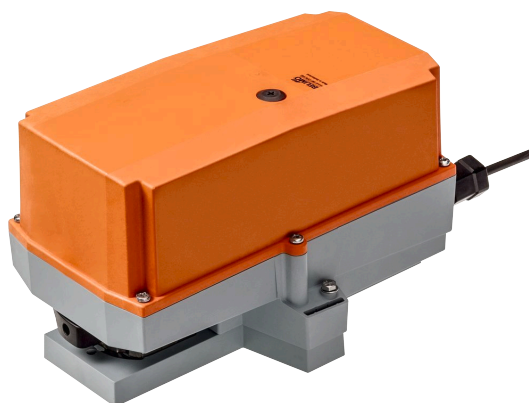


- Torque motor 20 Nm
- Nominal voltage AC/DC 24 V
- Control modulating, communicative 2...10 V variable
- Position feedback 2...10 V variable
- Conversion of sensor signals
- Communication via Belimo MP-Bus
- Optimum protection against corrosion and chemical influences, UV radiation, damp and condensation



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	3.5 W
	Power consumption in rest position	1.25 W
	Power consumption for wire sizing	6 VA
	Connection supply / control	Cable 1 m, 4 x 0.75 mm ² (halogen-free)
	Parallel operation	Yes (note the performance data)
Data bus communication	Communicative control	MP-Bus
	Number of nodes	MP-Bus max. 8
Functional data	Torque motor	20 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
	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
	Position accuracy	±5%
	Manual override	with push-button, can be locked
	Running time motor	90 s / 90°
	Running time motor variable	90...350 s
	Adaptation setting range	manual (automatic on first power-up)
	Sound power level, motor	45 dB(A)
	Position indication	Mechanically, pluggable
Safety data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	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	

Safety data	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
	Rated impulse voltage supply / control	0.8 kV
	Pollution degree	4
	Ambient temperature	-30...50°C
	Storage temperature	-40...80°C
	Ambient humidity	Max. 100% RH
	Servicing	maintenance-free
Mechanical data	Connection flange	F03/F04/F05
	Weight	Weight 1.8 kg

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 switch for changing the direction of rotation may only be operated by authorised specialists. The direction of rotation must not in particular be reversed in a frost protection circuit.
- The surface temperature between actuator and fitting may not exceed 50°C.
- 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.
- 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 information on chemical resistance refers to laboratory tests with raw materials and finished products and to trials in the field in the areas of application indicated.
- The materials used may be subjected to external influences (temperature, pressure, constructional fixture, effect of chemical substances, etc.), which cannot be simulated in laboratory tests or field trials.
- The information regarding areas of application and resistance can therefore only serve as a guideline. 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. The chemical or mechanical resistance of the materials used is not alone sufficient for judging the suitability of a product. Regulations pertaining to combustible liquids such as solvents etc. must be taken into account with special reference to explosion protection.
- When used under high UV loads, e.g. extreme sunlight, the use of flexible metallic or equivalent cable conduits is recommended.

Product features

Mode of operation Conventional operation:
 The actuator is connected with a standard modulating signal of 0...10 V and drives to the position defined by the control signal. The measuring voltage U serves for the electrical display of the actuator position 0.5...100% and as control signal for other actuators.
 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.

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.

Application For rotary valves and butterfly valves with the following mechanical specifications:
 – ISO 5211: F03, F04, F05 (hole circle diameter on the flange for mounting the fitting)
 – ISO 5211: quadratic, flat head or wedge-shaped spindle head geometry

Tappet shaft The form fit adapter is not included in the scope of delivery (see «Accessories»)
 further form fit adapters

ZPV-..		ZPF-..			ZSK-..	
Typ	s [mm]	Typ	s [mm]	d ₈ [mm]	Typ	d ₇ [mm]
ZPV-08	8	ZPF-08	8	17	ZPK-12	12
ZPV-09	9	ZPF-09	9	12	ZPK-14	14
ZPV-10	10	ZPF-10	10	17		
ZPV-11	11	ZPF-11	11	14		
ZPV-12	12	ZPF-14	14	18		
ZPV-14	14					

Simple direct mounting Simple direct mounting on the rotary valve or butterfly valve with mounting flange. The mounting orientation in relation to the fitting can be selected in 90° steps.

Manual override Manual override with push-button possible (the gear is disengaged for as long as the button is pressed or remains locked).
 The housing cover must be removed for manual override.

Adjustable angle of rotation Adjustable angle of rotation with mechanical end stops. Standard setting 0...90°. The housing cover must be removed to set the angle of rotation.

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 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.
 Factory setting: Y2 (counter-clockwise rotation).

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)

Accessories

	Description	Type	
Gateways	Gateway MP zu BACnet MS/TP	UK24BAC	
	Gateway MP to Modbus RTU	UK24MOD	
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	
	MP-Bus power supply for MP actuators	ZN230-24MP	
Mechanical accessories	Description	Type	
	Form fit adapter square 8x8x57 mm (LxWxH)	ZPV-08	
	Form fit adapter square 9x9x57 mm (LxWxH)	ZPV-09	
	Form fit adapter square 10x10x57 mm (LxWxH)	ZPV-10	
	Form fit adapter square 11x11x57 mm (LxWxH)	ZPV-11	
	Form fit adapter square 12x12x57 mm (LxWxH)	ZPV-12	
	Form fit adapter square 14x14x57 mm (LxWxH)	ZPV-14	
	Form fit adapter flat head 8xØ17x57 mm (WxØxH)	ZPF-08	
	Form fit adapter flat head 9xØ12x57 mm (WxØxH)	ZPF-09	
	Form fit adapter flat head 10xØ17x57 mm (WxØxH)	ZPF-10	
	Form fit adapter flat head 11xØ14x57 mm (WxØxH)	ZPF-11	
	Form fit adapter flat head 14xØ18x57 mm (WxØxH)	ZPF-14	
	Form fit adapter wedge groove Ø12x4x57 mm (ØxWxH)	ZPK-12	
	Form fit adapter wedge groove Ø14x5x57 mm (ØxWxH)	ZPK-14	
	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

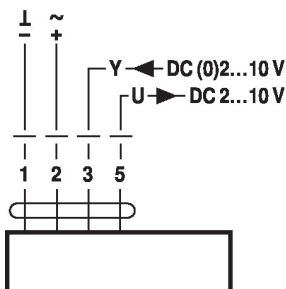

Supply from isolating transformer.

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

Direction of rotation switch is covered. Factory setting: Direction of rotation Y2.

Wiring diagrams

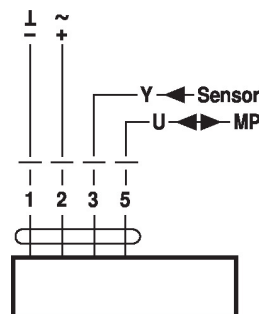
AC/DC 24 V, modulating



Cable colours:

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

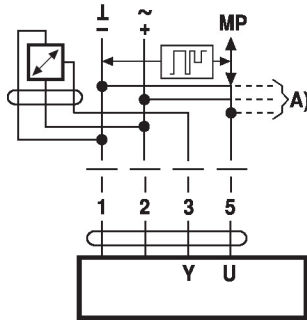
Operation on the MP-Bus



Cable colours:

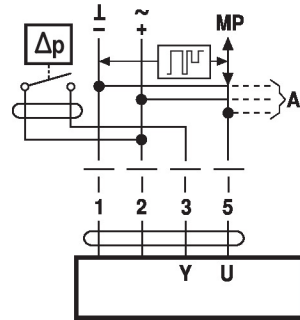
- 1 = black
- 2 = red
- 3 = white
- 5 = orange

Connection of active sensors



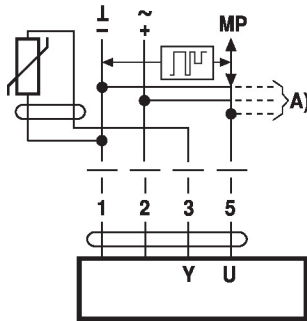
- A) additional MP-Bus nodes (max. 8)
- Supply AC/DC 24 V
 - Output signal DC 0...10 V (max. DC 0...32 V)
 - Resolution 30 mV

Connection of external switching contact



- 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



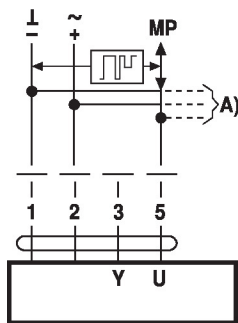
Ni1000	-28...+98°C	850...1600 Ω ²⁾
PT1000	-35...+155°C	850...1600 Ω ²⁾
NTC	-10...+160°C ¹⁾	200 Ω ...60 k Ω ²⁾

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

Functions

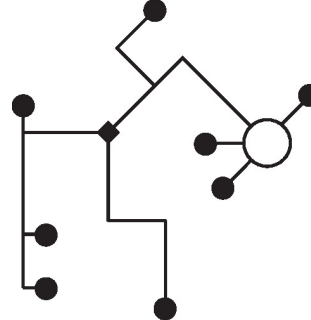
Functions when operated on MP-Bus

Connection on the MP-Bus



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

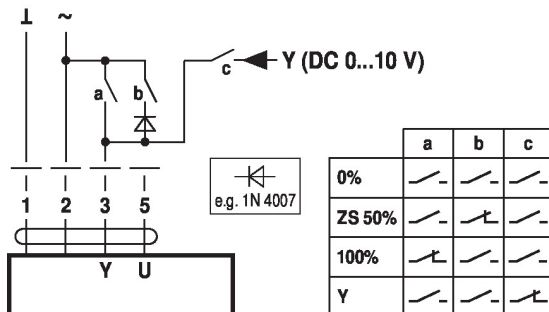
MP-Bus Network topology



- 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

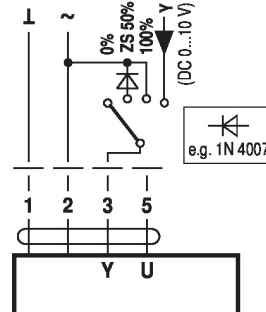
Functions with basic values (conventional mode)

Override control with AC 24 V with relay contacts

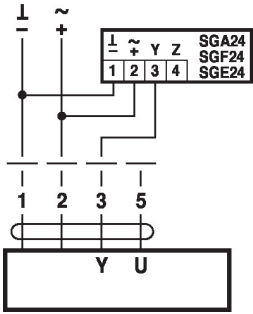


	a	b	c
0%			
ZS 50%			
100%			
Y			

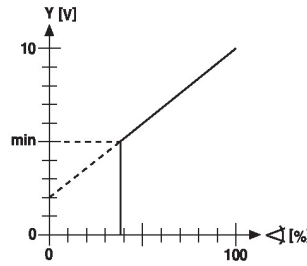
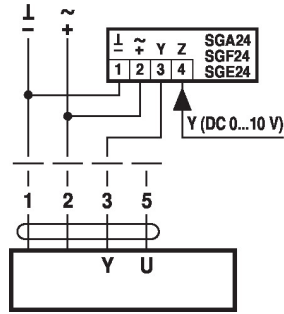
Override control with AC 24 V with rotary switch



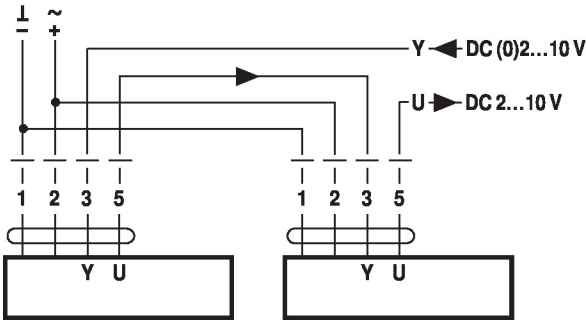
Control remotely 0...100% with positioner SG..



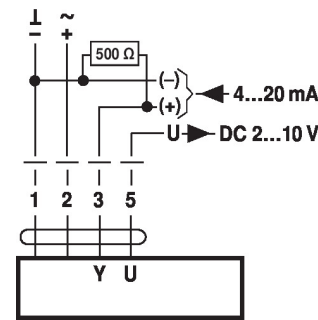
Minimum limit with positioner SG..



Follow-up control (position-dependent)

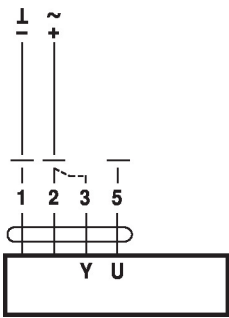


Control with 4...20 mA via external resistor



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

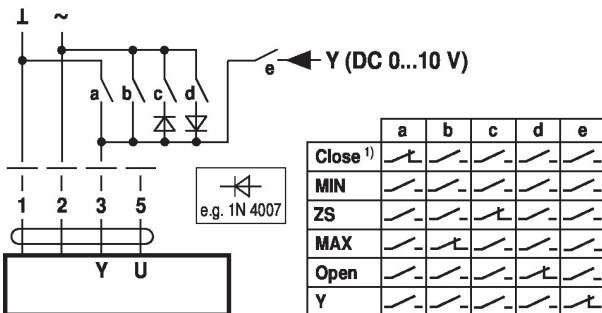


Procedure

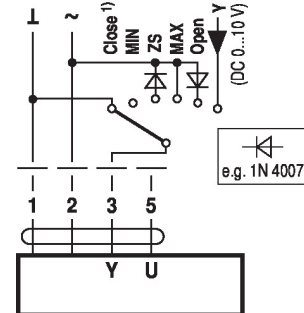
1. Connect 24 V to connections 1 and 2
2. Disconnect connection 3:
 - with direction of rotation Y1: Actuator rotates to the left
 - with direction of rotation Y2: Actuator rotates to the right
3. Short-circuit connections 2 and 3:
 - Actuator runs in opposite direction

Functions with specific parameters (parametrisation necessary)

Override control and limiting with AC 24 V with relay contacts

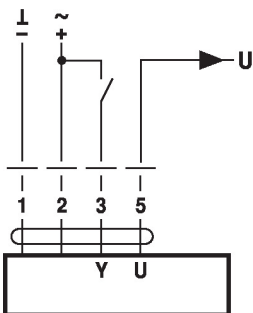


Override control and limiting with AC 24 V with rotary switch

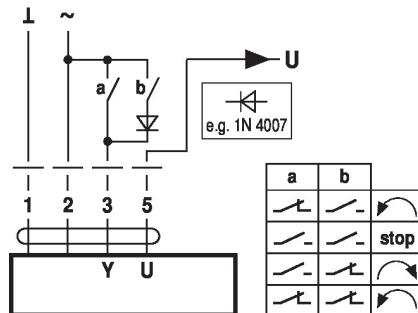


1) **Caution:** This function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

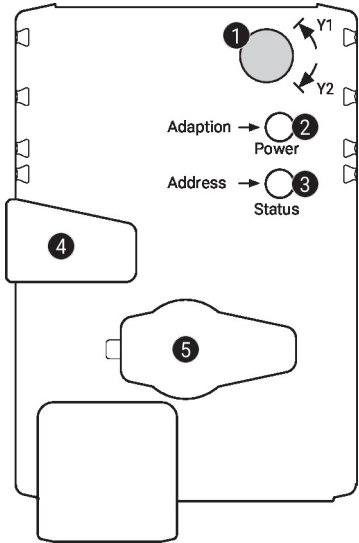
Control open/close



Control 3-point with AC 24 V



Operating controls and indicators



1 Direction of rotation switch

Switch over: Direction of rotation changes

2 Push-button and LED display green

Off: No power supply or malfunction
 On: In operation
 Press: Triggers angle of rotation adaptation, followed by standard mode button:

3 Push-button and LED display yellow

Off: Standard mode
 On: Adaptation or synchronisation process active
 Flickering: MP-Bus communication active
 Flashing: Request for addressing from MP client
 Press button: Confirmation of the addressing

4 Gear disengagement button

Press button: Gear disengages, motor stops, manual override possible
 Release button: Gear engages, standard mode

5 Service plug

For connecting parametrisation and service tools

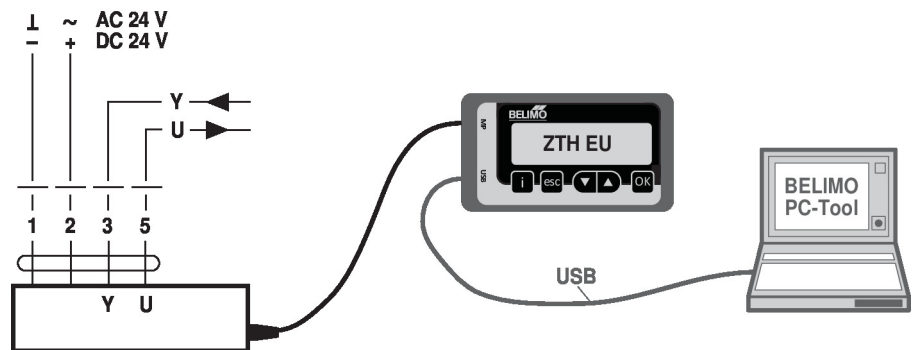
Check power supply connection

2 Off and **3** On Possible wiring error in power supply

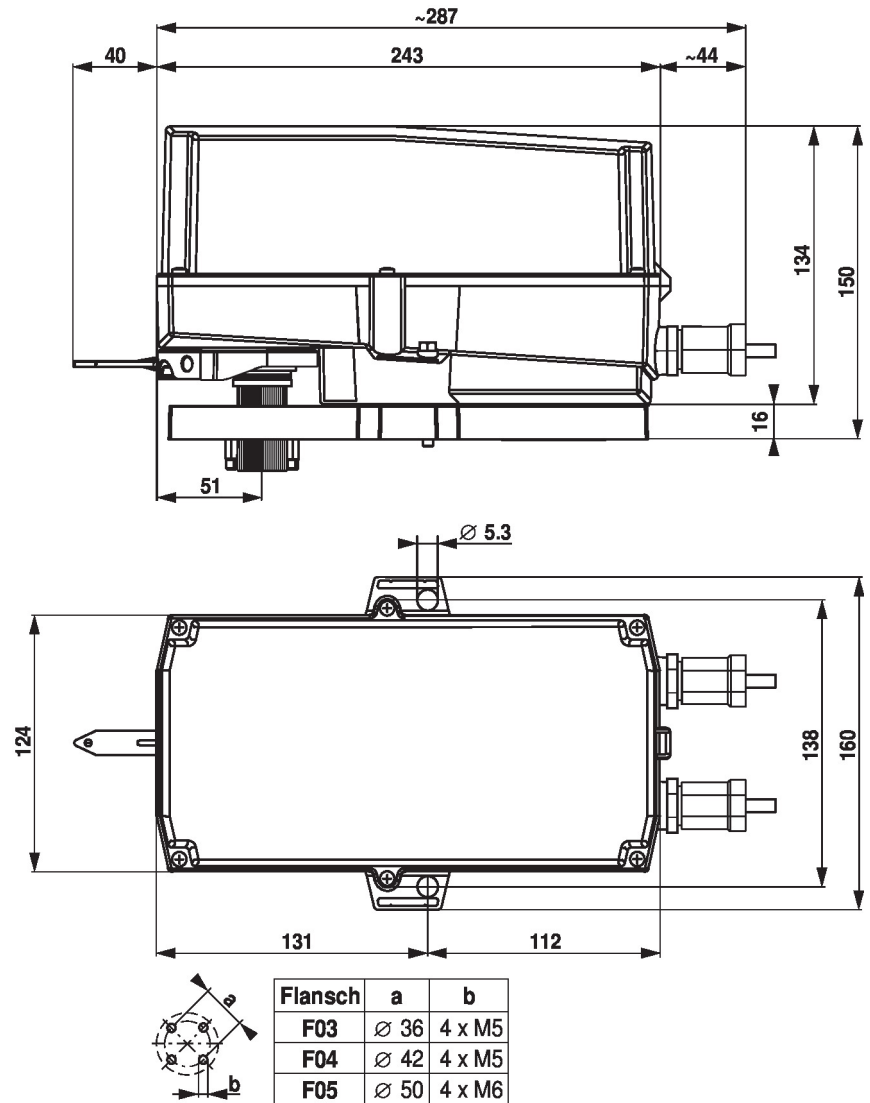
Service

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

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