/EC |

* MP-T models available on request

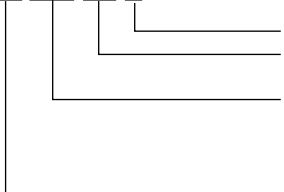
| Model No. | Nominal Torque (Nm) | Motor power | | Running time | | | Running current | | Manual override | Weight (kg) | Mounting flange |
|-----------|---------------------|-------------|---------|--------------|---------|------|-----------------|---------|-----------------|-------------|-----------------|
| | | AC 24V | AC 230V | AC 24V | AC 230V | | AC 24V | AC 230V | | | |
| | | | | | 50Hz | 60Hz | | | | | |
| SY1.. | 35 | 10W | 10W | 15s | 13s | 12s | 0.6A | 0.3A | by 8mm Wrench | 2 | F05 |
| SY2.. | 90 | 70W | 40W | 15s | 17s | 15s | 3.0A | 0.5A | Handwheel | 11 | F07 |
| SY3.. | 150 | 70W | 40W | 22s | 26s | 22s | 3.0A | 0.5A | Handwheel | 11 | F07 |
| SY4.. | 400 | 180W | 120W | 16s | 18s | 16s | 6.0A | 0.6A | Handwheel | 22 | F10 |
| SY5.. | 500 | 180W | 120W | 22s | 25s | 22s | 6.5A | 0.7A | Handwheel | 22 | F10 |
| SY6.. | 650 | / | 120W | / | 31s | 28s | / | 0.8A | Handwheel | 22 | F10 |
| SY7.. | 1000 | / | 180W | / | 55s | 46s | / | 1.6A | Handwheel | 36 | F14 |
| SY8.. | 1500 | / | 220W | / | 55s | 46s | / | 2.0A | Handwheel | 36 | F14 |
| SY9.. | 2000 | / | 180W | / | 70s | 58s | / | 1.6A | Handwheel | 56 | F16 |
| SY10.. | 2500 | / | 220W | / | 70s | 58s | / | 2.0A | Handwheel | 56 | F16 |
| SY11.. | 3000 | / | 250W | / | 70s | 58s | / | 1.6A | Handwheel | 56 | F16 |
| SY12.. | 3500 | / | 300W | / | 70s | 58s | / | 2.2A | Handwheel | 56 | F16 |

Product Feature

- Electrical connections** All actuator control elements are wired to a terminal strip under the main cover. Remove the cover and insert the cables through the cable connector in order to reach the terminal strip. The connectors should be made according to the diagram. Before beginning this procedure, make sure that the power supply voltage is in accordance with the actuator's name plate. After the terminal connections have been made, move the actuator manually to the half-open position and make a preliminary check of the wiring.
- Overload protection** If the real running torque exceeds the nominal torque, the overload protection will be functioned to prevent the motor overload.
- Manual operation** The manual operation is available by turning a handwheel of actuators (SY2...12) and using a 8mm wrench for SY1.

Ordering sample

SY4 U230 -MF -T



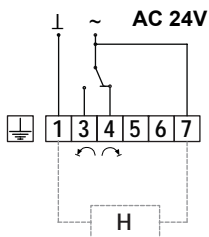
- With terminal only
- "-MF/SR": Modulating control
- "-3": Open/Close or 3-point control
- "U24": 24V nominal voltage (modulating)
- "U230": 230V nominal voltage (modulating)
- "-24": 24V nominal voltage (Open/Close, 3-point)
- "-230": 230V nominal voltage (Open/Close, 3-point)
- Model number

eg. Modulating control
SY2U230-MF-T
Open/Close, 3-point control
SY2-230-3-T

Wiring diagrams

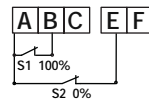
SY..-24-3-T Open/Close or 3-point control Terminal

- Notes:**
- Connection via safety isolating transformer.
 - Relays are needed in parallel connection of several actuators
 - "L" cannot be connected to terminal #3 and #4 simultaneously.
 - 30% duty cycle.

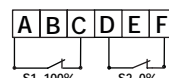


| | |
|----|---|
| #1 | Power supply Com/Neutral |
| #3 | Power supply Hot line for Open |
| #4 | Power supply Hot line for Close |
| #5 | Connect to Com/Neutral for fully open indication |
| #6 | Connect to Com/Neutral for fully close indication |
| #7 | Heater |

Auxiliary switch



SY1-24-3-T

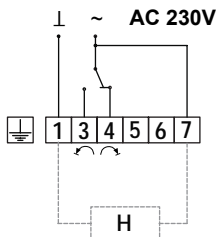


SY(2...4)-24-3-T

SY..-230-3-T Open/Close or 3-point control Terminal

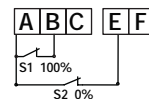
WARNING! Leakage current is possible (<3.5mA)!
Connect the earth first before applying any supply voltage!
Disconnect the supply voltage before the earth!

- Notes:**
- Caution: Power supply voltage!
 - Relays are needed in parallel connection of several actuators
 - "L" cannot be connected to terminal #3 and #4 simultaneously.
 - 30% duty cycle.

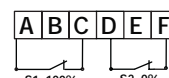


| | |
|----|---|
| #1 | Power supply Com/Neutral |
| #3 | Power supply Hot line for Open |
| #4 | Power supply Hot line for Close |
| #5 | Connect to Com/Neutral for fully open indication |
| #6 | Connect to Com/Neutral for fully close indication |
| #7 | Heater |

Auxiliary switch



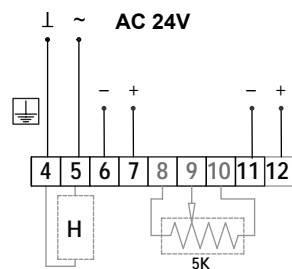
SY1-230-3-T



SY(2...12)-230-3-T

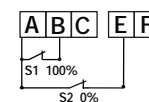
SY1U24-SR-T Modulating control Terminal

- Notes:**
- Connection via safety isolating transformer.
 - Power supply Com/Neutral and control signal "-" wiring to a common is prohibited.
 - The control signal has to be separated from the others and shielded.
 - 75% duty cycle.



| | |
|-----|---------------------------|
| #4 | Power supply Com/Neutral |
| #5 | Power supply Hot line |
| #6 | Control signal - |
| #7 | Control signal + |
| #8 | For actuator internal use |
| #9 | For actuator internal use |
| #10 | For actuator internal use |
| #11 | Feedback signal - |
| #12 | Feedback signal + |

Auxiliary switch

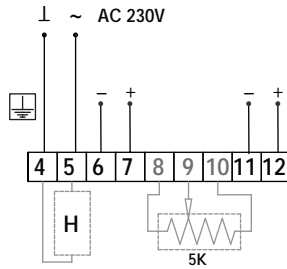


Wiring diagrams (continued)

SY1U230-SR-T Modulating control

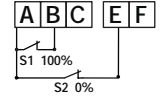
Terminal

WARNING! Leakage current is possible (<3.5mA)! Connect the earth first before applying any supply voltage! Disconnect the supply voltage before the earth!



| | |
|-----|---------------------------|
| #4 | Power supply Com/Neutral |
| #5 | Power supply Hot line |
| #6 | Control signal - |
| #7 | Control signal + |
| #8 | For actuator internal use |
| #9 | For actuator internal use |
| #10 | For actuator internal use |
| #11 | Feedback signal - |
| #12 | Feedback signal + |

Auxiliary switch

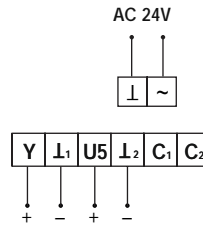


- Notes:**
- Caution: Power supply voltage!
 - Power supply Com/Neutral and control signal "-" wiring to a common is prohibited.
 - The control signal has to be separated from the others and shielded.
 - 75% duty cycle.

SY..U24-MF-T Modulating control

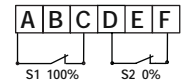
Terminal

- Notes:**
- Connection via safety isolating transformer.
 - Power supply Com/Neutral and control signal "-" wiring to a common is prohibited.
 - The control signal has to be separated from the others and shielded.
 - 75% duty cycle.



| | |
|----|--------------------------|
| ⊥ | Power supply Com/Neutral |
| ~ | Power supply Hot line |
| Y | Control signal + |
| ⊥1 | Control signal - |
| U5 | Feedback signal + |
| ⊥2 | Feedback signal - |
| C1 | leave unconnected |
| C2 | leave unconnected |

Auxiliary switch

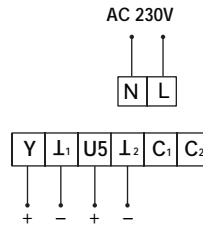


SY(2...4)U24-MF-T

SY..U230-MF-T Modulating control

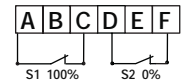
Terminal

WARNING! Leakage current is possible (<3.5mA)! Connect the earth first before applying any supply voltage! Disconnect the supply voltage before the earth!



| | |
|----|--------------------------|
| ⊥ | Power supply Com/Neutral |
| ~ | Power supply Hot line |
| Y | Control signal + |
| ⊥1 | Control signal - |
| U5 | Feedback signal + |
| ⊥2 | Feedback signal - |
| C1 | leave unconnected |
| C2 | leave unconnected |

Auxiliary switch



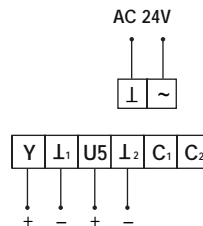
SY(2...12)U230-MF-T

- Notes:**
- Caution: Power supply voltage!
 - Power supply Com/Neutral and control signal "-" wiring to a common is prohibited.
 - The control signal has to be separated from the others and shielded.
 - 75% duty cycle.

SY..U24-MP-T Modulating control

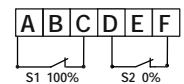
Terminal

- Notes:**
- Connection via safety isolating transformer.
 - Power supply Com/Neutral and control signal "-" wiring to a common is prohibited.
 - The control signal has to be separated from the others and shielded.
 - 75% duty cycle.



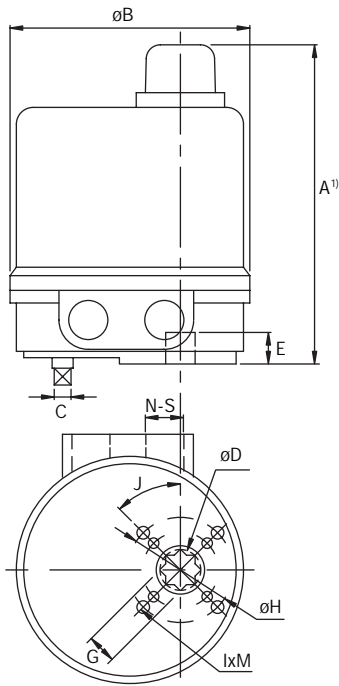
| | |
|----|--------------------------|
| ⊥ | Power supply Com/Neutral |
| ~ | Power supply Hot line |
| Y | Sensor signal + |
| ⊥1 | Sensor signal - |
| U5 | MP-Bus signal + |
| ⊥2 | MP-Bus signal - |
| C1 | leave unconnected |
| C2 | leave unconnected |

Auxiliary switch

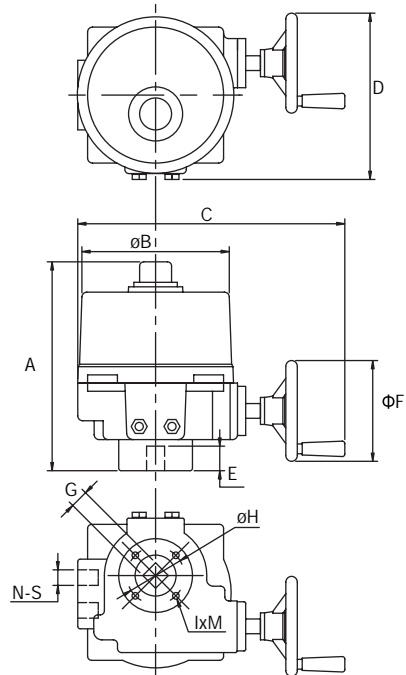


SY(2...4)U24-MP-T

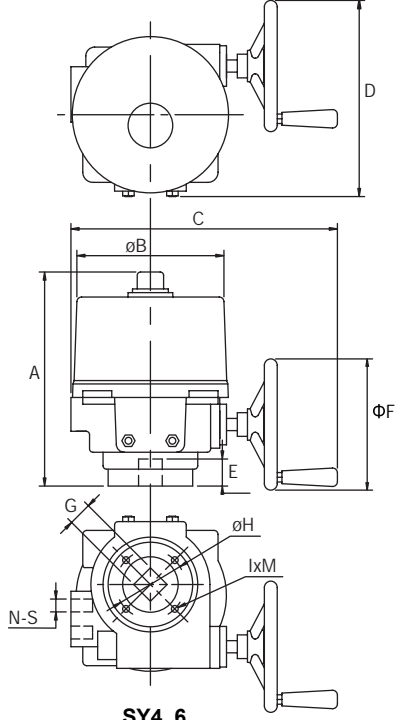
Dimensions [mm]



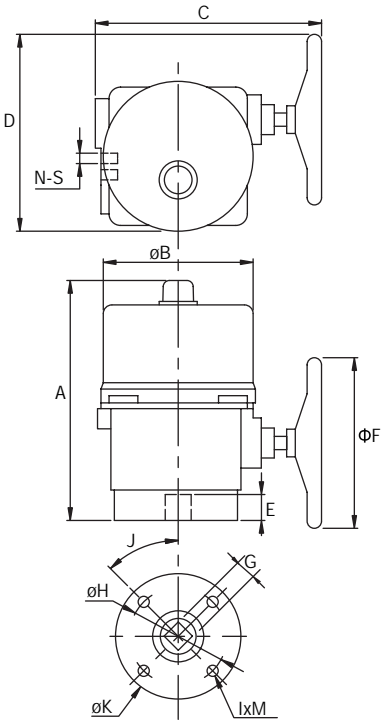
SY1..



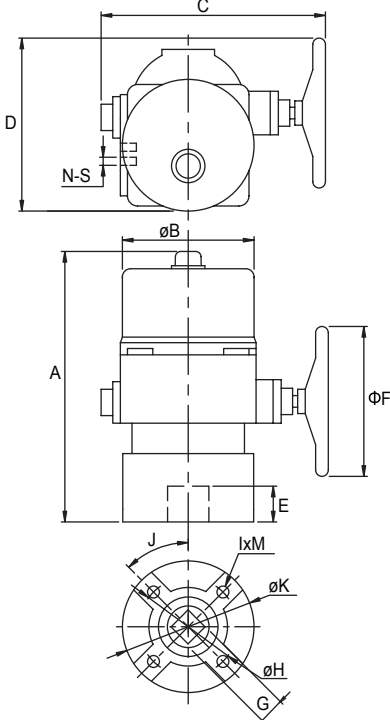
SY2/3..



SY4..6..



SY7/8..



SY9..12..

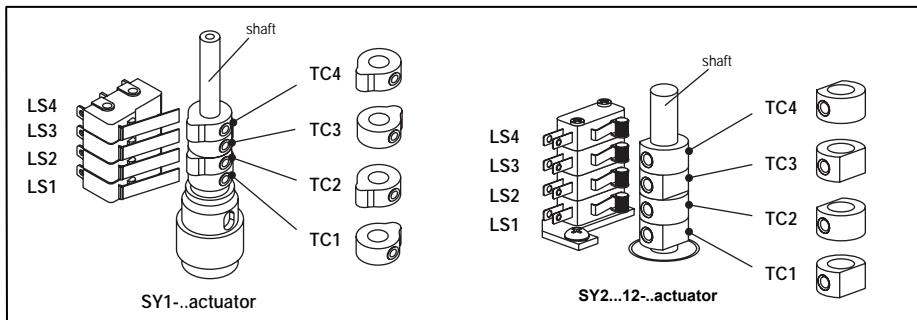
1) For SY1U24(230)-SR-T, A is 183.
2) For SY2(3)-230-3-T, A is 255.

| Model No | Dim | A | B | C | D | E | Φ F | G | H | I | J | K | M | N | S | Flange type |
|------------|-----|-------------------|-----|-----|-----|----|-----|-------|-----|---|-----|-----|-----|---|--------|-------------|
| SY1.. | | 150 ¹⁾ | 106 | 8 | 19 | 15 | - | 14 | 50 | 4 | 45° | - | M6 | 2 | 1/2 PS | F05 |
| SY2/3.. | | 255 ²⁾ | 181 | 326 | 208 | 30 | 123 | 17/22 | 70 | 4 | - | 90 | M8 | 2 | 1/2 PS | F07 |
| SY4..6.. | | 317 | 217 | 394 | 294 | 40 | 194 | 22/35 | 102 | 4 | - | 125 | M10 | 2 | 1/2 PS | F10 |
| SY7/8.. | | 406 | 217 | 347 | 336 | 45 | 295 | 36 | 140 | 4 | 45° | 180 | M16 | 2 | 1/2 PS | F14 |
| SY9...12.. | | 564 | 256 | 455 | 392 | 57 | 395 | 36 | 165 | 4 | 45° | 221 | M20 | 2 | 1/2 PS | F16 |

Travel cams TC..

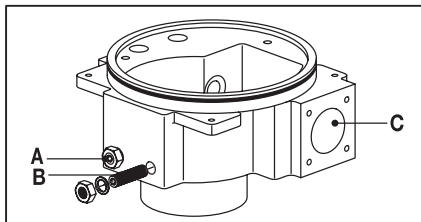
Only authorised and trained persons are allowed to change the settings.

- TC1-for open position of limit switch (factory setting 90°).
- TC2-for closed position of limit switch (factory setting 0°).
- TC3-for open position of auxiliary switch (factory setting 87°).
- TC4-for closed position of auxiliary switch (factory setting 3°).



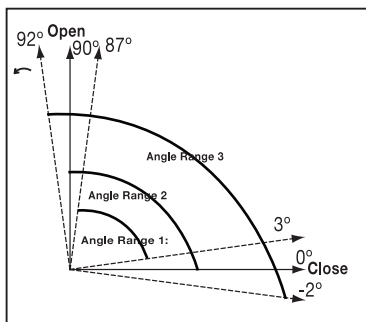
The cams for adjusting the limit and auxiliary switches are accessible if the cover is removed. The LS2/LS1 limit switches interrupt the power supply to the motor and are controlled by means of the TC.. cams which rotate with the shaft. The LS4/LS3 auxiliary switches can optionally be connected for signalisation purposes. The actuator closes the valve when the shaft turns clockwise (CW) and opens the valve when the shaft turns counter clockwise (CCW).

Relationship of auxiliary switches, limiting switches and limits of manual rotation angle



- A stop screw for OPEN limiting
- B stop screw for CLOSED limiting
- C stop screw connection for manual operation

The limits of manual operation is set at -2°...92° in the factory. The override handwheel turns the planetary gear by means of a worm wheel. The gear is stopped mechanically by the two stop screws A and B.



Angle Range 1: Two auxiliary switches LS3 and LS4 are set at 3°...87° angle in the factory

Angle Range 2: The two limit switches LS2 and LS1 are set at 0°...90° angle in the factory

Angle Range 3: Two stop screws A and B are set at -2°...92° angle in the factory

Fully Open/Closed position setting

Fully Closed position (0%) setting

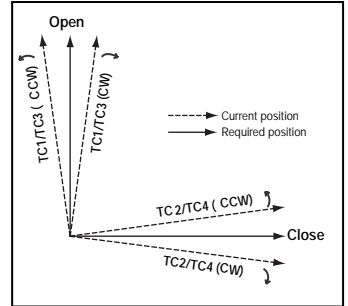
- 1) Power on. The actuator will drive CW to closed position.
- 2) Check whether disc of valve at fully closed position.
- 3) Adjust travel cams TC2 and stop screws for closed limiting (see "Adjusting travel cams and stop screws")

Fully Open position (100%) setting

- 1) Power on. The actuator will drive CCW to open position.
- 2) Check whether disc of valve is at fully open position.
- 3) Adjust travel cams TC1 and stop screws for open limiting (see "Adjusting travel cams and stop screws")

Adjusting the TC and stop screws

1. Loosen the corresponding stop screw;
 2. Loosen the travel cam to be re-adjusted with a 2.5mm hexagonal key;
 3. Turn the travel cam clockwise or counter clockwise with the hexagonal key as shown in the right diagram and initially tighten the cam;
 4. Check the full rotation of limit switch with power on;
 5. Tighten the travel cam after successful re-adjustment, otherwise repeat to do point 3 and 4 until the travel cam is successfully re-adjusted.
 6. When the motor stops at fully closed or open position, tighten the corresponding stop screw until it touches the gearbox, turn the stop screw cycle back and lock by a hexagonal key and a wrench (1 turn of the stop screw corresponding to 2° angle of rotation around).
- **The LS2/LS1 switches must always switch off the motor before the effect of stop screws.**
 - **Perform an adaption after changing the position of the travel cam**



Adaption button

Installation guidelines

Cautions of installation

- Check power supply before wiring.
- Replace housing cover immediately after making adjustments and make sure seal is secure. If water or dust is present, thoroughly dry and clean before replacing housing.
- The motor cannot be reversed and the actuator cannot be installed upside down.
- Be sure to keep it away from gas; do not use in explosive and chemical district.
- Power off before maintenance purpose.
- The Open/Close frequency of the electric actuator is restricted according to the duty cycle to avoid overheating.

Maintenance

All actuators are lubricated with anti-high temperature lubricant for a long life and therefore require no special maintenance. The condition of the valve stem and its nut must be checked periodically to make sure they are clean and well lubricated. We recommend that a program of periodic maintenance should be drawn up for actuators that are operated infrequently.

Storage

The actuator includes electrical equipment as well as grease lubricated gear stages. In spite of the weather proof enclosure, oxidation, jamming and other alterations are possible if the actuator is not correctly stored. The actuator should be stored under a shelter in a clean, dry place and protected from frequent changes in temperature. Avoid placing the actuators directly on the floor. The actuators are equipped with heat resistance, but it's recommended to connect the actuators to the power supply, especially if storage area is humid. Check that the temporary sealing plug of the cable entries are well in place. Make sure that the covers and boxes are well closed to ensure weather proof sealing.

FAQ

| Conditions | Possibilities | Solutions |
|---|--|--|
| Motor overheat | Voltage abnormal | Check by multimeter |
| | High working frequency | Limit the working frequency |
| | Motor spindle is stuck or valve is too tight to move | Replace the stuck assemblies or the valve. |
| | The gear box stuck by stop screw | Check and correct travel cam for evidence of loosening; inspect the stop screw setting by operating the handwheel manually. |
| No operation | Power supply or voltage abnormal | Check the power supply voltage with the identification plate. |
| | Fuse blown | Check and replace the fuse as required (except for HW-CBPCB) |
| | Tripping of motor thermal protective device | Check if the motor is hot. The actuator will be available again after the motor has cooled down. Solve the motor overheat problem. |
| Running motor stops | Power supply has short circuit | Check wiring |
| | External object stuck in the pipe | Take off the valve for cleaning |
| Not fully opening/closing | The fixing screw for travel cam is loose | Re-adjust and tighten the travel cam |
| The actuator is continually hunting | The sensitivity setting is incorrect | Adjust the sensitivity switch SW1 to increase the number (only for SY1..). |
| Occasional fail in motor switched on or off | Power input of "open" and "close" simultaneously | Check if the external control switch is normal; relays are needed in parallel connection of several actuators |