oventrop

Aktor M

Operating instructions EN

Aktor M

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1. General information

The original operating instructions are written in German.

The operating instructions in other languages have been translated from German.

1.1 Validity of the instructions

These instructions are valid for the electromotive actuator Aktor M (item no. 1158023).

1.2 Type plate

The type plate is affixed to the crossbeam of the product.

1.3 Scope of delivery

- Electromotive actuator Aktor M 24 V for Cocon QTR/QFC DN 40-DN 100
- Adapter set (item no. 11580203)
- Safety and installation advice

1.4 Contact

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59939 Olsberg
GERMANY
www.oventrop.com

Technical service
Phone: +49 (0) 29 62 82-234

1.5 Symbols used

	Highlights important information and further additions.
▶	Action required
•	List
1 2	Fixed order. Steps 1 to X.
▷	Result of action

2. Safety-related information

2.1 Intended use

Operational safety is only guaranteed if the product is used as intended.

The Aktor M ST/3P L, 24 V electromotive actuator is designed for the automated, finely graduated adjustment of Cocon QTR/QFC valves in nominal sizes DN 40 to DN 100 to control flow rates or mixing ratios in heating, ventilation and air conditioning systems.

Any use beyond and/or different from this is considered unintended use.

Claims of any kind against the manufacturer and/or his authorised representatives for damage resulting from unintended use cannot be recognised.

Intended use also includes correct compliance with these instructions.

2.2 Warnings

Each warning contains the following elements:

Warning symbol **SIGNAL WORD**

Type and source of danger!
Possible consequences if the danger occurs or the warning is ignored.

! Ways to avoid the danger.

Signal words define the severity of the danger posed by a situation.

DANGER

Indicates an imminent danger with high risk. If the situation is not avoided, death or most serious bodily injuries will result.

WARNING

Indicates a possible danger with moderate risk. If the situation is not avoided, death or serious bodily injuries may result.

CAUTION

Indicates a possible danger with lower risk. If the situation is not avoided, minor and reversible bodily injuries will result.

NOTICE

Indicates a situation that can potentially result in damage to property if not avoided.

2.3 Safety instructions

We have developed this product in accordance with current safety requirements.

Observe the following instructions for safe use.

2.3.1 Danger to life due to electric current

- ! Make sure that the product can be disconnected from the power supply at any time.
- ! Do not operate the product if there is visible damage.

During work on the product

- ! Disconnect all components from the power supply at all poles and secure them against being switched on again.
- ! Check that no voltage is present.

2.3.2 Danger due to insufficient personnel qualification

Work on this product may only be carried out by suitably qualified specialist tradespeople.

Due to their professional training and experience as well as knowledge of the relevant legal regulations, qualified specialist tradespeople are able to carry out work on the described product in a professional manner.

Operator

The operator must be instructed in the operation by specialist tradespeople.

2.3.3 Risk of burns on hot components and surfaces

- ! Allow the system to cool down before working on it.
- ! Wear suitable protective clothing to avoid unprotected contact with hot fittings and system components.

2.3.4 Risk of injury due to the weight of the product

- ! Always wear safety shoes during installation.
- ! If necessary, call in other people for the installation.
- ! If necessary, use a suitable lifting tool.

2.3.5 Risk of injury

Stored energy, angular components, points and corners can cause injuries.

- ! Ensure there is sufficient space before starting work.
- ! Handle open and sharp-edged components with care.
- ! Wear suitable protective clothing.
- ! Keep the working area tidy and clean to avoid sources of accidents.

2.3.6 Damage to property due to unsuitable location

- ! Do not install the product in rooms prone to frost.
- ! Do not install the product in wet or damp environments.
- ! Do not install the product in rooms with corrosion-enhancing ambient air.
- ! Ensure that the product is not exposed to strong sources of electromagnetic radiation.

2.3.7 Availability of the operating instructions

Every person who works with this product must have read and apply this manual and all applicable instructions.

The instructions must be available at the place of use of the product.

- ! Pass on these instructions and all applicable instructions to the operator.

3. Technical description

3.1 Design

Fig. 1: Design - side view

1 Cover

2 Handwheel

3 Current stroke position

4 Crossbeam

5 Position marker for lower valve control

6 Position marker for upper valve control

3.2 Functional description

The electromotive actuator Aktor M 24 V for Cocon QTR/QFC is used for the finely graduated stroke adjustment of Cocon QTR/QFC valves in nominal sizes DN 40 to DN 100 with a positioning force of 1000 N.

The actuator can be controlled with a modulating signal as well as with floating and on/off signals.

The actuator has self-adjusting position markers for stroke indication. The position indication is realised by a sliding bridge within the position markers.

For valve monitoring, an automatic valve blocking monitoring with elimination programme is integrated.

The operating mode selector switch can be used to switch the actuator to manual mode.

3.2.1 Automatic blocking logarithm with fault message

If a blockage occurs within the valve stroke due to foreign bodies in the pipeline, the actuator signals this fault by means of a feedback signal.

Setting	Feedback signal
V (DIP B2 = ON)	The actuator signals the fault with a feedback signal of 12.5 V
mA (DIP B2 = OFF)	The actuator signals the fault with a feedback signal of 0 mA.

By means of an automatic elimination logarithm, the actuator then tries to eliminate the blockage several times on its own by lifting the valve plug for a short time.

3.2.2 Switchable end position hysteresis

The end position hysteresis is the point at which the actuator moves to the end position.
For the hysteresis, the values 0.5 V (1 mA) or 0.2 V (0.4 mA) are set via DIP switch A1.
Example: With hysteresis 0.5 V, the end position is moved at Yin < 0.5 V and > 9.5 V. In this case, the feedback is a signal of 0 V or 10 V.

3.2.3 Feedback

The feedback can be inverted separately from the Yin via DIP switch B4. The output of the feedback can be switched between absolute and relative position via DIP switch A2. The signal is output in 2..10 V or 4..20 mA when DIP switch B5 is in ON position.

3.2.4 Actuator heating

The actuator heating is used to prevent condensation at low temperatures.
The function is activated via DIP switch A3.

3.2.5 Priority switch

The priority switch is a direct control and superimposes the modulating Y input signal for a valve position Open or Closed on terminals 2 or 3 (e.g. frost protection or limitation).

3.2.6 Valve blocking protection

If the system conditions permit, the valve blocking protection can be activated during commissioning.
The valve blocking protection prevents the plug from getting stuck when the valve is at a standstill for a longer period of time during summer break in heating systems.
When the valve blocking function is activated, the valve plug is lifted for a few seconds if there has been no stroke movement within 21 days.
This functionality can be activated via DIP switch B1.

3.2.7 Safety end position / resynchronisation of the end position

Operating mode	Behaviour
Modulating control / Automatic mode	After a voltage reset, after the end of manual mode (Stop) or after the end of manual adjustment via the magnetic contact, the end position is resynchronised by moving to the safety end position.
On/off or floating control / Automatic mode	After finishing the manual adjustment via the magnetic contact, the end position is resynchronised by moving to the current end position again.
Manual mode (Open/ Closed) or priority switch (Open/Closed)	After termination of the manual adjustment via the magnetic contact or after a voltage reset, the end position is resynchronised by moving to the current end position again.

The direction of the safety end position can be set via DIP switch B6.

In addition, the safety end position is approached in case of a detected wire breakage (see wire breakage detection).

In this case, the feedback via Yout is a signal of approx. 12.5 V or 0 mA, depending on the position of DIP switch B2.

3.2.8 Dynamic Yin damping / Balancing external disturbances

To prevent the actuator from oscillating when external disturbances are coupled to the control line Y, the input hysteresis band is automatically increased.
If the fault no longer occurs, the hysteresis is reset to minimum values. This function largely prevents external disturbances and avoids unnecessary temperature fluctuations and wear on the actuator and valve.

3.2.9 Wire breakage detection

To use this function, the setting range must be set to 2..10 V or 4..20 mA (DIP switch B5).

With in input signal in modulating mode of < 2 V or 4 mA, the actuator moves to the safety position.

In this case, the feedback via Yout takes place with a signal of approx. 12.5 V or 0 mA.

3.2.10 Priorities in the execution of the input signals

Prio.	Operating mode	Feedback
1	Manual adjustment (via cover or via DIP)	Fault message 12.5 V or 0 mA
2	Init. (automatic or via DIP)	Fault message 12.5 V or 0 mA
3	Priority switch (Open) = 0 V (travel up)	Position 0..100 %
4	Priority switch (Closed) = 0 V (travel down)	Position 0..100 %
5	Manual mode (Stop) M = open (only after M = 0 V (wire jumper))	Fault message 12.5 V or 0 mA
6	Valve blocking protection	Position 0..100 %
7	On/off / floating mode 2 = 24 V (travel up)	Position 0..100 %
8	On/off / floating mode 3 = 24 V (travel down)	Position 0..100 %
9	Modulating control (Yin)	Position 0..100 %

3.3 Operating elements and displays

3.3.1 Cover

Fig. 2: Design - top view

1 Cover screws

2 Automatic mode

3 Operating mode selector switch

4 Manual adjustment

3.3.2 DIP switches and LED

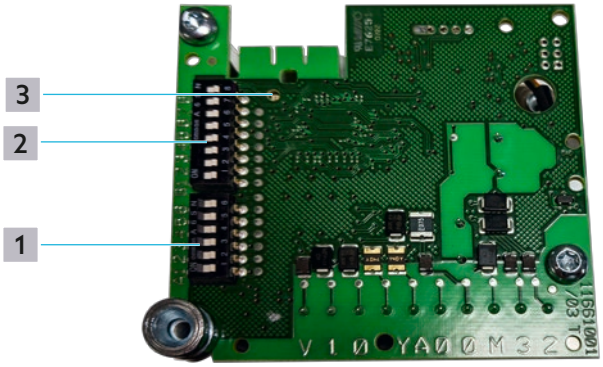

Fig. 3: DIP switches and LED

1 DIP switches A (1-6)

2 DIP switches B (1-8)

3 LED

3.3.3 LED displays

LED display	Meaning
LED lights up green	Normal operation / Automatic mode
	Valve blocking protection
	Safety end position
LED flashes green	Initialisation (valve adaptation)
LED lights up green + LED flashes red quickly = LED flashes orange quickly	Wire breakage with DIP switch B5 ON and 2..10 V or 4..20 mA and Yin < 1 V or 2 mA
LED lights up green + LED flashes red = LED flashes orange	Manual adjustment or manual mode (Stop) / Actuator does not follow the control signal
LED lights up red	Unsolvable blockade
LED flashes red	Initialisation failed / Actuator does not follow the control signal
LED flashes red quickly	Operating voltage too low

3.4 Technical data

Technical data	
Nominal voltage	24 V AC/DC ±10 %; 50/60 Hz
Dimensioning	18 VA (AC); 9 W (DC) with actuator heating: 24 VA (AC); 12 W (DC)
Switch-on current	max. 7 A, < 1 ms, < 0.049 A^2s *
Power consumption	Sleep mode: 1.6 VA (AC); 0.6 W (DC) 1.9 s/mm and 2.6 s/mm: nominal: 9 VA (AC); 4.5 W (DC) 5.5 s/mm and 9 s/mm: nominal: 3 VA (AC); 1.5 W (DC)
Control	Floating signal (Open/ Stop/Closed); minimum switch-on time 2 s On/off signal (Open/ Closed) or modulating control; alternatively adjustable with voltage signal 0(2)..10 V DC; Re=100 kΩ; invertible or with current signal 0(4)..20 mA; invertible
Cable cross-section	min. 0.75 mm^2
Stroke	max. 20 mm, automatic stroke adaptation
Position feedback	0(2)..10 V DC; 5 mA for 0..100 % positioning stroke; invertible; approx. 12.5 V signal in case of fault or 0(4)..20 mA; Ri= 0.5 kΩ for 0..100 % positioning stroke; invertible; approx. 0 mA signal in case of fault
Positioning speed	Adjustable via DIP switches (see page 34): 1.9 s/mm 2.6 s/mm 5.5 s/mm (factory setting) 9 s/mm
Positioning force	nominal 1000 N
Sound power	approx. 38 dB(A) at 5.5 s/mm
Ambient temperature	0..55 °C
Ambient humidity	0..95 % r.h., non-condensing
Protection type	IP54 (upper half-sphere), IP40 (lower half-sphere) (see Fig. 5 on page 12)
Protection class	III according to EN 60730
Mounting position	360°
Maintenance	Maintenance-free
Weight	1.45 kg

3.5 Dimensions

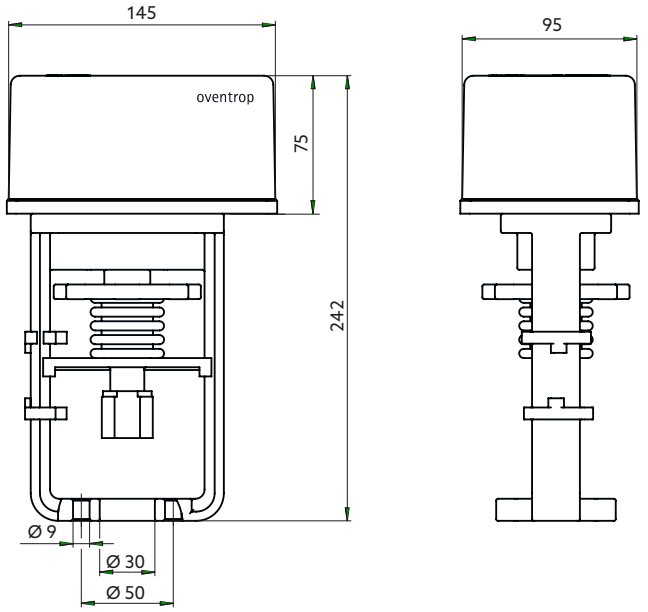

Fig. 4: Dimensions

4. Transport and storage

Parameter	Value
Temperature range	0 °C to +40 °C
Relative air humidity	max. 95 %
Particles	Store in a dry and dust-protected place
Mechanical influences	Protected from mechanical shock
Weather influences	Do not store outdoors
	Protect from sunlight
Chemical influences	Do not store together with aggressive media

5. Mounting

Keep the actuator in its original packaging for protection until mounting.

Allow for sufficient free space for mounting the actuator. A free space of at least 100 mm must remain above the actuator.

Make sure that there is no differential pressure in the valve body. Close the corresponding gate valves and switch off the pumps.

Mount the actuator before connecting the power supply!

CAUTION

Risk of burns on hot components!
Touching hot components can cause burns.

- Allow the valve to cool down before working on it.
- Wear suitable protective clothing to avoid unprotected contact with hot fittings and system components.

CAUTION

Risk of injury due to the weight of the product!
Holding or carrying a heavy actuator-valve combination or dropping the product can cause injuries.

- Always wear safety shoes during installation.
- If necessary, call in other people for the installation.
- If necessary, use a suitable lifting tool.

5.1 Installation positions

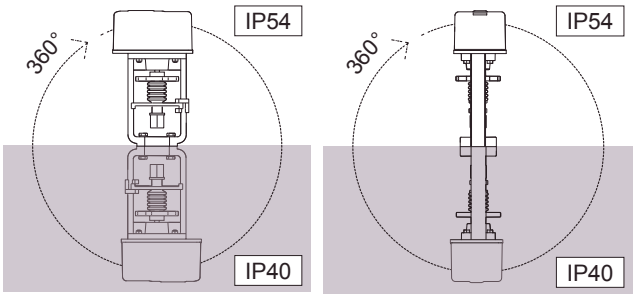

Fig. 5: Installation positions

The actuator can be mounted vertically above and below the valve up to the horizontal position. For horizontal installation, the actuator columns must be vertically above each other. If necessary, turn the crossbeam (for this you have to loosen the fastening nut).

5.2 Mounting of the actuator

1 Position the union nut over the valve spindle.

2 Insert the circlip into the union nut.

3 Loosen the threaded pin in the drive ring with a 2.5 mm hexagon socket.

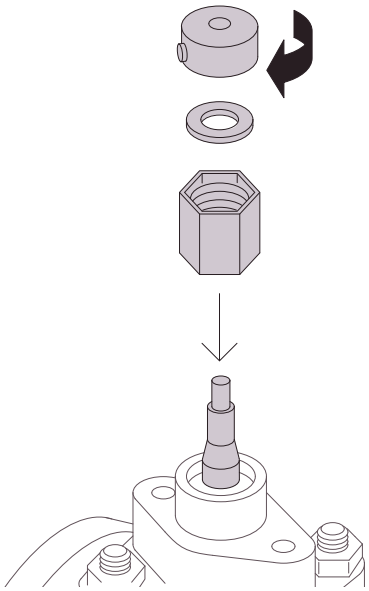

Fig. 6: Positioning of the union nut

4 Position the drive ring on the valve spindle.

5 Tighten the threaded ring with a 2.5 mm hexagon socket and a tightening torque of 3 Nm.

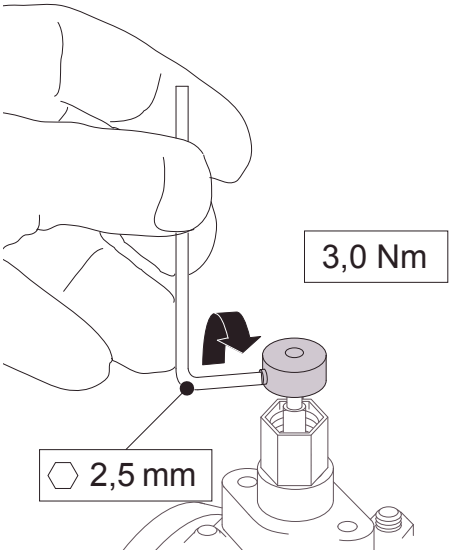

Fig. 7: Positioning of the drive ring

6 Position the actuator on the valve.

Make sure that the actuator crossbeam rests stress-free on the valve crossbeam.

7 Hand-tighten the screws ISO4017-M8x25-8.8.

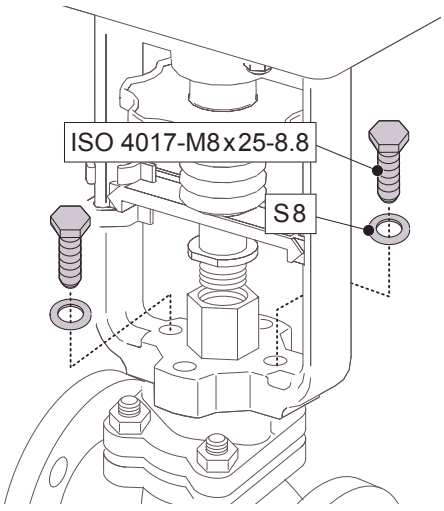

Fig. 8: Positioning of the actuator on the valve

8 Tighten the union nut by hand.

9 Tighten the union nut with a 24 mm open-end spanner and a tightening torque of 6 Nm.

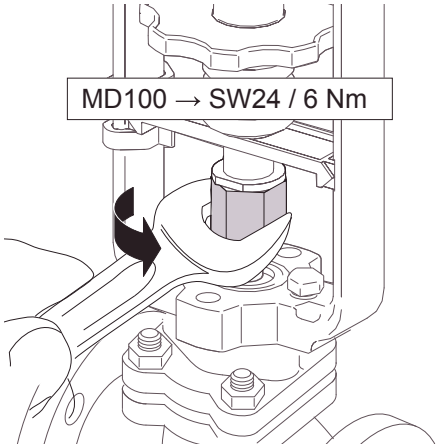

Fig. 9: Tightening of the union nut

10 Tighten the screws ISO4017-M8x25-8.8 with an open-end spanner and a tightening torque of 14 Nm.

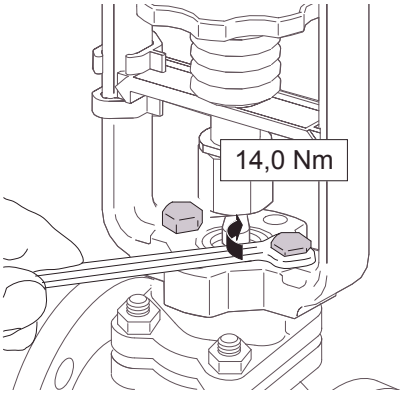

Fig. 10: Tightening of the screws

5.3 Electrical connection of the actuator

CAUTION

Risk of injury from electric current!
A short circuit of the 24 V voltage can cause burns and fires.

- ! Disconnect the product from the power supply at all poles.
- ! Check that no voltage is present.
- ! Secure the product against being switched on again.
- ! Only install the product in dry indoor areas.

NOTICE

Damage to the actuator due to wrong polarity!

- ! Connect the actuator as a fixed installation.

NOTICE

Damage to the actuator due to commissioning without valve!

- ! Only connect the actuator electrically after mounting it on a valve.

The permissible minimum cable cross-section is 0.75 mm². Consider an appropriate adjustment of the cable cross-section if long cables have to be laid.

When doing so, take into account the installation specifications valid for the application at the installation site.

5.3.1 Operating modes

5.3.1.1 Modulating mode mA/V (0..100 %)

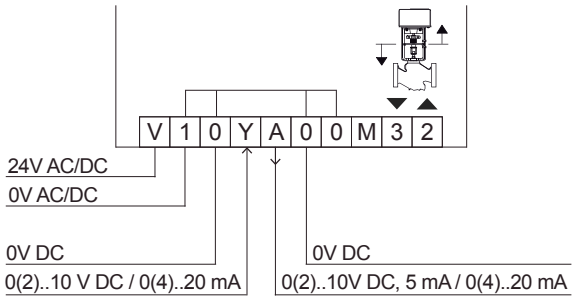

Fig. 11: Modulating mode mA/V (0..100 %)

5.3.1.2 Priority switch (Open / Closed)

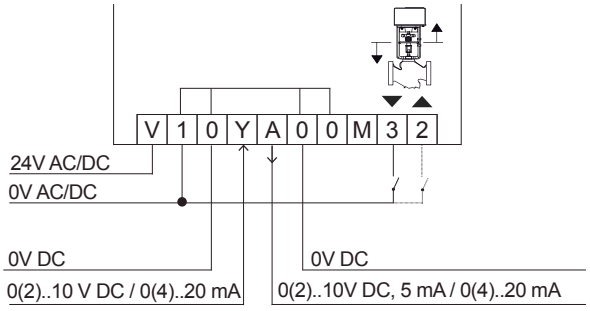

Fig. 12: Priority switch (Open / Closed)

5.3.1.3 On/off mode (Open / Closed)

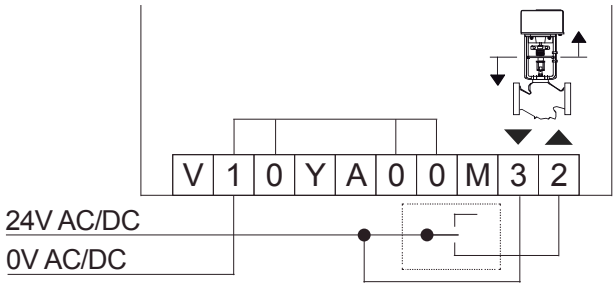

Fig. 13: On/off mode (Open / Closed)

5.3.1.4 Floating mode (Open / Stop / Closed)

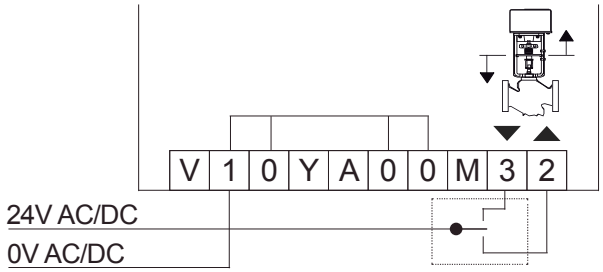

Fig. 14: Floating mode (Open / Stop / Closed)

5.3.1.5 Manual mode with operating mode selector switch (Auto / Stop / Closed / Open)

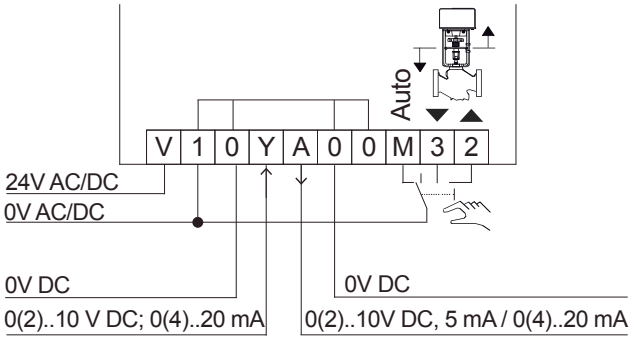

Fig. 15: Manual mode with operating mode selector switch (Auto / Stop / Closed / Open)

5.3.2 Cabling

1. Loosen the cover screws (position 1 in Fig. 2 on page 9).
2. Lift off the cover.

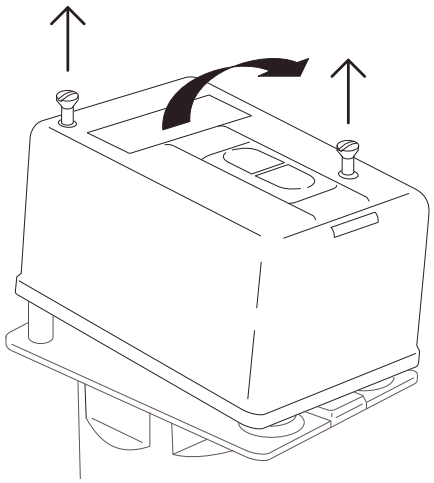

Fig. 16: Loosening of the cover screws

3. Mount the screwed cable gland.

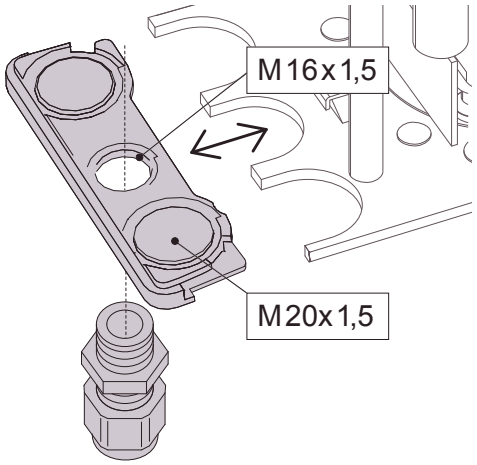

Fig. 17: Mounting of the screwed cable gland

4. Guide the connection cable through the screwed cable gland.

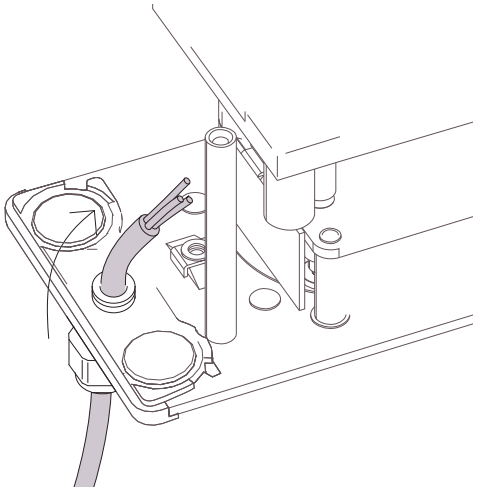

Fig. 18: Guiding of the connection cable through the screwed cable gland

5 Disconnect the connector plug from the actuator.

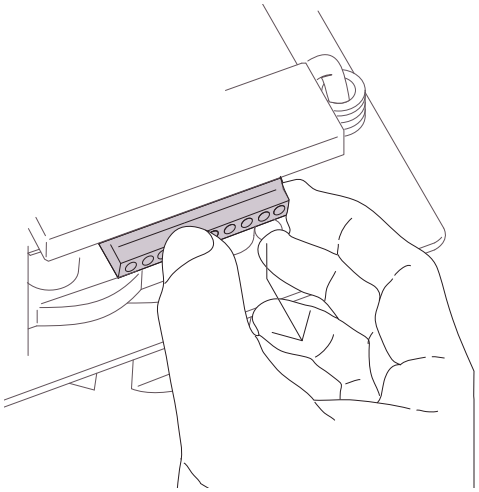

Fig. 19: Loosening of the connector plug

6 Connect the electrical connection to the connector plug according to the desired operating mode (par. 5.3.1 on page 13).

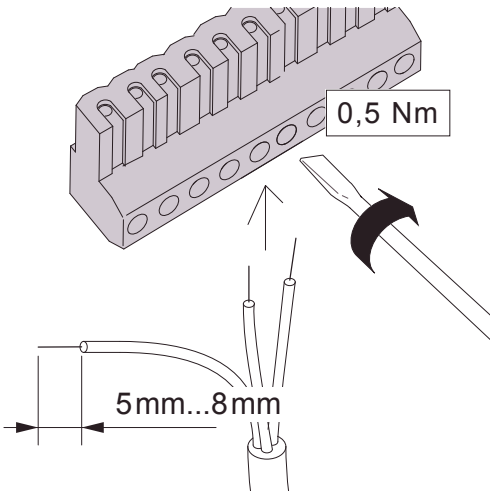

Fig. 20: Cabling of the connector plug

7 Plug in the configured connector plug.

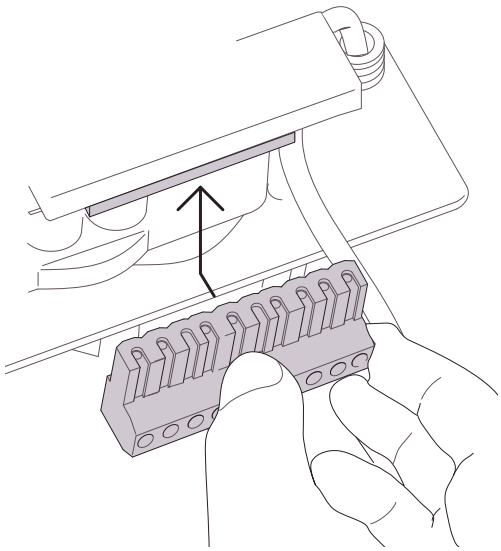

Fig. 21: Plugging in the connector plug

8 Hand-tighten the screwed cable gland until the cable connects tightly.

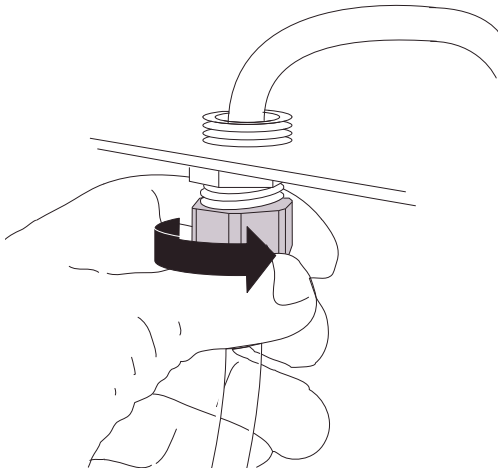

Fig. 22: Tightening of the screwed cable gland

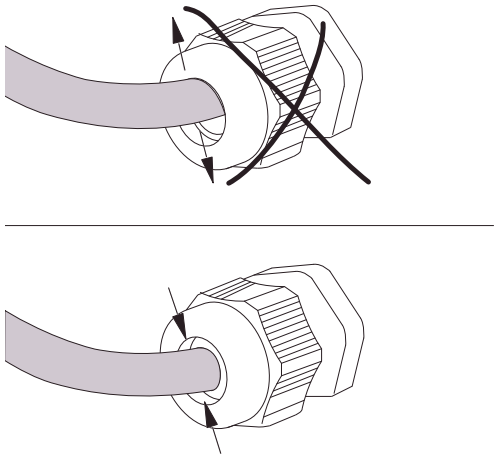

Fig. 23: Tight connection of the screwed cable gland

6. Commissioning

6.1 Setting of the DIP switches

NOTICE

Damage to the actuator due to short circuit!
Touching conductive areas of the PCB with a conductive tool can damage electronic components.

! Do not use conductive tools to adjust the DIP switches.

6.1.1 DIP switches A

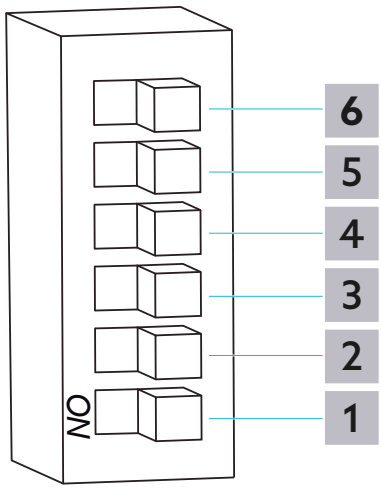

Fig. 24: DIP switches A

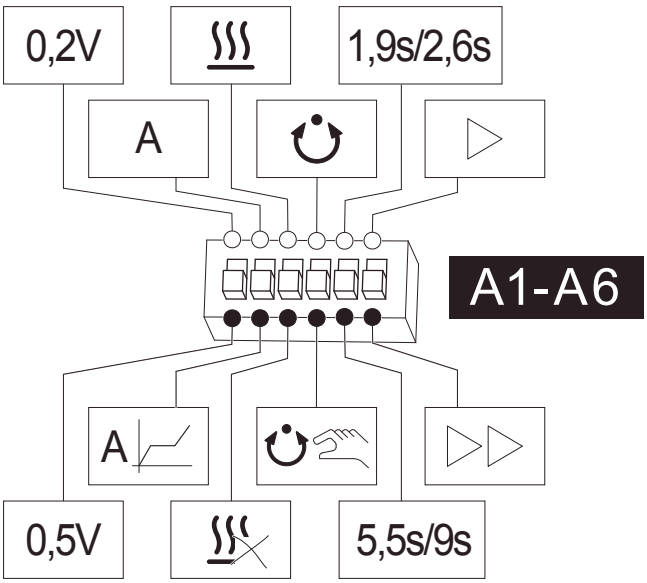

Fig. 25: Settings of DIP switches A

DIP	ON	OFF	Function
1	■		Hysteresis: 0,2 V (0.4 mA)
1		■	Hysteresis: 0,5 V (1 mA)
2	■		Feedback: absolute position
2		■	Feedback: relative position
3	■		Actuator heating: On (is switched on at low temperatures)
3		■	Actuator heating: Off
4	■		Automatic mode: On
4		■	Automatic mode: Off Function of the magnetic switch active
5 6		■ ■	Positioning speed 5.5 s/mm
5 6	■	 ■	Positioning speed 1.9 s/mm
5 6	 ■	■	Positioning speed 9 s/mm
5 6	■ ■		Positioning speed 2.6 s/mm

Relative position:

Regardless of the set valve characteristic line, Yin = Yout when reaching the control position.

Absolute position:

Depending on the set valve characteristic line, Yout can deviate from Yin when reaching the control position. Example equal-percentage characteristic line: Yin = 4 V →Yout = 3.5 V

6.1.2 DIP switches B

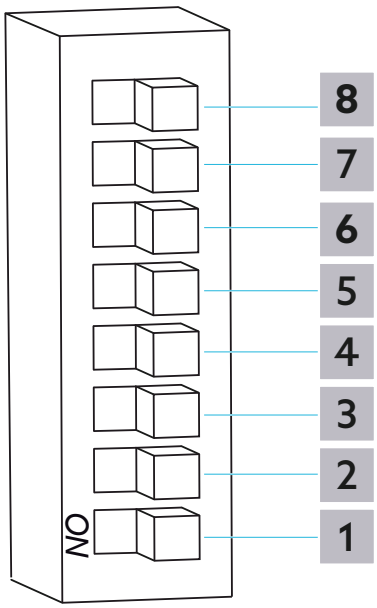

Fig. 26: DIP switches B

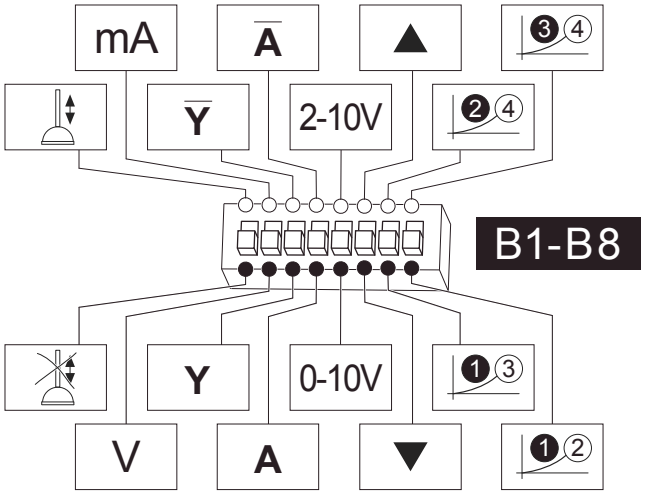

Fig. 27: Settings of DIP switches B

DIP	ON	OFF	Function
1	■		Valve blocking protection: On
1		■	Valve blocking protection: Off
2	■		Signal (Yin + Yout): mA
2		■	Signal (Yin + Yout): V
3	■		Inversion (Yin): 0..10 V (0..20 mA) →100..0 %
3		■	Inversion (Yin): 0..10 V (0..20 mA) →0..100 %
4	■		Inversion (Yout): 0..100 % →10..0 V (20..0 mA)
4		■	Inversion (Yout): 0..100 % →0..10 V (0..20 mA)
5	■		Setting range (Yin + Yout): 2..10 V (4..20 mA) →0..100 %
5		■	Setting range (Yin + Yout): 0..10 V (0..20 mA) →0..100 %
6	■		Safety end position: Top
6		■	Safety end position: Bottom
7 8		■ ■	Characteristic line 1
7 8	■	 ■	Characteristic line 2
7 8		■ ■	Characteristic line 3
7 8	■ ■		Characteristic line 4

6.2 Functional test

In the standard setting, the actuator switches to manual mode when the cover is removed.

1. Set DIP switch A4 to ON to be able to perform a functional test without cover.
2. Establish the power supply.

▷ The LED (position 3 in Fig. 3 on page 9) flashes green.

▷ The actuator performs an initialisation run to adapt to the valve stroke.
The valve is fully opened and closed once. In this case, the feedback via Yout takes place with a signal of approx. 12.5 V or 0 mA.

▷ The completed initialisation is indicated by a steady light.

3. Set DIP switch A4 to OFF to reactivate the function of the cover's magnetic switch.
4. Put the cover on and tighten the screws.

▷ The actuator is ready for operation.

6.3 Initialisation run

After remounting or after changing the setting of the maximum flow rate on the valve, a new valve adaptation must be carried out by reinitialisation.

▶ Switch DIP switch A5 back and forth (change switch position).

▷ The actuator performs a re-initialisation.

7. Operation

7.1 Operating mode selector switch

Operating mode	Setting
Automatic mode	With the cover in place, set the operating mode selector switch to automatic mode (position 2 in Fig. 2 on page 9)
Manual adjustment	With the cover in place, set the operating mode selector switch to manual adjustment (position 4 in Fig. 2 on page 9)

7.2 External operating mode selector switch (manual mode)

An external operating mode selector switch (par. 5.3.1.5 on page 14) can be used to switch between automatic mode, Stop, Closed and Open.

7.3 Superimposition through DIP switches

Operating mode	Setting
Automatic mode	Operating mode selector switch to manual adjustment and DIP switch A4 to ON.
	When the cover has been removed, automatic mode can be activated by setting DIP switch A4 to ON. This function is only permitted for qualified tradespeople.
Manual adjustment	Operating mode selector switch to automatic mode and DIP switch A4 to ON.

7.4 Manual adjustment

If the operating mode manual adjustment has been activated, the valve can be adjusted at the handwheel of the actuator (position 2 in Fig. 1 on page 7).

8. Troubleshooting

CAUTION

Risk of burns on hot surfaces or danger of hypothermia on cold surfaces!
If there is a hardware or software error, an unexpected positioning movement and opening of the valve may occur. Severe burns or hypothermia are possible when coming into contact with hot or cold surfaces on valves and pipelines.

- ! Before starting work, wait until the valve has approximately reached the ambient temperature.
- ! Wear suitable protective clothing to avoid unprotected contact with hot fittings or system components.

8.1 Troubleshooting table

FAULT	CAUSE	REMEDY
The actuator does not move, the LED is off	Mains failure	Restore the power supply.
	The actuator is connected incorrectly	Check and correct the cabling.
	Short circuit due to incorrect connection	Check and correct the cabling.
	The main board is defective	Contact your specialist dealer.
The actuator does not move, the LED lights up green + the LED flashes red	The actuator is in manual mode	Trigger an initialisation or set the jumper between 0 and M
The actuator moves unstably	Voltage failure due to too long electrical connection cable and/or too small a cross-section	Measure the operating voltage. Recalculate and replace electrical connection cables.
	The mains fluctuations are greater than the permissible tolerance	Improve the grid conditions.
The actuator temporarily stops	The supply cable has a loose contact	Check and tighten the connections on the terminal strip.
The actuator does not move or does not move correctly to the valve position specified by the input signal, the valve does not close or open	The valve is stuck	Ensure a smooth-running valve or replace the valve.
	The valve is stuck	Ensure a smooth-running valve or replace the valve.
	The differential pressure is too high	Set the differential pressure correctly.
	The main board is defective	Contact your specialist dealer.

9. Maintenance

9.1 Maintenance

No maintenance work is required for the Aktor M actuator.

9.2 Cleaning

No cleaning is required for the Aktor M actuator.

10. Dismantling and disposal

When the product reaches the end of its service life or has an irreparable defect, it must be dismantled and disposed of in an environmentally friendly manner or the components must be recycled.

CAUTION

Risk of burns on hot components!
Touching hot components can cause burns.

- ! Make sure that there is no differential pressure in the valve body. If necessary, close the gate valves and switch off the pumps.
- ! Allow the valve to cool down before working on it.
- ! Wear suitable protective clothing to avoid unprotected contact with hot fittings and system components.

CAUTION

Risk of injury due to the weight of the product!
Holding or carrying a heavy actuator-valve combination or dropping the product can cause injuries.

- ! Always wear safety shoes during installation.
- ! If necessary, call in other people for the installation.
- ! If necessary, use a suitable lifting tool.

▶ Dismantle the product in reverse order to mounting.

NOTICE

Risk of environmental pollution!
Incorrect disposal can lead to environmental damage.

- ! Dispose of packaging material in an environmentally friendly manner.
- ! If possible, recycle the components.
- ! Dispose of non-recycable components according to local regulations.

Directive 2012/19/UE WEEE:

- The "crossed-out wheeled bin" symbolises that you are legally obliged to dispose of old appliances separately from unsorted municipal waste. Incorrect disposal can lead to environmental damage.
- Remove old batteries and accumulators not enclosed in the old appliance as well as lamps from the old appliance without destroying them and dispose of them separately.
- You can hand in your old appliance free of charge within the framework of the possibilities provided by the public waste disposal authorities.
- Distributors with a sales area for electrical and electronic equipment of at least 400 square meters are obliged to take back your old appliance free of charge when you buy a similar new appliance (1:1 take-back). You can also return all old appliances to distributors free of charge if the external dimensions do not exceed 25 centimetres and the return is limited to three appliances per type of appliance.
- Delete your personal data stored on the old device to be disposed of, if any, on your own responsibility.

11. Appendix

11.1 Characteristic lines (DIP B3 = OFF)

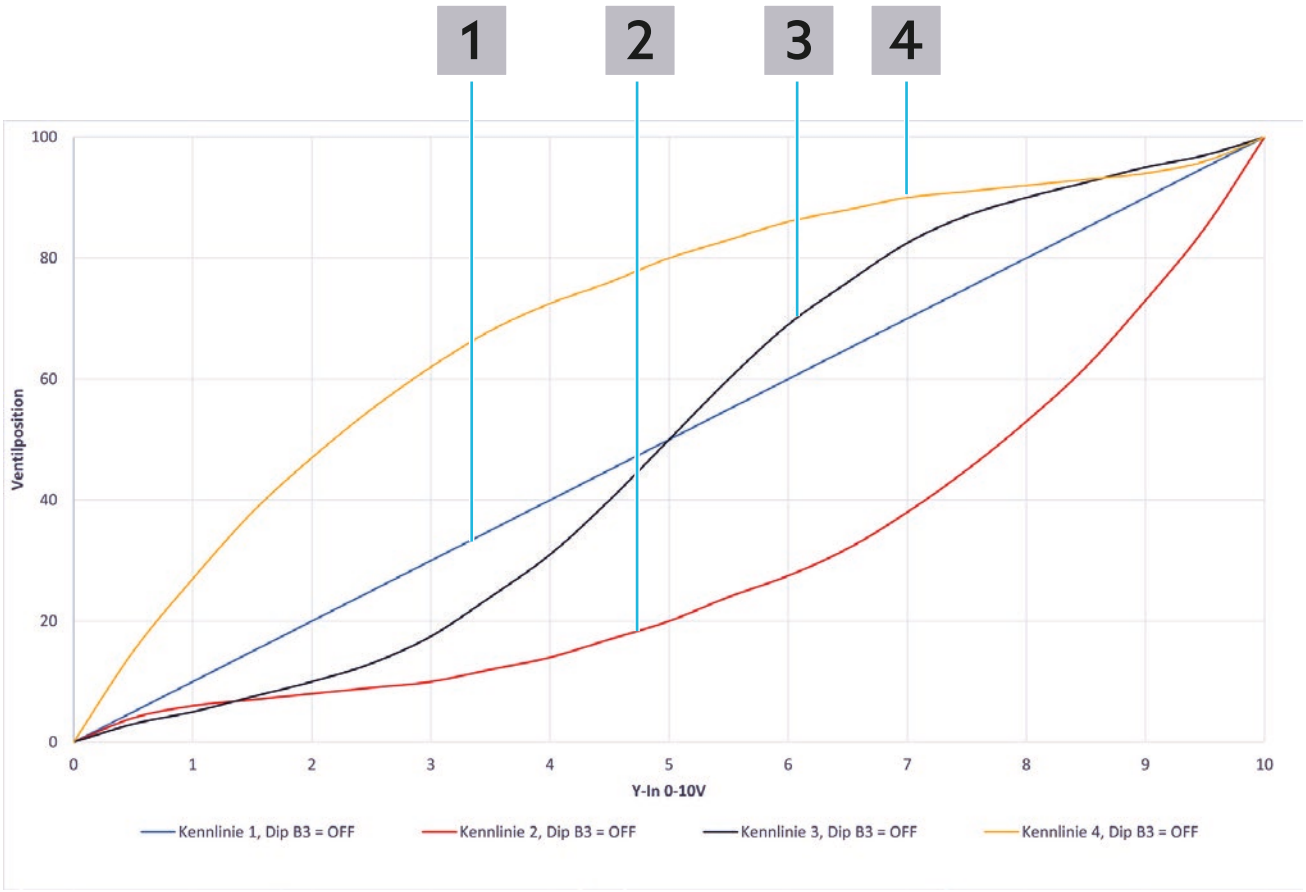

Fig. 28: Characteristic lines

1 Characteristic line 1

2 Characteristic line 2

3 Characteristic line 3

4 Characteristic line 4

11.2 Inverted characteristic lines (DIP B3 = ON)

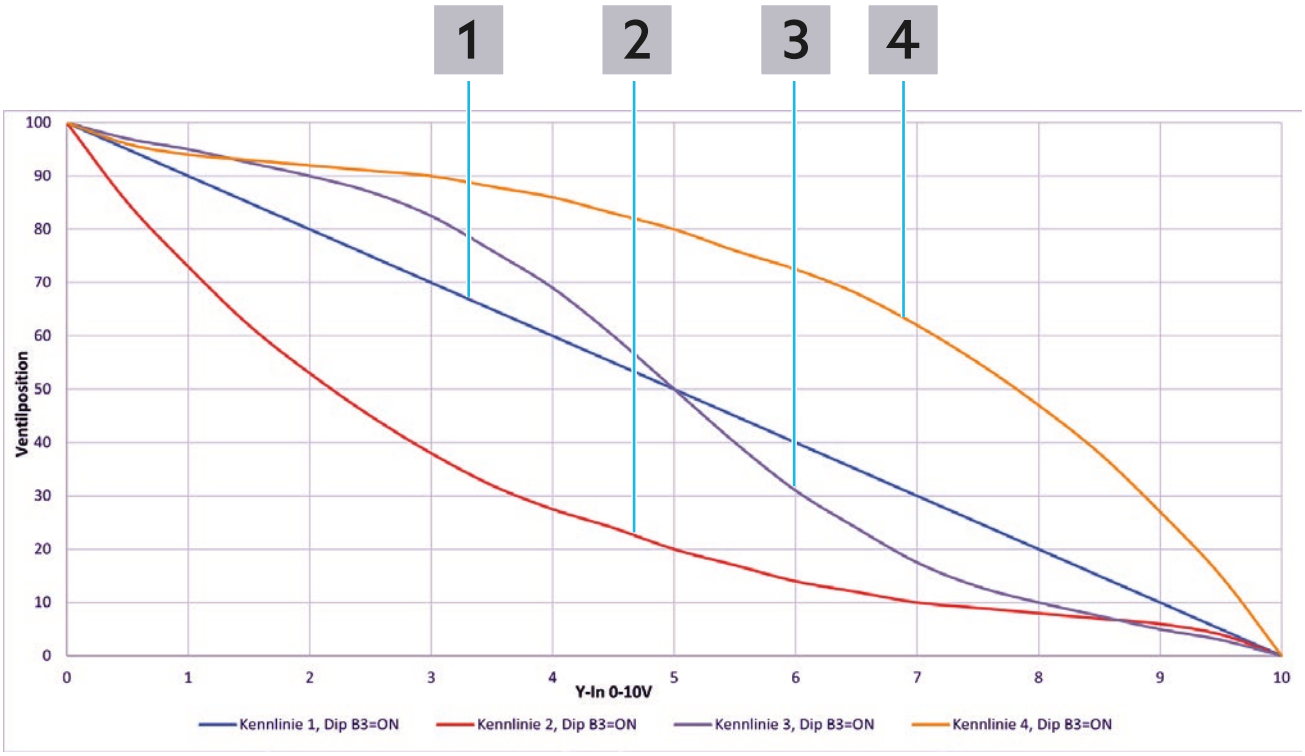

Fig. 29: Inverted characteristic lines

1 Characteristic line 1

2 Characteristic line 2

3 Characteristic line 3

4 Characteristic line 4

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