



## Multi-turn actuators

SAExC 07.1 – SAExC 16.1

SARExC 07.1 – SARExC 16.1

with actuator controls

AUMA MATIC AMExB 01.1



### Read operation instructions first.

- Observe safety instructions.
- These operation instructions are part of the product.
- Preserve operation instructions during product life.
- Pass on instructions to any subsequent user or owner of the product.

### Purpose of the document:

This document contains information for installation, commissioning, operation and maintenance staff. It is intended to support device installation and commissioning.

### Reference documents:

Reference documents can be downloaded from the Internet ([www.auma.com](http://www.auma.com)) or ordered directly from AUMA (refer to <Addresses>).

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## 1. Safety instructions

### 1.1 Basic information on safety

**Standards/directives** AUMA products are designed and manufactured in compliance with recognised standards and directives. This is certified in a Declaration of Incorporation and an EC Declaration of Conformity.

The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation.

They include among others standards and directives such as IEC/EN 60079 "Electrical apparatus for explosive atmospheres" –

- Part 14: Electrical installations in hazardous areas (other than mines).
- Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines).

**Safety instructions/warnings** All personnel working with this device must be familiar with the safety and warning instructions in this manual and observe the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.

**Qualification of staff** Assembly, electrical connection, commissioning, operation, and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or contractor of the plant only.

Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety.

Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant are responsible for respect and control of these regulations, standards, and laws.

**Commissioning** Prior to commissioning, it is important to check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.

**Operation** Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the device if it is in perfect condition while observing these instructions.
- Immediately report any faults and damage and allow for corrective measures.
- Observe recognised rules for occupational health and safety.
- Observe the national regulations.
- During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend checking the surface temperature using an appropriate thermometer and wearing protective gloves, if required, prior to working on the device.

**Protective measures** The end user or the contractor are responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.

**Maintenance** To ensure safe device operation, the maintenance instructions included in this manual must be observed.

Any device modification requires prior consent of the manufacturer.

### 1.2 Range of application

AUMA multi-turn actuators are designed for the operation of industrial valves, e.g. globe valves, gate valves, butterfly valves, and ball valves.

The devices described below are approved for use in the potentially explosive atmospheres of zones 1, 2, 21, and 22.

If temperatures >40 °C are to be expected at the valve mounting flange or the valve stem (e.g. due to hot media), please consult AUMA. Temperatures > 40 °C are not considered with regards to the non-electrical explosion protection.

Other applications require explicit (written) confirmation by the manufacturer.

The following applications are not permitted, e.g.:

- Industrial trucks according to EN ISO 3691
- Lifting appliances according to EN 14502
- Passenger lifts according to DIN 15306 and 15309
- Service lifts according to EN 81-1/A1
- Escalators
- Continuous duty
- Buried service
- Permanent submersion (observe enclosure protection)
- Potentially explosive areas of zones 0 and 20
- Potentially explosive areas of group I (mining)
- Radiation exposed areas in nuclear power plants

No liability can be assumed for inappropriate or unintended use.

Observance of these operation instructions is considered as part of the device's designated use.

**Information** These operation instructions are only valid for the "clockwise closing" standard version, i.e. driven shaft turns clockwise to close the valve.

### 1.3 Warnings and notes

The following warnings draw special attention to safety-relevant procedures in these operation instructions, each marked by the appropriate signal word (DANGER, WARNING, CAUTION, NOTICE).



**Indicates an imminently hazardous situation with a high level of risk. Failure to observe this warning could result in death or serious injury.**



**Indicates a potentially hazardous situation with a medium level of risk. Failure to observe this warning could result in death or serious injury.**



**Indicates a potentially hazardous situation with a low level of risk. Failure to observe this warning may result in minor or moderate injury. May also be used with property damage.**



**Potentially hazardous situation. Failure to observe this warning may result in property damage. Is not used for personal injury.**

#### Arrangement and typographic structure of the warnings




**Type of hazard and respective source!**

*Potential consequence(s) in case of non-observance (option)*

→ Measures to avoid the danger

→ Further measure(s)

Safety alert symbol  warns of a potential personal injury hazard.

The signal word (here: DANGER) indicates the level of hazard.


1.4      **References and symbols**

The following references and symbols are used in these instructions:

**Information**      The term **Information** preceding the text indicates important notes and information.

      Symbol for CLOSED (valve closed)

      Symbol for OPEN (valve open)

      Important information before the next step. This symbol indicates what is required for the next step or what has to be prepared or observed.

**< >      Reference to other sections**

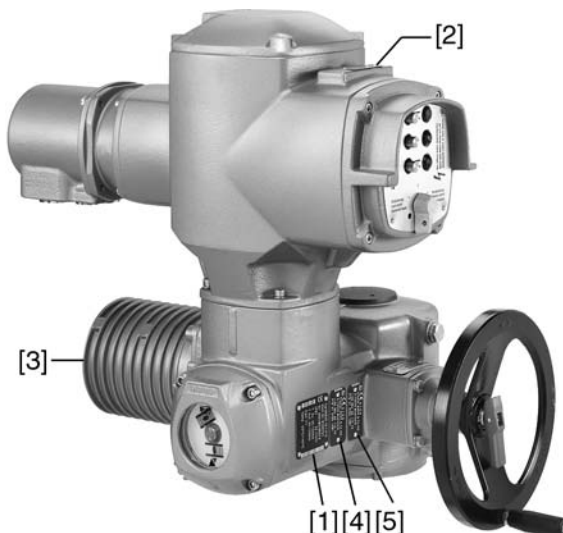
Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

## 2. Identification

### 2.1 Name plate

Each device component (actuator, controls, motor) is equipped with a name plate.

Figure 1: Arrangement of name plates



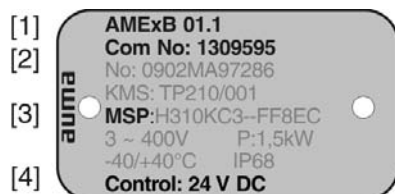
- [1] Actuator name plate
- [2] Controls name plate
- [3] Motor name plate
- [4] Additional plate, e.g. KKS plate (Power Plant Classification System)
- [5] Explosion protection approval plate

**Data for identification** Figure 2: Actuator name plate



- [1] Type and size of actuator
- [2] Commission number

Figure 3: Controls name plate



- [1] Type and size of the controls
- [2] Commission number
- [3] Wiring diagram
- [4] Control



Figure 4: Explosion protection approval plate



- [1] Ex symbol, CE mark, number of notified body
- [2] EC type examination certificate
- [3] Explosion protection classification - electrical explosion protection
- [4] Explosion protection classification - dust protection
- [5] Explosion protection classification - non-electrical explosion protection

#### Type and size

These instructions apply to the following devices:

Multi-turn actuators for open-close duty: SAExC 07.1, 07.5, 10.1, 14.1, 14.5, 16.1

Multi-turn actuators for modulating duty: SARExC 07.1, 07.5, 10.1, 14.1, 14.5, 16.1

AMExB 01.1 = actuator controls AUMA MATIC

#### Commission number

An order-specific commission number is assigned to each device. This commission number can be used to directly download the wiring diagram, inspection records and further information regarding the device from the Internet: <http://www.auma.com>.

#### Control

**24 V DC** = Control via parallel interface at 24 V DC control voltage.

**115 V AC** = Control via parallel interface at 115 V AC control voltage.

**0/4 – 20 mA** = Control via parallel interface via analogue input 0/4 – 20 mA.

## 2.2 Short description

#### Multi-turn actuator

Definition in compliance with EN ISO 5210:

A multi-turn actuator is an actuator which transmits to the valve a torque for at least one full revolution. It is capable of withstanding thrust.

AUMA multi-turn actuators are driven by an electric motor and are capable of withstanding thrust in combination with output drive type A. For manual operation, a handwheel is provided. Switching off in end positions may be either by limit or torque seating. Controls are required to operate or process the actuator signals.

#### Actuator controls

The AUMA MATIC actuator controls are used to operate AUMA actuators and are supplied ready for use. The controls can be mounted directly to the actuator but also separately on a wall bracket. The functions of the AUMA MATIC controls include standard valve control in OPEN - CLOSE duty, position indications and different signals right through to position control.

#### Local controls

Operation (via push buttons), setting and indication can be performed directly at the controls (contents of these instructions).

### 3. Transport, storage and packaging

#### 3.1 Transport

For transport to place of installation, use sturdy packaging.



##### Hovering load!

*Risk of death or serious injury.*

- Do NOT stand below hovering load.
- Attach ropes or hooks for the purpose of lifting by hoist only to housing and NOT to handwheel.
- Actuators mounted on valves: Attach ropes or hooks for the purpose of lifting by hoist to valve and NOT to actuator.
- Actuators mounted to gearboxes: Attach ropes or hooks for the purpose of lifting by hoist only to the gearbox using eyebolts and NOT to the actuator.
- Actuators mounted to controls: Attach ropes or hooks for the purpose of lifting by hoist only to the actuator and NOT to the controls.

#### 3.2 Storage

##### NOTICE

##### Danger of corrosion due to inappropriate storage!

- Store in a well-ventilated, dry room.
- Protect against floor dampness by storage on a shelf or on a wooden pallet.
- Cover to protect against dust and dirt.
- Apply suitable corrosion protection agent to uncoated surfaces.

##### Long-term storage

If the device must be stored for a long period (more than 6 months) the following points must be observed in addition:

1. Prior to storage:  
Protect uncoated surfaces, in particular the output drive parts and mounting surface, with long-term corrosion protection agent.
2. At an interval of approx. 6 months:  
Check for corrosion. If first signs of corrosion show, apply new corrosion protection.

#### 3.3 Packaging

Our products are protected by special packaging for transport when leaving the factory. The packaging consists of environmentally friendly materials which can easily be separated and recycled. We use the following packaging materials: wood, cardboard, paper, and PE foil. For the disposal of the packaging material, we recommend recycling and collection centres.

## 4. Assembly

### 4.1 Mounting position

AUMA actuators and actuator controls can be operated without restriction in any mounting position.

### 4.2 Handwheel fitting

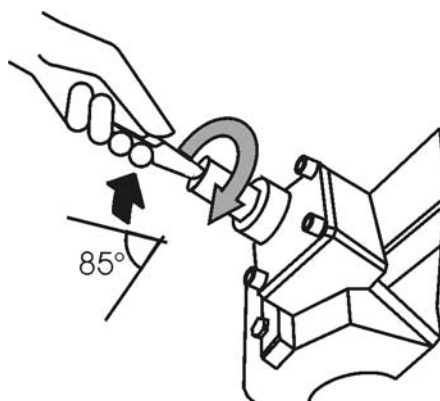
**Information** For transport purposes, handwheels from a diameter of 400 mm are supplied separately.

#### NOTICE

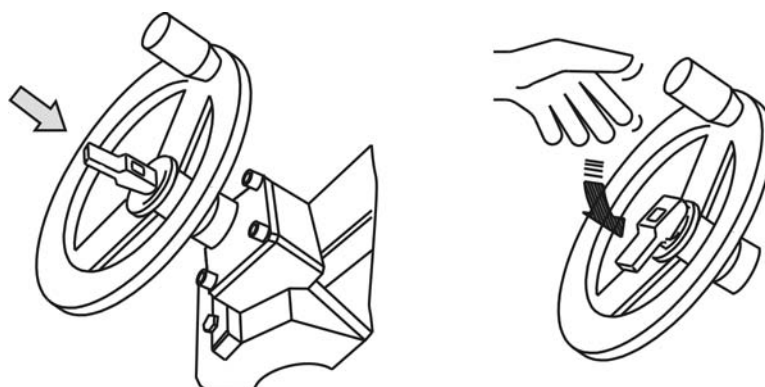
#### Damage at the change-over mechanism due to incorrect assembly!

- Only pivot change-over lever manually.
- Do NOT use extensions as lever for operation.
- First engage manual operation correctly, then mount handwheel.

1. Manually lift the red change-over lever while slightly turning the shaft back and forth until manual operation engages.
- ➔ The manual operation is correctly engaged if the change-over lever can be lifted by approx. 85°.



2. Attach handwheel over the red change-over lever then on to the shaft.



3. Release change-over lever (should snap back into initial position by spring action, if necessary, push it back manually).
4. Secure handwheel using the circlip supplied.

### 4.3 Multi-turn actuator: mount to valve/gearbox

#### NOTICE

#### Danger of corrosion due to damage to paint finish and condensation!

- Touch up damage to paint finish after work on the device.
- After mounting, connect the device immediately to electrical mains to ensure that heater minimises condensation.

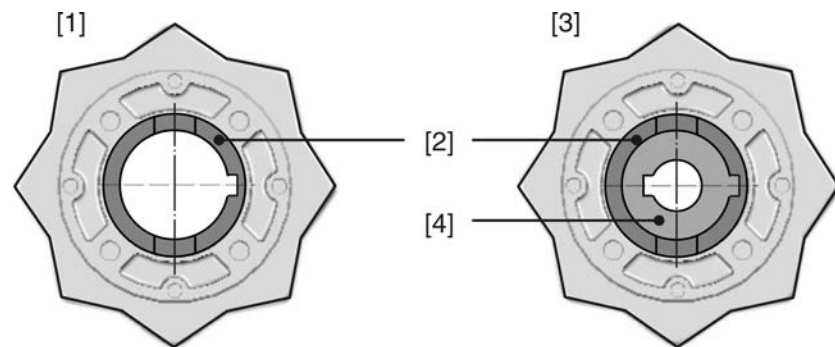
#### 4.3.1 Output drive types B, B1 – B4 and E

- Application**
- For rotating, non-rising valve stem
  - Not capable of withstanding thrust

**Design** Output drive bore with keyway:

- Types B1 – B4 with bore according to ISO 5210
- Types B and E with bore according to DIN 3210
- Later change from B1 to B3, B4, or E is possible.

Figure 7: Output drives



- [1] Output drive types B1/B2 and B
- [2] Hollow shaft with keyway
- [3] Output drive types B3/B4 and E
- [4] Output drive sleeve/output drive plug sleeve with bore and keyway

**Information** Spigot at flanges should be loose fit.

#### 4.3.1.1 Multi-turn actuator (with output drive types B1 – B4 or E): mount to valve/gearbox

1. Check if mounting flanges fit together.
2. Check whether bore and keyway match the input shaft.
3. Apply a small quantity of grease to the input shaft.
4. Place multi-turn actuator.

**Information:** Ensure that the spigot fits uniformly in the recess and that the mounting faces are in complete contact.

5. Fasten multi-turn actuator with screws according to table.

**Information:** We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.

6. Fasten screws crosswise to a torque according to table.

Table 1: Tightening torques for screws

Screws	Tightening torque $T_A$ [Nm]
Threads	Strength class 8.8
M8	25
M10	51
M12	87
M16	214
M20	431

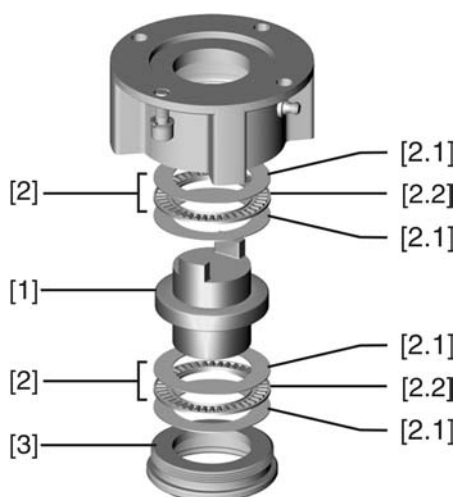
#### 4.3.2 Output drive type A

- Application**
- Output drive for rising, non-rotating valve stem
  - Capable of withstanding thrust

##### 4.3.2.1 Stem nut: finish machining

- ✓ This working step is only required if stem nut is supplied unbored or with pilot bore.

Figure 8: Design of output drive type A

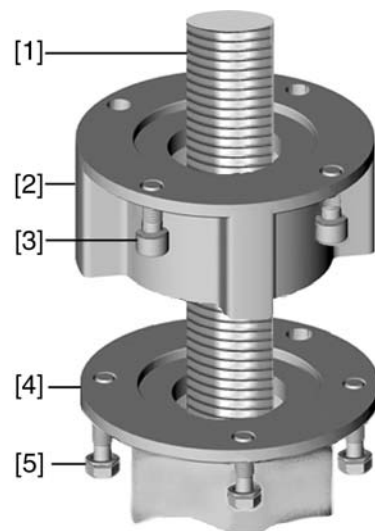


- [1] Stem nut  
[2] Bearing  
[2.1] Bearing race  
[2.2] Bearing rim  
[3] Spigot ring

1. Remove spigot ring [3] from output drive.
2. Remove stem nut [1] together with bearings [2].
3. Remove bearing races [2.1] and bearing rims [2.2] from stem nut [1].
4. Drill and bore stem nut [1] and cut thread.  
**Information:** When fixing in the chuck, make sure stem nut runs true!
5. Clean the machined stem nut [1].
6. Apply sufficient Lithium soap EP multi-purpose grease to bearing rims [2.2] and bearing races [2.1], ensuring that all hollow spaces are filled with grease.
7. Place greased bearing rims [2.2] and bearing races [2.1] onto stem nut [1].
8. Re-insert stem nut [1] with bearings [2] into output drive.  
**Information:** Ensure that dogs or splines are placed correctly in the keyway of the hollow shaft.
9. Screw in spigot ring [3] until it is firm against the shoulder.

#### 4.3.2.2 Multi-turn actuator (with output drive type A): mount to valve

Figure 9: Assembly with output drive type A



- [1] Valve stem
- [2] Output drive type A
- [3] Screws to actuator
- [4] Valve flange
- [5] Screws to output drive

1. If the output drive type A is already mounted to the multi-turn actuator: Loosen screws [3] and remove output drive type A [2].
2. Check if the flange of output drive type A matches the valve flange [4].
3. Apply a small quantity of grease to the valve stem [1].
4. Place output drive type A on valve stem and turn until it is flush on the valve flange.
5. Turn output drive type A until alignment of the fixing holes.
6. Screw in fastening screws [5], however do not completely tighten.
7. Fit multi-turn actuator on the valve stem so that the stem nut dogs engage into the output drive sleeve.
- ➡ The flanges are flush with each other if properly engaged.
8. Adjust multi-turn actuator until alignment of the fixing holes.
9. Fasten multi-turn actuator with screws [3].
10. Fasten screws [3] crosswise with a torque according to table.

Table 2: Tightening torques for screws

Screws	Tightening torque $T_A$ [Nm]
Threads	Strength class 8.8
M6	11
M8	25
M10	51
M12	87
M16	214
M20	431

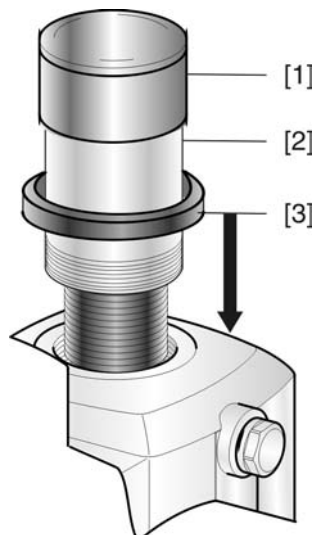
11. Turn multi-turn actuator with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

## 4.4 Accessories for assembly

### 4.4.1 Stem protection tube for rising valve stem

— Option —

Figure 10: Assembly of the stem protection tube



- [1] Cap for stem protection tube
- [2] Stem protection tube
- [3] Sealing ring

1. Seal thread with hemp, Teflon tape, or thread sealing material.
2. Screw stem protection tube [2] into thread and tighten it firmly.
3. Push down the sealing ring [3] onto the housing.
4. Check whether cap for stem protection tube [1] is available and in perfect condition.

## 4.5 Mounting positions of local controls

The mounting position of the local controls is selected according to the order. If, after mounting the actuator to the valve or the gearbox on site, the local controls are in an unfavourable position, the mounting position can be changed at a later date. Four mounting positions are possible.

Figure 11: Mounting positions A and B



Figure 12: Mounting positions C and D



#### 4.5.1 Mounting positions: modify



##### Flameproof enclosure, danger of explosion!

*Risk of death or serious injury.*

- Before opening, ensure that there is no explosive gas and no voltage.
- Handle cover and housing parts with care.
- Joint surfaces must not be damaged or soiled in any way.
- Do not jam cover during fitting.

1. Loosen screws and remove the local controls.
2. Loosen 3 screws of the board, turn board to the new position and fasten the screws.
3. Check whether O-ring is in good condition, correctly insert O-ring.
4. Turn local controls into new position and re-place.

##### NOTICE

##### Cable damage due to twisting or pinching!

*Risk of functional failures.*

- Turn local controls by a maximum of 180°.
- Carefully assemble local controls to avoid pinching the cables.

5. Fasten screws evenly crosswise.



## 5. Electrical connection

### 5.1 Basic information



**WARNING**

#### Danger due to incorrect electrical connection

*Failure to observe this warning can result in death, serious injury, or property damage.*

- The electrical connection must be carried out exclusively by suitably qualified personnel.
- Prior to connection, observe basic information contained in this chapter.
- After connection but prior to applying the voltage, observe the <Commissioning> and <Test run> chapters.

#### Wiring diagram/terminal plan

The pertaining wiring diagram/terminal plan (in German and English language) is attached to the device in a weather-proof bag, together with these operation instructions. It can also be obtained from AUMA (state commission no., refer to name plate) or downloaded directly from the Internet ([www.auma.com](http://www.auma.com)).

#### Protection on site

For short-circuit protection and for disconnecting the actuator from the mains, fuses and disconnect switches have to be provided by the customer.

The current values for respective sizing is derived from the current consumption of the motor (refer to electrical data sheet) plus the current consumption of the controls.

Table 3: Current consumption controls

Mains voltage	Max. current consumption
100 to 120 V AC ( $\pm 10\%$ )	575 mA
208 to 240 V AC ( $\pm 10\%$ )	275 mA
380 to 500 V AC ( $\pm 10\%$ )	160 mA
24 V DC (+20 %/–15 %) and AC motor	500 mA

Table 4: Maximum permissible protection

Switchgear	Rated power	max. protection
Reversing contactor A1	up to 1.5 kW	16 A (gL/gG)
Reversing contactor A2	up to 7.5 kW	32 A (gL/gG)
Reversing contactor A3	up to 11 kW	63 A (gL/gG)

If controls are mounted separately from actuator (controls on wall bracket): Consider length and cross section of connecting cable when defining the protection required.

#### Power supply for the controls (electronics)

If the controls (electronics) are supplied externally with 24 V DC, the power supply is smoothed via an internal 1,000  $\mu$ F capacitor. When selecting a power supply, care must be taken to consider the capacitor inrush current upon powering the unit up.

#### Safety standards

All externally connected devices shall comply with the relevant safety standards.

#### Cable installation in accordance with EMC

Signal and bus cables are susceptible to interference.

Motor cables are interference sources.

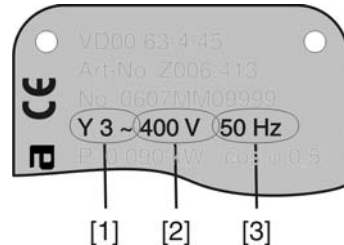
- Lay cables being susceptible to interference or sources of interference at the highest possible distance from each other.
- The interference immunity of signal and bus cables increases if the cables are laid close to the earth potential.
- If possible, avoid laying long cables and make sure that they are installed in areas being subject to low interference.
- Avoid long parallel paths with cables being either susceptible to interference or interference sources.

- For the connection of remote position transmitters, screened cables must be used.

#### Type of current, mains voltage and mains frequency

Type of current, mains voltage and mains frequency must match the data on the motor name plate.

Figure 13: Motor name plate (example)



- [1] Type of current
- [2] Mains voltage
- [3] Mains frequency (for 3-ph and 1-ph AC motors)

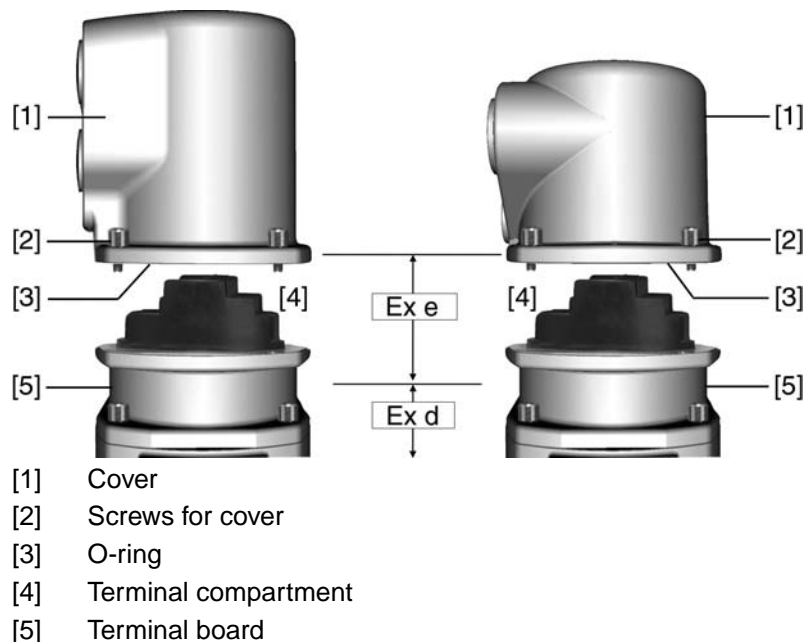
#### Connecting cables

- For device insulation, appropriate (voltage-proof) cables must be used. Specify cables for the highest occurring rated voltage.
- Use connecting cables with a minimum temperature range of +80 °C.
- For connecting cables exposed to UV radiation (outdoor installation), use UV resistant cables.

## 5.2 Connecting via plug/socket connector with screw-type terminals (KP, KPH)

### 5.2.1 Terminal compartment: open

Figure 14: Plug/socket connector KPH, KP





### Hazardous voltage!

*Risk of electric shock.*

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
- ➔ Terminal compartment [4] is designed for explosion protection Ex e (increased safety). The flameproof compartment (type of protection Ex d) remains hereby closed.
2. Insert cable glands with Ex e approval and of size suitable for connection cables.
- ➔ The enclosure protection IP... stated on the name plate is only ensured if suitable cable glands are used. Example: Name plate shows enclosure protection IP 68.



3. Seal cable entries which are not used with approved plugs suitable for the required protection type.
4. Insert the wires into the cable glands.

## 5.2.2 Cable connection

Table 5: Terminal cross sections and tightening torques

Type	Terminal cross sections	Tightening torques
Power terminals (U1, V1, W1) PE connection	(1.5) <sup>1)</sup> 2.5 – 6 mm <sup>2</sup> (flexible or solid)	2 Nm
Control contacts (1 to 50)	0.75 – 1.5 mm <sup>2</sup> (flexible or solid)	1 Nm

1) with small clamp washers

1. Remove cable sheathing in a length of 120 – 140 mm.
2. Strip wires.
  - Controls max. 8 mm, motor 12 mm
3. For flexible cables: Use end sleeves according to DIN 46228.
4. Connect cables according to order-related wiring diagram.

**Information:** Two wires for each connection permitted.

→ When using motor cables with a cross section of 1.5 mm<sup>2</sup>: Use small clamp washers for connection to terminals U1, V1, W1 and PE (the small clamp washers are provided in the electrical connection cover).



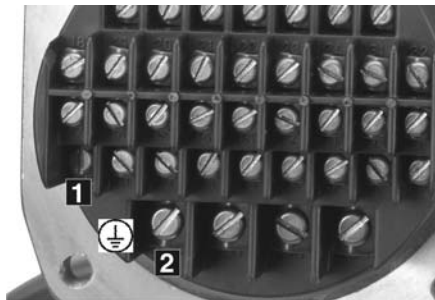
**In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!**

*Risk of electric shock.*

- Connect all protective earth conductors.
- Connect PE connection to external protective earth conductor of connecting cables.
- Start running the device only after having connected the protective earth conductor.

#### 5. Tighten protective earth firmly to PE connection

Figure 16: PE connection



- [1] PE connection, control cable
- [2] PE connection, motor cable

#### NOTICE

**Danger of corrosion: Damage due to condensation!**

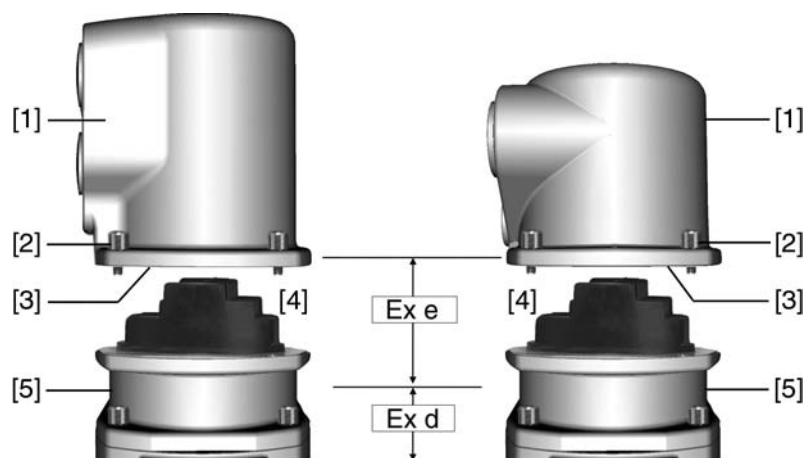
- After mounting, commission the device immediately to ensure that heater minimises condensation.

#### Information

Some actuators are equipped with an additional motor heater. The motor heater minimises condensation within the motor and improves the start-up behaviour for extremely low temperatures.

### 5.2.3 Terminal compartment: close

Figure 17: Plug/socket connector KPH, KP



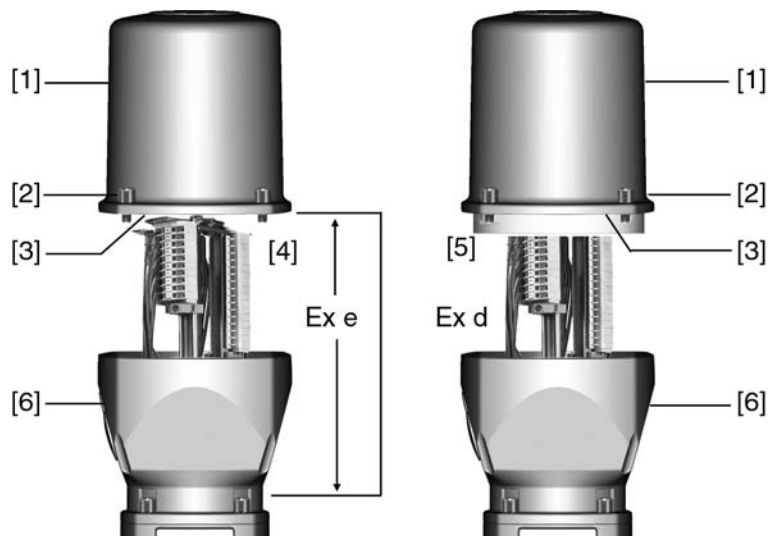
- [1] Cover
- [2] Screws for cover
- [3] O-ring
- [4] Terminal compartment
- [5] Terminal board

1. Clean sealing faces of cover [1] and housing.
2. Check whether O-ring [3] is in good condition, replace if damaged.
3. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.
4. Fit cover [1] and fasten screws [2] evenly crosswise.
5. Fasten cable glands with the specified torque to ensure the required enclosure protection.

### 5.3 Connecting via plug/socket connector with terminal blocks (KES)

#### 5.3.1 Terminal compartment: open

Figure 18: Plug/socket connector: left KES, right KES flameproof



- [1] Cover
- [2] Screws for cover
- [3] O-ring
- [4] Terminal compartment: Type of protection Ex e
- [5] Terminal compartment: Type of protection Ex d
- [6] Frame



#### **Hazardous voltage!**

*Risk of electric shock.*

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
- ➔ Terminal compartments [4] and [5] designed either in type of protection Ex e (increased safety) or in type of protection Ex d (flameproof enclosure). Hereby, the flameproof interior compartment of the actuator (Ex d) remains closed.
2. Insert cable glands with Ex e approval and of size suitable for connection cables.
- ➔ The enclosure protection IP... stated on the name plate is only ensured if suitable cable glands are used. Example: Name plate shows enclosure protection IP 68.



3. Seal cable entries which are not used with approved plugs suitable for the required protection type.
4. Remove cable sheathing and insert the wires into the cable glands.
5. Fasten cable glands with the specified torque to ensure the required enclosure protection.

### 5.3.2 Cable connection

Table 6: Terminal cross sections and tightening torques

Type	Terminal cross sections	Tightening torques
Power terminals (U, V, W)	max. 10 mm <sup>2</sup> (flexible or solid)	1.5 – 1.8 Nm
PE connection	max. 10 mm <sup>2</sup> (flexible or solid)	3.0 – 4.0 Nm
Control contacts (1 to 50)	max. 2.5 mm <sup>2</sup> (flexible or solid)	0.6 – 0.8 Nm

1. Strip wires.
2. For flexible cables: Use end sleeves according to DIN 46228.
3. Connect cables according to order-related wiring diagram.



**WARNING**

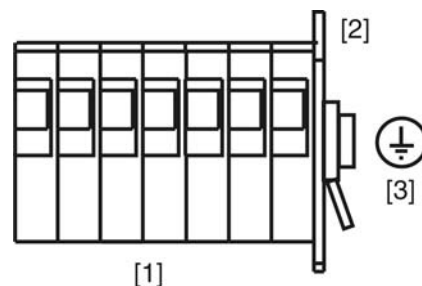
**In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!**

*Risk of electric shock.*

- Connect all protective earth conductors.
- Connect PE connection to external protective earth conductor of connecting cables.
- Start running the device only after having connected the protective earth conductor.

4. Tighten protective earth firmly to PE connection

Figure 20: PE connection



- [1] Terminal blocks  
 [2] Terminal housing  
 [3] PE connection, symbol: ⊕

**NOTICE**

**Danger of corrosion: Damage due to condensation!**

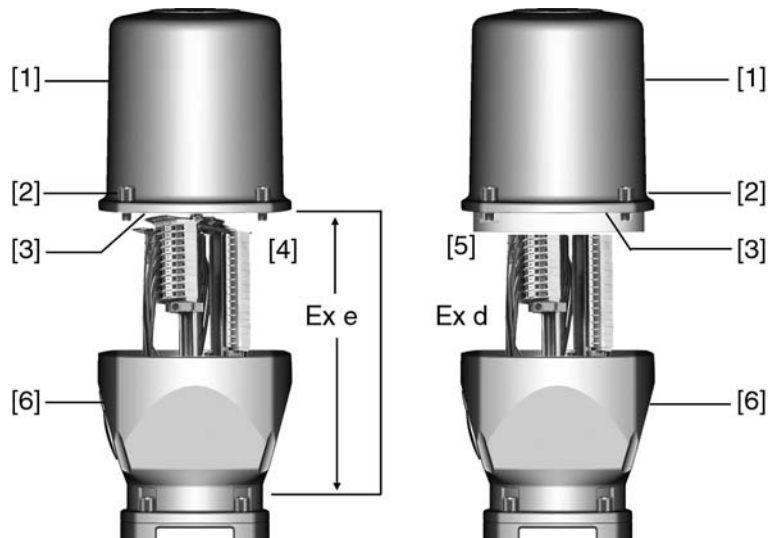
- After mounting, commission the device immediately to ensure that heater minimises condensation.

#### Information

Some actuators are equipped with an additional motor heater. The motor heater minimises condensation within the motor and improves the start-up behaviour for extremely low temperatures.

### 5.3.3 Terminal compartment: close

Figure 21: Plug/socket connector: left KES, right KES flameproof



- [1] Cover
- [2] Screws for cover
- [3] O-ring
- [4] Terminal compartment: Type of protection Ex e
- [5] Terminal compartment: Type of protection Ex d
- [6] Frame

1. Clean sealing faces of cover [1] and housing.
2. Plug/socket connector designed as KES flameproof: Preserve joint surfaces with an acid-free corrosion protection agent.
3. Check whether O-ring [3] is in good condition, replace if damaged.
4. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.



**WARNING**

#### Flameproof enclosure, danger of explosion!

*Risk of death or serious injury.*

- Handle cover and housing parts with care.
- Joint surfaces must not be damaged or soiled in any way.
- Do not jam cover during fitting.

5. Fit cover [1] and fasten screws [2] evenly crosswise.

## 5.4 Accessories for electrical connection

### — Option —

#### 5.4.1 Parking frame

##### Application

Parking frame for safe storage of a disconnected plug.

For protection against touching the bare contacts and against environmental influences.

Figure 22: Parking frame and plug/socket connector with screw-type terminals (KP/KPH)

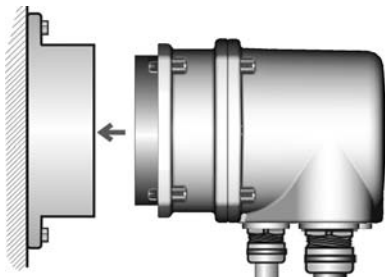
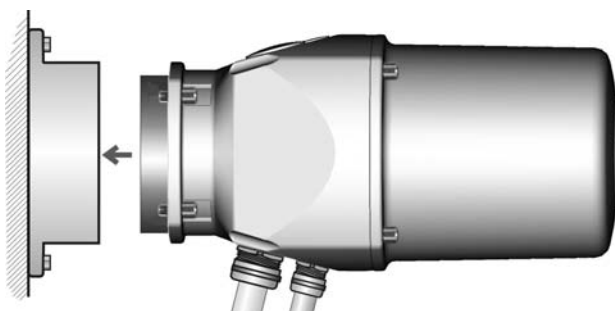


Figure 23: Parking frame and plug/socket connector with terminal blocks (KES)



#### 5.4.2 Protection cover

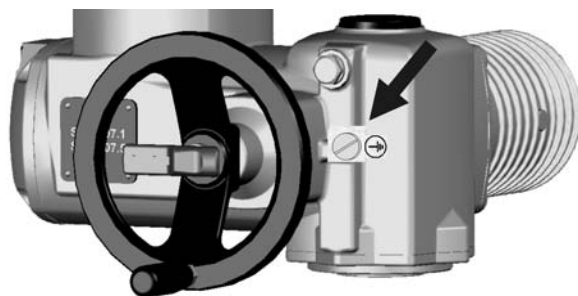
Protection cover for plug compartment when plug is removed.

The open terminal compartment can be closed using a protective cover (not illustrated).

#### 5.4.3 Earth connection, external

The housing is equipped with an external earth connection (U-bracket) to connect the device to the equipotential earth bonding.

Figure 24: Earth connection





## 6. Operation

### 6.1 Manual operation

For purposes of setting and commissioning, in case of motor failure or power failure, the actuator may be operated manually. Manual operation is engaged by an internal change-over mechanism.

#### 6.1.1 Manual operation: engage

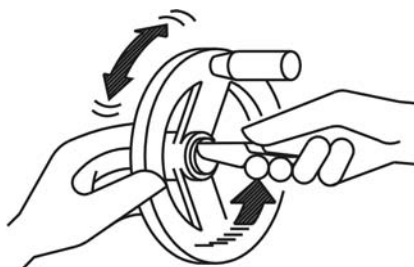
**Information** When using brake motors, note that the motor is disengaged during manual operation. For this reason, the brake motor cannot sustain any load during manual operation. The load must be sustained via the handwheel.

#### NOTICE

#### Damage at the change-over mechanism due to faulty operation!

- Engage manual operation only during motor standstill.
- Only pivot change-over lever manually.
- Do NOT use extensions as lever for operation.

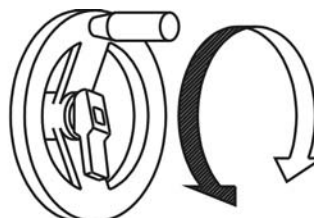
1. Pivot change-over lever manually to approx. 85° while slightly turning the handwheel back and forth until manual operation engages.



2. Release change-over lever (should snap back into initial position by spring action, if necessary, push it back manually).



3. Turn handwheel in desired direction.
  - To close the valve, turn handwheel clockwise:
    - ➡ Drive shaft (valve) turns clockwise in direction CLOSE.



#### 6.1.2 Manual operation: disengage

Manual operation is automatically disengaged when motor is started again. The handwheel does not rotate during motor operation.

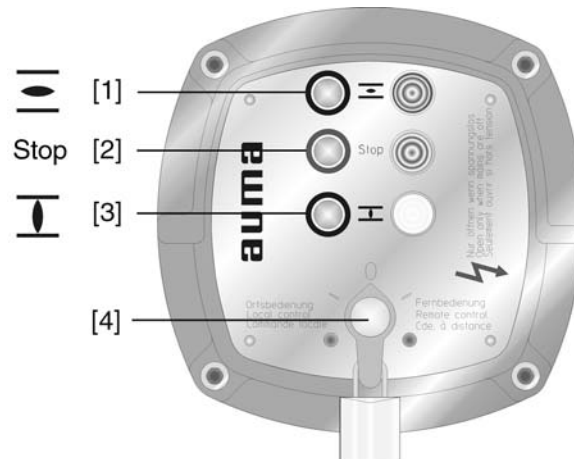
## 6.2 Motor operation

- ✓ Perform all commissioning settings and the test run prior to motor operation.

### 6.2.1 Local operation

The local operation of the actuator is performed using the push buttons of the local controls.

Figure 28: Local controls



- [1] Push button for operation command in direction OPEN
- [2] Push button Stop
- [3] Push button for operation command in direction CLOSE
- [4] Selector switch



**Hot surfaces, e.g. possibly caused by high ambient temperatures or strong direct sunlight!**

*Danger of burns*

→ Check surface temperature and wear protective gloves, if required.

→ Set selector switch [4] to position **Local control** (LOCAL).



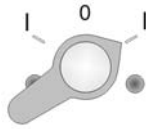
➡ The actuator can now be operated using the push buttons [1 – 3]:

- Run actuator in direction OPEN: Press push button [1]
- Stop actuator: Press push button [2] **Stop**.
- Run actuator in direction CLOSE: Press push button [3]

**Information** The OPEN - CLOSE operation commands can be given either in push-to-run operation mode or in self-retaining mode. In self-retaining mode, the actuator runs to the defined end position after pressing the button, unless another command has been received beforehand.

### 6.2.2 Actuator operation from remote

→ Set selector switch to **Remote control** (REMOTE).



➡ Now, it is possible to operate the actuator via remote control, via operation commands (OPEN, STOP, CLOSE) or analogue setpoints (e.g. 0 – 20 mA).

**Information** For actuators equipped with positioner, it is possible to optionally **select** between **open-close duty** (REMOTE OPEN-CLOSE) and **modulating duty** (REMOTE SETPOINT). Selection is made via REMOTE MANUAL input, e.g. based on a 24 V DC signal (refer to wiring diagram).

Behaviour in modulating duty for version with positioner:

In case of signal loss of setpoint E1 or actual value E2, the actuator moves to a preset position. The following reactions are possible:

- **Fail as is:** Actuator stops immediately and remains in this position.
- **Fail close:** Actuator moves the valve to end position CLOSED.
- **Fail open:** Actuator moves the valve to end position OPEN.

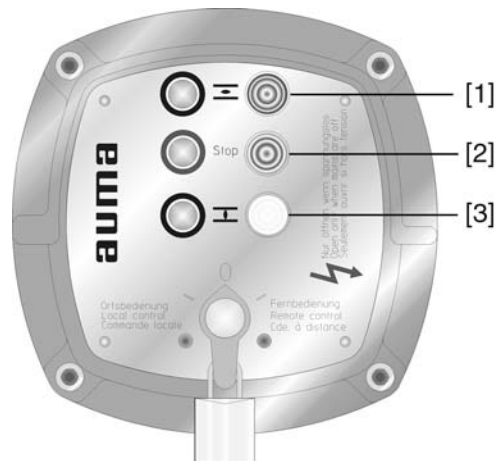
The behaviour on loss of signal can be set via a switch in the controls.

## 7. Indications

### 7.1 Indication lights

The colours of the 3 indication lights on the local controls and the assignment of the signals are specified in the order.

Figure 31: Local controls with indication lights (default signalling)



- [1] illuminated (green): End position OPEN reached
- [2] illuminated (red): Collective fault signal
- [3] illuminated (yellow): End position CLOSED reached

**Collective fault signal** The collective fault signal (red indication light) will be activated if one of the following events occurs (default configuration):

- Torque fault: The set torque was exceeded before reaching an end position. (This signal can be activated/deactivated via a switch in the controls.)
- Thermal fault: Motor protection has tripped, i.e. the motor is overheated.
- Phase failure: One phase is missing (3-ph AC motors only).
- PTC tripping device: Test complete

**Running indication** If the actuator is equipped with a blinker transmitter (wiring diagram designation: S5), indication lights [1] and [3] can be used as running indication. The running indication can be activated/deactivated via a switch in the controls. If the running indication is active, the respective indication light blinks during operation.

### 7.2 Mechanical position indicator/running indication

— Option —

Mechanical position indicator:

- Continuously indicates the valve position  
(For complete travel from OPEN to CLOSED or vice versa, the indicator disc [2] rotates by approximately 180° to 230°.)
- Indicates whether the actuator is running (running indication)
- Indicates that the end positions are reached (via indicator mark [3])

Figure 32: Mechanical position indicator



- [1] Cover
- [2] Indicator disc
- [3] Mark
- [4] Symbol for position OPEN
- [5] Symbol for position CLOSED

## 8. Signals

### 8.1 Feedback signals via output contacts (binary)

The output contacts can be used to indicate operation modes of the actuator or the controls as binary signals.

The signals are assigned according to the order. Example:

Output contact open = end position CLOSED not reached

Output contact closed = end position CLOSED reached

#### Collective fault signal

Switches: 1 NC and 1 NO (standard)

Designation in the wiring diagram: K9

The collective fault signal appears if one of the following events occurs (default configuration):

- Torque fault: The set torque was exceeded before reaching an end position. (This signal can be activated/deactivated via a switch in the controls.)
- Thermal fault: Motor protection has tripped, i.e. the motor is overheated.
- Phase failure: One phase is missing (3-ph AC motors only).
- PTC tripping device: Test complete

#### 4 output contacts:

Switches: 1 NC (standard)

Designation in the wiring diagram: K5, K6, K7, K8

Default configuration:

- K5: Selector switch is in position **Remote control** (REMOTE).
- K6: Selector switch is in position **Local control** (LOCAL).
- K7: End position OPEN reached
- K8: End position CLOSED reached

### 8.2 Feedback signals (analogue)

— (Option) —

If the actuator is equipped with a position transmitter (potentiometer or RWG), an analogue position feedback signal is available.

#### Valve position

Signal: E2 = 0/4 – 20 mA (galvanically isolated)

Designation in the wiring diagram: E2 (actual value)

## 9. Commissioning (basic settings)

1. Set selector switch to position **0** (OFF).



**Information:** The selector switch is not a mains switch. When positioned to **0** (OFF), the actuator cannot be operated. The controls' power supply is maintained.

2. Switch on the power supply.

**Information:** Please consider the heat-up time for ambient temperatures below  $-20\text{ }^{\circ}\text{C}$ .

3. Perform basic settings.

### 9.1 Heat-up time for low temperature version

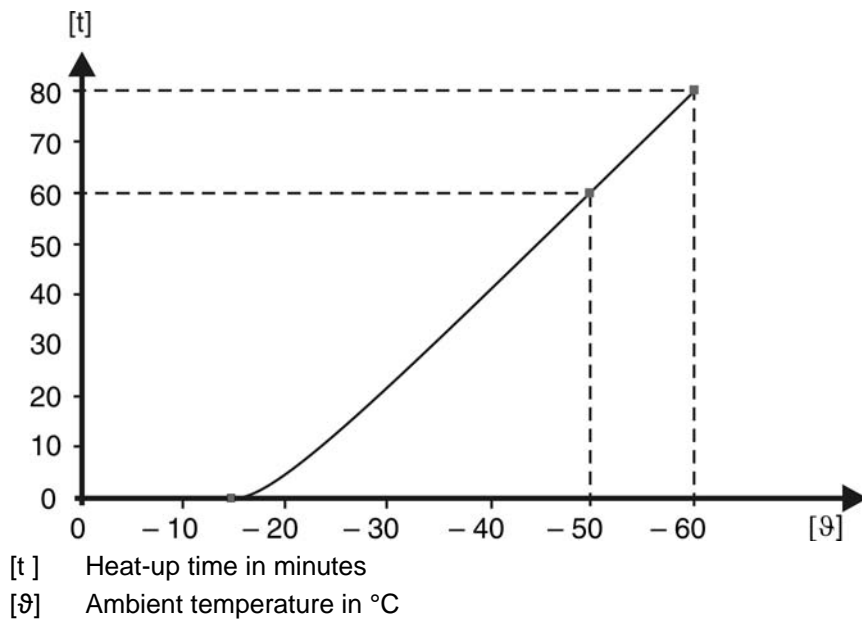
Please note that for low temperature versions, the controls require a heat-up time.

This heat-up time is applicable in case the actuator and the controls are not live and have cooled down to ambient temperature. Under these conditions and after connection to the voltage supply, the following heat-up times must be complied with prior to commissioning:

For  $-50\text{ }^{\circ}\text{C}$  = 60 min.

For  $-60\text{ }^{\circ}\text{C}$  = 80 min.

Figure 34: Sketch illustrating the heat-up time



### 9.2 Switch compartment: open

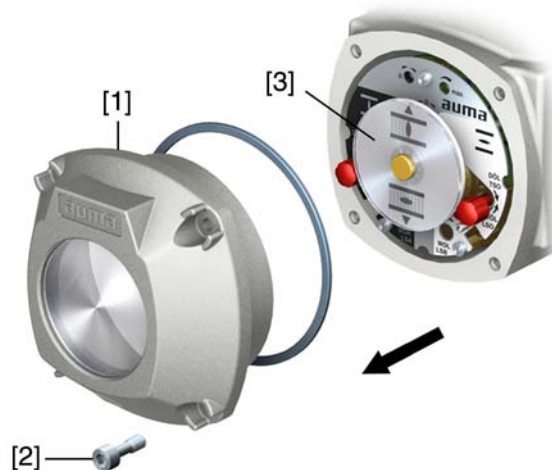
The switch compartment must be opened to perform the following settings (options).

**Flameproof enclosure, danger of explosion!***Risk of death or serious injury.*

- Before opening, ensure that there is no explosive gas and no voltage.
- Handle cover and housing parts with care.
- Joint surfaces must not be damaged or soiled in any way.
- Do not jam cover during fitting.

1. Loosen screws [2] and remove cover [1] from the switch compartment.

Figure 35:

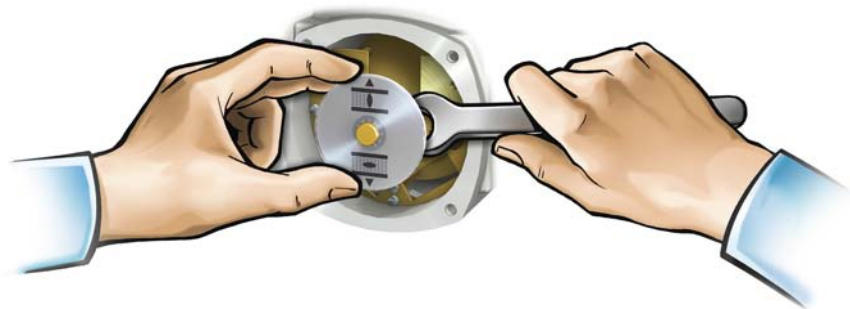


2. If indicator disc [3] is available:

Remove indicator disc [3] using a spanner (as lever).

**Information:** To avoid damage to paint finish, use spanner in combination with soft object, e.g. fabric.

Figure 36:

**9.3 Torque switching: set**

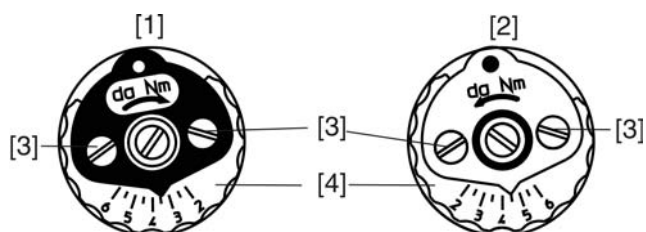
Once the set torque is reached, the torque switches will be tripped (overload protection of the valve).

**Information** The torque switches may also trip during manual operation.**NOTICE****Valve damage due to excessive tripping torque limit setting!**

- The tripping torque must suit the valve.
- Only change the setting with the consent of the valve manufacturer.



Figure 37: Torque switching heads



- [1] Torque switching head black in direction CLOSE
- [2] Torque switching head white in direction OPEN
- [3] Lock screws
- [4] Torque dials

1. Loosen both lock screws [3] at the indicator disc.
2. Turn torque dial [4] to set the required torque (1 da Nm = 10 Nm).
3. Fasten lock screws [3] again.

**Information:** Maximum tightening torque: 0.3 – 0.4 Nm

➔ The torque switch setting is complete.

Example: The figure above shows the following settings:

- 3.5 da Nm = 35 Nm for direction CLOSE
- 4.5 da Nm = 45 Nm for direction OPEN

#### 9.4 Limit switching: set

The limit switching records the travel. When reaching the preset position, switches are operated.

Figure 38: Setting elements for limit switching



##### Black section:

- [1] Setting spindle: End position CLOSED
- [2] Pointer: End position CLOSED
- [3] Mark: End position CLOSED is set

##### White section:

- [4] Setting spindle: End position OPEN
- [5] Pointer: End position OPEN
- [6] Mark: End position OPEN is set

##### 9.4.1 End position CLOSED (black section): set

1. Engage manual operation.
2. Turn handwheel clockwise until valve is closed.

3. Turn handwheel by approximately half a turn (overrun) in the opposite direction.
4. **Press down** and turn setting spindle [1] with screw driver in direction of the arrow and observe the pointer [2]: While a ratchet click is felt and heard, the pointer [2] moves 90° every time.
5. If the pointer [2] is 90° from mark [3]: Continue turning slowly.
6. If the pointer [2] moves to mark [3]: Stop turning and release setting spindle.
- ➡ The end position CLOSED setting is complete.
7. If you override the tripping point inadvertently (ratchet click is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

#### 9.4.2 End position OPEN (white section): set

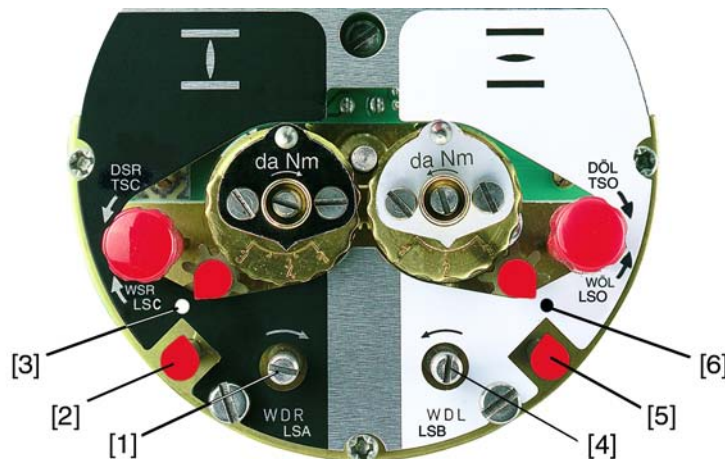
1. Engage manual operation.
2. Turn handwheel counterclockwise until valve is open.
3. Turn handwheel by approximately half a turn (overrun) in the opposite direction.
4. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet click is felt and heard, the pointer [5] moves 90° every time.
5. If the pointer [5] is 90° from mark [6]: Continue turning slowly.
6. If the pointer [5] moves to mark [6]: Stop turning and release setting spindle.
- ➡ The end position OPEN setting is complete.
7. If you override the tripping point inadvertently (ratchet click is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

#### 9.5 Intermediate positions: set

##### — Option —

Actuators equipped with DUO limit switching contain two intermediate position switches. One intermediate position may be set for each running direction.

Figure 39: Setting elements for limit switching



##### Black section:

- [1] Setting spindle: Running direction CLOSE
- [2] Pointer: Running direction CLOSE
- [3] Mark: Intermediate position CLOSED is set

##### White section:

- [4] Setting spindle: Running direction OPEN
- [5] Pointer: Running direction OPEN
- [6] Mark: Intermediate position OPEN is set

**Information** After 177 turns (control unit for 1 – 500 turns/stroke) or 1,769 turns (control unit for 1 – 5,000 turns/stroke), the intermediate switches release the contact.

#### 9.5.1 Running direction CLOSE (black section): set

1. Move valve in direction CLOSE to desired intermediate position.
2. If you override the tripping point inadvertently: Turn valve in opposite direction and approach intermediate position again in direction CLOSE.  
**Information:** Always approach the intermediate position in the same direction as in later electrical operation.
3. **Press down** and turn setting spindle [1] with screw driver in direction of the arrow and observe the pointer [2]: While a ratchet click is felt and heard, the pointer [2] moves 90° every time.
4. If the pointer [2] is 90° from mark [3]: Continue turning slowly.
5. If the pointer [2] moves to mark [3]: Stop turning and release setting spindle.  
➡ The intermediate position setting in running direction CLOSE is complete.
6. If you override the tripping point inadvertently (ratchet click is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

#### 9.5.2 Running direction OPEN (white section): set

1. Move valve in direction OPEN to desired intermediate position.
2. If you override the tripping point inadvertently: Move valve in opposite direction and approach intermediate position again in direction OPEN (always approach the intermediate position in the same direction as in later electrical operation).
3. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet click is felt and heard, the pointer [5] moves 90° every time.
4. If the pointer [5] is 90° from mark [6]: Continue turning slowly.
5. If the pointer [5] moves to mark [6]: Stop turning and release setting spindle.  
➡ The intermediate position setting in running direction OPEN is complete.
6. If you override the tripping point inadvertently (ratchet click is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

#### 9.6 Test run

Perform test run only once all settings previously described have been performed.

#### 9.6.1 Direction of rotation: check

##### NOTICE

##### Valve damage due to incorrect direction of rotation!

- If the direction of rotation is wrong, switch off immediately (press STOP).
- Eliminate cause, i.e. correct phase sequence for cable set wall bracket.
- Repeat test run.

1. Move actuator manually to intermediate position or to sufficient distance from end position.
2. Set selector switch to position **Local control** (LOCAL).

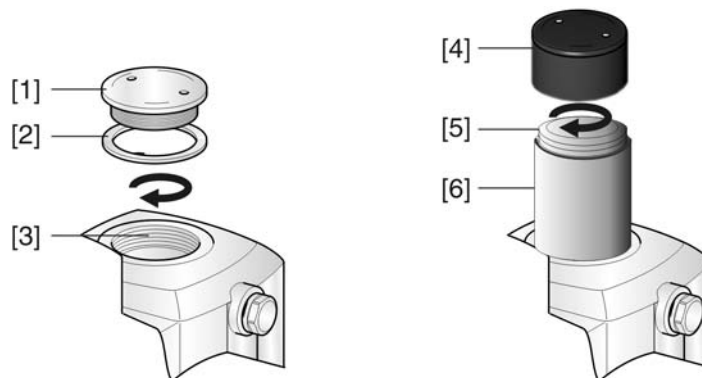


3. Switch on actuator in running direction **CLOSE** and observe the direction of rotation:  
 with indicator disc: step 4  
 without indicator disc: step 5 (hollow shaft)  
 → Switch off before reaching the end position.
4. With indicator disc:  
 → Observe direction of rotation.  
 ➔ The direction of rotation is correct, if **actuator runs in direction CLOSE** and **indicator disc turns counterclockwise**.



5. Without the indicator disc:  
 → Unscrew threaded plug [1] and seal [2] or cap for stem protection tube [4] and observe direction of rotation at hollow shaft [3] or the stem [5].  
 ➔ The direction of rotation is correct, if **actuator runs in direction CLOSE** and hollow shaft or stem **turn clockwise**.

Figure 42: Hollow shaft/stem



- |     |                              |
|-----|------------------------------|
| [1] | Threaded plug                |
| [2] | Seal                         |
| [3] | Hollow shaft                 |
| [4] | Cap for stem protection tube |
| [5] | Stem                         |
| [6] | Stem protection tube         |

### 9.6.2 Limit switching: check

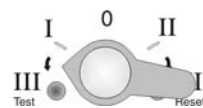
1. Set selector switch to position **Local control (LOCAL)**.



2. Operate actuator using push buttons OPEN - STOP - CLOSE.
  - ➔ The limit switching is set correctly if (default indication):
    - the yellow indication light is illuminated in end position CLOSED
    - the green indication light is illuminated in end position OPEN
    - the indication lights go out after travelling into the opposite direction.
  - ➔ The limit switching is set incorrectly if:
    - the actuator comes to a standstill before reaching the end position
    - the red indication light is illuminated (torque fault).
3. If the end position setting is incorrect: Reset limit switching.
4. If the end position setting is correct and no options (e.g. potentiometer, position transmitter) are available: Close switch compartment.

### 9.6.3 PTC tripping device (option): test

1. Turn selector switch to position **Test** (spring return).



- ➔ If the PTC tripping device is working properly, the tripping of the motor protection is signalled via the red indication light "collective fault signal" on the local controls.

2. Turn selector switch to position **Reset**.



- ➔ The fault signal is reset if the device is working properly.
3. If no fault signal is initiated: Request AUMA service to check both wiring and selector switch.

### 9.7 Potentiometer setting

#### — Option —

The potentiometer as travel sensor records the valve position.

**Information** This setting is only required if the potentiometer is directly wired to the customer connection XK (refer to wiring diagram).

**Information** Due to the ratio of the reduction gearing the complete resistance range/stroke is not always passed. Therefore, external adjustment (setting potentiometer) must be provided.

Figure 46: View of control unit



[1] Potentiometer

1. Move valve to end position CLOSED.

2. Turn potentiometer [1] clockwise to the stop.
- ➔ End position CLOSED corresponds to 0 %
- ➔ End position OPEN corresponds to 100 %
3. Turn potentiometer [1] slightly in opposite direction.
4. Perform fine-tuning of the zero point at external setting potentiometer (for remote indication).

## 9.8 Electronic position transmitter RWG: set

### — Option —

The electronic position transmitter RWG records the valve position. On the basis of the actual position value measured by the potentiometer (travel sensor), it generates a current signal between 0 – 20 mA or 4 – 20 mA.

Table 7: Technical data RWG 4020

Wiring		3- or 4-wire system
Terminal plan	KMS	TP_ _4/ _ _ _
Output current	$I_A$	0 – 20 mA, 4 – 20 mA
Power supply	$U_V$	24 V DC, $\pm 15$ % smoothed
Max. current consumption	$I$	24 mA at 20 mA output current
Max. load	$R_B$	600 $\Omega$

Figure 47: View of control unit



- [1] Potentiometer (travel sensor)
- [2] Potentiometer min. (0/4 mA)
- [3] Potentiometer max. (20 mA)
- [4] Measuring point (+) 0/4 – 20 mA
- [5] Measuring point (–) 0/4 – 20 mA


1. Connect voltage to electronic position transmitter.
2. Move valve to end position CLOSED.
3. Connect ammeter for 0 – 20 mA to measuring points [4 and 5].
4. Turn potentiometer [1] clockwise to the stop.
5. Turn potentiometer [1] slightly in opposite direction.
6. Turn potentiometer [2] clockwise until output current starts to increase.
7. Turn potentiometer [2] in opposite direction until the following value is reached:
  - for 0 – 20 mA approx. 0.1 mA
  - for 4 – 20 mA approx. 4.1 mA
- ➔ This ensures that the signal remains above the dead and live zero point.
8. Move valve to end position OPEN.
9. Set potentiometer [3] to end value 20 mA.
10. Approach end position CLOSED again and check minimum value (0.1 mA or 4.1 mA). If necessary, correct the setting.




**Information** If the maximum value cannot be reached, the selection of the reduction gearing must be checked. (The max. possible turns/stroke are indicated on the order-related technical data sheet for the actuator.)

## 9.9 Mechanical position indicator: set


### — Option —

1. Place indicator disc on shaft.
2. Move valve to end position CLOSED.
3. Turn lower indicator disc until symbol  (CLOSED) is in alignment with the mark ▲ on the cover.



4. Move actuator to end position OPEN.
5. Hold lower indicator disc in position and turn upper disc with symbol  (OPEN) until it is in alignment with the mark ▲ on the cover.



6. Move valve to end position CLOSED again.
7. Check settings:  
If the symbol  (CLOSED) is no longer in alignment with mark ▲ on the cover:  
7.1 Repeat setting procedure.  
7.2 Check whether the appropriate reduction gearing has been selected, if required.

## 9.10 Switch compartment: close

### NOTICE

### Danger of corrosion due to damage to paint finish!

→ Touch up damage to paint finish after work on the device.

1. Clean sealing faces of housing and cover.
2. Preserve joint surfaces with an acid-free corrosion protection agent.
3. Check whether O-ring [3] is in good condition, replace if damaged.

4. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.

**Flameproof enclosure, danger of explosion!**

*Risk of death or serious injury.*

- Handle cover and housing parts with care.
- Joint surfaces must not be damaged or soiled in any way.
- Do not jam cover during fitting.

5. Place cover [1] on switch compartment.
6. Fasten screws [2] evenly crosswise.



## 10. Commissioning – controls settings

The controls are set in the factory according to the order. The settings only have to be changed if the device is used for applications other than those specified in the order. In case the device is equipped with a positioner (option), subsequent setting may be required.

The following settings are described in these operation instructions:

- Type of seating (limit or torque seating): set
- Push-to-run operation or self-retaining: set
- Running indication (blinker transmitter) (option): activate/deactivate
- Torque fault in collective fault signal: activate/deactivate
- Positioner setting (option)

### 10.1 Controls: open



#### Flameproof enclosure, danger of explosion!

*Risk of death or serious injury.*

- Before opening, ensure that there is no explosive gas and no voltage.
- Handle cover and housing parts with care.
- Joint surfaces must not be damaged or soiled in any way.
- Do not jam cover during fitting.

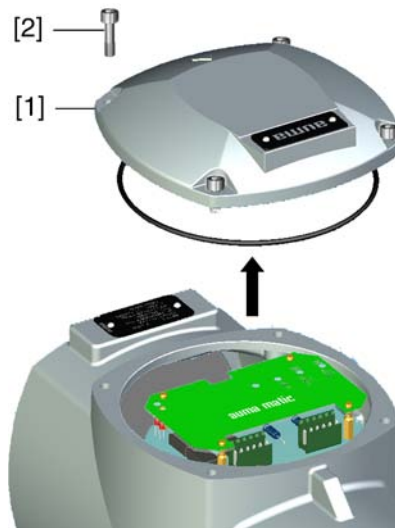
#### NOTICE

#### Electrostatic discharge ESD!

*Risk of damage to electronic components.*

- Earth both operators and devices.

- Loosen screws [2] and remove cover [1].



### 10.2 Type of seating: set

#### NOTICE

#### Valve damage due to incorrect setting!

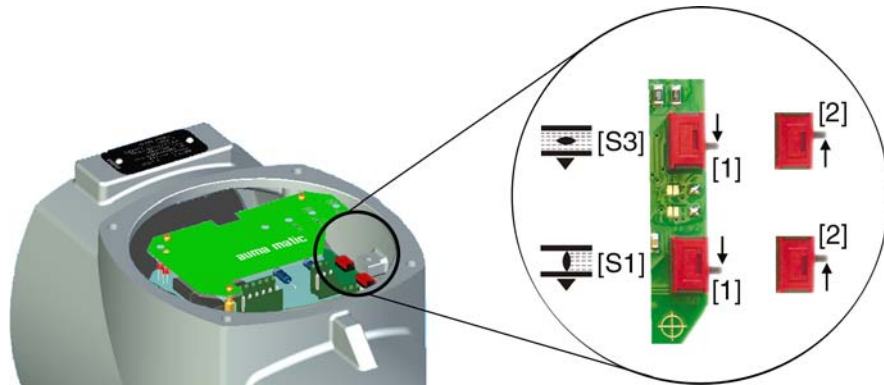
- The type of seating must suit the valve.
- Only change the setting with prior consent of the valve manufacturer.

The type of seating can be set via two DIP switches on the logic board.

- Limit seating** The limit switching is set in such a way that the actuator switches off at the desired switching points. The torque switching acts as overload protection for the valve.
- Torque seating** The torque switching is set to the desired tripping torque. After reaching the tripping torque, the actuator is turned off.
- The limit seating is used to signal that the limit switching will trip shortly **before** reaching the set tripping torque. If this is not the case, either the indication light on the local controls or the alarm contact K9 (collective fault signal) will signal a fault.

→ Set type of seating for end positions via DIP switches [S1] and [S3].

Figure 52: DIP switches on logic board



- [S1] DIP switch for end position CLOSED  
 [S3] DIP switch for end position OPEN  
 [1] Position [1] = limit seating  
 [2] Position [2] = torque seating

### 10.3 Push-to-run operation or self-retaining: set

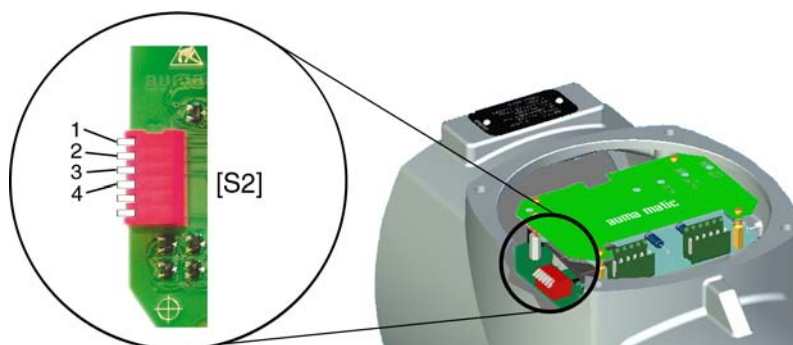
Push-to-run operation or self-retaining is set via a DIP switch on the logic board.

**Push-to-run operation** Actuator only runs in direction OPEN or CLOSE while an operation command is being received. The actuator stops if the operation command is cancelled.

**Self-retaining** After receiving an operation command, the actuator continues to run in direction OPEN or CLOSE, even if the operation command is cancelled (self-retaining). The actuator is either stopped by the STOP command or if an end position or intermediate position has been reached.

→ Set push-to-run operation or self-retaining via DIP switch [S2].

Figure 53: DIP switch on logic board



[S2] 6-way DIP, switches [1 – 4]:

- 1 for operation commands CLOSE from remote
- 2 for operation commands OPEN from remote
- 3 for operation commands CLOSE via push button at local controls
- 4 for operation commands OPEN via push button at local controls

- ➔ Switch in lower position (position ON): Self-retaining
- ➔ Switch in upper position (position OFF): Push-to-run operation

**Information** If the controls are equipped with a positioner, switches 1 and 2 (operation commands from remote) must be in position OFF (push-to-run operation).

#### 10.4 Running indication (blinker transmitter): activate/deactivate

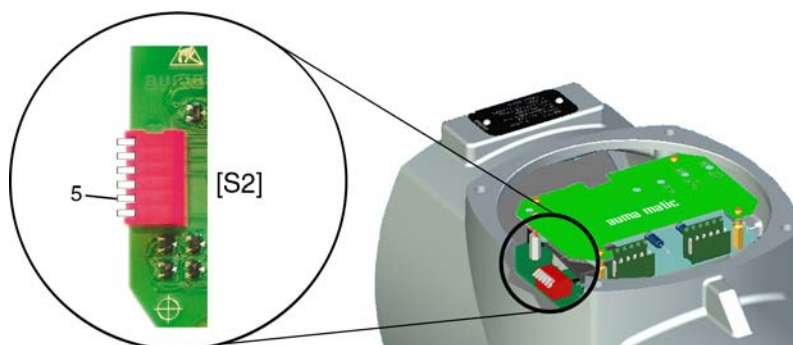
— (Option) —

If the actuator is equipped with a blinker transmitter (wiring diagram designation: S5), indication lights (OPEN/CLOSE) on the local controls can be used as running indication. If the running indication is active, the respective indication light blinks during actuator operation.

The running indication is activated/deactivated via a DIP switch on the logic board.

→ Set running indication (blinker) via DIP switch [S2].

Figure 54: DIP switch on logic board



[S2] 6-way DIP, switch 5

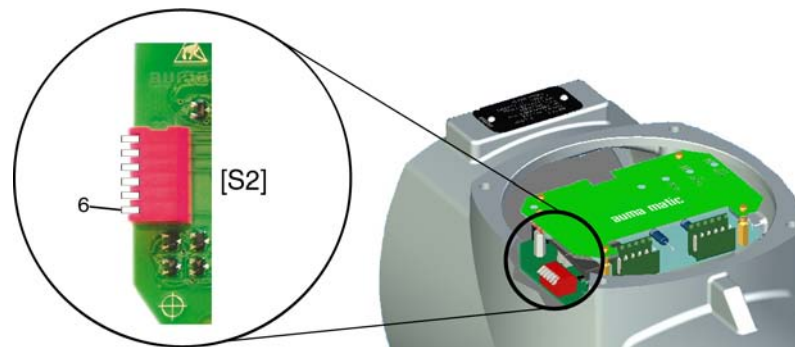
- ➔ Switch 5 in lower position (position ON): Running indication is deactivated.
- ➔ Switch 5 in upper position (position OFF): Running indication is activated.

#### 10.5 Torque fault in collective fault signal: activate/deactivate

The torque fault signal is activated/deactivated via a DIP switch on the logic board.

→ Activate/deactivate signal via DIP switch [S2].

Figure 55: DIP switch on logic board



[S2] 6-way DIP, switch 6

- ➔ Switch 6 in lower position (position ON): The signal "Torque fault in collective fault signal" is activated.
- ➔ Switch 6 in upper position (position OFF): The signal "Torque fault in collective fault signal" is deactivated.

## 10.6 Positioner

— (Option) —

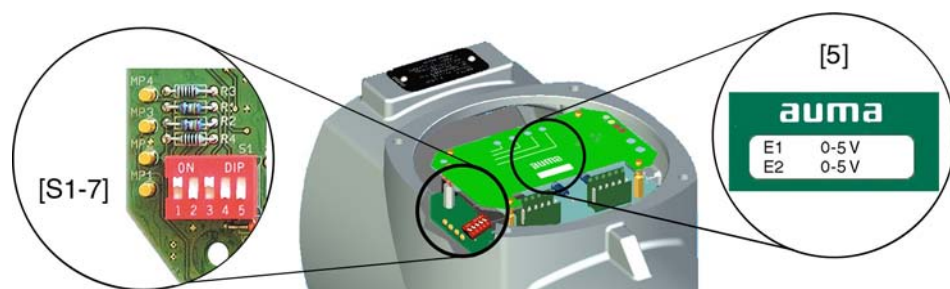
→ Prior to positioner setting, set limit and torque switching as well as potentiometer or electronic position transmitter.

### 10.6.1 Input ranges (signal type) for setpoint and actual value

The input range (signal type) for setpoint E1 and actuator value E2 is set in the factory and marked with a label on the cover plate of the positioner.

The type of signal can be modified at a later date exclusively for versions with setpoint E1  $\neq$  0/4 – 20 mA and split-range version. For these versions, the positioner board is equipped with an additional contact.

Figure 56: Version with additional switch on the positioner board



5. Label indicating the set input ranges
- [S1-7] 5 contact DIP switch for setting
- DIP1 Actual value E2 (current or voltage signal)
  - DIP3 Setpoint E1 (current or voltage signal)
  - DIP5 Setpoint E1 (double signal range e.g. for split range)

Table 8: Input range setting for setpoint E1





















Setpoint E1	[S1-7]				
	DIP 3 and 5				
0/4 – 20 mA	ON				
0 – 5 V	ON				
0 – 10 V	ON				

Table 9: Input range setting for actual value E2

Actual value E2	[S1-7]				
	DIP 1				
0/4 – 20 mA <sup>1)</sup>	ON				
0 – 5 V <sup>2)</sup>	ON				

- 1) for internal feedback of electronic position transmitter RWG  
2) for internal feedback of precision potentiometer 5 kΩ

**Information** When changing the setting, a new label [5] indicating the set signal type must be provided. Furthermore, the wiring diagram indicated on the name plate of the actuator controls also changes.

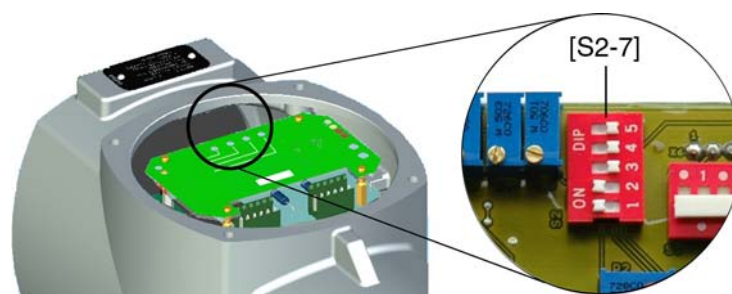
### 10.6.2 Behaviour on loss of signal (actuator reaction)

In case of a loss of signal of setpoint E1 or actual value E2, the reaction of the actuator can be programmed via switch [S2-7]. The complete selection range, however, is only available for signals 4 – 20 mA.

The following reactions are possible:

- Fail as is:** Actuator stops immediately and remains in this position.
- Fail close:** Actuator moves the valve to end position CLOSED.
- Fail open:** Actuator moves the valve to end position OPEN.

Figure 57: DIP switch [S2-7] on positioner board



DIP1 = ON, actual value E2 is monitored  
DIP2 = ON, setpoint E1 is monitored

Table 10: Recommended settings











Behaviour on loss of signal of		Signal type		[S2-7]
E1 and/or E2		Setpoint E1	Actual value E2	DIP 1 2 3 4
Fail as is		4 – 20 mA	4 – 20 mA	ON 
Fail close				ON 
Fail open				ON 

Table 11: Further possible settings

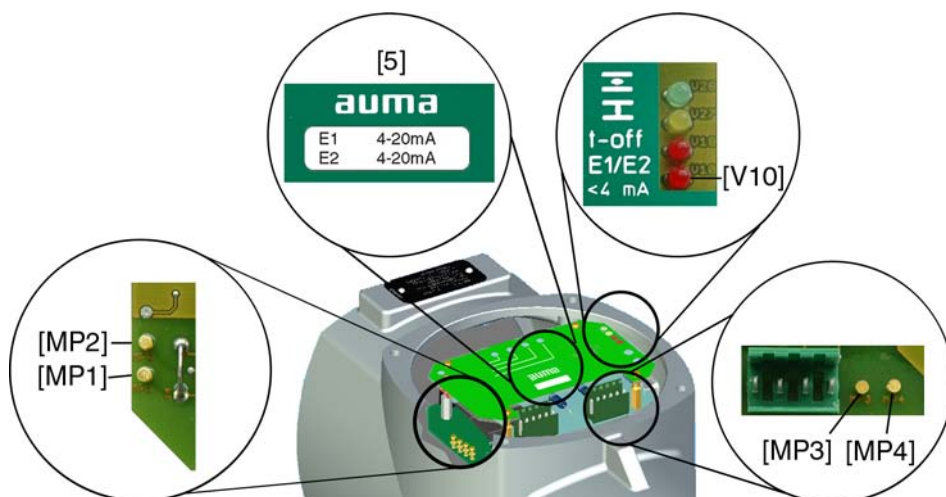
Behaviour on loss of signal of		Signal type <sup>1)</sup>		[S2-7]
E1	E2	Setpoint E1	Actual value E2	DIP 1 2 3 4
Fail as is	Fail open	4 – 20 mA	0 – 5 V	ON 
Fail close	Fail open	4 – 20 mA	0 – 5 V	ON 
		0 – 20 mA	4 – 20 mA	ON 
		0 – 20 mA 0 – 5 V 0 – 10 V	0 – 20 mA 0 – 5 V	ON 
	Fail close	0 – 20 mA 0 – 5 V	4 – 20 mA	ON 
	Fail as is	0 – 20 mA 0 – 10 V	4 – 20 mA	ON 
Fail open		4 – 20 mA	0 – 20 mA 0 – 5 V	ON 

- 1) in case of a signal loss, a misinterpretation might be made for 0 – 20 mA, 0 – 5 V or 0 – 10 V, due to the fact that E1 or E2 could take the value 0 mA even without loss of signal (end position CLOSED = 0 mA or 0 V).

### 10.6.3 Adjustment in end positions

The setting described below applies to the standard positioner version, i.e. maximum setpoint E1 (20 mA) triggers a travel to end position OPEN, minimum setpoint (0/4 mA) triggers a travel to end position CLOSED.

Figure 58: Electronic positioner board



- [MP1] Measuring point (–) for actual value E2  
 [MP2] Measuring point (+) for actual value E2  
 [MP3] Measuring point (+) for setpoint E1  
 [MP4] Measuring point (–) for setpoint E1  
 [5] Label with signal indication  
 [V10] Red LED: E1/E2 <4 mA

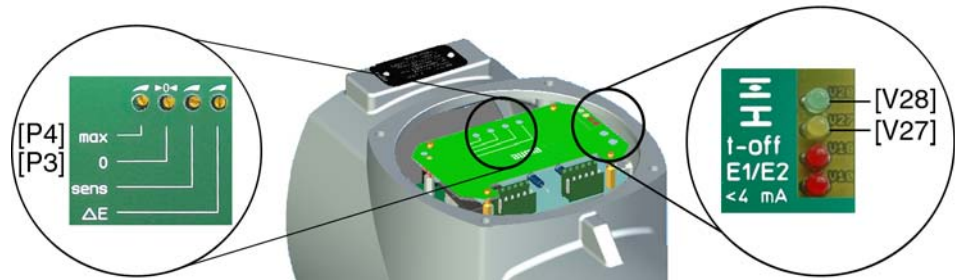
#### End position CLOSED

1. Set selector switch to position **Local control** (LOCAL).
2. Move valve to end position CLOSED.
3. Connect lower setpoint to customer connection XK (terminals 2/3). The lower setpoint (0 V, 0 mA or 4 mA) is indicated on the label [5].
4. If the red LED [V10] **E1/E2 <4 mA** is illuminated:
  - 4.1 Verify polarity of setpoint E1.
  - 4.2 Check whether external load is connected to customer connection XK (terminals 23/24) (observe max. load  $R_B$ ), or
  - 4.3 Connect terminals 23/24 across customer connection XK (terminals 23/24).
5. Measure setpoint E1: Connect measuring device for 0 – 5 V to measuring points **[MP3/MP4]**.
  - ➔ For a setpoint E1 of 0 V or 0 mA, the voltmeter shows 0 V.
  - ➔ For a setpoint E1 of 4 mA, the voltmeter shows 1 V.
6. If measured value is not correct: Correct setpoint E1.
7. Measure actual value E2: Connect measuring device for 0 – 5 V to measuring points **[MP1/MP2]**.
  - ➔ For an actual value E2 of 0 mA, the voltmeter shows 0 V.
  - ➔ For an actual value E2 of 4 mA, the voltmeter shows 1 V.
8. If measured value is not correct: Re-set potentiometer or electronic position transmitter and perform adjustment once again, starting from step 1.



9. Adjust positioner using potentiometer **0** [P3].
  - 9.1 If both LEDs are OFF or the green LED [V28] is illuminated: Turn potentiometer **0** [P3] slightly clockwise until the yellow LED [V27] is illuminated.
  - 9.2 If the yellow LED [V27] is illuminated: Turn potentiometer **0** [P3] counterclockwise until the yellow LED [V27] goes out. Then turn potentiometer **0** [P3] slightly clockwise until the yellow LED [V27] is illuminated again.

Figure 59: Electronic positioner board



[P3] Potentiometer 0

[P4] Potentiometer max

[V27] Yellow LED: End position CLOSED reached

[V28] Green LED: End position OPEN reached

- ➔ The setting is correct if the yellow LED [V27] is switched on when reaching end position CLOSED.

**End position OPEN**

10. Move valve to end position OPEN.
11. Measure actual value E2 (measuring points **[MP1/MP2]**):
  - ➔ For an actual value E2 of 20 mA, the voltmeter shows 5 V.
12. If measured value is not correct: Re-set potentiometer or electronic position transmitter and perform adjustment once again, starting from step 1.
13. Set maximum setpoint E1 (5 V or 20 mA, refer to label [5]).
14. Measure setpoint E1 (measuring points **[MP3/MP4]**):
  - ➔ For a setpoint E1 of 5 V or 20 mA, the voltmeter shows 5 V.
15. If measured value is not correct: Verify setpoint E1.
16. Adjust positioner using potentiometer **max** [P4].
  - 16.1 If both LEDs are OFF or the yellow LED [V27] is illuminated: Turn potentiometer **max** [P4] slightly counterclockwise until the green LED [V28] is illuminated.
  - 16.2 If the green LED [V28] is illuminated: Turn potentiometer **max** [P4] clockwise until the green LED [V28] goes out. Then turn potentiometer **0** [P3] slightly counterclockwise until the green LED [V28] is illuminated again.
    - ➔ The setting is correct if the green LED [V28] is switched on when reaching end position OPEN.

**10.6.4 Sensitivity setting****NOTICE****Unnecessary wear at valve and actuator caused by an excessive number of starts (sensitivity)!**

- Set maximum dead band acceptable for the process.
- Observe maximum number of actuator starts (refer to technical data sheet for modulating actuators).

**Dead band**

The dead band determines the sensitivity between switch-on point and switch-off point. The smaller the dead band, the higher the sensitivity of the positioner.



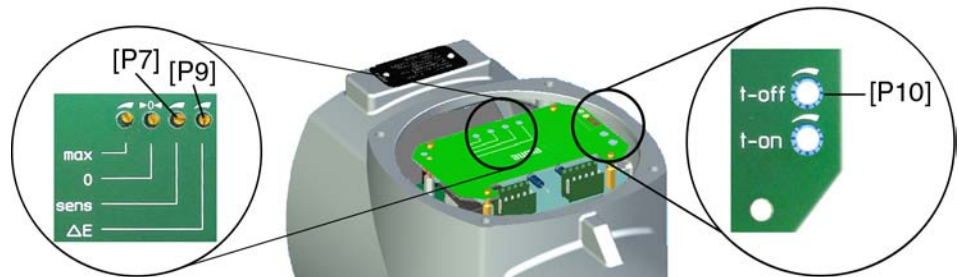
Default value: 2.5 %

Setting range: 0.5 % to 2.5 % (of the maximum setpoint E1)

#### Dead time

The dead time prevents the operation to a new setpoint within a pre-determined time (0.5 to 10 seconds). The number of starts can be reduced by setting the dead time to a sufficiently high value.

Figure 60: Sensitivity setting



[P7] Potentiometer **sens** (fine tuning)

[P9] Potentiometer **Δ E** (dead band)

[P10] Potentiometer **t-off** (dead time)

#### Dead band setting

1. Set selector switch to position **Remote control** (REMOTE).
2. Connect setpoint E1 to customer connection XK (terminals 2/3).
3. Set dead band using potentiometer **Δ E** [P9]:
  - Reduce dead band (increase sensitivity): Turn potentiometer counterclockwise.
  - Increase dead band (reduce sensitivity): Turn potentiometer clockwise.

#### Fine tuning

**Information:** Fine tuning is only useful for output speeds <16 rpm. For 1-phase AC motors, fine tuning is not possible.

4. Reduce dead band further by up to 0.25 % (increase sensitivity): Turn potentiometer **sens** [P7] counterclockwise.

#### Dead time setting

5. Set dead time using potentiometer **t-off** [P10]:
  - Reduce dead time: Turn potentiometer **t-off** [P10] counterclockwise.
  - Increase dead time: Turn potentiometer **t-off** [P10] clockwise.

### 10.7 EMERGENCY command (EMERGENCY - OPEN/EMERGENCY - CLOSE)

#### — (Option) —

The EMERGENCY input (refer to wiring diagram) has to be connected to the control voltage using an NC contact (closed circuit principle). In the event of an EMERGENCY command (removal of the signal = NC contact is operated), the actuator runs to the preset end position:

- EMERGENCY - CLOSE input: Actuator runs to end position CLOSED.
- EMERGENCY - OPEN input: Actuator runs to end position OPEN.

The EMERGENCY command is effective in all three selector switch positions (LOCAL, OFF, REMOTE).



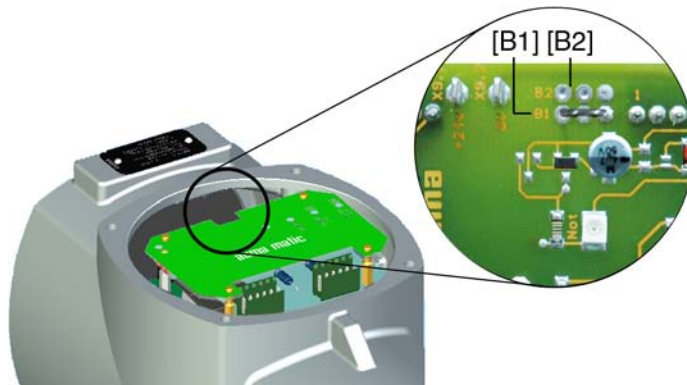
#### The actuator can immediately start when switched on!

*Risk of personal injuries or damage to the valve.*

- Ensure that EMERGENCY signal is present when switching on.
- If the actuator starts to run unexpectedly: Immediately press push button **Stop**.

**Disable EMERGENCY  
command**

Figure 61: Interface board for available option EMERGENCY - OPEN/EMERGENCY - CLOSE



[B1] Link available: EMERGENCY - CLOSE

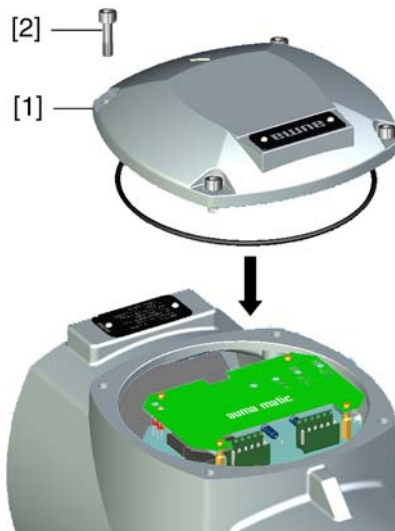
[B2] Link available: EMERGENCY - OPEN

1. Remove face plate.
2. Disconnect links [B1] or [B2].

**10.8 Controls: close****NOTICE****Danger of corrosion due to damage to paint finish!**

→ Touch up damage to paint finish after work on the device.

1. Clean sealing faces of housing and cover.
2. Preserve joint surfaces with an acid-free corrosion protection agent.
3. Check whether O-ring [3] is in good condition, replace if damaged.
4. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.

**WARNING****Flameproof enclosure, danger of explosion!***Risk of death or serious injury.*

- Handle cover and housing parts with care.
- Joint surfaces must not be damaged or soiled in any way.
- Do not jam cover during fitting.

5. Place cover [1] on switch compartment.
6. Fasten screws [2] evenly crosswise.

## 11. Corrective action

### 11.1 Faults during commissioning

Table 12: Faults during commissioning

Fault description	Possible causes	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
Fault in end position Actuator runs to end stop although the limit switches work properly.	The overrun was not considered when setting the limit switching. The overrun is generated by the inertia of both the actuator and the valve and the delay time of the controls.	Determine overrun: Overrun = travel covered from switching off until complete standstill. Set limit switching again considering the overrun (turn handwheel back by the amount of the overrun).
Position transmitter RWG Measurement range 4 – 20 mA or maximum value 20 mA cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
Limit and/or torque switches do not trip.	Switch is defective or switch setting is incorrect.	Check setting, if required, reset end positions. → <b>Check switches</b> and replace them, if required.

#### Switch check

The red test buttons [1] and [2] are used for manual operation of the switches:



1. Turn test button [1] in direction of the TSC arrow: Torque switch CLOSED trips. The red indication light (fault) on the local controls is illuminated.
2. Press push button OPEN to reset the fault (indication light) by operating the device in the opposite direction.
3. Turn test button [2] in direction of the TSO arrow: Torque switch OPEN trips.
4. Press push button CLOSE to reset the fault (indication light) by operating the device in the opposite direction.

If the actuator is equipped with a DUO limit switching (option), the intermediate position switches (LSA and LSB) will be operated at the same time as the torque switches.

1. Turn test button [1] in direction of the LSC arrow: Limit switch CLOSED trips.
2. Turn test button [2] in direction of the LSO arrow: Limit switch OPEN trips.

### 11.2 Fuses

#### 11.2.1 Fuses within the actuator controls

After removal of local controls, the fuses can be accessed.

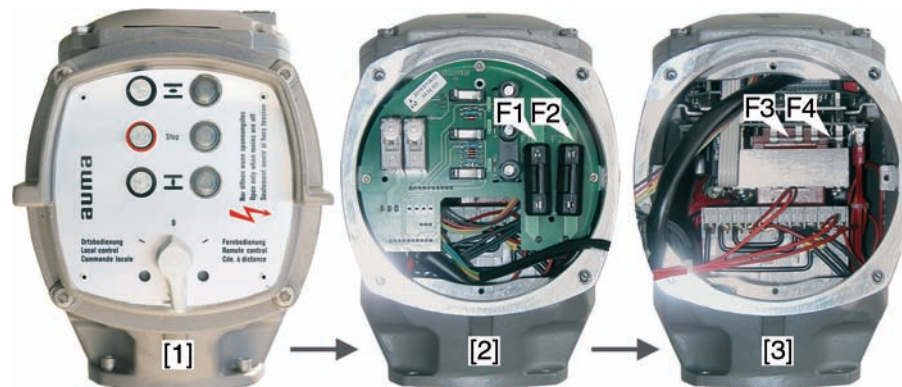


#### Hazardous voltage!

*Risk of electric shock.*

→ Disconnect device from the mains before opening.

Figure 64: Access to fuses



- [1] Local controls  
[2] Signal and control board  
[3] Power supply unit

**F1/F2** Primary fuses on power supply unit

G fuses	F1/F2	AUMA Art. No.:
Size	6.3 x 32 mm	
Reversing contactors Power supply ≤ 500 V	1 A T; 500 V	K002.277
Reversing contactors Power supply > 500 V	2 A FF; 690 V	K002.665

**F3** Internal 24 V DC supply

G fuse according to IEC 60127-2/III	F3	AUMA Art.no.:
Size	5 x 20 mm	
Voltage output (power supply unit) = 24 V	500 mA T; 250 V	K001.183
Voltage output (power supply unit) = 115 V	500 mA T; 250 V	K001.183

**F4** Internal 24 V AC supply (115 V AC) for:

- Heater, switch compartment, reversing contactors control
- PTC tripping device
- for 115 V AC also control inputs OPEN - STOP - CLOSE

G fuse according to IEC 60127-2/III	F4	AUMA Art.no.:
Size	5 x 20 mm	
Voltage output (power supply unit) = 24 V	1.0 A T; 250 V 1.6 A T; 250 V	K004.831 K003.131
Voltage output (power supply unit) = 115 V	0.4 A T; 250 V	K003.021

**Information** Only replace fuses with fuses of the same type and value.

→ After replacing the fuses, screw local controls back on again.

#### NOTICE

#### Cable damage due to twisting or pinching!

*Risk of functional failures.*

- Turn local controls by a maximum of 180°.
- Carefully assemble local controls to avoid pinching the cables.

### 11.2.2 Motor protection (thermal monitoring)

In order to protect against overheating and impermissibly high surface temperatures at the actuator, PTC thermistors or thermoswitches are embedded in the motor

winding. The thermoswitch is tripped as soon as the max. permissible winding temperature has been reached.

The actuator is stopped and the red indication light on the local controls is illuminated.

The motor has to cool down before the operation can be resumed.

#### **Version with thermoswitch (standard)**

The actuator can be controlled again once the motor has cooled down (red indication light goes out).

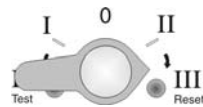
#### **Version with thermoswitch and additional thermal overload relay within the controls (option)**

The operation may only be resumed once the fault signal (red indication light) has been reset. The fault signal is reset via the overload relay integrated in the actuator controls. Therefore the controls have to be opened at the cover and the relay held down. The relay is located on the contactors.

#### **Version with PTC thermistor (option)**

The operation may only be resumed once the fault signal (red indication light) has been reset. The fault signal is reset via selector switch position **Reset** of the local controls.

Figure 65: Selector switch on local controls



## 12. Servicing and maintenance



### Damage caused by inappropriate maintenance!

- Servicing and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or the contractor of the plant. Therefore, we recommend contacting our service.
- Only perform servicing and maintenance tasks when the device is switched off.

### AUMA Service & Support

AUMA offer extensive service such as servicing and maintenance as well as customer product training. For the relevant contact addresses, please refer to <Addresses> in this document or to the Internet ([www.auma.com](http://www.auma.com)) .

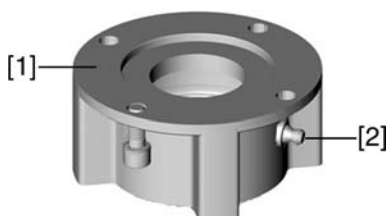
### 12.1 Preventive measures for servicing and safe operation

The following measures are required to ensure safe device operation:

#### 6 months after commissioning and then every year

- Carry out visual inspection:  
Cable entries, cable glands, blanking plugs, etc. have to be checked for correct tightness and sealing.  
Respect torques according to manufacturer's details.
- Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>.
- When rarely operated: Perform test run.
- For devices with output drive A: Press in Lithium soap EP multi-purpose grease on mineral oil base at the grease nipple with a grease gun.
- Lubrication of the valve stem must be done separately.

Figure 66: Output drive type A



[1] Output drive type A

[2] Grease nipple

Table 13: Grease quantities for bearing of output drive type A

Output drive	A 07.2	A 10.2	A 14.2	A 16.2
Quantity [g] <sup>1)</sup>	1.5	2	3	5

1) For grease at density  $\rho = 0.9 \text{ kg/dm}^3$

#### For enclosure protection IP 68

After continuous immersion:

- Check actuator.
- In case of ingress of water, locate leaks and repair, dry device correctly and check for proper function.

### 12.2 Disconnection from the mains

If the device must be dismantled, e.g. for service purposes, it can be separated from the mains without having to remove the wiring.



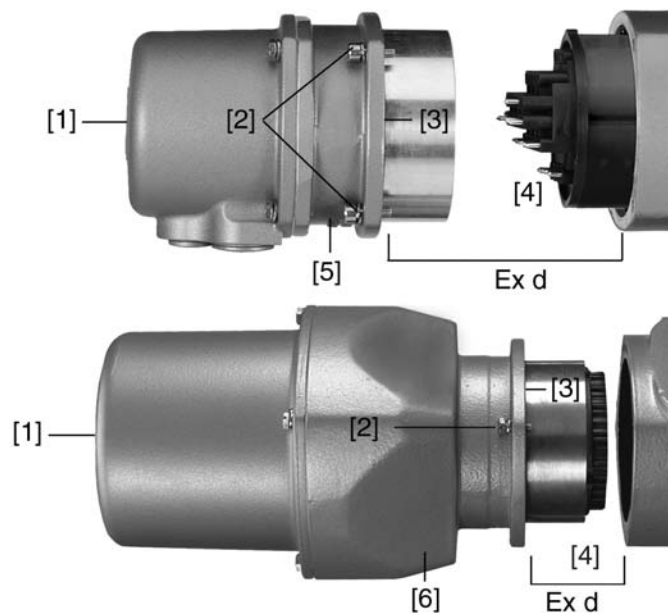


### Flameproof enclosure, danger of explosion!

*Risk of death or serious injury.*

- Before opening, ensure that there is no explosive gas and no voltage.
- Handle cover and housing parts with care.
- Joint surfaces must not be damaged or soiled in any way.
- Do not jam cover during fitting.

Figure 67: top: KP/KPH, bottom: KES



- [1] Cover
- [2] Screws for housing
- [3] O-ring
- [4] Terminal compartment
- [5] Terminal board (KP, KPH)
- [6] Frame (KES)

#### Removing the plug:

1. Loosen the screws [2].
2. Remove plug/socket connector.
- ➔ Hereby, cover [1] and terminal board [5] or frame [6] remain together.
3. Seal open plug/socket connection, e.g. using AUMA protection cover and parking frame.

#### Fitting the plug:

4. Clean sealing faces at the cover and the housing.
5. Preserve joint surfaces with an acid-free corrosion protection agent.
6. Check whether O-ring [3] is in good condition, replace if damaged.
7. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.
8. Replace plug/socket connector and fasten screws evenly crosswise.

## 12.3 Maintenance

### Lubrication

- In the factory, the gear housing is filled with grease.
- Grease change is performed during maintenance
  - Generally after 4 to 6 years for modulating duty.
  - Generally after 6 to 8 years if operated frequently (open-close duty).
  - Generally after 10 to 12 years if operated rarely (open-close duty).
- We recommend exchanging the seals when changing the grease.

**Notes regarding the maintenance**

- No additional lubrication of the gear housing is required during operation.
- Check actuator visually. Ensure that no outside damage or changes are visible.
- The electric connection cables must be without damage and wired correctly.
- Do a thorough touch-up of possible damage to paint finish to prevent corrosion. Original paint in small quantities can be supplied by AUMA.
- Cable entries, cable glands, plugs etc. have to be checked for correct tightness and sealing. Consider torques according to manufacturer's details. If required, replace the components. Only use components which have an EC type examination certificate.
- Check whether Ex connections are fastened correctly.
- Take care of possible discolouration of the terminals and wires. This would indicate an increased temperature.
- For Ex housings, pay special attention to a possible collection of water. This may originate from "breathing" due to severe temperature variations (e. g. change of night and day), from damaged seals etc. Remove any water immediately.
- Check the flame path gaps of flameproof enclosures for dirt and corrosion.
- Since the dimensions of all flameproof joints are strictly defined and inspected, no mechanical work (such as grinding) shall be performed on them. The joint surfaces have to be cleaned chemically (e. g. with Esso-Varsol).
- Prior to fitting, preserve joint surfaces with an acid-free corrosion protection agent (e. g. Esso Rust-BAN 397).
- Ensure that all housing covers are handled carefully and that the seals are checked.
- All cable and motor protection components have to be checked.
- If defects impairing the safety are detected during maintenance, repair measures have to be initiated without delay.
- Any kind of surface coating for the joint surfaces is not permitted.
- When exchanging parts, seals etc. only original spare parts shall be used.

**12.4 Disposal and recycling**

Our devices have a long lifetime. However, they have to be replaced at one point in time. The devices have a modular design and may, therefore, easily be separated and sorted according to materials used, i.e.:

- electronic scrap
- various metals
- plastics
- greases and oils

The following generally applies:

- Greases and oils are hazardous to water and must not be released into the environment.
- Arrange for controlled waste disposal of the disassembled material or for separate recycling according to materials.
- Observe the national regulations for waste disposal.



## 13. Technical data

**Information** The following technical data includes standard and optional features. For detailed information on the customer-specific version, refer to the order-relevant data sheet. This data sheet can be downloaded from the Internet at <http://www.auma.com> in German and English (indication of commission number required).

### 13.1 Features and functions of actuator

Explosion protection	Standard: <ul style="list-style-type: none"> <li>• II2G EEx de IIB T4 or T3</li> <li>• II2D Ex tD A21 IP6x T130 °C or T190 °C</li> <li>• II2G c IIC T4 or T3</li> </ul> For actual version, refer to actuator name plate.
EC type examination certificate	PTB 03 ATEX 1122
Protection types	<ul style="list-style-type: none"> <li>• Ex <b>d</b> flameproof enclosure: <ul style="list-style-type: none"> <li>- Motor compartment</li> <li>- Controls housing</li> </ul> </li> <li>• Ex <b>e</b> increased safety: <ul style="list-style-type: none"> <li>- Terminal compartment</li> <li>- Switch compartment</li> </ul> </li> <li>• Ex <b>i</b> Intrinsic safety: <ul style="list-style-type: none"> <li>- Electronic position transmitter RWG 5020Ex</li> </ul> </li> <li>• <b>c</b> constructional safety: <ul style="list-style-type: none"> <li>- Gear housing</li> </ul> </li> </ul>
Type of duty <sup>1)</sup>	Standard: <ul style="list-style-type: none"> <li>• SAEx: Short-time duty S2 - 15 min</li> <li>• SAREx: Intermittent duty S4 - 25 %</li> </ul> Options: <ul style="list-style-type: none"> <li>• SAEx: Short-time duty S2 - 30 min</li> <li>• SAREx: Intermittent duty S4 - 50 %</li> </ul>
Torque range	Refer to actuator name plate
Output speed	Refer to actuator name plate
Motor	Standard: 3-ph AC asynchronous motor, type IM B9 according to IEC 60034
Insulation class	Standard: F, tropicalized Option: H, tropicalized
Motor protection	Standard: PTC thermistors (according to DIN 44082) Option: Thermostats (NC)
Self-locking	Self-locking: Output speeds up to 90 rpm (50 Hz), 108 rpm (60 Hz) NOT self-locking: Output speeds up to 125 rpm (50 Hz), 150 rpm (60 Hz) Multi-turn actuators are self-locking, if the valve position cannot be changed from standstill while torque acts upon the output drive.
Limit switching	Counter gear mechanism for end positions CLOSED and OPEN Turns per stroke: 1 to 500 (standard) or 1 to 5,000 (option) Standard: <ul style="list-style-type: none"> <li>• Single switches (1 NC and 1 NO; not galvanically isolated) for each end position</li> </ul> Options: <ul style="list-style-type: none"> <li>• Tandem switches (2 NC and 2 NO) for each end position, switches galvanically isolated</li> <li>• Triple switches (3 NC and 3 NO) for each end position, switches galvanically isolated</li> <li>• Intermediate position switch (DUO limit switching), adjustable for any position</li> </ul>
Torque switching	Torque switching adjustable for directions OPEN and CLOSE Standard: <ul style="list-style-type: none"> <li>• Single switches (1 NC and 1 NO; not galvanically isolated) for each direction</li> </ul> Option: <ul style="list-style-type: none"> <li>• Tandem switches (2 NC and 2 NO) for each direction, switches galvanically isolated</li> </ul>
Position feedback signal, analogue (option)	Potentiometer or 0/4 – 20 mA (RWG)

## Technical data

Mechanical position indicator (option)	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED
Running indication	Blinker transmitter (standard for SA, option for SAR)
Motor heater (option)	Voltages: 110 – 220 V AC, 220 – 240 V AC or 400 V AC Power depending on the size 12.5 – 25 W
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation. Option: Handwheel lockable
Connection to controls	AUMA plug/socket connector with screw-type connection
Valve attachment	Standard: B1 according to EN ISO 5210 Options: A, B2, B3, B4 according to EN ISO 5210 A, B, D, E according to DIN 3210 C according to DIN 3338 Special output drive types: AF, B3D, ED, DD, IB1, IB3 A with stem lubrication

- 1) For nominal voltage and 20 °C ambient temperature and an average load with running torque or modulating torque according to separate technical data. The type of duty must not be exceeded.

Technical data for limit and torque switches	
Mechanical lifetime	2 x 10 <sup>6</sup> starts
<b>Silver plated contacts:</b>	
U min.	30 V AC/DC
U max.	250 V AC/DC
I min.	20 mA
I max. AC current	5 A at 250 V (resistive load) 3 A at 250 V (inductive load, cos phi = 0.6)
I max. DC current	0.4 A at 250 V (resistive load) 0.03 A at 250 V (inductive load, L/R = 3 µs) 7 A at 30 V (resistive load) 5 A at 30 V (inductive load, L/R = 3 µs)
<b>Gold plated contacts:</b>	
U min.	5 V
U max.	30 V
I min.	4 mA
I max.	400 mA

Technical data for blinker transmitter	
Mechanical lifetime	10 <sup>7</sup> starts
<b>Silver plated contacts:</b>	
U min.	10 V AC/DC
U max.	250 V AC/DC
I max. AC current	3 A at 250 V (resistive load) 2 A at 250 V (inductive load, cos phi ≈ 0.8)
I max. DC current	0.25 A at 250 V (resistive load)

### 13.2 Features and functions of actuator controls

Power supply, mains frequency	For mains voltage and mains frequency, refer to name plates at the controls and the motor Permissible variation of the mains voltage: $\pm 10\%$ Permissible variation of the mains frequency: $\pm 5\%$ Option: Permissible variation of the mains voltage: $-10\%$
Current consumption	Motor current consumption: Refer to motor name plate Current consumption of the controls depending on the mains voltage: 100 to 120 V AC = max. 575 mA 208 to 240 V AC = max. 275 mA 380 to 500 V AC = max. 160 mA
External supply of the electronics (option)	24 V DC $\pm 20\%$ / $-15\%$ Current consumption: Basic version approx. 200 mA, with options up to 500 mA
Rated power	The controls are conceived for the rated motor power, refer to motor name plate
Overvoltage category	Category III according to IEC 60364-4-443
Switchgear <sup>1)</sup>	Standard: Reversing contactors (mechanically and electrically interlocked) for motor power up to 1.5 kW, nominal motor current up to 9 A (OPEN-CLOSE duty) or 5.2 A (modulating duty) Options: <ul style="list-style-type: none"> <li>Reversing contactors (mechanically and electrically interlocked) for motor power up to 7.5 kW, nominal motor current up to 20 A (OPEN-CLOSE duty) or 18 A (modulating duty)</li> </ul>
Auxiliary voltage output	Standard: 24 V DC $\pm 5\%$ , max. 50 mA for supply of the control inputs, galvanically isolated from internal voltage supply Option: 115 V AC $\pm 10\%$ , max. 30 mA for supply of the control inputs <sup>2)</sup> , galvanically isolated from internal voltage supply
Control	Standard: Control inputs 24 V DC, OPEN - STOP - CLOSE (via opto-isolator, one common), current consumption: approx. 10 mA per input, observe minimum pulse duration for modulating actuators Option: Control inputs 115 V AC, OPEN - STOP - CLOSE - EMERGENCY (via opto-isolator, one common), current consumption: approx. 15 mA input Additional enable inputs for directions OPEN and CLOSE
Status signals	Standard: 5 output contacts with gold-plated contacts: <ul style="list-style-type: none"> <li>4 potential-free NO contacts with one common, max. 250 V AC, 0.5 A (resistive load) <ul style="list-style-type: none"> <li>Default configuration: End position OPEN, end position CLOSED, selector switch REMOTE, selector switch LOCAL</li> </ul> </li> <li>1 potential-free change-over contacts, max. 250 V AC, 0.5 A (resistive load) <ul style="list-style-type: none"> <li>Default configuration: Collective fault signal (torque fault, phase failure, motor protection tripped)</li> </ul> </li> </ul> Options: <ul style="list-style-type: none"> <li>Signals in combination with positioner: <ul style="list-style-type: none"> <li>End position OPEN, end position CLOSED (requires tandem switch within actuator), selector switch REMOTE, selector switch REMOTE, selector switch LOCAL via 2<sup>nd</sup> level selector switch</li> </ul> </li> <li>1 potential-free change-over contact, max. 250 V AC, 0.5 A (resistive load) <ul style="list-style-type: none"> <li>Default configuration: Collective fault signal (torque fault, phase failure, motor protection tripped)</li> </ul> </li> </ul>
Position feedback signal (option)	Galvanically isolated analogue output E2 = 0/4 – 20 mA (load max. 300 $\Omega$ )
Local controls	Standard: <ul style="list-style-type: none"> <li>Selector switch LOCAL - OFF - REMOTE (lockable in all three positions)</li> <li>Push buttons OPEN, STOP, CLOSE</li> <li>3 indication lights: <ul style="list-style-type: none"> <li>End position CLOSED (yellow), collective fault signal (red), end position OPEN (green)</li> </ul> </li> </ul> Options: <ul style="list-style-type: none"> <li>Special colours for the 3 indication lights</li> <li>Protection cover, lockable</li> <li>Protection cover with indicator glass, lockable</li> </ul>

Functions	<p>Standard:</p> <ul style="list-style-type: none"> <li>Switch-off mode adjustable <ul style="list-style-type: none"> <li>Limit or torque seating for end position OPEN and end position CLOSED</li> </ul> </li> <li>Overload protection against excessive torques over the whole travel</li> <li>Excessive torque (torque fault) can be excluded from collective fault signal.</li> <li>Phase failure monitoring with automatic phase correction</li> <li>Push-to-run operation or self-retaining in REMOTE</li> <li>Push-to-run operation or self-retaining in LOCAL</li> <li>Running indication via blinker transmitter signal of actuator (option) can be activated or deactivated</li> </ul> <p>Options:</p> <ul style="list-style-type: none"> <li>Positioner <ul style="list-style-type: none"> <li>Position setpoint via analogue input E1 = 0/4 – 20 mA</li> <li>Galvanic isolation for position setpoint (0/4 – 20 mA) and position feedback (0/4 – 20 mA)</li> <li>Adjustable behaviour on loss of signal</li> <li>Adjustable sensitivity (dead band) and pause time</li> </ul> </li> <li>Positioner for Split Range operation</li> </ul>
Motor protection evaluation	<p>Standard:</p> <p>Monitoring of the motor temperature with PTC tripping device in combination with PTC thermistors in the actuator motor</p> <p>Options:</p> <p>Thermal overload relay in combination with thermoswitches in the actuator motor</p>
Electrical connection	<p>Standard:</p> <p>Plug/socket connector with screw type terminals (KP, KPH) Ex e (increased safety) and M-threads</p> <p>Options:</p> <ul style="list-style-type: none"> <li>Plug/socket connector with terminal blocks (KES) Ex e (increased safety)</li> <li>Plug/socket connector with terminal blocks (KES) Ex d (flameproof enclosure)</li> <li>Pg-threads, NPT-threads, G-threads, special threads</li> <li>Parking frame for wall mounting of the disconnected plug</li> <li>Protection cover for plug compartment (when plug is removed)</li> </ul>
Wiring diagram	Refer to name plate

- 1) The reversing contactors are designed for a lifetime of 2 million starts.
- 2) Not possible in combination with PTC tripping device

### 13.3 Service conditions

Mounting position	Any position
Use	Indoor and outdoor use permissible
Enclosure protection according to EN 60529	<p>Standard:</p> <ul style="list-style-type: none"> <li>IP 67 with AUMA 3-ph AC motor</li> </ul> <p>For both enclosure protection types (IP 67 and IP 68), the terminal compartment is additionally sealed against the interior – double sealed</p> <p>For actual version, refer to actuator/controls name plate.</p>
Corrosion protection	<p>Standard:</p> <p>KS: Suitable for installation in industrial units, in water or power plants with a low pollutant concentration as well as for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. in wastewater treatment plants, chemical industry)</p> <p>Options:</p> <ul style="list-style-type: none"> <li>KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration</li> <li>KX-G : same as KX, however aluminium-free version (outer parts)</li> </ul>
Installation altitude	<p>Standard: <math>\leq 2,000</math> m above sea level</p> <p>Option: <math>&gt; 2,000</math> m above sea level, please contact AUMA</p>
Finish coating	Standard: Paint based on polyurethane (powder coating)
Colour	Standard: AUMA silver-grey (similar to RAL 7037)

Ambient temperature	Standard: <ul style="list-style-type: none"> <li>–40 °C to +40 °C/+60 °C</li> </ul> For actual version, refer to actuator/controls name plate.
Vibration resistance according to IEC 60068-2-6	1 g, from 10 to 200 Hz Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this. Not valid in combination with gearboxes.
Lifetime	Open-close duty (operating cycles (OPEN - CLOSE - OPEN): SA 07.1/07.5 – SA 10.1: 20,000 SA 14.1/14.5 – SA 16.1: 15,000 Modulating duty: <sup>1)</sup> SAR 07.1/07.5 – SAR 10.1: 5.0 million modulating steps SAR 14.1/14.5 – SAR 16.1: 3.5 million modulating steps
Weight	Refer to separate technical data

- 1) The lifetime depends on the load and the number of starts. A high starting frequency will rarely improve the modulating accuracy. To reach the longest possible maintenance and fault-free operating time, the number of starts per hour chosen should be as low as permissible for the process.

### 13.4 Further information

EU Directives	<ul style="list-style-type: none"> <li>ATEX Directive: (94/9/EC)</li> <li>Electromagnetic Compatibility (EMC): (2004/108/EC)</li> <li>Low Voltage Directive: (2006/95/EC)</li> <li>Machinery Directive: (2006/42/EC)</li> </ul>
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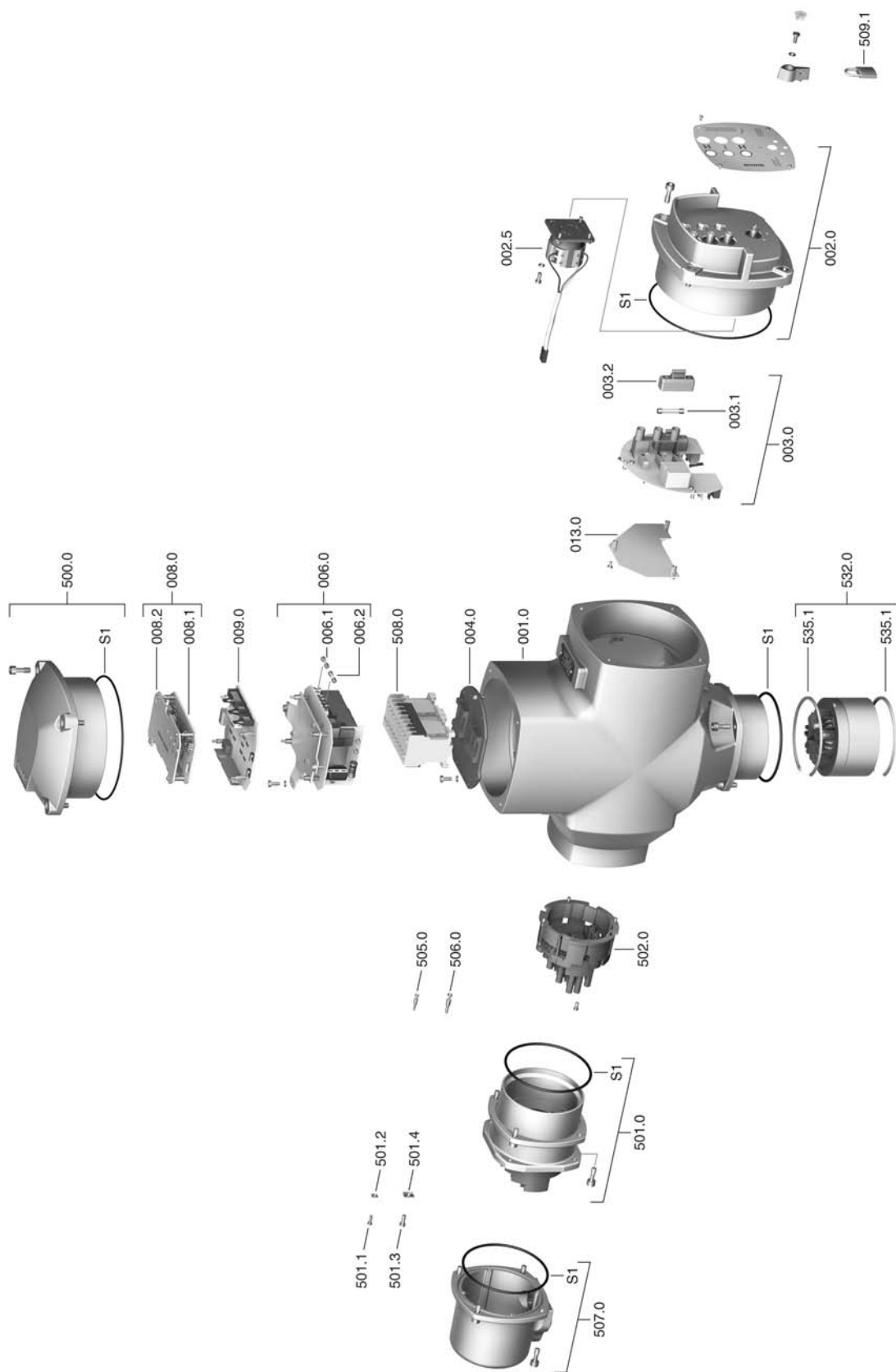
14.1	Multi-turn actuators SAExC 07.1 – SAExC 16.1/SARExC 07.1 – SARExC 16.1 via plug/socket connector with screw-type terminals (KP, KPH)
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**Information:** Please state type and commission no. of the device (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Delivered spare parts may slightly vary from the representation.

No.	Designation	Type	No.	Designation	Type
001.0	Housing	Sub-assembly	516.1	Output drive shaft D	
002.0	Bearing flange	Sub-assembly	535.1	Snap ring	
003.0	Hollow shaft without worm wheel	Sub-assembly	539.0	Screw plug	Sub-assembly
005.0	Worm shaft	Sub-assembly	542.0	Handwheel with ball handle	Sub-assembly
005.1	Motor coupling		549.1	Output drive sleeve B3/B4/E	
005.2	Coupling pin		551.1	Parallel key	
005.3	Manual drive coupling		553.0	Mechanical position indicator	Sub-assembly
005.4	Pull rope		554.0	Socket carrier with motor cable harness	Sub-assembly
006.0	Worm wheel		556.0	Potentiometer for position transmitter	Sub-assembly
009.0	Planetary gear for manual drive	Sub-assembly	556.1	Potentiometer without slip clutch	
010.0	Retaining flange	Sub-assembly	557.0	Heater	Sub-assembly
017.0	Torque lever	Sub-assembly	558.0	Blinker transmitter including pins at wires (without impulse disc and insulation plate)	Sub-assembly
018.0	Gear segment		559.0-1	Control unit without torque switching heads and switches	Sub-assembly
019.0	Crown wheel	Sub-assembly	559.0-2	Control unit with magnetic limit and torque transmitter (MWG) for Non-intrusive version in combination with AUMATIC integral controls	Sub-assembly
020.0	Swing lever	Sub-assembly	560.0-1	Switch stack for direction OPEN	Sub-assembly
022.0	Drive pinion II for torque switching	Sub-assembly	560.0-2	Switch stack for direction CLOSE	Sub-assembly
023.0	Output drive wheel for limit switching	Sub-assembly	560.1	Switch for limit/torque switching	
024.0	Drive wheel for limit switching	Sub-assembly	560.2	Switch case	
025.0	Locking plate	Sub-assembly	566.0	Position transmitter RWG	Sub-assembly
058.0	Wire for protective earth (pin)	Sub-assembly	566.1	Potentiometer for RWG without slip clutch	Sub-assembly
061.0	Torque switching head	Sub-assembly	566.2	Electronic board RWG	Sub-assembly
070.0	Motor (VD motor incl. no. 079.0)	Sub-assembly	566.3	Wire harness for RWG	Sub-assembly
079.0	Planetary gear for motor drive (SA/SAR 07.1 – 14.1 for VD motor)	Sub-assembly	567.1	Slip clutch for potentiometer/RWG	Sub-assembly
080.0	Planetary gear for motor drive (SA/SAR 16.1 for AD90 motor)	Sub-assembly	568.1	Stem protection tube (without cap)	
155.0	Reduction gearing	Sub-assembly	568.2	Cap for stem protection tube	
500.0	Cover for switch compartment	Sub-assembly	568.3	V-Seal	
501.0	Terminal board	Sub-assembly	569.0	Change-over lever assy	Sub-assembly
501.1	Screw for control terminal		569.1	Change-over lever	
501.2	Washer for control terminal		569.2	Notched pin	
501.3	Screw for power terminal		574.1	Radial seal output drive A for ISO flange	
501.4	Washer for power terminal		575.1	Stem nut type A	
502.0	Pin carrier without pins	Sub-assembly	S1	Seal kit, small	Set
505.0	Pin for controls	Sub-assembly	S2	Seal kit, large	Set
506.0	Pin for motor	Sub-assembly			
507.0	Plug cover	Sub-assembly			
511.0	Threaded plug				
514.0	Output drive form A (without stem nut)	Sub-assembly			
514.1	Axial needle roller bearing				

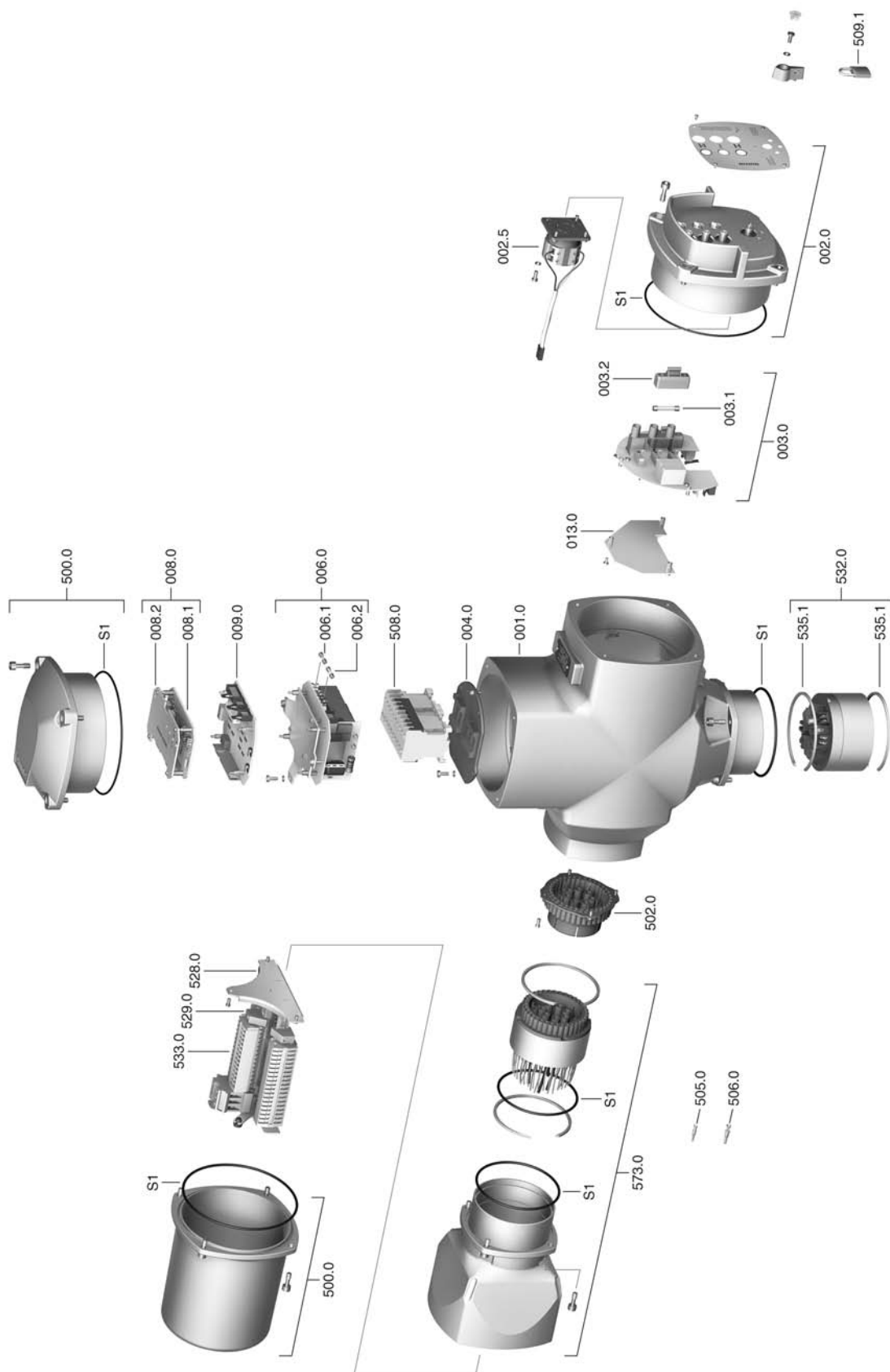


**14.2 Actuator controls AUMA MATIC AMExB 01.1 via plug/socket connector with screw-type terminals (KP, KPH)**



**Information:** Please state type and commission no. of the device (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Delivered spare parts may slightly vary from the representation.

No.	Designation	Type
001.0	Housing	Sub-assembly
002.0	Local controls	Sub-assembly
002.5	Selector switch	Sub-assembly
003.0	Local controls board	Sub-assembly
003.1	Primary fuse	
003.2	Fuse cover	
004.0	Carrier for contactors	
006.0	Power supply	Sub-assembly
006.1	Secondary fuse F3	
006.2	Secondary fuse F4	
008.0	Interface board	Sub-assembly
008.1	Interface board	
008.2	Cover plate for interface board	
009.0	Logic board	Sub-assembly
013.0	Adapter board	
500.0	Cover	Sub-assembly
501.0	Terminal board	Sub-assembly
501.1	Screw for control terminal	
501.2	Washer for control terminal	
501.3	Screw for power terminal	
501.4	Washer for power terminal	
502.0	Pin carrier without pins	Sub-assembly
505.0	Pin for controls	Sub-assembly
506.0	Pin for motor	Sub-assembly
507.0	Plug cover	Sub-assembly
508.0	Switchgear	Sub-assembly
509.1	Padlock	
532.0	Line bushing (actuator connection)	Sub-assembly
535.1	Circlip	
S	Seal kit	Set

**14.3 Actuator controls AUMA MATIC AMExB 01.1 via plug/socket connector with terminal blocks (KES)**

**Information:** Please state type and commission no. of the device (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Delivered spare parts may slightly vary from the representation.

No.	Designation	Type
001.0	Housing	Sub-assembly
002.0	Local controls	Sub-assembly
002.5	Selector switch	Sub-assembly
003.0	Local controls board	Sub-assembly
003.1	Primary fuse	
003.2	Fuse cover	
004.0	Carrier for contactors	
006.0	Power supply	Sub-assembly
006.1	Secondary fuse F3	
006.2	Secondary fuse F4	
008.0	Interface board	Sub-assembly
008.1	Interface board	
008.2	Cover plate for interface board	
009.0	Logic board	Sub-assembly
013.0	Adapter board	
500.0	Cover	Sub-assembly
502.0	Pin carrier without pins	Sub-assembly
505.0	Pin for controls	Sub-assembly
506.0	Pin for motor	Sub-assembly
508.0	Switchgear	Sub-assembly
509.1	Padlock	
528.0	Terminal frame (without terminals)	Sub-assembly
529.0	End piece	
532.0	Line bushing (actuator connection)	Sub-assembly
533.0	Terminals for motor/controls	
535.1	Circlip	
573.0	Plug-in electrical connection	
S	Seal kit	Set

**15. Certificates****15.1 Declaration of Incorporation and EC Declaration of Conformity**

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Aumastr. 1  
79379 Müllheim, Germany  
www.auma.com

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Fax +49 7631 809-1250  
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**Original Declaration of Incorporation of Partly Completed Machinery  
(EC Directive 2006/42/EC) and EC Declaration of Conformity in compliance with the  
Directives on EMC, Low Voltage and Explosion Protection**

for electric AUMA multi-turn actuators of the type ranges **SAExC 07.1 – SAExC 16.1** and **SARExC 07.1 – SARExC 16.1** in versions **AUMA SEMIPACT-IIB** or **AUMA MATIC-IIB**.

AUMA Riester GmbH & Co. KG as manufacturer declares herewith, that the above mentioned multi-turn actuators meet the following basic requirements of the EC Machinery Directive 2006/42/EC: Annex I, articles 1.1.2, 1.1.3, 1.1.5, 1.2.1; 1.2.6, 1.3.1, 1.3.7, 1.5.1, 1.6.3, 1.7.1, 1.7.3, 1.7.4

The following harmonised standards within the meaning of the Machinery Directive have been applied:

EN 12100-1: 2003	ISO 5210: 1996
EN 12100-2: 2003	EN 60204-1: 2006

With regard to the partly completed machinery, the manufacturer commits to submitting the documents to the competent national authority via electronic transmission upon request. The relevant technical documentation pertaining to the machinery described in Annex VII, part B has been prepared.

AUMA multi-turn actuators are designed to be installed on industrial valves. AUMA multi-turn actuators must not be put into service until the final machinery into which they are to be incorporated has been declared in conformity with the provisions of the EC Directive 2006/42/EC.

Authorised person for documentation: Peter Malus, Aumastrasse 1, D-79379 Müllheim

As partly completed machinery, the multi-turn actuators further comply with the requirements of the following directives and the respective approximation of national laws as well as the respective harmonised standards as listed below:

**(1) Equipment and protective systems intended for use in potentially explosive atmospheres (94/9/EC)**

EN 60079-0: 2006	EN 60079-11: 2007	EN 1127-1: 2007
EN 60079-1: 2007	EN 13463-1: 2009	
EN 60079-7: 2007	EN 13463-5: 2003	

The EC type examination certificate PTB 03 ATEX 1122 issued by the Physikalisch Technische Bundesanstalt (EU number 0102) is available for the multi-turn actuators mentioned above.

**(2) Directive relating to Electromagnetic Compatibility (EMC) (2004/108/EC)**

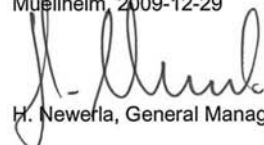
EN 61000-6-4: 2007  
EN 61000-6-2: 2005

**(3) Low Voltage Directive (2006/95/EC)**

EN 60204-1: 2006	EN 60034-1: 2004
EN 50178: 1997	EN 61010-1: 2001

Year of affixing of the CE marking: 2010

Müllheim, 2009-12-29

  
H. Newerla, General Management

This declaration does not contain any guarantees. The safety instructions in product documentation supplied with the devices must be observed. Non-concerted modification of the devices voids this declaration.

Y004.928/002/en

15.2 ATEX certificate

**Physikalisch-Technische Bundesanstalt**

Braunschweig und Berlin



(1) **EC-TYPE-EXAMINATION CERTIFICATE**  
(Translation)

- (2) Equipment and Protective Systems Intended for Use in  
Potentially Explosive Atmospheres - **Directive 94/9/EC**
- (3) EC-type-examination Certificate Number:



**PTB 03 ATEX 1122**

- (4) Equipment: Multi-turn actuator, types SA.ExC 07.1-... to SA.ExC 16.1-...  
version AUMA MATIC IIB
- (5) Manufacturer: AUMA RIESTER GmbH & Co. KG
- (6) Address: 79379 Müllheim, Germany
- (7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.
- (8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
- The examination and test results are recorded in the confidential report PTB Ex 04-13198.
- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
EN 50014: 1997 + A1 + A2      EN 50018: 2000      EN 50019: 2000  
EN 50281-1-1:1998
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- (12) The marking of the equipment shall include the following:

**II 2 G/D   EEx de IIB T4 or T3   IP 67   T 130 °C or 190 °C**

Zertifizierungsstelle Explosionsschutz  
By order:

Braunschweig, September 29, 2004

Dr.-Ing. U. Klausmeyer  
Regierungsdirektor



sheet 1/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt  
Braunschweig und Berlin

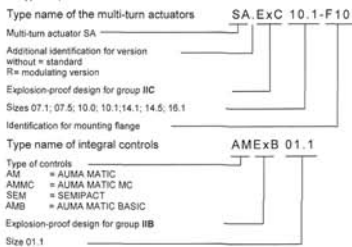
### SCHEDULE

(13) EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 1122

#### (15) Description of equipment

The multi-turn actuator, types SA ExC 07.1... to SA ExC 16.1..., with attached integral AUMA MATIC controls comprises the following elements:

- Housing accommodating the gearing and the mechanical actuators (these do not form part of this type approval).
- Flanged pole-type motor designed to Flameproof Enclosure type of protection. The shaft rotates in anti-friction bearings. Together with the end shield provided at the drive end, the shaft forms the flameproof shaft joint. Electric power supply is by means of separately certified cable entries.
- Motors separately certified by means of an adapter flange as an option (designed to Flameproof Enclosure "d" or Increased Safety "e" type of protection).
- Switching and signalling compartment cast integral with the enclosure. This compartment forms a joint compartment (designed to Flameproof Enclosure "d" type of protection) together with the interior of the attached integrated control system.
- The terminal compartment is designed to Increased Safety "e" or Flameproof Enclosure "d" type of protection.



#### Technical data

For the S2, S4 or S5 duty types, the electrical motor data, incl. specifications for compliance with the temperature class, are defined in the attached data sheet for the EC type-examination certificate.

sheet 2/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt  
Braunschweig und Berlin

### SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 1122

Size of actuator	Size of motor	Output
SA ExC 07.1	ADX63 / VDX63	0.025 to 0.37 kW
SA ExC 07.5	ADX63 / VDX63	0.045 to 0.75 kW
SA ExC 10.1	ADX71 / VDX71	0.090 to 1.50 kW
SA ExC 14.1	ADC90 / VDC90 / ADX90 / VDX90	0.18 to 3.0 kW
SA ExC 14.5	ADC90 / VDC90 / ADX90 / VDX90	0.37 to 4.0 kW
SA ExC 16.1	ADC91 / ADC112 / ADX90 / ADX112	0.75 to 7.5 kW

Electric circuit	Motor	Controls
Rated insulation voltage	up to 750 V	250 V
Rated current	max. 40 A	10 A
Rated cross section	max. 2 x 6 mm <sup>2</sup>	2.5 mm <sup>2</sup>
Admissible ambient temperature range	-20 °C to +60 °C	

The admissible ambient temperature range may be restricted by the components selected or the data sheet for the electrical design.

The composition of the protection symbol will be based on the types of protection of the components actually used.

#### (16) Test report PTB Ex 04-13198

#### (17) Special conditions for safe use

None

#### Notes for operation and manufacturing

Any components attached or installed (e.g. limit switches, potentiometers, electronic control gear, display units) shall be of a technical standard that complies with the specifications on the cover sheet, they shall be suited for the operating conditions, and be covered by a separate examination certificate. The notes specified in the component certificate shall be complied with.

The monitoring devices shall satisfy the requirements of Directive 94/9 EC and EN 1127-1.

This EC Type Examination Certificate as well as any future supplements thereto shall at the same time be regarded as supplements for the Certificate of Conformity PTB No. Ex-91.C.1027. These are no supplements as defined by Directive 76/117/EEC, but only show that the old examination certificate has been replaced.

#### (18) Essential health and safety requirements

Met by compliance with the aforementioned Standards.

Zertifizierungsstelle Explosionsschutz

By order:

*[Signature]*  
Dr.-Ing. U. Klausmeyer  
Regierungsdirektor

Braunschweig, September 29, 2004

sheet 3/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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### DATA SHEET 01 TO EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 1122

Manufacturer: AUMA RIESTER GmbH &amp; Co. KG, 79379 Müllheim, Germany

for the actuator motors

Size of actuator	Size of motor	Output
SA ExC 07.1	ADX63 / VDX63	0.025 to 0.37 kW
SA ExC 07.5	ADX63 / VDX63	0.045 to 0.75 kW
SA ExC 10.1	ADX71 / VDX71	0.090 to 1.50 kW
SA ExC 14.1	ADC90 / VDC90 / ADX90 / VDX90	0.18 to 3.0 kW
SA ExC 14.5	ADC90 / VDC90 / ADX90 / VDX90	0.37 to 4.0 kW
SA ExC 16.1	ADC91 / ADC112 / ADX90 / ADX112	0.75 to 7.5 kW

of the multi-turn actuators, types SA ExC 07.1... to SA ExC 16.1...

#### Electrical ratings

This certificate is valid for the following designs, provided the actuator motors, marked II 2 G/D EEx de IIB T4 or T3 IP 67 T 130 °C or T 190 °C, differ only negligibly from the sample tested as regards their electrical and thermal loads:

Rated voltage:	100 to 690	V AC
Rated current:	0.2 A to 40	A
Rated power:	0.025 to 7.5	kW
Power factor cos φ:	0.40 to 0.95	
Rated frequency:	50 or 60	Hz
Rated speed:	700 to 3360	rpm
Duty types:	S2, S4 or S5 in compliance with EN 60034-1	
Temperature class:	T4 or T3	

For the defined output and the corresponding voltage ratings, additional ratings, and the maximum temperatures, reference is made to test report VB No. 010-08.001291-00.

In addition to the above-mentioned voltage ratings, intermediate values are also permissible, provided the temperature class specifications are complied with. The corresponding currents are to be converted at a ratio which is the reciprocal of the voltages. The mains voltage may vary by up to ±10 % from the rated values.

The actuator motors may operate on electric low-voltage networks with nominal voltages and voltage tolerances in compliance with IEC 38, or other networks or power supply systems with nominal voltage tolerances of ±10 % as a maximum. Motor overload protection must be provided. This may be done in the form of:

- Current limitation (e.g. by means of thermostats and overcurrent protection device) for duty type S2. The rated current must be set, and the motor must be stopped under operating conditions at 1.2 times the current rating at the latest.
- Temperature limitation by means of integrated PTC thermistors in the stator, for duty types S4 and S5. The PTC thermistors shall be connected to a tripping device that complies with the requirements in ATEX 100a, Annex II, section 1.5.5, and EN 1127-1.

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Physikalisch-Technische Bundesanstalt  
Braunschweig und Berlin

### DATA SHEET 01 TO EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 1122

For compliance with the temperature class, the drive motor will be stopped once the limit temperatures have been reached. This is done by connecting an approved tripping device to the intended measuring points. The tripping temperatures specified in the data sheet must be complied with by all means.

The electrical data specified in test report VB No. 010-08.001291-00 relate to duty type S2 15 min. and are used as reference values for the other duty types.

#### Report PTB Ex 04-13198

#### Special conditions

None

Zertifizierungsstelle Explosionsschutz

By order:

*[Signature]*  
Dr.-Ing. U. Klausmeyer  
Regierungsdirektor

Braunschweig, September 29, 2004

Page 2/2

**Physikalisch-Technische Bundesanstalt**  
Braunschweig und Berlin



**1st SUPPLEMENT**

according to Directive 94/9/EC Annex III.6

**to EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 1122**  
**(Translation)**

Equipment: Multi-turn actuator, types SA.ExC 07.1-... to SA.ExC 16.1-...  
Model AUMA MATIC IIB

Marking: II 2 G EEx de ib IIB T4 / T3 or EEx de IIB T4 / T3  
 II 2 D Ex tD A21 IP 6x T 130 °C / T 190 °C

Manufacturer: AUMA Riester GmbH & Co. KG

Address: Aumastraße 1  
79379 Müllheim, Germany

Description of supplements and modifications

The multi-turn actuator, types SA.ExC 07.1-... to SA.ExC 16.1-..., model AUMA MATIC IIB, may be manufactured with the following modifications:

- The multi-turn actuator is suited for ambient temperatures of -50 °C to 60 °C.
- The multi-turn actuator, types SA.ExC 07.1-... and SA.ExC 07.5-..., may alternatively be equipped with a d.c. or a.c. motor, type VKX063....
- Modified sightglasses may alternatively be used.
- A cable bushing with integrated connector and screwed contacts may alternatively be used for drives SA.ExC 07.1 to SA.ExC 16.1 and for control systems AMExB01.1 and ACExB01.1 in the EEx d area.
- The multi-turn actuator may alternatively be powder coated to protect it against corrosion.
- The flameproof switchgear compartment of the multi-turn actuators, model AUMA MATIC, may optionally be provided with intrinsically safe components certified with a separate examination certificate.

Applied standards

EN 50014:1997 + A1 + A2  
EN 50020:2007

EN 50018:2000  
EN 50281-1-1:1998

EN 50019:2000

Test report: PTB Ex PTB Ex 07-16257

Zertifizierungsstelle Explosionsschutz

By order:

Dr.-Ing. M. Thiedens  
Oberregierungsrat



Braunschweig, October 10, 2007

Sheet 1/1

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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