

Communicative rotary actuator fail-safe for adjusting dampers in technical building installations

- Air damper size up to approx. 6 m<sup>2</sup>
- Torque motor 30 Nm
- Nominal voltage AC/DC 24 V
- Control modulating, communicative 2...10 V variable
- Position feedback 2...10 V variable
- Communication via Belimo MP-Bus
- Conversion of sensor signals



Picture may differ from product

## 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	9.5 W
Power consumption in rest position	4.5 W
Power consumption for wire sizing	16 VA
Connection supply / control	Cable 1 m, 4x 0.75 mm <sup>2</sup> (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	30 Nm
Torque fail-safe	30 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
Position accuracy	±5%
Direction of motion motor	selectable with switch L/R
Direction of motion variable	electronically reversible
Direction of motion fail-safe	selectable by mounting L/R
Manual override	by means of hand crank and locking switch
Angle of rotation	Max. 95°
Angle of rotation note	adjustable starting at 33% in 5% steps (with mechanical end stop)
Running time motor	150 s / 90°
Running time motor variable	60...150 s
Running time fail-safe	<20 s @ -20...50°C, <60 s @ -30°C
Sound power level, motor	45 dB(A)
Sound power level, fail-safe	71 dB(A)
Adaptation setting range	manual

## Technical data

<b>Functional data</b>	Adaptation setting range variable	No action Adaptation when switched on Adaptation after using the hand crank
	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
	Mechanical interface	Universal shaft clamp 12...26.7 mm
	Position indication	Mechanical
	Service life	Min. 60'000 fail-safe positions
<b>Safety data</b>	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Degree of protection IEC/EN	IP54
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Hygiene test	According to VDI 6022 Part 1
	Type of action	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Pollution degree	3
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	-30...50°C [-22...122°F]
	Storage temperature	-40...80°C [-40...176°F]
	Servicing	maintenance-free
<b>Weight</b>	Weight	4.6 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.
- 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 with during installation.
- 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.
- Cables must not be removed from the device.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section and the design, as well as 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.

## Product features

<b>Operating mode</b>	The actuator moves the damper to the operating position at the same time as tensioning the return spring. The damper is turned back to the fail-safe position by spring force when the supply voltage is interrupted.  Conventional operation:  The actuator is connected with an analogue control signal Y (note the operating range) and drives to the position defined. The measuring voltage U serves for the electrical display of the damper position 0...100% and as control signal for other actuators.  Operation on Bus:  The actuator receives its digital control 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.
<b>Converter for sensors</b>	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.
<b>Configurable device</b>	The factory settings cover the most common applications. Single parameters can be modified with Belimo Assistant 2.
<b>Simple direct mounting</b>	Simple direct mounting on the damper shaft with a universal shaft clamp, supplied with an anti-rotation mechanism to prevent the actuator from rotating.
<b>Shaft stabiliser</b>	The shaft clamp of the spring-return actuator is factory-equipped with a shaft stabiliser for the stabilisation of the combination of damper, damper shaft and actuator.  This is comprised of two plastic support rings and must be left in place, partially, or completely removed, depending on the installation situation and the shaft diameter.
<b>Manual override</b>	By using the hand crank the damper can be actuated manually and engaged with the locking switch at any position. Unlocking is carried out manually or automatically by applying the operating voltage.
<b>Adjustable angle of rotation</b>	Adjustable angle of rotation with mechanical end stops.
<b>High functional reliability</b>	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.
<b>Home position</b>	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.
<b>Adaptation and synchronisation</b>	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 actuating the hand crank is programmed. The synchronisation is in the home position (0%).  The actuator then moves into the position defined by the control signal.  A range of settings can be made using Belimo Assistant 2.

## Accessories

Tools	Description	Type
	Service tool for wired and wireless setup, on-site operation and troubleshooting.	Belimo Assistant 2
	Belimo Assistant Link Bluetooth and USB to NFC and MP-Bus converter for configurable and communicative devices	LINK.10
	Connecting cable 5 m, A: RJ11 6/4 LINK.10, B: 6-pin for connection to service socket	ZK1-GEN
	Connecting cable 5 m, A: RJ11 6/4 LINK.10, B: free wire end for connection to MP/PP terminal	ZK2-GEN
Electrical accessories	Description	Type
	Signal converter voltage/current 100 kΩ 4...20 mA, Supply AC/DC 24 V	Z-UIC
	Positioner for wall mounting	SGA24

## Accessories

	Description	Type
	Positioner for built-in mounting	SGE24
	Positioner for front-panel mounting	SGF24
	Positioner for wall mounting	CRP24-B1
	MP-Bus power supply for MP actuators	ZN230-24MP
Gateways	Description	Type
	Gateway MP to BACnet MS/TP	UK24BAC
	Gateway MP to Modbus RTU	UK24MOD
Mechanical accessories	Description	Type
	End stop indicator	IND-EFB
	Shaft clamp reversible, clamping range ø12...26.7 mm	K9-2
	Damper crank arm Slot width 8.2 mm, clamping range ø14...25 mm	KH10
	Actuator arm Slot width 8.2 mm	KH-EFB
	Mounting kit for linkage operation for flat and side installation	ZG-EFB
	Anti-rotation mechanism 230 mm, Multipack 20 pcs.	Z-ARS230
	Hand crank 63 mm	ZKN2-B

## Electrical installation



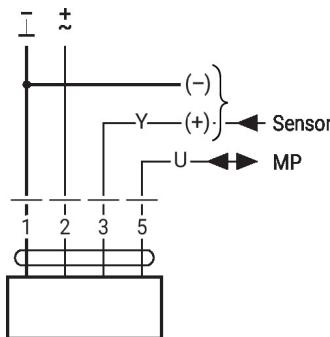
Supply from isolating transformer.

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

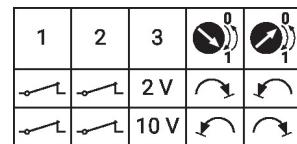
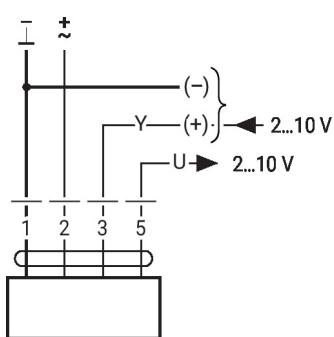
## Wire colours:

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

## MP-Bus



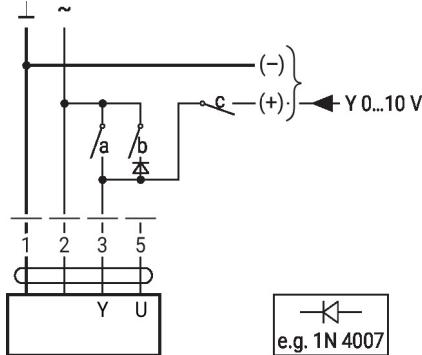
## AC/DC 24 V, modulating



## Further electrical installations

## Functions with basic values (conventional mode)

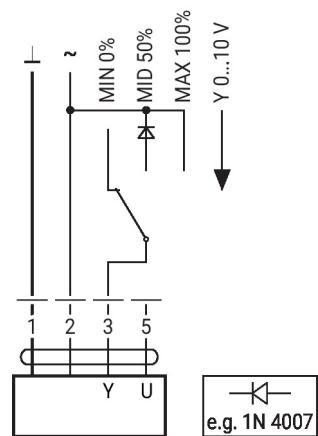
Override control with AC 24 V with relay contacts



1	2	a	b	c	
—	—	—	—	—	0 %
—	—	—	—	—	ZS 50%
—	—	—	—	—	100%
—	—	—	—	—	Y

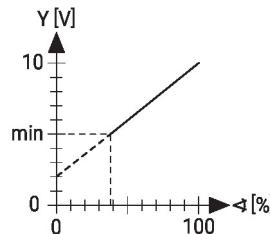
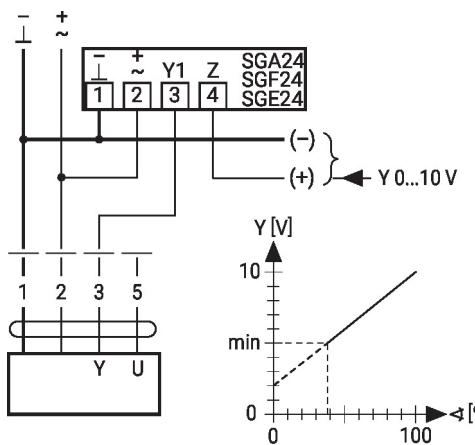
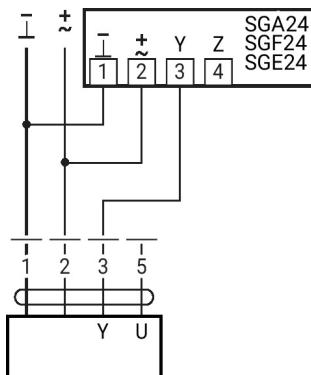
e.g. 1N 4007

Override control with AC 24 V with rotary switch

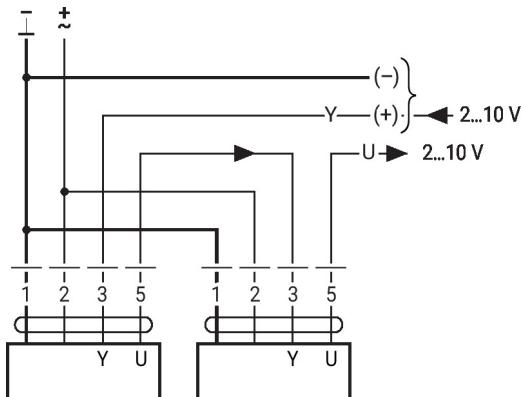


Control remotely 0...100% with positioner SG..

Minimum limit with positioner SG..

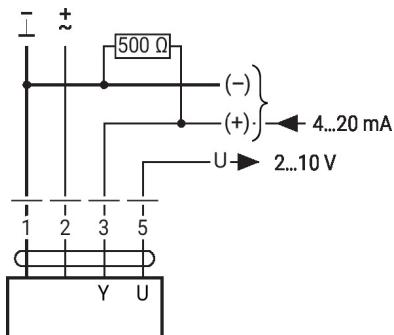


## Primary/secondary operation (position-dependent)

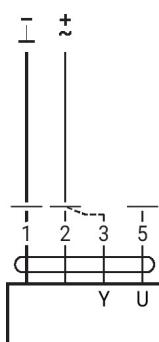


**Further electrical installations****Functions with basic values (conventional mode)**

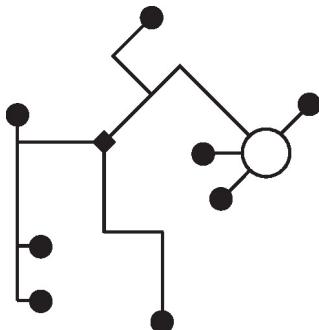
Control with 4...20 mA via external resistor

**Caution:**

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

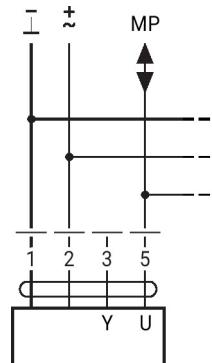
**Functional check****Procedure**

1. Connect 24 V to connections 1 and 2
2. Disconnect connection 3:
  - With direction of rotation 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

**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

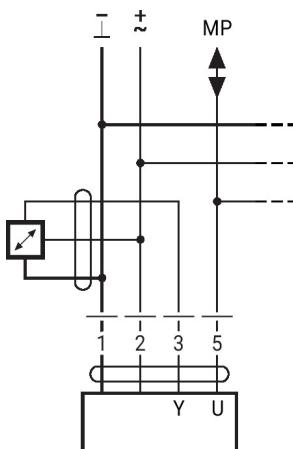
**Connection on the MP-Bus**

Max. 8 MP-Bus nodes

## Further electrical installations

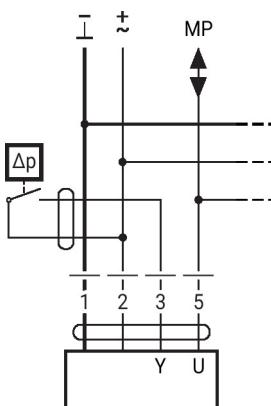
## MP-Bus

## Connection of active sensors



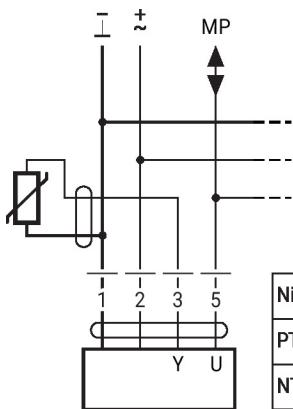
- Supply AC/DC 24 V
- Output signal 0...10 V (max. 0...32 V)
- Resolution 30 mV

## Connection of external switching contact



- Switching current 16 mA @ 24 V
- Start point of the operating range must be configured on the MP actuator as  $\geq 0.5$  V

## Connection of passive sensors

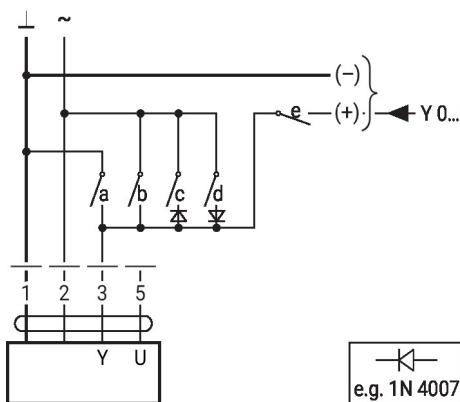


Ni1000	-28...+98°C	850...1600 $\Omega$ <sup>2)</sup>
PT1000	-35...+155°C	850...1600 $\Omega$ <sup>2)</sup>
NTC	-10...+160°C <sup>1)</sup>	200 $\Omega$ ...60 k $\Omega$ <sup>2)</sup>

1) Depending on the type  
 2) Resolution 1 Ohm  
 Compensation of the measured value is recommended

## Functions with specific parameters (configuration necessary)

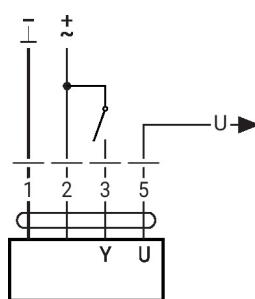
## Override control and limiting with AC 24 V with relay contacts



e.g. 1N 4007

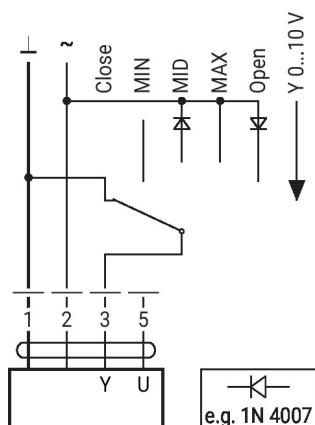
1	2	a	b	c	d	e	Close
o	o	o	o	o	o	o	MIN
o	o	o	o	o	o	o	ZS
o	o	o	o	o	o	o	MAX
o	o	o	o	o	o	o	Open
o	o	o	o	o	o	o	Y

## Control open/close

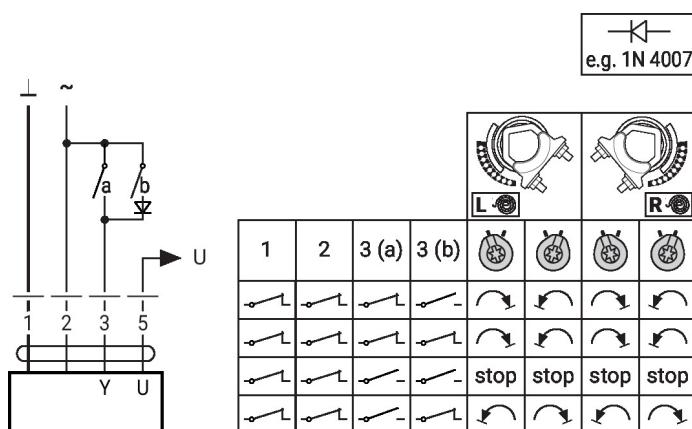
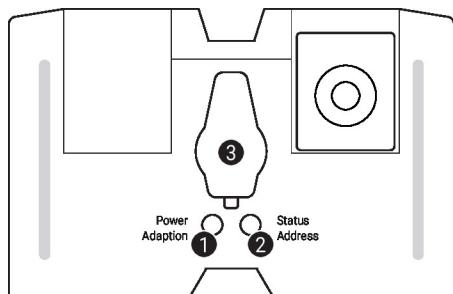


**Further electrical installations****Functions with specific parameters (configuration necessary)**

Override control and limiting with AC 24 V with rotary switch

**Caution:**

The "Close" function is only guaranteed if the start point of the operating range is defined as min. 0.5 V.

**Control 3-point with AC 24 V****Operating controls and indicators****① Membrane key and LED display green**

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

**② Membrane key 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

**③ Service plug**

For connecting configuration and service tools

**Check power supply connection**

① Off and ② On      Possible wiring error in power supply

## Installation notes



The shaft stabiliser must nevertheless be used with installation of the anti-rotation mechanism on the opposite side of the shaft clamp and a shaft diameter <20 mm.

**Shaft stabiliser long shaft mounting**

In the case of long shaft installation the use of the shaft stabiliser at a shaft diameter of

- 12...20 mm is necessary
- 21...26.7 mm is not necessary and can be removed

**Shaft stabiliser short shaft mounting**

In the case of short shaft installation, the necessity of the shaft stabiliser is dispensed with. It can be removed or – if the shaft length permits this – left in the shaft clamp.

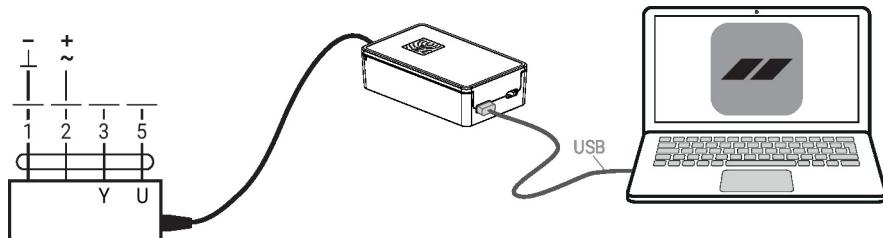
## Service

Using Belimo Assistant 2, device parameters can be modified. Belimo Assistant 2 can operate on a smartphone, tablet or PC. The available connection options vary depending on the hardware on which Belimo Assistant 2 is installed.

For more information about Belimo Assistant 2, refer to the Quick Guide – Belimo Assistant 2.

**Wired connection**

Belimo devices can be accessed by connecting Belimo Assistant Link to the USB port on a PC or laptop and to the Service Socket or MP-Bus wire on the device.



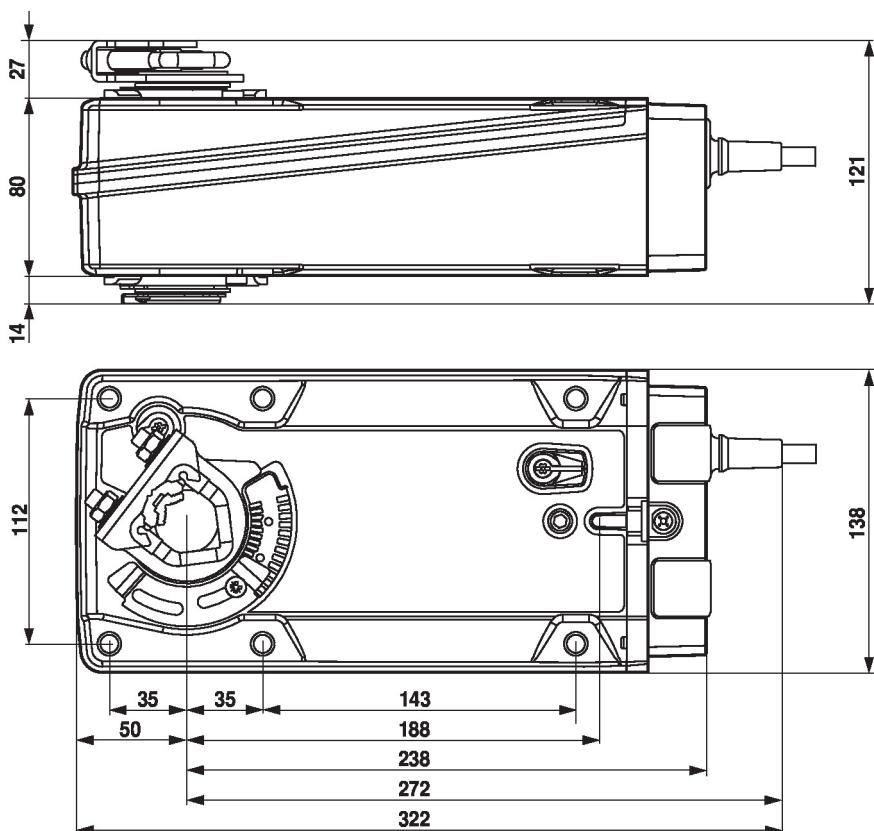
## Dimensions

## Shaft length

	Min. 117
	Min. 20 mm [0.75"]

## Clamping range

	 12...22	 12...18
	 22...26.7	 12...18



## Further documentation

- Overview MP Cooperation Partners
- Tool connections
- Introduction to MP-Bus Technology
- Quick Guide – Belimo Assistant 2