BELIMO®

Communicative globe valve actuator with fail-safe for 2-way and 3-way globe valves

MPⱭⱭBUS®

• Actuating force 2000 N
• Nominal voltage AC/DC 24 V
• Control modulating, communicative 2...10 V variable
• Stroke 32 mm
• Conversion of sensor signals
• Communication via Belimo MP-Bus

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	5 W
	Power consumption in rest position	2 W
	Power consumption for wire sizing	9.5 VA
	Connection supply / control	Terminals with cable 1 m, 4 x 0.75 mm² (Terminal 4 mm²)
	Parallel operation	Yes (note the performance data)
Data bus communication	Communicative control	MP-Bus
	Number of nodes	MP-Bus max. 8
Functional data	Actuating force motor	2000 N
	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
	Options positioning signal	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	Stem 0...100%, adjustable (POP rotary knob)
	Bridging time (PF)	2 s
	Bridging time (PF) variable	0...10 s
	Position accuracy	±5%
	Manual override	with push-button
	Stroke	32 mm
	Running time motor	150 s / 32 mm
	Running time motor variable	90...150 s
	Running time fail-safe	35 s / 32 mm
	Adaptation setting range	manual (automatic on first power-up)
	Adaptation setting range variable	No action Adaptation when switched on Adaptation after pushing the gear disengagement button
	Override control	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position, AC only) = 50%

Functional data	Override control variable	MAX = (MIN + 33%)...100% ZS = MIN...MAX
	Sound power level, motor	60 dB(A)
	Sound power level, fail-safe	60 dB(A)
	Position indication	Mechanically, 5...32 mm stroke
Safety data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Power source UL	Class 2 Supply
	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 2
	Enclosure	UL Enclosure Type 2
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Certification UL	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	3
	Ambient temperature	0...50°C
	Storage temperature	-40...80°C
	Ambient humidity	Max. 95% RH, non-condensing
	Servicing	maintenance-free
Weight	Weight	3.8 kg
Terms	Abbreviations	POP = Power off position / fail-safe position CPO = Controlled power off / controlled fail-safe 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.
- Outdoor application: only possible in case that no (sea) water, snow, ice, insolation or aggressive gases interfere directly with the device and that it is ensured that the ambient conditions remain within the thresholds according to the data sheet at any time.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- The switch for changing the direction of motion and so the closing point may be adjusted only by authorised specialists. The direction of motion is critical, particularly in connection with frost protection circuits.
- 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 device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Product features

Mode of operation

Conventional operation:

The actuator is connected with a standard modulating signal of 0...10 V and moves to the position defined by the positioning signal at the same time as the integrated capacitors are loaded.

Interrupting the supply voltage causes the valve to be moved to the selected fail-safe position by means of stored electrical energy.

Operation on Bus:

The actuator receives its digital positioning signal from the higher level controller via the MP-Bus and drives to the position defined. Connection U serves as communication interface and does not supply an analogue measuring voltage.

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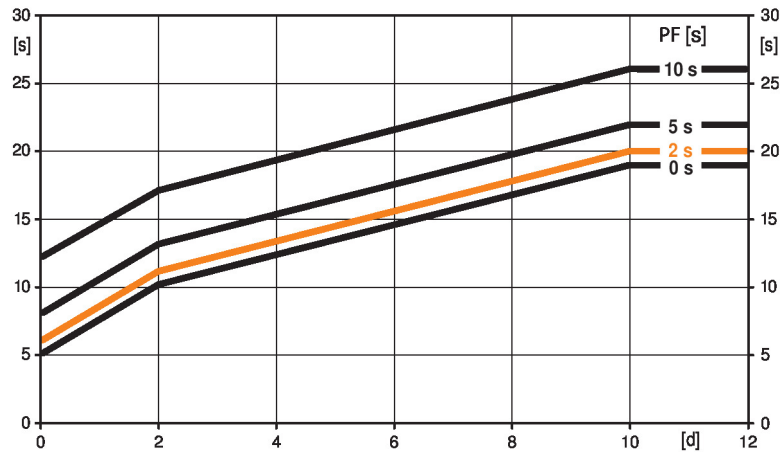
[d] = Electricity interruption in days
[s] = Pre-charging time in seconds
PF[s] = Bridging time
Calculation example: Given an electricity interruption of 3 days and a bridging time (PF) set at 5 s, the actuator requires a pre-charging time of 14 s after the electricity has been reconnected (see graphic).

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 from 0...100% in 10% increments. The rotary knob refers to the adapted or programmed height of stroke. In the event of a power failure, the actuator will move to the selected fail-safe position, taking into account the bridging time (PF) of 2 s set at the factory.
	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.
Converter for sensors	Connection option for a sensor (passive or active sensor or switching contact). The MP actuator serves as an analogue/digital converter for the transmission of the sensor signal via MP-Bus to the higher level system.
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 globe valve by means of form-fit hollow clamping jaws. The actuator can be rotated by 360° on the valve neck.
Manual override	Manual control with push-button possible - temporary. The gear is disengaged and the actuator decoupled for as long as the button is pressed.
	The stroke can be adjusted by using a hexagon socket screw key (5 mm), which is inserted into the top of the actuator. The stem extends when the key is rotated clockwise.
High functional reliability	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
Home position	Factory setting: Actuator stem is retracted.
	When valve-actuator combinations are shipped, the direction of motion is set in accordance with the closing point of the valve.
	The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out an adaptation, which is when the operating range and position feedback adjust themselves to the mechanical setting range.
	The actuator then moves into the position defined by the positioning 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).
	Automatic synchronisation after pressing the gearbox disengagement button is configured. The synchronisation is in the home position (0%).
	The actuator then moves into the position defined by the positioning signal.
	A range of settings can be adapted using the PC-Tool (see MFT-P documentation)
Setting direction of motion	When actuated, the stroke direction switch changes the running direction in normal operation. The stroke direction switch has no influence on the fail-safe position which has been set.

Accessories

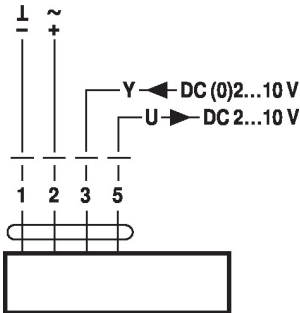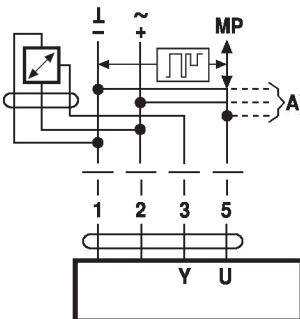| Gateways	Description	Type
	Gateway MP zu BACnet MS/TP	UK24BAC
	Gateway MP to Modbus RTU	UK24MOD
Electrical accessories	Description	Type
	Auxiliary switch 2 x SPDT add-on	S2A-H
	MP-Bus power supply for MP actuators	ZN230-24MP
Service tools	Description	Type
	Service Tool, with ZIP-USB function, for parametrisable 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

Electrical installation

⚠ **Supply from isolating transformer.**

Parallel connection of other actuators possible. Observe the performance data.

Direction of stroke switch factory setting: Actuator stem retracted (▲).

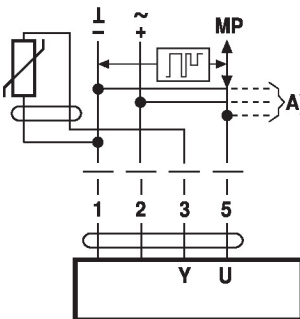### Wiring diagrams

AC/DC 24 V, modulating

Operation on the MP-Bus

Cable colours:
1 = black
2 = red
3 = white
5 = orange

Cable colours:
1 = black
2 = red
3 = white
5 = orange

Connection of active sensors

Connection of external switching contact

A) additional MP-Bus nodes (max. 8)
• Supply AC/DC 24 V
• Output signal DC 0…10 V (max. DC 0…32 V)
• Resolution 30 mV

A) additional MP-Bus nodes (max. 8)
• Switching current 16 mA @ 24 V
• Start point of the operating range must be parametrised on the MP actuator as ≥ 0.5 V

Connection of passive sensors

Ni1000	−28…+98°C	850…1600 Ω [2]
PT1000	−35…+155°C	850…1600 Ω [2]
NTC	−10…+160°C [1]	200 Ω…60 kΩ [2]

A) additional MP-Bus nodes (max. 8)
1) Depending on the type
2) Resolution 1 Ohm
Compensation of the measured value is recommended

Functions

Functions when operated on MP-Bus

Connection on the MP-Bus
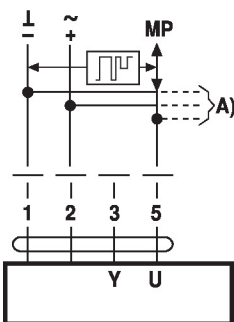
MP-Bus Network topology
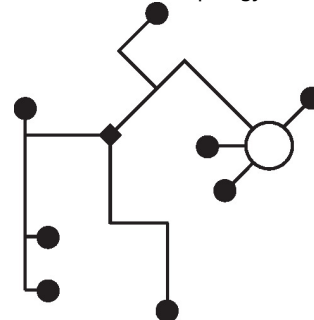
There are no restrictions for the network topology (star, ring, tree or mixed forms are permitted).
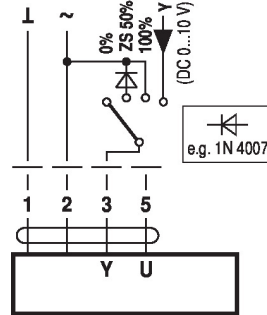Supply and communication in one and the same 3-wire cable
• no shielding or twisting necessary
• no terminating resistors required

A) additional MP-Bus nodes (max. 8)

Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

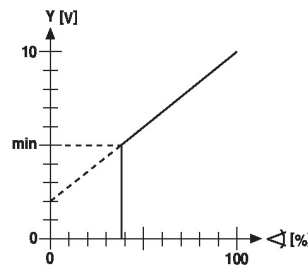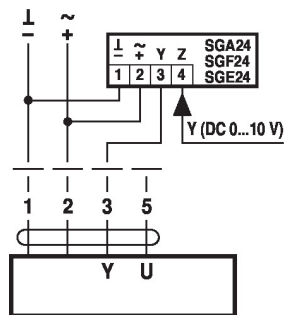|	a	b	c
0%			
ZS 50%			
100%			
Y			
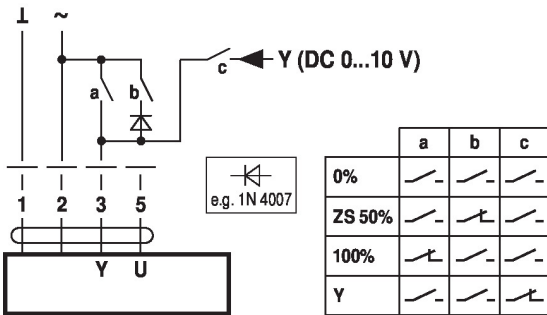
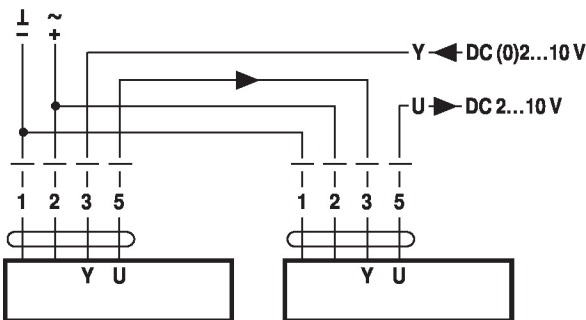Override control with AC 24 V with rotary switch
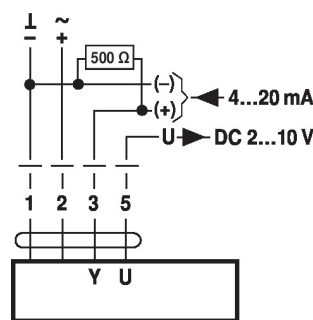
Control remotely 0...100% with positioner SG..
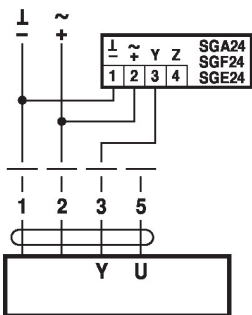
Minimum limit with positioner SG..

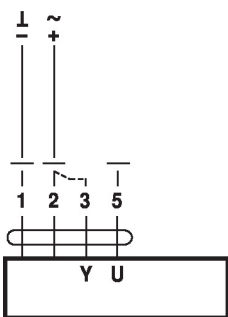Follow-up control (position-dependent)

Control with 4...20 mA via external resistor

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

Functional check

Procedure
1. Apply 24 V to connection 1 and 2
2. Disconnect connection 3:
- with upwards direction of motion: closing point at top
- with downwards direction of motion: closing point at bottom
3. Short circuit connections 2 and 3:
- Actuator runs in the opposite direction

Functions with specific parameters (parametrisation necessary)

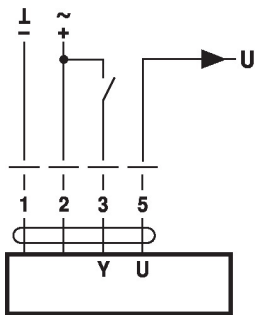Override control and limiting with AC 24 V with relay contacts

	a	b	c	d	e
Close [1]					
MIN					
ZS					
MAX					
Open					
Y					
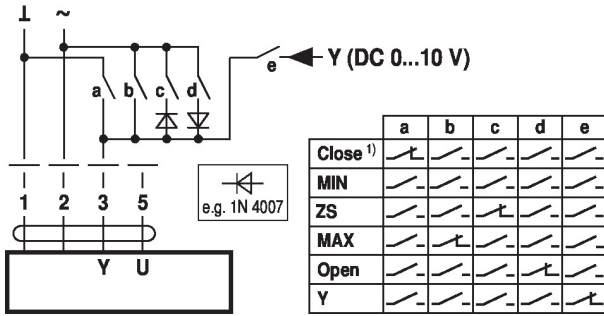
Override control and limiting with AC 24 V with rotary switch
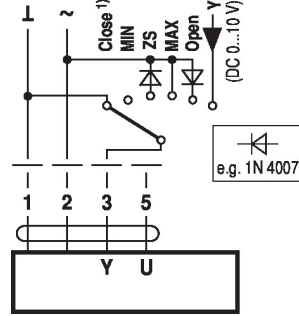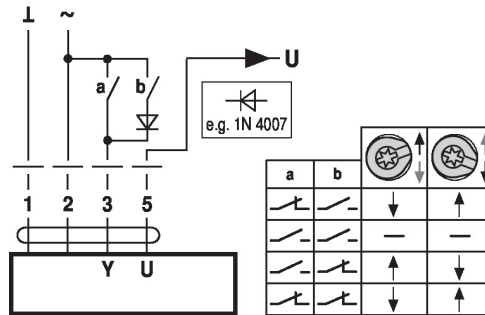

1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.
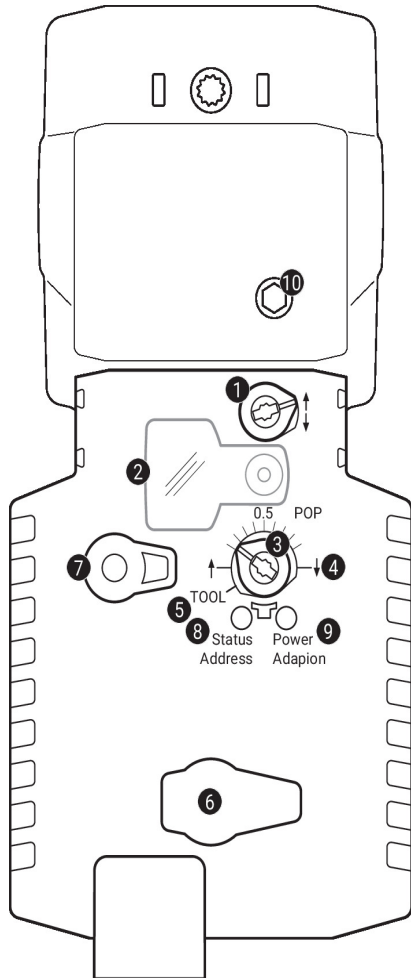
Control open/close

Control 3-point

a	b		
		↓	↑
		—	—
		↑	↓
		↓	↑

Operating controls and indicators

① Direction of stroke switch

Switch over: Direction of stroke 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 Gear disengagement button

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

Release button: Gear 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	MP-Bus communication active

⑧ Push-button (LED yellow)

Press button: Acknowledgment of addressing

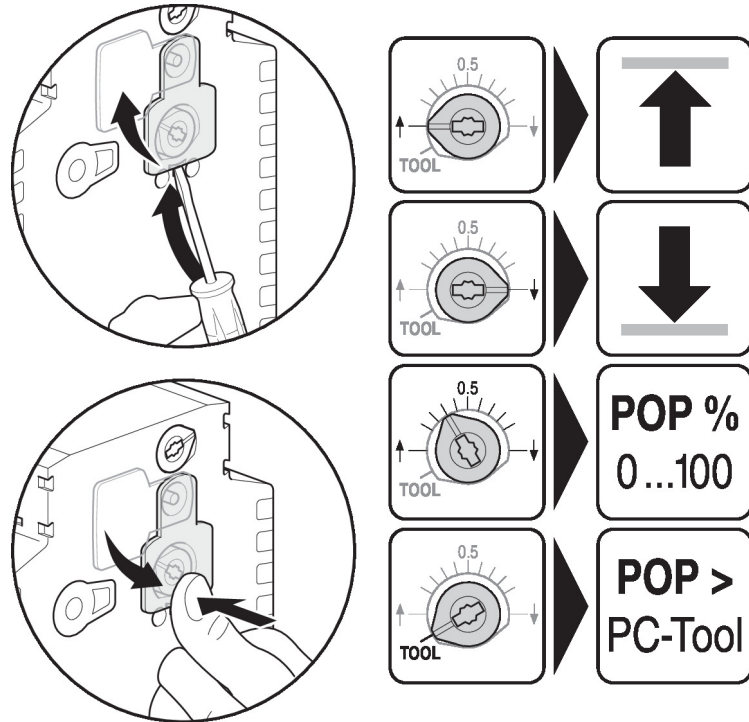**⑨ Push-button** (LED green)

Press button: Triggers stroke adaptation, followed by standard mode

⑩ Manual override

Clockwise: Actuator stem extends
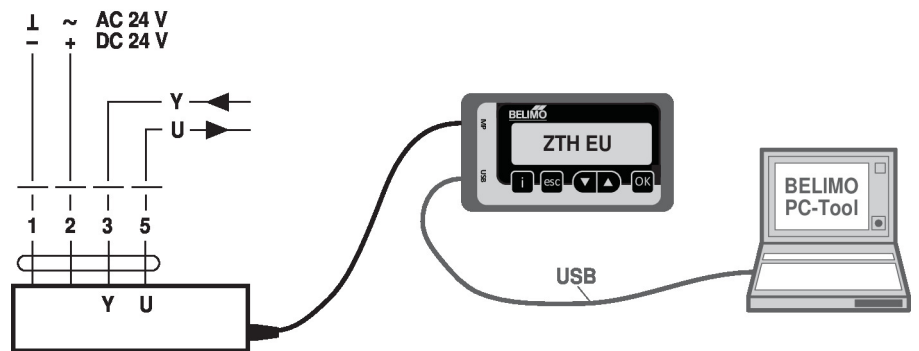
Counterclockwise: Actuator stem retracts

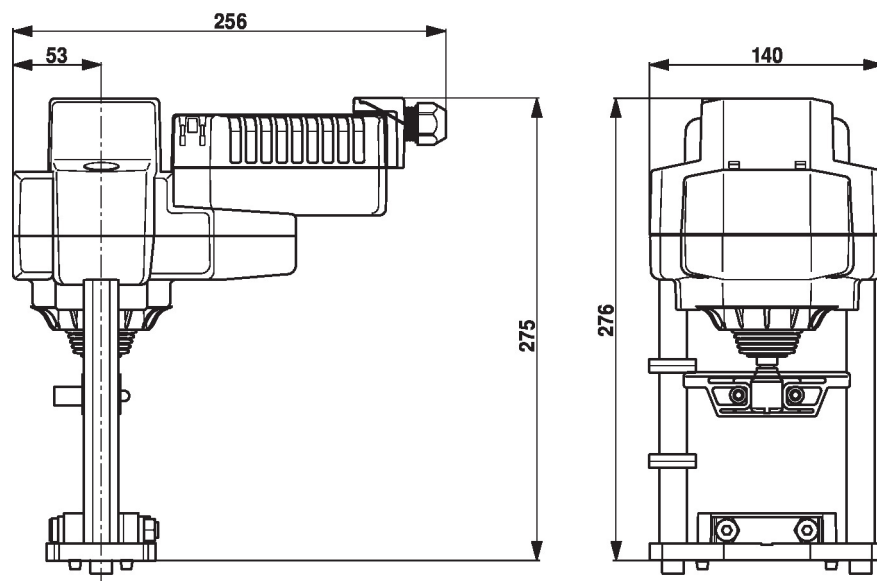Setting emergency setting position (POP)

Service

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

Further documentation

- The complete product range for water applications
- Installation instructions for actuators and/or globe valves
- Data sheets for globe valves
- Notes for project planning 2-way and 3-way globe valves
- General notes for project planning
- Tool connections
- Introduction to MP-Bus Technology
- Overview MP Cooperation Partners