

Parametrisable damper actuator fail-safe and extended functionalities in the IP66/67 protective housing for adjusting dampers in technical building installations

- Air damper size up to approx. 8 m²
- Torque motor 40 Nm
- Nominal voltage AC/DC 24 V
- Control modulating 2...10 V variable
- Position feedback 2...10 V variable
- Optimum weather protection for use outdoors (for use in ambient temperatures up to -40°C, there is a separate actuator available with built-in heater)


Technical data

| | | |
|-----------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------|
| Electrical data | Nominal voltage | AC/DC 24 V |
| | Nominal voltage frequency | 50/60 Hz |
| | Nominal voltage range | AC 19.2...28.8 V / DC 21.6...28.8 V |
| | Power consumption in operation | 11 W |
| | Power consumption in rest position | 3 W |
| | Power consumption for wire sizing | 21 VA |
| | Power consumption for wire sizing note | I _{max} 20 A @ 5 ms |
| | Connection supply / control | Cable 1 m, 4 x 0.75 mm ² (halogen-free) |
| | Parallel operation | Yes (note the performance data) |
| Functional data | Torque motor | 40 Nm |
| | Operating range Y | 2...10 V |
| | Input Impedance | 100 kΩ |
| | Operating range Y variable | Start point 0.5...30 V End point 2.5...32 V |
| | Operating modes optional | Open/close 3-point (AC only) Modulating (DC 0...32 V) |
| | Position feedback U | 2...10 V |
| | Position feedback U note | Max. 0.5 mA |
| | Position feedback U variable | Start point 0.5...8 V End point 2.5...10 V |
| | Setting fail-safe position | 0...100%, adjustable in increments of 10% (POP rotary knob on 0 corresponds to left end stop) |
| | Bridging time (PF) | 2 s |
| | Bridging time (PF) variable | 0...10 s |
| | Position accuracy | ±5% |
| | Direction of motion motor | selectable with switch 0/1 |
| | Direction of motion note | Y = 0 V: At switch position 0 (ccw rotation) / 1 (cw rotation) |
| | Direction of motion variable | electronically reversible |
| | Direction of motion fail-safe | selectable with switch 0...100% |
| | Manual override | with push-button (under protective housing) |
| | Angle of rotation | Max. 95° |
| | Angle of rotation note | can be limited on both sides with adjustable mechanical end stops |
| | Running time motor | 150 s / 90° |
| Running time motor variable | 90...150 s | |
| Running time fail-safe | 35 s / 90° | |
| Adaptation setting range | manual | |

| | | |
|----------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Functional data | Adaptation setting range variable | No action Adaptation when switched on Adaptation after pushing the manual override button |
| | Override control | MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position, AC only) = 50% |
| | Override control variable | MAX = (MIN + 32%)...100% MIN = 0%...(MAX - 32%) ZS = MIN...MAX |
| | Sound power level, motor | 52 dB(A) |
| | Sound power level, fail-safe | 61 dB(A) |
| | Mechanical interface | Universal shaft clamp 14...26.7 mm |
| | Position indication | Mechanical |
| | Safety data | Protection class IEC/EN |
| Power source UL | | Class 2 Supply |
| Degree of protection IEC/EN | | IP66/67 |
| Degree of protection NEMA/UL | | NEMA 4X |
| Enclosure | | UL Enclosure Type 4X |
| EMC | | CE according to 2014/30/EU |
| Certification IEC/EN | | IEC/EN 60730-1 and IEC/EN 60730-2-14 |
| UL Approval | | cULus according to UL60730-1A, UL60730-2-14 and CAN/CSA E60730-1 The UL marking on the actuator depends on the production site, the device is UL-compliant in any case |
| Mode of operation | | Type 1.AA |
| Rated impulse voltage supply / control | | 0.8 kV |
| Pollution degree | | 4 |
| Ambient humidity | | Max. 100% RH |
| Ambient temperature | | -30...50°C [-22...122°F] |
| Ambient temperature note | | -40...50°C for actuator with integrated heating |
| Storage temperature | | -40...80°C [-40...176°F] |
| Servicing | | maintenance-free |
| Weight | Weight | 3.8 kg |
| Terms | Abbreviations | POP = Power off position / fail-safe position PF = Power fail delay time / bridging time |

Safety notes



- This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- Junction boxes must at least correspond with enclosure IP degree of protection!
- The cover of the protective housing may be opened for adjustment and servicing. When it is closed afterwards, the housing must seal tight (see installation instructions).
- 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 cables must not be removed from the device installed in the interior.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation situation and the ventilation conditions must be observed.
- The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.
- The device is not designed for applications where chemical influences (gases, fluids) are present or for utilisation in corrosive environments in general.
- The actuator may not be used in plenary applications (e.g. suspended ceilings or raised floors).
- The materials used may be subject to external influences (temperature, pressure, construction fastening, effect of chemical substances, etc.), which cannot be simulated in laboratory tests or field trials. In case of doubt, we definitely recommend that you carry out a test. This information does not imply any legal entitlement. Belimo will not be held liable and will provide no warranty.
- Self adaptation is necessary when the system is commissioned and after each adjustment of the angle of rotation (press the adaptation push-button once).
- Flexible metallic cable conduits or threaded cable conduits of equal value are to be used for UL (NEMA) Type 4X applications.
- When used under high UV loads, e.g. extreme sunlight, the use of flexible metallic or equivalent cable conduits is recommended.

Product features

- Fields of application** The actuator is particularly suitable for utilisation in outdoor applications and is protected against the following weather conditions:
- UV radiation
 - Rain / Snow
 - Dirt / Dust
 - Air humidity
 - Alternating climate / frequent and severe temperature fluctuations (Recommendation: use the actuator with integrated factory-installed heating which can be ordered separately to prevent internal condensation)
- Mode of operation** The actuator moves the damper to the desired operating position at the same time as the integrated capacitors are charged. Interrupting the supply voltage causes the damper to be rotated back into the fail-safe position by means of stored electrical energy.
- The actuator is connected with a standard control signal of 0...10 V and drives to the position defined by the control signal. Measuring voltage U serves for the electrical display of the damper position 0...100% and as control signal for other actuators.

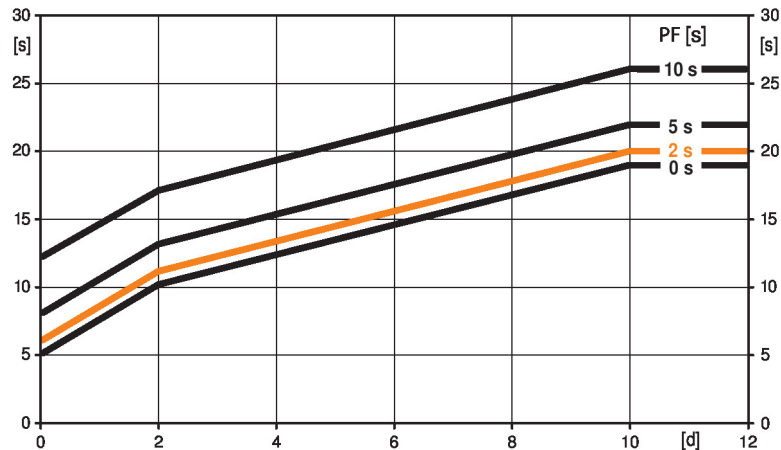
Pre-charging time (start up)

The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of a power failure, the actuator can move at any time from its current position into the preset fail-safe position.

The duration of the pre-charging time depends mainly on following factors:

- Duration of the power failure
- PF delay time (bridging time)

Typical pre-charging time



[d] = Electricity interruption in days

[s] = Pre-charging time in seconds

PF[s] = Bridging time

Calculation example: Given an electricity interruption of 3 days and a bridging time (PF) set at 5 s, the actuator requires a pre-charging time of 14 s after the electricity has been reconnected (see graphic).

| PF [s] | [d] | | | | |
|--------|-----|----|----|----|-----|
| | 0 | 1 | 2 | 7 | ≥10 |
| 0 | 5 | 8 | 10 | 15 | 19 |
| 2 | 6 | 9 | 11 | 16 | 20 |
| 5 | 8 | 11 | 13 | 18 | 22 |
| 10 | 12 | 15 | 17 | 22 | 26 |
| | [s] | | | | |

Delivery condition (capacitors)

The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20 s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level.

Bridging time

Electrical interruptions can be bridged up to a maximum of 10 s.

In the event of a power failure, the actuator will remain stationary in accordance with the set bridging time. If the power failure is greater than the set bridging time, the actuator will move into the selected fail-safe position.

The bridging time set at the factory is 2 s. It can be modified on site in operation by means of the Belimo service tool MFT-P.

Settings: The rotary knob must not be set to the "Tool" position!

For retroactive adjustments of the bridging time with the Belimo service tool MFT-P or with the ZTH EU adjustment and diagnostic device only the values need to be entered.

Setting fail-safe position (POP)

The rotary knob fail-safe position can be used to adjust the desired fail-safe position 0...100% in 10% increments.

The rotary knob refers only to the adapted angle of rotation range 30°...95°. No set min. or max. values are observed.

In the event of a power failure, the actuator will move into the selected fail-safe position, taking into account the bridging time that has been set.

Settings: The rotary knob must be set to the «Tool» position for retroactive settings of the fail-safe position with the Belimo service tool MFT-P. Once the rotary knob is set back to the range 0...100%, the manually set value will have positioning authority.

Parametrisable actuators

The factory settings cover the most common applications. Single parameters can be modified with the Belimo Service Tools MFT-P or ZTH EU.

Simple direct mounting

Simple direct mounting on the damper shaft with a universal shaft clamp, supplied with an anti-rotation device to prevent the actuator from rotating.

| | |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manual override | Manual control with push-button possible - temporary. The gear train is disengaged and the actuator decoupled for as long as the button is pressed. The housing cover must be removed for manual override. |
| Adjustable angle of rotation | Adjustable angle of rotation with mechanical end stops. |
| High functional reliability | The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached. |
| Home position | The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out a synchronisation. The synchronisation is in the home position (0%). The actuator then moves into the position defined by the control signal. |
| Adaptation and synchronisation | An adaptation can be triggered manually by pressing the "Adaptation" button or with the PC-Tool. Both mechanical end stops are detected during the adaptation (entire setting range). A range of settings can be adapted using the PC-Tool (see MFT-P documentation) |
| Setting direction of motion | When actuated, the direction of the rotation switch changes the running direction in normal operation. The direction of the rotation switch has no influence on the fail-safe position which has been set. |

Accessories

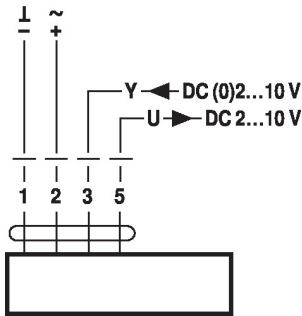
| | | |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Electrical accessories | Description | Type |
| | Auxiliary switch 2 x SPDT add-on, grey | S2A GR |
| | Feedback potentiometer 140 Ω add-on | P140A |
| | Feedback potentiometer 200 Ω add-on | P200A |
| | Feedback potentiometer 500 Ω add-on | P500A |
| | Feedback potentiometer 1 kΩ add-on | P1000A |
| | Feedback potentiometer 2.8 kΩ add-on | P2800A |
| | Feedback potentiometer 5 kΩ add-on | P5000A |
| | Feedback potentiometer 10 kΩ add-on | P10000A |
| | Adapter for auxiliary switch and feedback potentiometer | Z-SPA |
| | Signal converter voltage/current 100 kΩ 4...20 mA, Supply AC/DC 24 V | Z-UIC |
| | Positioner for wall mounting | SGA24 |
| | Positioner for built-in mounting | SGE24 |
| | Positioner for front-panel mounting | SGF24 |
| | Positioner for wall mounting | CRP24-B1 |
| Mechanical accessories | Description | Type |
| | Cable gland for cable diameter Ø 4...10 mm | Z-KB-PG11 |
| Tools | Description | Type |
| | Service Tool, with ZIP-USB function, for parametrisable and communicative Belimo actuators, VAV controller and HVAC performance devices | ZTH EU |
| | Belimo PC-Tool, Software for adjustments and diagnostics | MFT-P |
| | Adapter for Service-Tool ZTH | MFT-C |
| | Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: 6-pin for connection to service socket | ZK1-GEN |
| | Connection cable 5 m, A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal | ZK2-GEN |
| Options ex works only | Description | Type |
| | Heater, with adjustable thermostat | HT24-MG |
| | Heater, with mechanical humidistat | HH24-MG |

Electrical installation

Supply from isolating transformer.
Parallel connection of other actuators possible. Observe the performance data.

Wiring diagrams

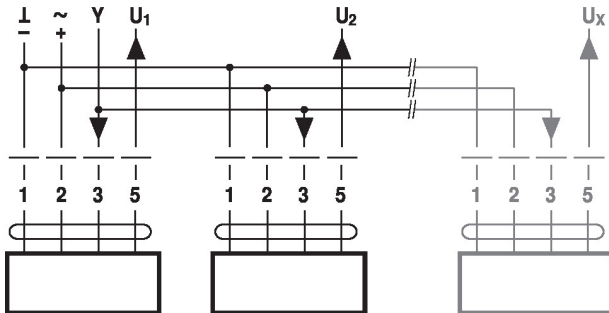
AC/DC 24 V, modulating



Cable colours:

- 1 = black
- 2 = red
- 3 = white
- 5 = orange

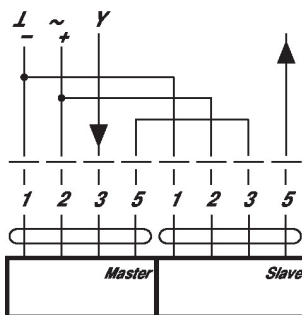
Parallel operation



Notes

- A maximum of eight actuators can be connected in parallel.
- Parallel operation is permitted only on non-connected axes.
- Do not fail to observe performance data with parallel operation.

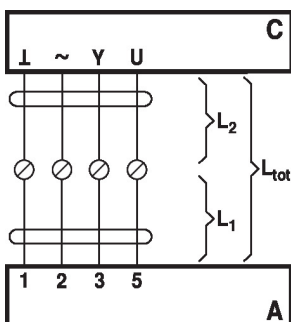
Wiring diagram piggyback operation (mechanically coupled actuators)



Notes

- A maximum of two actuators can be connected in primary/secondary operation.
- Primary/secondary operation is permitted only on one fixed shaft or on two mechanically coupled shafts.
- The programming of the primary actuator is adopted by the secondary actuator.

Signal cable lengths

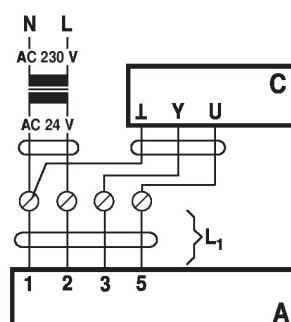


| L ₂ ┴ / ~ | L _{tot} = L ₁ + L ₂ | |
|-------------------------|----------------------------------------------------|-------|
| | AC | DC |
| 0.75 mm ² | ≤30 m | ≤5 m |
| 1.00 mm ² | ≤40 m | ≤8 m |
| 1.50 mm ² | ≤70 m | ≤12 m |
| 2.50 mm ² | ≤100 m | ≤20 m |

- A = Actuator
- C = Control unit (controlling unit)
- L1 = Connecting cable of the actuator
- L2 = Customer cable
- Ltot = Maximum signal cable length

Note:

When several actuators are connected in parallel, the maximum signal cable length must be divided by the number of actuators.



- A = Actuator
- C = Control unit (controlling unit)
- L1 = Connecting cable of the actuator

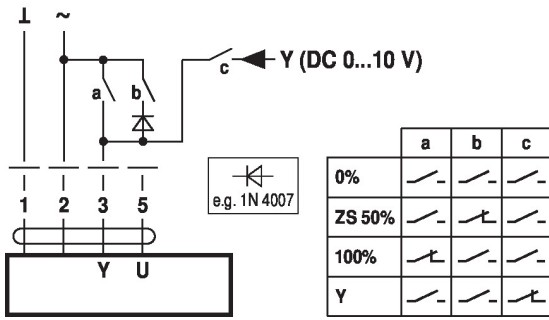
Note:

There are no special restrictions on installation if the supply and the data cable are routed separately.

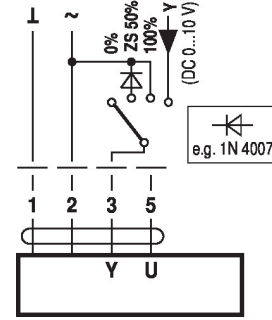
Functions

Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

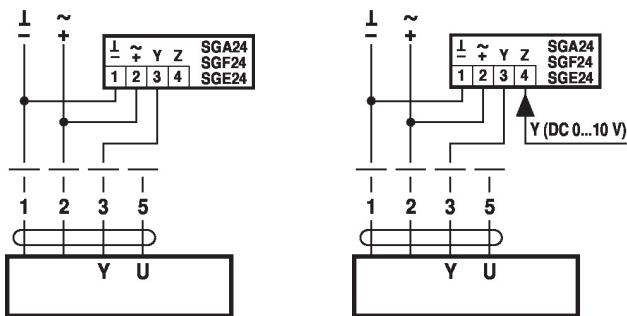


Override control with AC 24 V with rotary switch



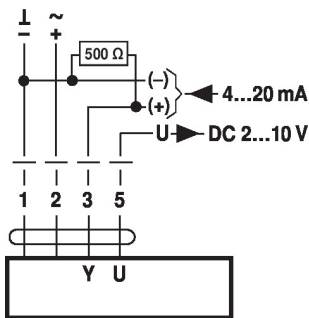
Control remotely 0...100% with positioner SG..

Minimum limit with positioner SG..

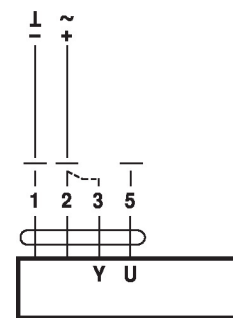


Control with 4...20 mA via external resistor

Functional check



Caution:
The operating range must be set to DC 2...10 V.
The 500 Ω resistor converts the 4...20 mA current signal to a voltage signal DC 2...10 V

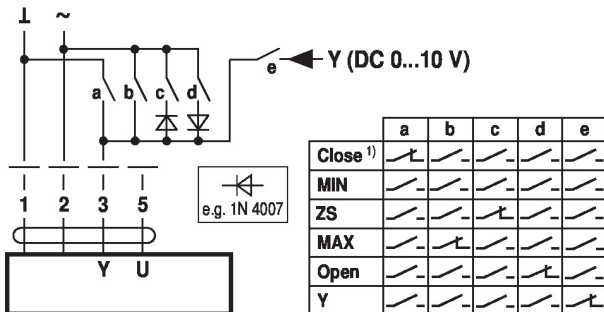


Procedure

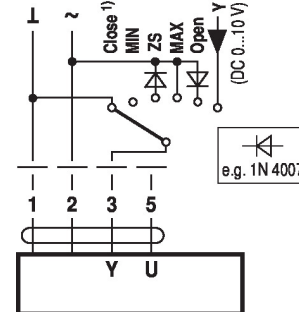
1. Connect 24 V to connections 1 and 2
2. Disconnect connection 3:
 - with direction of rotation 0: Actuator rotates to the left
 - with direction of rotation 1: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
 - Actuator runs in opposite direction

Functions with specific parameters (parametrisation necessary)

Override control and limiting with AC 24 V with relay contacts

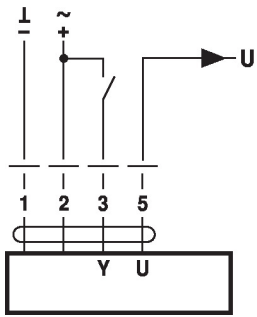


Override control and limiting with AC 24 V with rotary switch

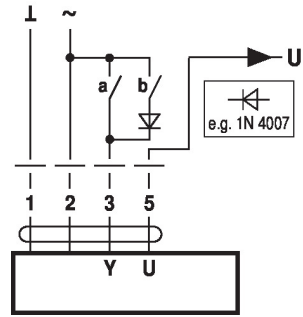


1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

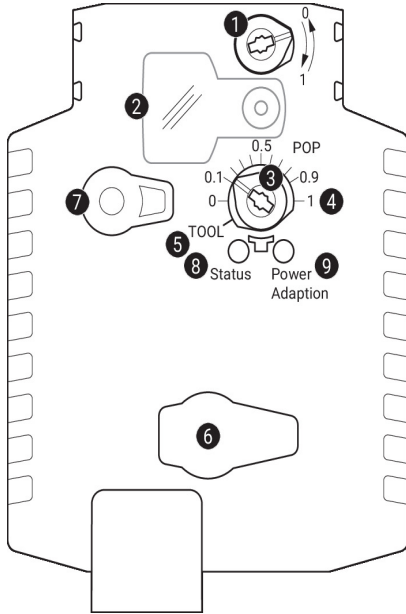
Control open/close



Control 3-point



Operating controls and indicators



1 Direction of rotation switch

Switch over: Direction of rotation changes

2 Cover, POP button

3 POP button

4 Scale for manual adjustment

5 Position for adjustment with tool

6 Service plug

For connecting parametrisation and service tools

7 Manual override button

Press button: Gear train disengages, motor stops, manual override possible

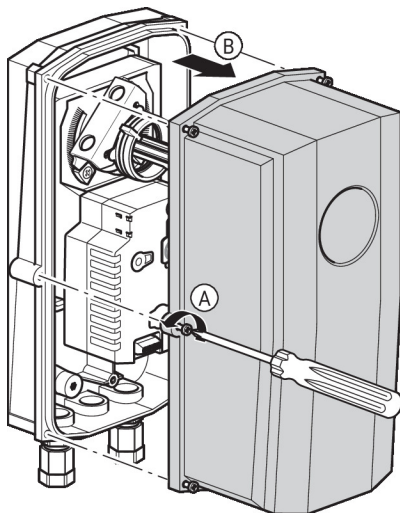
Release button: Gear train engages, standard mode

LED displays

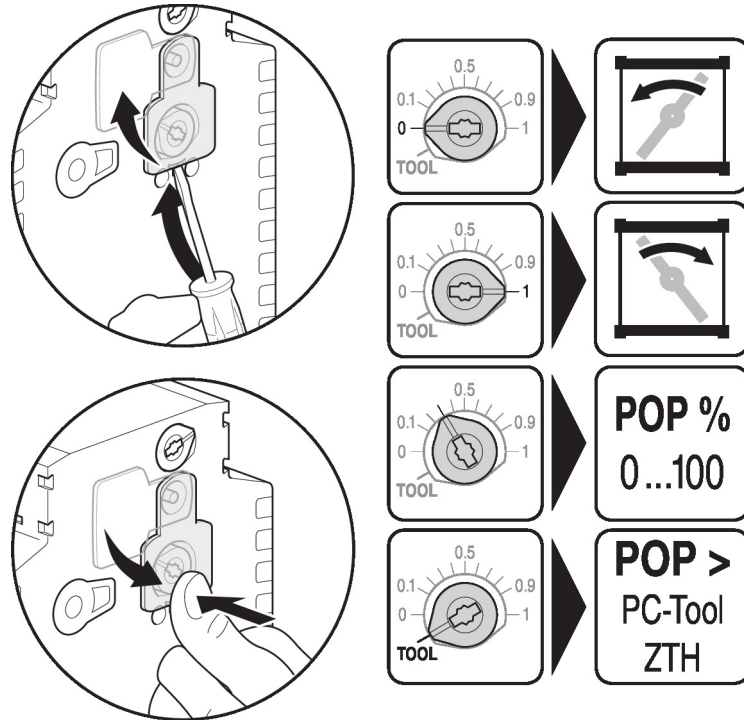
| yellow 8 | green 9 | Meaning / function |
|-----------------|----------------|-------------------------------------|
| Off | On | Operation OK |
| Off | Flashing | POP function active |
| On | Off | Fault |
| Off | Off | Not in operation |
| On | On | Adaptation process active |
| Flickering | On | Communication with programming tool |

9 Push-button (LED green)

Press button: Triggers angle of rotation adaptation, followed by standard mode



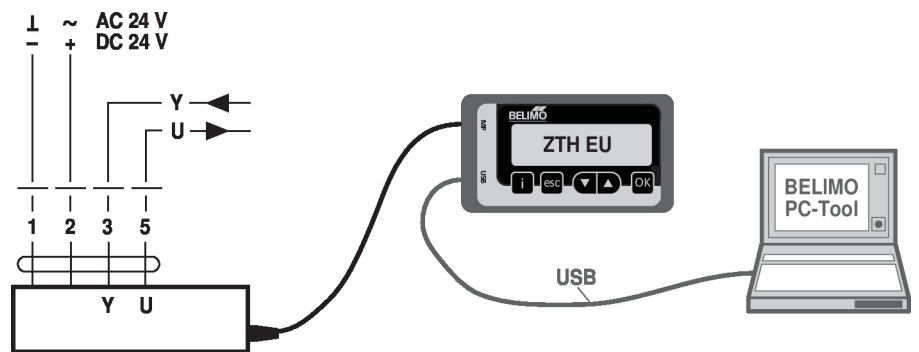
Setting emergency setting position (POP)



Service

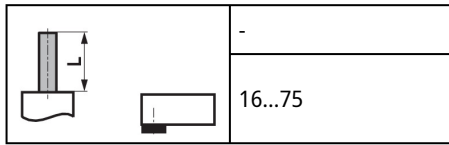
Tools connection The actuator can be parametrised by ZTH EU via the service socket. For an extended parametrisation the PC tool can be connected.

Connection ZTH EU / PC-Tool



Dimensions

Spindle length



Clamping range damper shaft

