



Part-turn actuators

SGExC 05.1 – SGExC 12.1

Control unit: electromechanic
with actuator controls

AUMATIC ACExC 01.2 Intrusive

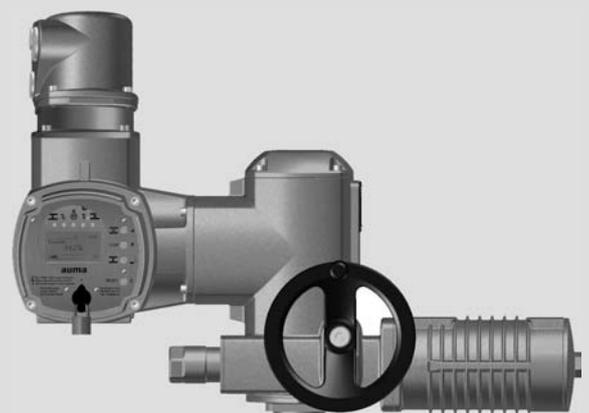
Control

→ Parallel

Profibus DP

Modbus

Foundation Fieldbus



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:

- Manual (Operation and setting) AUMATIC AC 01.2 Parallel

Reference documents can be downloaded from the Internet (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 part-turn actuators are designed for the operation of industrial valves, e.g. 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.

M ▶ **Via the menu to parameter**

Describes the path within the menu to the parameter. By using the push buttons of the local controls you may quickly find the desired parameter in the display.

< > **Reference to other sections**

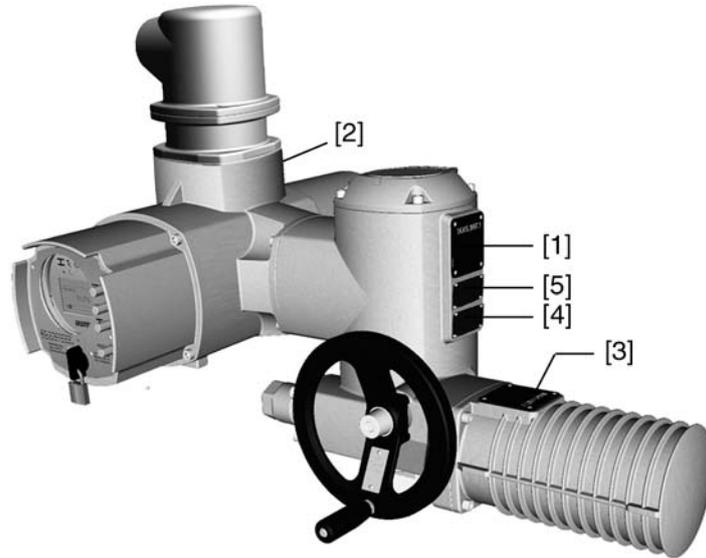
Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

2. Identification

2.1 Name plate

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

Figure 1: Arrangement of name plates



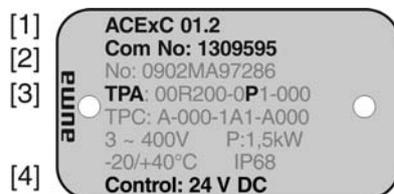
- [1] Actuator name plate
- [2] Controls name plate
- [3] Motor name plate
- [4] Additional plate, e.g. KKS plate (Power Plant Classification System)
- [5] Explosion protection approval plate

Data for identification Figure 2: Actuator name plate



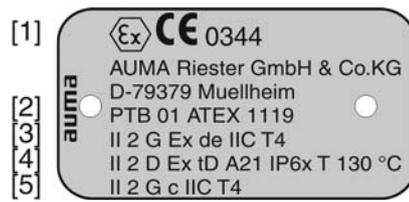
- [1] Type and size of actuator
- [2] Commission number

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: Part-turn actuators for open-close duty: SGExC 05.1, 07.1, 10.1, 12.1
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 .
Wiring diagram	The 9 th position in the TPA wiring diagram: Position transmitter (actuator) Control unit: electromechanical: 0 = without position transmitter A, B, J, K, L, N = potentiometer C, D, E, G, H, M = RWG (electronic position transmitter) Control unit: electronic: I = MWG (magnetic limit and torque transmitter)
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

Part-turn actuator	Definition in compliance with EN ISO 5211: A part-turn actuator is an actuator which transmits a torque to the valve for less than one full revolution. It need not be capable of withstanding thrust. AUMA part-turn actuators are driven by an electric motor. A handwheel is provided for manual operation. 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 AUMATIC actuator controls are used to operate AUMA actuators and are supplied ready for use. The controls may be mounted directly to the actuator or separately on a wall bracket. The functions of the AUMATIC controls include standard valve control in OPEN - CLOSE duty, positioning, process control, logging of operating data right through to diagnostic functions.
Local controls/AUMA ToolSuite	Operation, setting, and display can be performed on site directly at the controls. When set to local control, it is possible to <ul style="list-style-type: none"> • operate the actuator via the local controls (push buttons and display) and perform settings (contents of these instructions).

- read in or out data or modify and save settings via the AUMA ToolSuite software (option), using a computer (laptop or PC). The connection between computer and AUMATIC is wireless via Bluetooth interface (not included in these instructions).
- Intrusive - Non-Intrusive**
- Intrusive version (control unit: electromechanical):
Limit and torque setting is performed via switches in the actuator.
 - Non-Intrusive version (control unit: electronic):
Limit and torque setting is performed via the controls, actuator and controls housings do not have to be opened. For this purpose, the actuator is equipped with an MWG (magnetic limit and torque transmitter), also supplying analogue torque feedback signals/torque indication and analogue position feedback signals/position indication.

3. Transport, storage and packaging

3.1 Transport

For transport to place of installation, use sturdy packaging.

DANGER

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.

NOTICE

Damage on display caused by temperatures below permissible level!

- The AUMATIC actuator controls must NOT be stored below -30 °C .

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

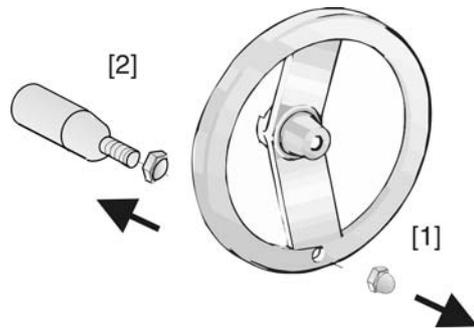
AUMA actuators and actuator controls can be operated without restriction in any mounting position.

4.2 Ball handle: fit to handwheel

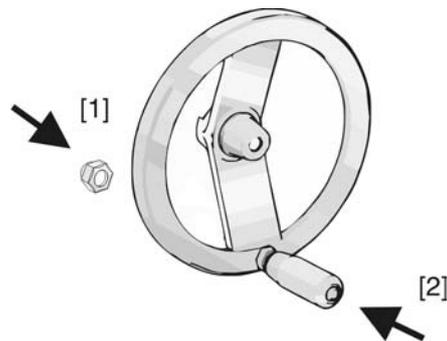
To avoid damage during transport, the ball handle is fitted at the rear of the handwheel.

Prior to commissioning, mount the ball handle into correct position:

1. Remove cap nut [1] and pull out ball handle [2].



2. Insert ball handle [2] in correct position and fasten with cap nut [1].



3. After ball handle fitting, remove label from handwheel.

4.3 Part-turn actuator to valve: mount

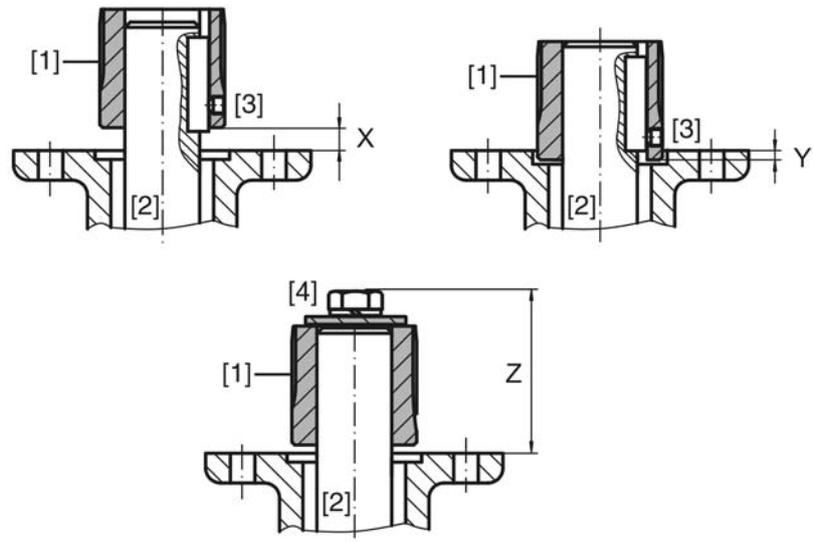
NOTICE

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 prevents condensation.

4.3.1 Coupling

Figure 7: Coupling fitting dimensions



- [1] Coupling
- [2] Valve shaft
- [3] Grub screw
- [4] Screw

Table 1: Coupling fitting dimensions

Type, size - mounting flange	X max [mm]	Y max [mm]	Z max [mm]
SGExC 05.1-F05	9	–	60
SGExC 05.1-F07	9	–	60
SGExC 07.1-F07	9	–	60
SGExC 07.1-F10	24	–	75
SGExC 10.1-F10	15	9	77
SGExC 10.1-F12	32	–	97
SGExC 12.1-F12	25	–	100
SGExC 12.1-F14	45	–	120
SGExC 12.1-F16	57	–	132

1. Use handwheel to drive actuator to mechanical end stop.
 - Information:** Assemble valve and actuator in the same end position.
 - With butterfly valves: recommended mounting position is end position CLOSED.
 - With ball valves: recommended mounting position is end position OPEN.
2. Thoroughly degrease mounting faces of the mounting flange.
3. Apply a small quantity of grease to the valve shaft [2].
4. Place coupling [1] onto valve shaft [2] and secure against axial slipping by using a grub screw, a circlip or a screw. Thereby, ensure that dimensions X, Y or Z are observed (refer to figure and table <Coupling fitting dimensions>).
5. Apply non-acidic grease at splines of coupling.
6. Fit actuator.
 - Information:** Ensure that the spigot (if provided) fits uniformly in the recess and that the flanges are in complete contact.
7. If flange bores do not match thread:
 - 7.1 Slightly rotate handwheel until bores line up.
 - 7.2 If required, shift actuator position by one tooth on the coupling.

8. Fasten actuator with screws [4].

Information: We recommend glueing the screws using sealing material to avoid contact corrosion.

→ Fasten screws [4] crosswise with a torque according to table:

Table 2: Tightening torques for screws

Screws Thread	Tightening torque T_A [Nm]
	Strength class 8.8
M6	11
M8	25
M10	51
M12	87

4.4 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 8: Mounting positions A-2 and B-2



Figure 9: Mounting positions C-2 and D-2



4.4.1 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.

Electrostatic discharge ESD!

Risk of damage to electronic components.

- Earth both operators and devices.

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

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.

4. Fasten screws evenly crosswise.

5. Electrical connection

5.1 Basic information



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).

Permissible networks (supply networks)

The controls (actuators) are suitable for use in TN and TT networks with directly earthed star point and a maximum voltage of 690 V AC. Use in IT networks is permitted while observing the respective <Protection on site> for maximum supply voltages of 600 V AC.

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	
Permissible variation of the mains voltage	±10 %	–30 %
100 to 120 V AC	750 mA	1,200 mA
208 to 240 V AC	400 mA	750 mA
380 to 500 V AC	250 mA	400 mA
515 to 690 V AC	200 mA	400 mA

Table 4: Maximum permissible protection

Switchgear	Rated power	max. protection
Reversing contactor A1	up to 1.5 kW	16 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.

Use appropriate insulation monitors when working in power installations, for example an insulation monitor measuring the pulse code.

Power supply for the controls (electronics)

In case of external supply of the controls (electronics): The external power supply must have a reinforced insulation against the mains voltage in accordance with IEC 61010-1 and may only be supplied by a circuit limited to 150 VA in accordance with IEC 61010-1.

Potential of customer connections

All input signals (control) must be supplied with the same potential.

All output signals (status signals) must be supplied with the same potential.

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.

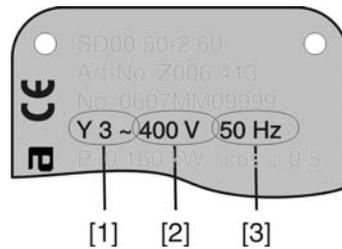
Motor cables are interference sources.

- 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 10: Motor name plate (example)



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

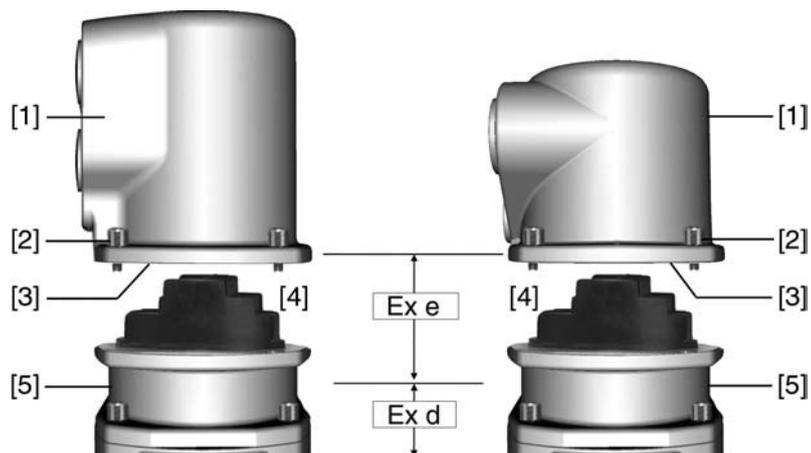
Connecting cables

- 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 11: Plug/socket connector KPH, KP



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

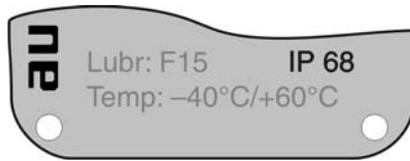


Hazardous voltage!

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) ¹⁾ 2.5 – 6 mm ² (flexible or solid)	2 Nm
Control contacts (1 to 50)	0.75 – 1.5 mm ² (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 mm²: Use small clamp washers for connection to terminals U1, V1, W1 and PE (the small clamp washers are provided in the electrical connection cover).



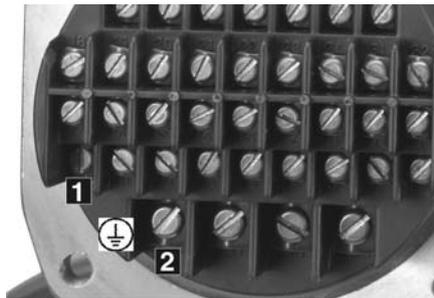
In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!

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 13: PE connection



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



Danger of corrosion: Damage due to condensation!

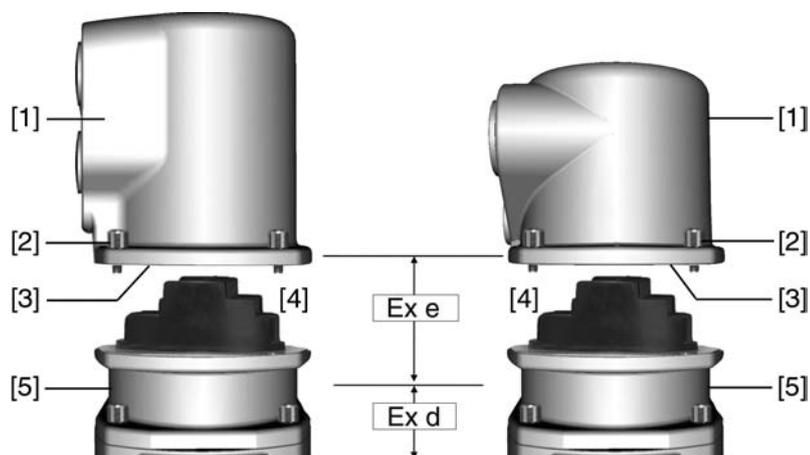
- After mounting, commission the device immediately to ensure that heater minimises condensation.

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 14: Plug/socket connector KPH, KP



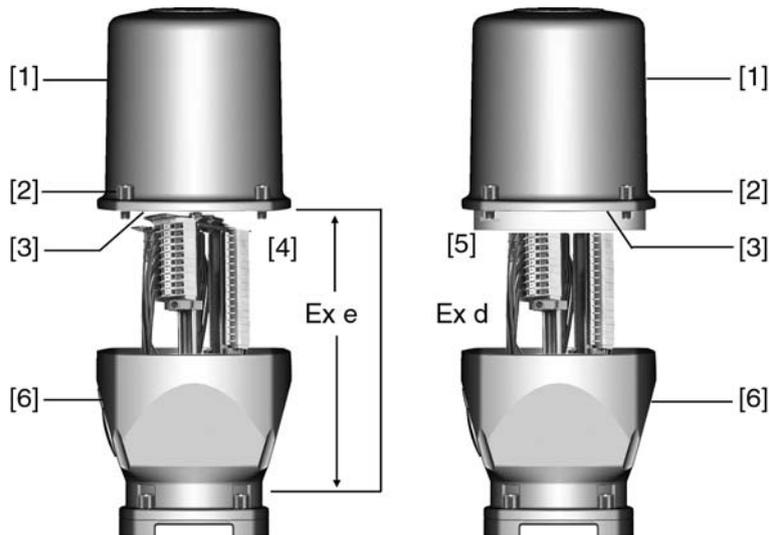
- [1] Cover
- [2] Screws for cover
- [3] O-ring
- [4] Terminal compartment
- [5] Terminal board

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 15: 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 ² (flexible or solid)	1.5 – 1.8 Nm
PE connection	max. 10 mm ² (flexible or solid)	3.0 – 4.0 Nm
Control contacts (1 to 50)	max.2.5 mm ² (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.



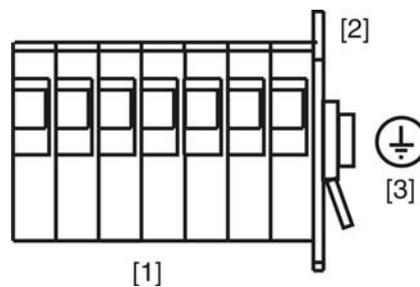
In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!

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 17: PE connection



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



Danger of corrosion: Damage due to condensation!

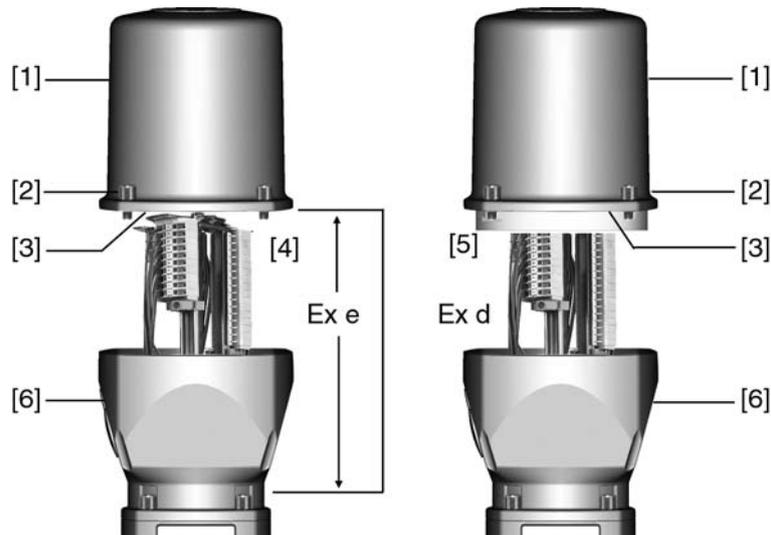
- After mounting, commission the device immediately to ensure that heater minimises condensation.

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 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

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.



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 Controls mounted to wall bracket

The wall bracket allows separate mounting of controls and actuator.

- | | |
|---|--|
| Application | <ul style="list-style-type: none"> • If the actuator cannot be accessed. • If the actuator is subjected to high temperatures. • In case of heavy vibration of the valve. |
| Design
Observe prior to
connection | <ul style="list-style-type: none"> • Permissible length of connecting cables: max. 100 m. • If the actuator is equipped with a position transmitter (RWG): Connecting cables must be available as shielded version. • Versions with potentiometer in the actuator are not suitable. • We recommend: AUMA cable sets LSW8-KES or LSW9-KP. |

- If the AUMA cable set is not used: Use suitable flexible and screened connecting cables.
- When using connecting cables, e.g. of the heater or switch, requiring direct wiring from the actuator to the XK customer connector (XA-XM-XK, refer to wiring diagram), these connecting cables must be subject to an insulation test in compliance with EN 50178. Connecting cables of position transmitters (RWG, IWG, potentiometer) do not belong to this group. They may **not** be subject to an insulation test.

5.4.2 Parking frame

Application Parking frame for safe storage of a disconnected plug.

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

Figure 19: Parking frame and plug/socket connector with screw-type terminals (KP/KPH)

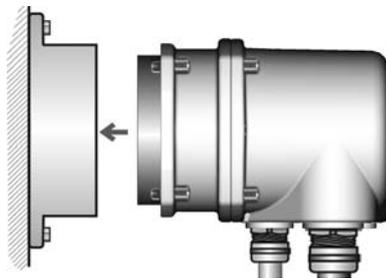
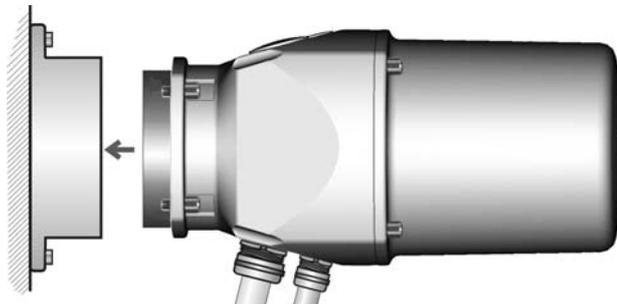


Figure 20: Parking frame and plug/socket connector with terminal blocks (KES)



5.4.3 Protection cover

Protection cover for plug compartment when plug is removed.

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

6. Operation

NOTICE**Valve damage due to incorrect basic setting!**

→ Prior to electrical operation of the actuator, the basic settings i.e. type of seating, torque and limit switching have to be completed.

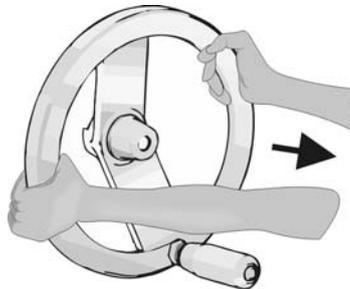
6.1 Manual operation

For purposes of setting and commissioning, in case of motor failure or power failure, the actuator may be operated manually.

The handwheel does not rotate during motor operation. Change-over from motor operation to manual operation is not required.

6.1.1 Manual operation: engage

→ Engage manual operation by pulling the handwheel.



Information Turning the handwheel during motor operation extends or reduces the operating time, depending on the direction of rotation.

6.1.2 Manual operation: disengage

→ Release handwheel.

➔ A spring pulls back the handwheel into the initial position.

Information Handwheel must engage, assist by turning manually, if required.

6.2 Motor operation

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

6.2.1 Local actuator operation

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

Figure 22: 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] Push button RESET
- [5] Selector switch

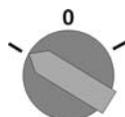


Hot surfaces, e.g. possibly caused by high ambient temperatures or strong direct sunlight!

Danger of burns

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

→ Set selector switch [5] to position **Local control** (LOCAL).

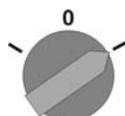


- ➔ The actuator can now be operated using the push buttons [1 – 3].
 - Run actuator in direction OPEN: Press push button [1]
 - Stop actuator: Press push button STOP [2].
 - Run actuator in direction CLOSE: Press push button [3]

Information OPEN - CLOSE operation commands can be given either in push-to-run or in self-retaining operation mode. In self-retaining mode, the actuator runs to the defined end position after pressing the button, unless another command has been received beforehand. For further information, please refer to Manual (Operation and setting).

6.2.2 Actuator operation from remote

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



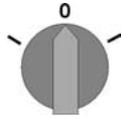
- ➔ Now, it is possible to operate the actuator via remote control, via operation commands (OPEN, STOP, CLOSE) or analogue setpoints (e.g. 0 – 20 mA).

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

6.3 Menu navigation via push buttons (for settings and indications)

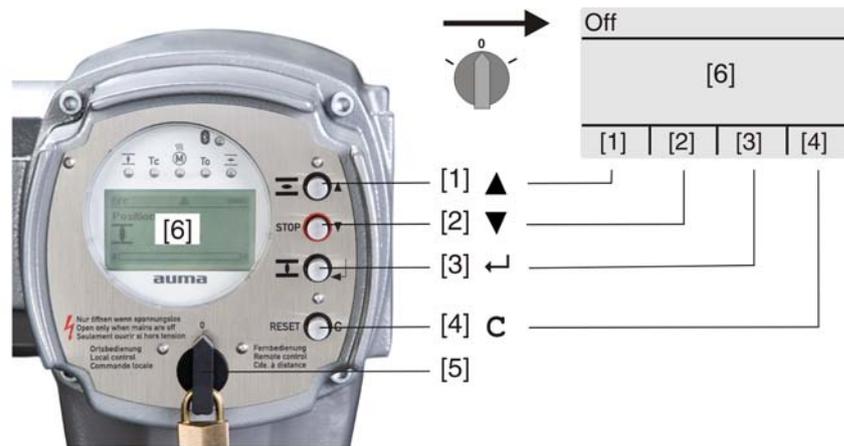
Menu navigation for display and setting is made via the push buttons [1 – 4] of the local controls.

Set the selector switch [5] to position 0 (OFF) when navigating through the menu.



The bottom row of the display [6] serves as navigation support and explains which push buttons [1 – 4] are used for menu navigation.

Figure 26:



- [1–4] Push buttons or navigation support
- [5] Selector switch
- [6] Display

Table 7: Important push button functions for menu navigation

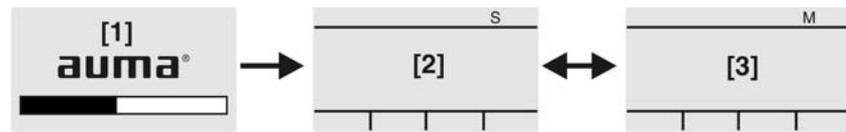
Push buttons	Navigation support on display	Functions
[1] ▲	Up ▲	Change screen/selection Change values Enter figures from 0 to 9
[2] ▼	Down ▼	Change screen/selection Change values Enter figures from 0 to 9
[3] ↵	Ok	Confirm selection
	Save	Save
	Edit	Enter <Edit> menu
	Details	Display more details
[4] C	Setup	Enter Main menu
	Esc	Cancel process
		Return to previous display

- Backlight**
- The display is illuminated in white during normal operation. The backlight turns to red under fault conditions.
 - The screen illumination is brighter when operating a push button. If no push button is operated for 60 seconds, the display will become dim again.

6.3.1 Menu layout and navigation

Groups The indications on the display are divided into 3 groups:

Figure 27: Groups



- [1] Startup menu
- [2] Status menu
- [3] Main menu

ID Status menu and main menu are marked with an ID.

Figure 28: Marking with ID



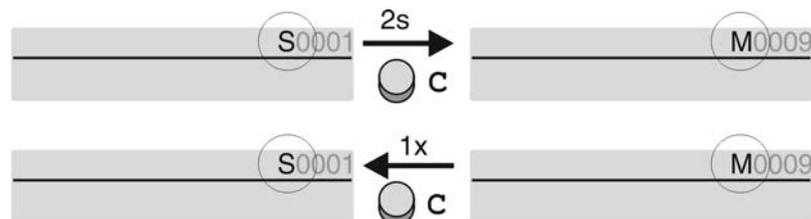
- S ID starts with S = status menu
- M ID starts with M = main menu

Group selection

It is possible to select between status menu **S** and main menu **M**:

For this, set selector switch to **0** (OFF), hold down push button **C** for approx. 2 seconds until a screen containing the ID **M...** appears.

Figure 29: Select menu groups



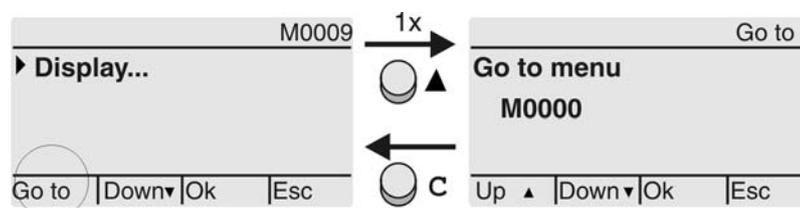
You return to the status menu if:

- the push buttons on the local controls have not been operated within 10 minutes
- or by briefly pressing **C**

Direct display via ID

When entering the ID within the main menu, screens can be displayed directly (without clicking through).

Figure 30: Direct display (example)



Display indicates in the bottom row: **Go to**

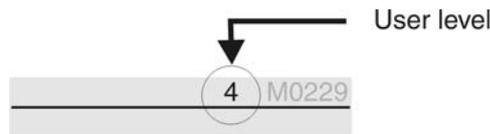
1. Press push button **▲ Go to**.
Display indicates: **Go to menu M0000**
2. Use push buttons **▲ ▼ Up ▲ Down ▼** to select figures 0 to 9.
3. Press push button **◀ Ok** to confirm first digit.
4. Repeat steps 2 and 3 for all further digits.
5. To cancel the process: Press **C Esc**.

6.4 User level, password

User level The user level defines which menu items or parameters can be displayed or modified by the active user.

There are 6 different user levels. The user level is indicated in the top row:

Figure 31: User level display (example)



Password A password must be entered to allow parameter modification. The display indicates: Password 0***
A specific password is assigned to each user level and permits different actions.

Table 8: User levels and authorisations

Designation (user level)	Authorisation/password
Observer (1)	Verify settings No password required
Operator (2)	Change settings Default factory password: 0000
Maintenance (3)	Reserved for future extensions
Specialist (4)	Change device configuration e.g. type of seating, assignment of output contacts Default factory password: 0000
Service (5)	Service staff Change configuration settings
AUMA (6)	AUMA administrator

6.4.1 Password entry

Display indicates: Password 0***

1. Select desired menu and hold down push button **↵** for approx. 3 seconds.
➔ Display indicates the set user level, e.g. **Observer (1)**
2. Press **▲ Up ▲** to select a higher user level and press **↵ Ok** to confirm.
➔ Display shows: **Password 0*****
3. Use push buttons **▲ ▼ Up ▲ Down ▼** to select figures 0 to 9.
4. Confirm first digit of password via push button **↵ Ok**.
5. Repeat steps 1 and 2 for all further digits.
➔ Having confirmed the last digit with **↵ Ok**, access to all parameters within one user level is possible if the password entry is correct.

6.4.2 Password change

Only the passwords of same or lower user level may be changed.

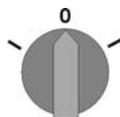
Example: The user is signed in as **Specialist (4)**. This authorises him or her to modify the passwords between user levels (1) to (4).

- M ▶ **Device configuration M0053**
- Service functions M0222**
- Change passwords M0229**

Menu point **Service functions M0222** is only visible if user level has been set to **Specialist (4)** or higher.

Select main menu

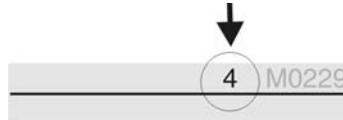
1. Set selector switch to position **0** (OFF).



2. Press push button **C Setup** and hold it down for approx. 3 seconds.
➔ Display goes to main menu and indicates: ▶ **Display...**

Change passwords

3. Select parameter **Change passwords** either:
 - click via the menu **M ▷** to parameter, or
 - via direct display: press **▲** and enter ID **M0229**
- Display indicates: **▶ Change passwords**
- The user level is indicated in the top row (1 – 6), e.g.:



- For user level 1 (view only), passwords cannot be changed. To change passwords, you must change to a higher user level. For this, enter a password via a parameter.
4. For a user level between 2 and 6: Press push button **↵ OK**.
 - ➔ The display indicates the highest user level, e.g.: **For user 4**
5. Select user level via push buttons **▲ ▼ Up ▲ Down ▼** and confirm with **↵ OK**.
 - ➔ Display indicates: **▶ Change passwords Password 0*****
6. Enter current password (→ enter password).
 - ➔ Display indicates: **▶ Change passwords Password (new) 0*****
7. Enter new password (→ enter password).
 - ➔ Display indicates: **▶ Change passwords For user 4 (example)**
8. Select next user level via push buttons **▲ ▼ Up ▲ Down ▼** or cancel the process via **Esc**.

6.5 Language in the display

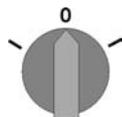
The AUMATIC display is multilingual.

6.5.1 Change language

M ▷ **Display... M0009**
Language M0049

Select main menu

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



Change language

2. Press push button **C Setup** and hold it down for approx. 3 seconds.
 - ➔ Display goes to main menu and indicates: **▶ Display...**
3. Press **↵ OK**.
 - ➔ Display indicates: **▶ Language**
4. Press **↵ OK**.
 - ➔ Display indicates the selected language, e.g.: **▶ Deutsch**
5. The bottom row of the display indicates:
 - **Save** → continue with step 10
 - **Edit** → continue with step 6
6. Press **↵ Edit**.
 - ➔ Display indicates: **▶ Observer (1)**
7. Select user level via **▲ ▼ Up ▲ Down ▼** resulting in the following significations:
 - black triangle: **▶** = current setting
 - white triangle: **▷** = selection (not saved yet)
8. Press **↵ OK**.
 - ➔ Display indicates: **Password 0*****

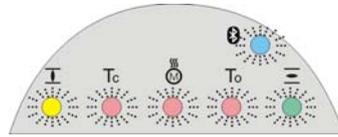
- Language selection**
9. Enter password (→ enter password).
 - ➔ Display indicates: ▶ **Language** and **Save** (bottom row)
 10. Select new language via ▲▼ **Up** ▲ **Down** ▼ resulting in the following significati-
ons:
 - black triangle: ▶ = current setting
 - white triangle: ▷ = selection (not saved yet)
 11. Confirm selection via ◀ **Save**.
 - ➔ The display changes to the new language. The new language selection is saved.

7. Indications

7.1 Indications during commissioning

LED test When switching on the power supply, all LEDs on the local controls illuminate for approx. 1 second. This optical feedback indicates that the voltage supply is connected to the controls and all LEDs are operable.

Figure 35: LED test

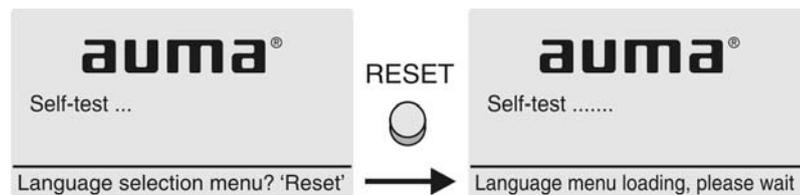


Language selection During the self-test, the language selection can be activated so that the selected language is immediately indicated in the display. For this, set selector switch [5] to position 0 (OFF).

Activate language selection:

1. Display indicates in the bottom row: **Language selection menu? 'Reset'**
2. Press push button **RESET** and hold it down until the following text is displayed in the bottom line: **Language menu loading, please wait.**

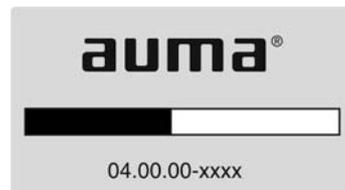
Figure 36: Self-test



The language selection menu follows the startup menu.

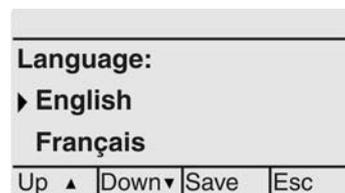
Startup menu The current firmware version is displayed during the startup procedure:

Figure 37: Startup menu with firmware version: 04.00.00–xxxx



If the language selection feature has been activated during the self-test, the menu for selecting the display language will now be indicated. For further information on language setting, please refer to chapter <Language in the display>.

Figure 38: Language selection

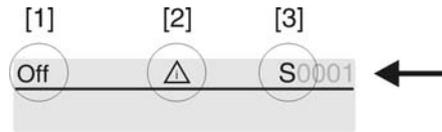


If no entry is made over a longer period of time (approx. 1 minute), the display automatically returns to the first status indication.

7.2 Indications in the display

Status bar The status bar (first row in the display) indicates the operation mode [1], the presence of an error [2] and the ID number [3] of the current display indication.

Figure 39: Information in the status bar (top)

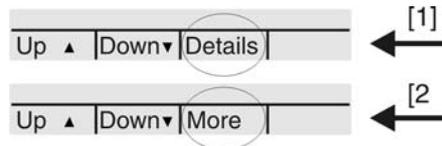


- [1] Operation mode
- [2] Error symbol (only for faults and warnings)
- [3] ID number: S = Status page

Navigation support

If further details or information are available with reference to the display, the following indications **Details** or **More** appear in the navigation support (bottom display row). Then, further information can be displayed via the ← push button.

Figure 40: Navigation support (bottom)



- [1] shows list with detailed indications
- [2] shows further available information

The navigation support (bottom row) is faded out after approx. 3 seconds. Press any push button (selector switch in position 0 (OFF)) to fade in the navigation support.

7.2.1 Feedback indications from actuator and valve

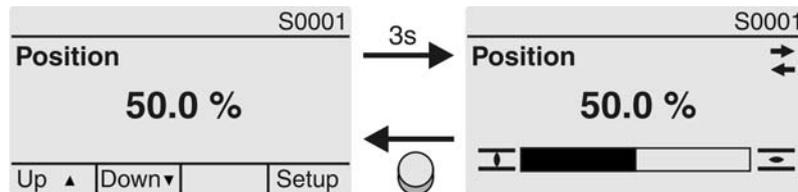
Display indications depend on the actuator version.

Valve position (S0001)

This indication is only available if a position transmitter (potentiometer, RWG or MWG) is installed in the actuator.

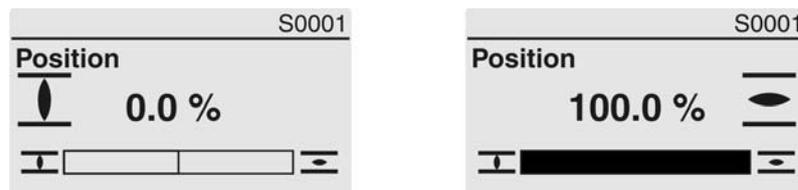
- **S0001** on the display indicates the valve position in % of the travel.
- The bargraph display appears after approx. 3 seconds.
- When issuing an operation command, an arrow indicates the direction (OPEN/CLOSE).

Figure 41: Valve position and direction of operation



Reaching the preset end positions is additionally indicated via symbols  (CLOSED) and  (OPEN).

Figure 42: End position CLOSED/OPEN reached



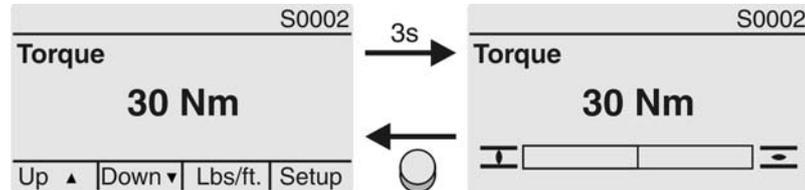
- 0% Actuator is in end position CLOSED
- 100% Actuator is in end position OPEN

Torque (S0002)

The indication is only available if the actuator is equipped with an MWG (magnetic limit and torque transmitter).

- S0002 on the display indicates the torque applied at the actuator output.
- The bargraph display appears after approx. 3 seconds.

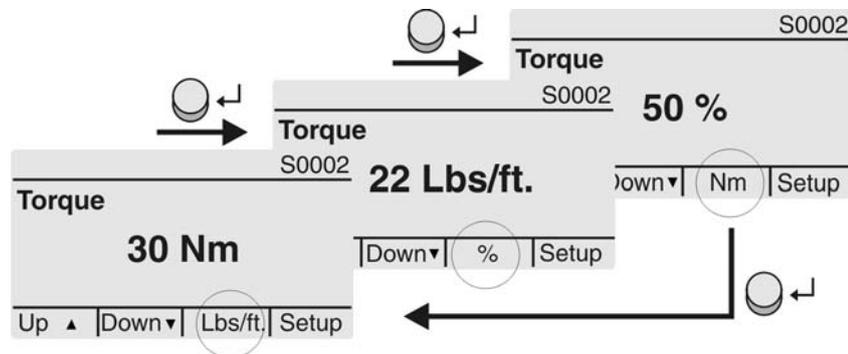
Figure 43: Torque



Select unit

The push button allows to select the unit displayed (percent %, Newton metre Nm or pounds per foot Lbs/ft).

Figure 44: Units of torque



Display in percent

100 % indication equals the max. torque indicated on the name plate of the actuator.
 Example: SA 07.5 with 20 – 60 Nm.

- 100 % corresponds to 60 Nm of nominal torque.
- 50 % corresponds to 30 Nm of nominal torque.

Operation commands (S0003)

The display S0003 indicates:

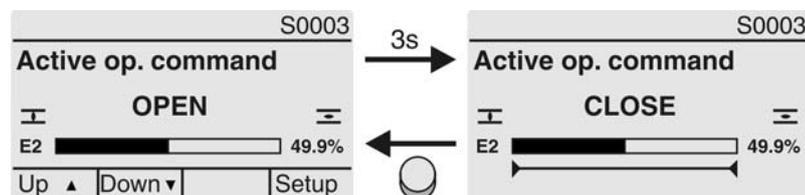
- active operation commands, like e.g.: Operation in direction CLOSE or in direction OPEN
- the actual value E2 as bargraph indication and as value between 0 and 100 %.
- for setpoint control (positioner): setpoint E1
- for stepping mode or for intermediate positions with operation profile: pivot points and operation behaviour of pivot points

The navigation support (bottom row) is faded out after approx. 3 seconds and the axis/axes for pivot point display are shown.

OPEN - CLOSE control

Active operation commands (OPEN, CLOSE, ...) are shown above the bargraph display. The figure below shows the operation command in direction CLOSE.

Figure 45: Display for OPEN - CLOSE control

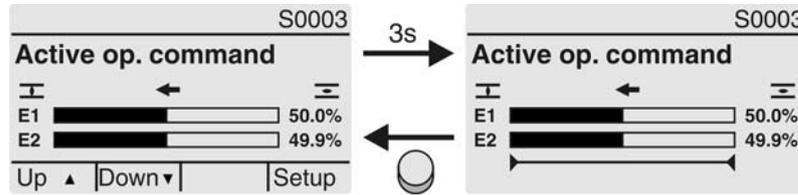


E2 Actual position value

Setpoint control If the positioner is enabled and activated, the bargraph indication for E1 (position setpoint) is displayed.

The direction of the operation command is displayed by an arrow above the bargraph indication. The figure below shows the operation command in direction CLOSE.

Figure 46: Display for setpoint control (positioner)



E1 Position setpoint
E2 Actual position value

Pivot point axis The pivot points and their operation behaviour (operation profile) are shown on the pivot point axis by means of symbols.

The symbols are only displayed if at least one of the following functions is activated:

Operation profile M0294

Timer CLOSE M0156

Timer OPEN M0206

Figure 47: Examples: on the left pivot points (intermediate positions); on the right stepping mode



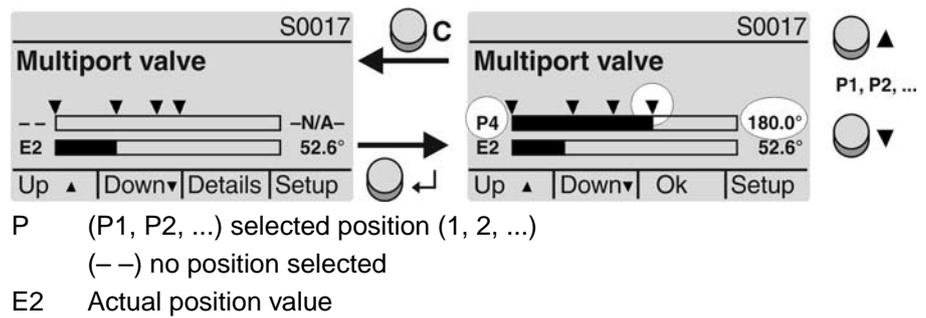
Table 9: Symbols along the pivot point axis

Symbol	Pivot point (intermediate position) with operation profile	Stepping mode
	Pivot point without reaction	End of stepping mode
◀	Stop during operation in direction CLOSE	Start of stepping mode in direction CLOSE
▶	Stop during operation in direction OPEN	Start of stepping mode in direction OPEN
◆	Stop during operation in directions OPEN and CLOSE	–
◁	Pause for operation in direction CLOSE	–
▷	Pause for operation in direction OPEN	–
◇	Pause for operation in directions OPEN and CLOSE	–

Multiport valve positions (S0017)

In case of active multiport valve function, the display S0017 indicates a second bargraph display with set positions (valve connections) above the actual position value E2. Positions (P1, P2, ...) are displayed with a black triangle ▼. Push buttons ▲ ▼ are used to select positions. Both positions and the actual position value E2 are displayed in degrees.

Figure 48: Status indication for multiport valve (example P4 = 180°)



7.2.2 Status indications according to AUMA classification

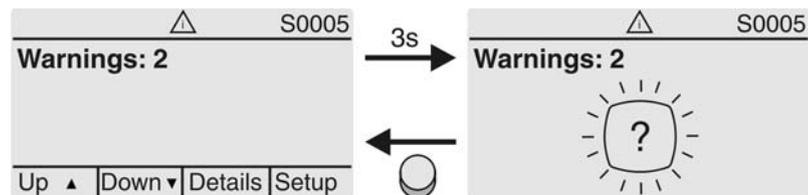
These indications are available, if the parameter **Diagnostic classific. M0539** is set to **AUMA**.

Warnings (S0005)

If a warning has occurred, the display shows **S0005**:

- the number of warnings occurred
- a blinking question mark after approx. 3 seconds

Figure 49: Warnings



For further information, please also refer to <Corrective action>.

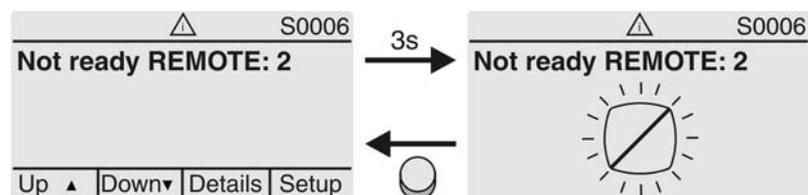
Not ready REMOTE (S0006)

The **S0006** display shows indications of the Not ready REMOTE group.

If such an indication has occurred, the display shows **S0006**:

- the number of indications occurred
- a blinking crossbar after approx. 3 seconds

Figure 50: Not ready REMOTE indications



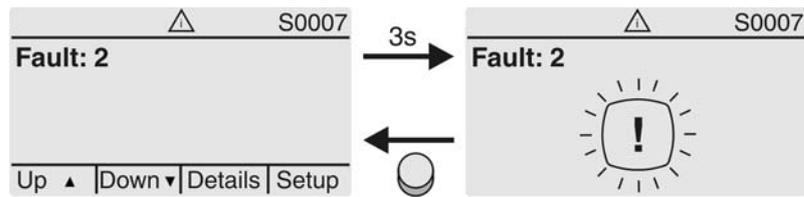
For further information, please also refer to <Corrective action>.

Fault (S0007)

If a fault has occurred, the display shows **S0007**:

- the number of faults occurred
- a blinking exclamation mark after approx. 3 seconds

Figure 51: Fault



For further information, please also refer to <Corrective action>.

7.2.3 Status indications according to NAMUR recommendation

These indications are available, if the parameter **Diagnostic classific. M0539** is set to **NAMUR**.

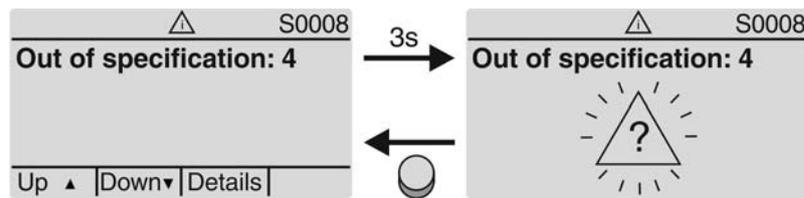
Out of Specification (S0008)

The **S0008** indication shows out of specification indications according to NAMUR recommendation NE 107.

If such an indication has occurred, the display shows **S0008**:

- the number of indications occurred
- a blinking triangle with question mark after approx. 3 seconds

Figure 52: Out of specification



For further information, please also refer to <Corrective action>.

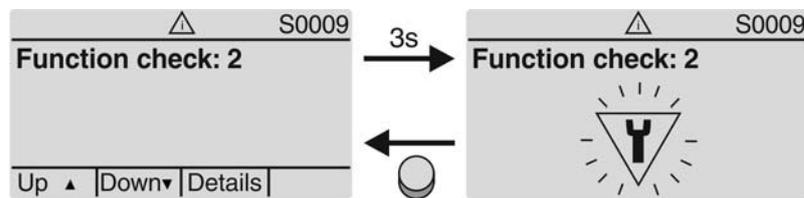
Function check (S0009)

The **S0009** indication shows function check indications according to NAMUR recommendation NE 107.

If an indication has occurred via the function check, the display shows **S0009**:

- the number of indications occurred
- a blinking triangle with a spanner after approx. 3 seconds

Figure 53: Function check



For further information, please also refer to <Corrective action>.

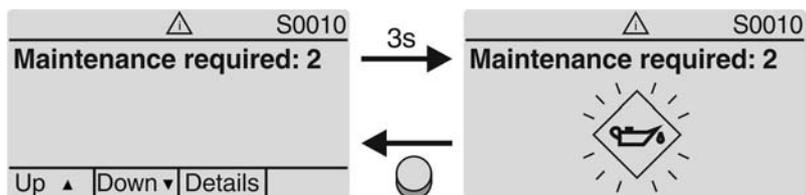
Maintenance required (S0010)

The **S0010** indication shows maintenance indications according to NAMUR recommendation NE 107.

If such an indication has occurred, the display shows **S0010**:

- the number of indications occurred
- a blinking square with an oil can after approx. 3 seconds

Figure 54: Maintenance required



For further information, please also refer to <Corrective action>.

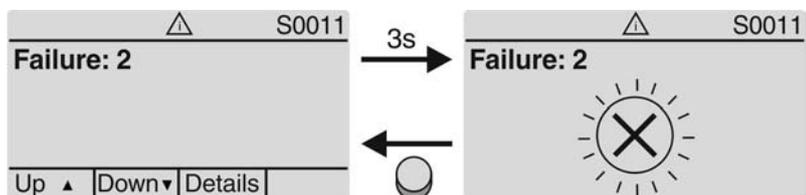
Failure (S0011)

The S0011 indication shows the causes of the failure indication according to NAMUR recommendation NE 107.

If such an indication has occurred, the display shows S0011:

- the number of indications occurred
- a blinking circle with a cross after approx. 3 seconds

Figure 55: Failure



For further information, please also refer to <Corrective action>.

7.3 Mechanical position indicator/running indication

Mechanical position indicator:

- Continuously indicates the valve position (For a swing angle of 90°, the indicator disc [2] rotates by approximately 180°.)
- Indicates whether the actuator is running (running indication)
- Indicates that the end positions are reached (via indicator mark [3])

Figure 56: Mechanical position indicator



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

7.4 Indication lights

Figure 57: Arrangement and signification of indication lights



- [1] Marking with symbols (standard)
- [2] Marking with figures 1 – 6 (option)
- 1 End position CLOSED reached (blinking: for operation in direction CLOSE)
- 2 Tc Torque fault CLOSE
- 3 Motor protection tripped
- 4 To Torque fault OPEN
- 5 End position OPEN reached (blinking: for operation in direction OPEN)
- 6 Bluetooth connection

Modify indication light assignment (indications)

Different indications can be assigned to LEDs 1 – 5.

- M ▷ **Device configuration M0053**
 - Local controls M0159
 - Indication light 1 (left) M0093
 - Indication light 2 M0094
 - Indication light 3 M0095
 - Indication light 4 M0096
 - Indicat. light 5 (right) M0097
 - Signal interm. pos. M0167

Default values (Europe):
 Indication light 1 (left) = End p. CLOSED, blink
 Indication light 2 = Torque fault CLOSE
 Indication light 3 = Thermal fault
 Indication light 4 = Torque fault OPEN
 Indicat. light 5 (right) = End p. OPEN, blink
 Signal interm. pos. = OPEN/CLOSED = Off

Further setting values:
 Refer to Manual (Operation and setting).

8. Signals

8.1 Status signals via output contacts (digital outputs)

Characteristics Output contacts are used to send status signals (e.g. reaching the end positions, selector switch position, faults...) as binary signals to the control room.

Status signals only have two states: active or inactive. Active means that the conditions for the signal are fulfilled.

8.1.1 Assignment of outputs

The output contacts (outputs DOUT 1 – 12) can be assigned to various signals.

Required user level: **Specialist (4)** or higher.

M ▶ **Device configuration M0053**
 I/O interface M0139
 Digital outputs M0110
 Signal DOUT 1 M0109

Default values:

Signal DOUT 1 = Fault
Signal DOUT 2 = End position CLOSED
Signal DOUT 3 = End position OPEN
Signal DOUT 4 = Selector sw. REMOTE
Signal DOUT 5 = Torque fault CLOSE
Signal DOUT 6 = Torque fault OPEN
Signal DOUT 7 = End position CLOSED
Signal DOUT 8 = End position OPEN
Signal DOUT 9 = Selector sw. REMOTE
Signal DOUT 10 = Torque fault CLOSE
Signal DOUT 11 = Torque fault OPEN
Signal DOUT 12 = Fault

8.1.2 Encoding of outputs

The output signals DOUT 1 – 12 can be set either to high active or low active.

- High active = output contact closed = signal active
- Low active = output contact open = signal active

Required user level: **Specialist (4)** or higher.

M ▶ **Device configuration M0053**
 I/O interface M0139
 Digital outputs M0110
 Coding DOUT 1 M0102

Default values for DOUT 1 – 12: High active

8.2 Analogue signals

— (Option) —

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

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

Designation in the wiring diagram:

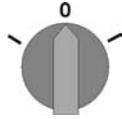
ANOUT1 (position)

ANOUT2 (position)

For further information on this topic, please refer to Manual (Operation and setting).

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 End stops in part-turn actuator

The internal end stops limit the swing angle. They protect the valve in the event of limit switching failure.

End stop setting is generally performed by the valve manufacturer **prior** to installing the valve into the pipework.



Exposed, rotating parts (discs/balls) at the valve!

Pinching and damage by valve or actuator.

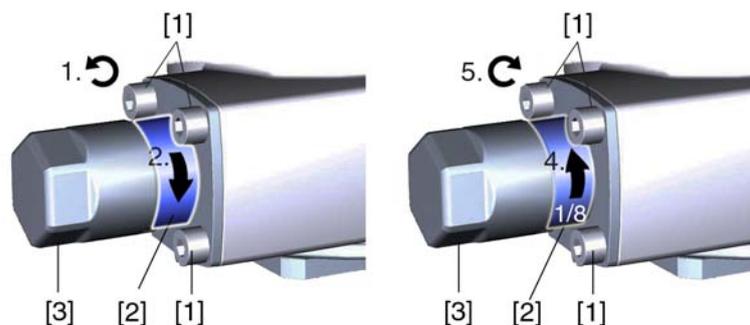
- End stops may be set by suitably qualified personnel only.
- Set end stops to ensure that they are NOT reached during normal operation.

- Information** The setting sequence depends on the valve:
- Recommendations for **butterfly valves**: Set end position CLOSED first.
 - Recommendations for **ball valves**: Set end position OPEN first.

- Information** When leaving the factory (without valve), the screws [1] are not fastened, i.e. the end stops must be set. If the actuator is mounted onto the valve with the screws [1] fastened, the valve manufacturer has already performed the end stop setting. In this case, the end stops must only be checked (use the handwheel to drive valve into end positions).

9.1.1 End stop CLOSED: set

Figure 59: End stop



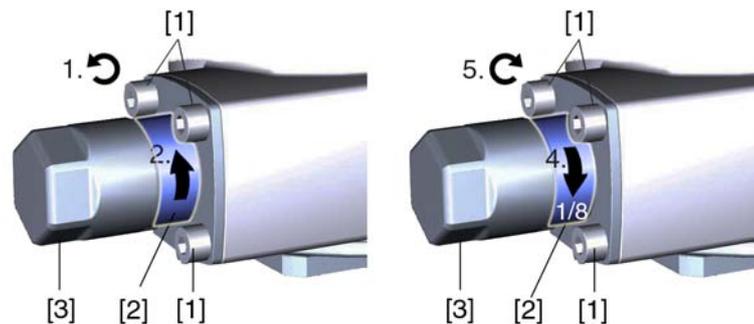
- [1] Screws
- [2] End stop nut
- [3] Protective cap

1. If the four screws [1] are fastened: Unfasten the screws [1] with approx. 3 turns.

2. Move valve to end position CLOSED with handwheel. Check whether end stop nut [2] rotates simultaneously.
 → Otherwise: Turn end stop nut [2] **clockwise** until end stop is reached.
3. In case end position CLOSED has been passed: Turn back the handwheel by several turns and approach end position CLOSED again.
4. Turn end stop nut [2] counterclockwise by 1/8th turn.
Information: In this process, the protective cap [3] must not be unfastened.
- ➔ Thus, the end stop CLOSED within the part-turn actuator is set to a slightly higher swing angle (approx. 1°) than the valve end position.
5. Fasten screws [1] crosswise at 25 Nm.
 - Following end stop setting, the limit switching for end position CLOSED can be set (refer to <Limit switching: set> chapter). For this, the switch compartment must be opened and the indicator disc removed (refer to <Switch compartment: open> chapter).
 - In general, the end stop OPEN does not require setting due to fact that the swing angle was already set in the factory.

9.1.2 End stop OPEN: set

Figure 60: End stop



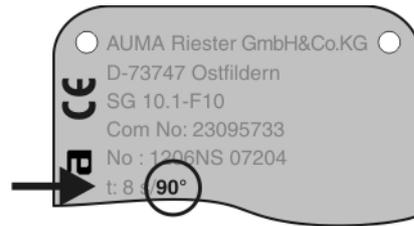
- [1] Screws
- [2] End stop nut
- [3] Protective cap

1. If the four screws [1] are fastened: Unfasten the screws [1] with approx. 3 turns.
2. Move valve to end position OPEN with handwheel. Check whether end stop nut [2] rotates simultaneously.
 → Otherwise: Turn end stop nut [2] **counterclockwise** until end stop.
3. In case end position OPEN has been passed: Turn back the handwheel by several turns and approach end position OPEN again.
4. Turn end stop nut [2] clockwise by 1/8th turn.
Information: In this process, the protective cap [3] must not be unfastened.
- ➔ Thus, the end stop OPEN within the part-turn actuator is set to a slightly higher swing angle (approx. 1°) than the valve end position.
5. Fasten screws [1] crosswise at 25 Nm.
 - Subsequent to this setting, the limit switching for end position OPEN can be set (refer to <Limit switching: set> chapter). For this, the switch compartment must be opened and the indicator disc removed (refer to <Switch compartment: open> chapter).
 - In general, the end stop CLOSED does not require setting due to the fact that the swing angle was already set in the factory.

9.2 Swing angle

The swing angle must only be changed if the swivel range for end stop setting is not sufficient.

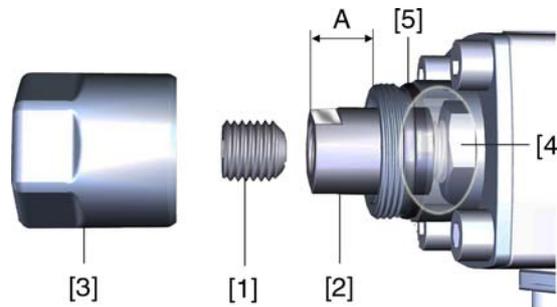
The swing angle set in the factory is indicated on the name plate.



In the standard version the swing angle can be adjusted within the range of 80° to 110°. Optional swivel ranges: refer to technical data pertaining to the order.

9.2.1 Swing angle: modify

Figure 62: End stop



- [1] Grub screw
- [2] End stop nut
- [3] Protective cap
- [4] Travelling nut
- [5] Sealing ring

1. Unfasten protective cap [3].
2. While holding end stop nut [2] in position with open end spanner, unfasten grub screw [1].
3. **Swing angle increase:**
 - 3.1 Turn end stop nut [2] **counterclockwise**. Do not exceed dimension A max.

Type	A max. [mm]
SGExC 05.1	22
SGExC 07.1	22
SGExC 10.1	17
SGExC 12.1	23

- 3.2 Move valve manually to the desired end position OPEN.
- 3.3 Turn end stop nut [2] clockwise until it is tight up to the travelling nut [4].
4. **Swing angle reduction:**
 - 4.1 Move valve manually to the desired end position OPEN.
 - 4.2 Turn end stop nut [2] **clockwise** until it is tight up to the travelling nut [4]. Do not fall below dimension A min.

Type	A min. [mm]
SGExC 05.1	10
SGExC 07.1	10
SGExC 10.1	08
SGExC 12.1	12

5. Degrease mounting face of grub screw [1].

6. While holding end stop nut [2] in position with open end spanner fasten grub screw [1] at 85 Nm.
7. Check O-ring [5] and replace if damaged.
8. Fasten protective cap [3].

9.3 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.

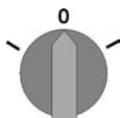
- M ▶ **Customer settings M0041**
 Type of seating M0012
 End position CLOSED M0086
 End position OPEN M0087

Default value: Limit

Setting values:

- Limit** Seating in end positions via limit switching.
- Torque** Seating in end positions via torque switching.

- Select main menu** 1. Set selector switch to position 0 (OFF).



2. Press push button **C Setup** and hold it down for approx. 3 seconds.
 → Display goes to main menu and indicates: ▶ **Display...**

- Select parameter** 3. Select parameter either:
 → click via the menu **M ▶** to parameter, or
 → via direct display: press **▲** and enter ID **M0086** or **M0087**
 → Display indicates: **End position CLOSED**

- CLOSE or OPEN** 4. Use **▲▼ Up ▲ Down ▼** to select:
 → ▶ **End position CLOSED**
 → ▶ **End position OPEN**
 → The black triangle ▶ indicates the current selection.
 5. Press **↵ Ok**.
 → Display indicates the current setting: **Limit** or **Torque**
 → The bottom row of the display indicates either:
 - **Edit** → continue with step 6
 - **Save** → continue with step 10

6. Press **↵ Edit**.
 → Display indicates: ▶ **Specialist (4)**
Log on user 7. Use **▲▼ Up ▲ Down ▼** to select user:
Information: Required user level: **Specialist (4)** or higher
 → The symbols have the following meaning:
 - black triangle: ▶ = current setting
 - white triangle: ▷ = selection (not saved yet)
 8. Press **↵ Ok**.
 → Display indicates: **Password 0*****

9. Enter password (→ enter password).
 ➔ The screen indicates the pre-set type of seating (► **Limit** or ► **Torque**) by means of a black triangle ►.
- Change settings**
10. Select new setting ▲▼ **Up** ▲ **Down** ▼ resulting in the following significations:
 ➔ The symbols have the following meaning:
 - black triangle: ► = current setting
 - white triangle: ▷ = selection (not saved yet)
11. Confirm selection via ◀ **Save**.
 ➔ The setting for the type of seating is complete.
12. Back to step 4 (CLOSED or OPEN): Press ◀ **Esc** .

9.4 Switch compartment: open

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



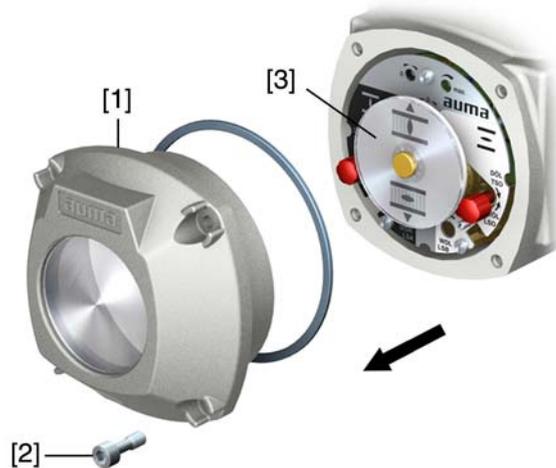
WARNING

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 64:



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 65:



9.5 Torque switching: set

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

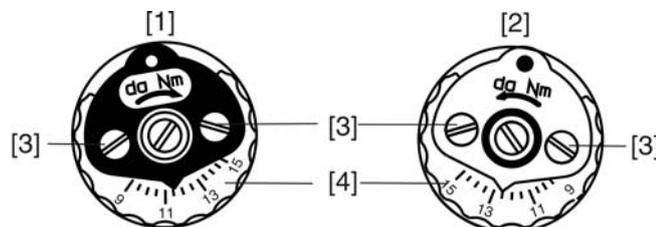
Information The torque switches may also trip during manual operation.

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 66: 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:

- 11.5 da Nm = 115 Nm for direction CLOSE
- 12.5 da Nm = 125 Nm for direction OPEN

9.6 Limit switching: set

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

Figure 67: 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

9.6.1 End position CLOSED (black section): set

1. Engage manual operation.
2. Turn handwheel clockwise until valve is closed.
3. To prevent that the end stop is reached (due to overrun) before the limit switch has tripped, turn handwheel 4 turns (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.

9.6.2 End position OPEN (white section): set

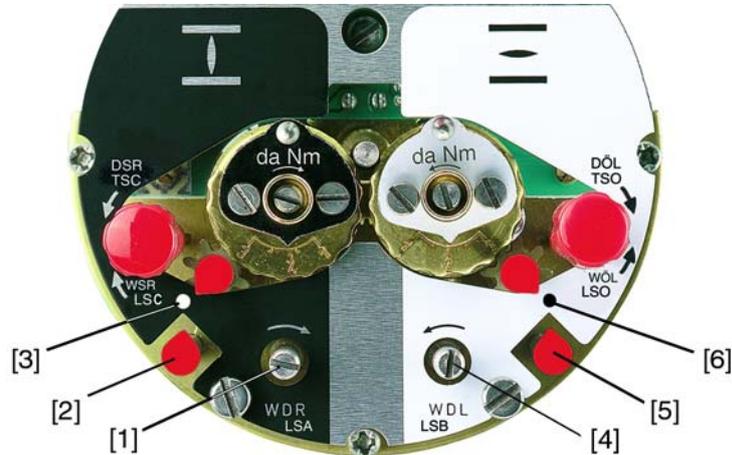
1. Engage manual operation.
2. Turn handwheel counterclockwise until valve is open.
3. To prevent that the end stop is reached (due to overrun) before the limit switch has tripped, turn handwheel 4 turns (overrun) in the opposite direction.
4. **Press down** and turn setting spindle [4] with screw driver 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.

9.7 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 68: 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

9.7.1 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.

9.7.2 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.

9.8 Test run

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

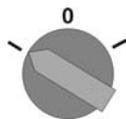
9.8.1 Direction of rotation: check

1. Move actuator manually to intermediate position or to sufficient distance from end position.
 2. Switch on actuator in direction CLOSE and observe the direction of rotation on the indicator disc.
 - Switch off before reaching the end position.
- ➔ The direction of rotation is correct, if **actuator runs in direction CLOSE** and **indicator disc turns clockwise**.



9.8.2 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/LED1 is illuminated in end position CLOSED
 - the green indication light/LED5 is illuminated in end position OPEN
 - the indication lights go out after travelling into opposite direction.
 - ➔ The limit switching is set incorrectly if:
 - the actuator comes to a standstill before reaching the end position
 - one of the red indication lights/LEDs is illuminated (torque fault)
 - the status indication **S0007** in the display signals a 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.

9.8.3 Reference operation position feedback: perform

For actuators with position feedback (RWG, potentiometer), a reference operation has to be performed once the limit switching setting was changed to ensure that the position feedback (0/4 – 20 mA) supplies correct values:

→ Operate actuator electrically (via the push buttons OPEN and CLOSE of the local controls) once to end position OPEN and once to end position CLOSED.

9.9 Potentiometer setting

— Option —

The potentiometer as travel sensor records the valve position.

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 71: View of control unit



[1] Potentiometer

1. Move valve to end position CLOSED.
2. Turn potentiometer [1] counterclockwise until stop is felt.
 - ➔ 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).

9.10 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 10: Technical data RWG 4020

Wiring		3- or 4-wire system
Terminal plan	TPA	9 th position = E or H
Output current	I _A	0 – 20 mA, 4 – 20 mA
Power supply	U _V	24 V DC, ±15 % smoothed
Max. current consumption	I	24 mA at 20 mA output current
Max. load	R _B	600 Ω

Figure 72: 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] counterclockwise 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.

9.11 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:
→ Repeat setting procedure.

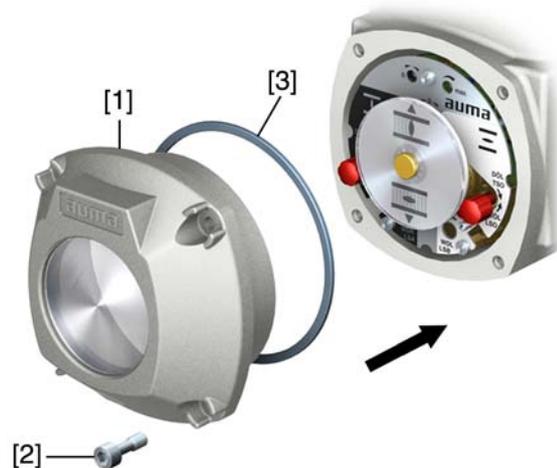
9.12 Switch compartment: close

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.



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.

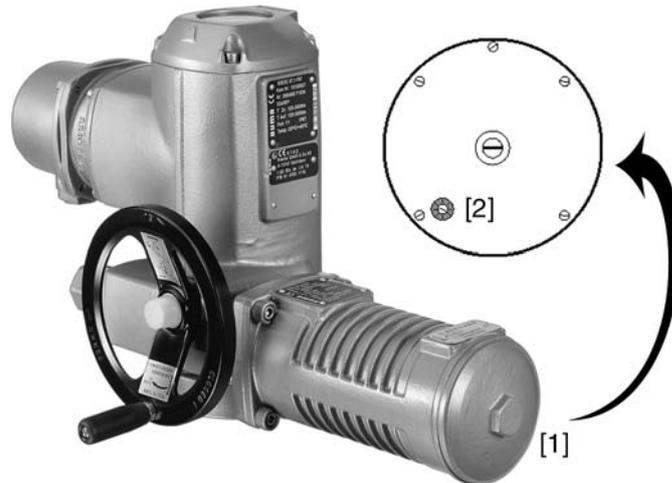
9.13 Operating time: set

For part-turn actuators with 1-phase AC motors, the operating time can be adjusted.

Table 11: Operating time setting for 90°

Size	Operating times
SGExC 05.1	4 to 32 seconds
SGExC 07.1	8 to 63 seconds
SGExC 10.1	16 to 125 seconds
SGExC 12.1	22 to 180 seconds

Figure 76: Part-turn actuator with 1-ph AC motor



- [1] Motor cover
[2] Potentiometer

CAUTION

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

Danger of corrosion due to damage to paint finish!

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

1. Unfasten motor cover [1].
2. Set required operating time via potentiometer [2].
3. Clean sealing faces of motor cover and housing.
4. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the sealing faces.
5. Preserve joint surfaces with an acid-free corrosion protection agent.
6. Check whether O-ring is in good condition, correctly insert O-ring.
7. Fit motor cover [1] and fasten with screws (tightening torque approx. 50 Nm).

10. Corrective action

10.1 Faults during commissioning

Table 12: Faults during commissioning

Fault description	Possible causes	Remedy
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).
Limit and/or torque switches do not trip.	Switch is defective or switch setting is incorrect.	Check setting, if required, reset end positions. → Check switches 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.
 2. Turn test button [2] in direction of the TSO arrow: Torque switch OPEN trips.
- 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.

10.2 Fault indications and warning indications

Faults interrupt or prevent the electrical actuator operation. In the event of a fault, the display backlight is red.

Warnings have no influence on the electrical actuator operation. They only serve for information purposes.

Collective signals include further indications which can be displayed via the **Details** push button.

Table 13: Faults and warnings via status indications in the display

Indication on display	Description/cause	For indicated value > 0:
Warnings S0005	Collective signal 02: Indicates the number of active warnings.	Press push button ← Details . For details, refer to <Warnings and Out of specification> table.
Not ready REMOTE S0006	Collective signal 04: Indicates the number of active signals.	Press push button ← Details . For details, refer to <Not ready REMOTE and Function check> table.
Fault S0007	Collective signal 03: Indicates the number of active faults. The actuator cannot be operated.	Press push button ← Details to display a list of detailed indications. For details, refer to <Faults and Failure> table.
Out of specification S0008	Collective signal 07: Indication according to NAMUR recommendation NE 107 Actuator is operated outside the normal operation conditions.	Press push button ← Details . For details refer to <Warnings and Out of specification> table.
Function check S0009	Collective signal 08: Indication according to NAMUR recommendation NE 107 The actuator is being worked on; output signals are temporarily invalid.	Press push button ← Details . For details, refer to <Not ready REMOTE and Function check> table.
Maintenance required S0010	Collective signal 09: Indication according to NAMUR recommendation NE 107 Recommendation to perform maintenance.	Press push button ← Details to display a list of detailed indications.
Failure S0011	Collective signal 10: Indication according to NAMUR recommendation NE 107 Actuator function failure, output signals are invalid	Press push button ← Details to display a list of detailed indications. For details, refer to <Faults and Failure> table.

Table 14: Warnings and Out of specification

Indication on display	Description/cause	Remedy
Config. warning	Collective signal 06: Possible cause: Configuration setting is incorrect. The device can still be operated with restrictions.	Press push button ← Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Internal warning	Collective signal 15: Device warnings The device can still be operated with restrictions.	Press push button ← Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
24 V DC external	The external 24 V DC voltage supply of the controls has exceeded the power supply limits.	Check 24 V DC voltage supply.
Wrn on time running	Warning on time max. running time/h exceeded	<ul style="list-style-type: none"> • Check modulating behaviour of actuator. • Check parameter Perm. running time/h M0356, re-set if required.
Wrn on time starts	Warning on time max. number of motor starts (starts) exceeded	<ul style="list-style-type: none"> • Check modulating behaviour of actuator. • Check parameter Permissible starts/h M0357, re-set if required.
Failure behav. active	The failure behaviour is active since all required setpoints and actual values are incorrect.	Verify signals: <ul style="list-style-type: none"> • Setpoint E1 • Actual value E2 • Actual process value E4
Wrn input AIN 1	Warning: Loss of signal analogue input 1	Check wiring.
Wrn input AIN 2	Warning: Loss of signal analogue input 2	Check wiring.
Wrn setpoint position	Warning: Loss of signal of actuator setpoint position Possible causes: Input signal for setpoint = 0 (signal loss)	Check setpoint signal.

Indication on display	Description/cause	Remedy
Op. time warning	The set time (parameter Perm.op. time, manual M0570) has been exceeded. The preset operating time is exceeded for a complete travel from end position OPEN to end position CLOSED.	The warning indications are automatically cleared once a new operation command is executed. <ul style="list-style-type: none"> • Check valve. • Check parameter Perm.op. time, manual M0570.
Wrn controls temp.	Temperature within controls housing too high	Measure/reduce ambient temperature.
Wrn motor temp.	Temperature within motor winding too high	Check actuator sizing, correct accordingly.
Wrn gearbox temp.	Temperature within actuator gear housing too high	Check actuator sizing, correct accordingly.
RTC not set	Real time clock has not yet been set.	Set time.
RTC button cell	Voltage of the RTC button cell is too low.	Replace button cell.
PVST fault	Partial Valve Stroke Test (PVST) could not be successfully completed.	Check actuator (PVST settings).
PVST abort	Partial Valve Stroke Test (PVST) was aborted or could not be started.	Perform RESET or restart PVST.
Wrn no reaction	No actuator reaction to operation commands within the set reaction time.	<ul style="list-style-type: none"> • Check movement at actuator. • Check parameter Reaction time M0634.
Wrn FOC	Optical receiving signal (channel 1) incorrect (no or insufficient Rx receive level) or RS-485 format error (incorrect bit(s))	Check/repair FO cables.
Wrn FO cable budget	Warning: FO cable system reserve reached (critical or permissible Rx receive level)	Check/repair FO cables.
Wrn FOC connection	Warning FO cable connection is not available.	Fit FO cable connection.
Torque wrn OPEN	Limit value for torque warning in direction OPEN exceeded.	Check parameter Wrn torque OPEN M0768 , re-set if required.
Torque wrn CLOSE	Limit value for torque warning in direction CLOSE exceeded.	Check parameter Wrn torque CLOSE M0769 , re-set if required.

Table 15: Faults and Failure

Indication on display	Description/cause	Remedy
Configuration error	Collective signal 11: Configuration error has occurred.	Press push button Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Config. error REMOTE	Collective signal 22: Configuration error has occurred.	Press push button Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Internal error	Collective signal 14: Internal error has occurred.	AUMA service Press push button Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Torque fault CLOSE	Torque fault in direction CLOSE	Perform one of the following measures: <ul style="list-style-type: none"> • Issue operation command in direction OPEN. • Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET.
Torque fault OPEN	Torque fault in direction OPEN	Perform one of the following measures: <ul style="list-style-type: none"> • Issue operation command in direction CLOSE. • Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET.

Indication on display	Description/cause	Remedy
Phase fault	<ul style="list-style-type: none"> When connecting to a 3-ph AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. When connecting to a 3-ph or 1-ph AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing. 	Test/connect phases.
Incorrect phase seq	The phase conductors L1, L2 and L3 are connected in the wrong sequence. Only applicable if connected to a 3-ph AC system.	Correct the sequence of the phase conductors L1, L2 and L3 by exchanging two phases.
Mains quality	Due to insufficient mains quality, the controls cannot detect the phase sequence (sequence of phase conductors L1, L2 and L3) within the pre-set time frame provided for monitoring.	<ul style="list-style-type: none"> Check mains voltage. Check parameter Tripping time M0172, extend time frame if required.
Thermal fault	Motor protection tripped	<ul style="list-style-type: none"> Cool down, wait. If the fault indication display persists after cooling down: <ul style="list-style-type: none"> Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET. Check fuses.
Fault no reaction	No actuator reaction to operation commands within the set reaction time.	Check movement at actuator.

Table 16: Not ready REMOTE and Function check (collective signal 04)

Indication on display	Description/cause	Remedy
Wrong oper. cmd	Collective signal 13: Possible causes: <ul style="list-style-type: none"> Several operation commands (e.g. OPEN and CLOSE simultaneously, or OPEN and SETPOINT operation simultaneously) A setpoint is present and the positioner is not active For fieldbus: Setpoint exceeds 100.0 % 	<ul style="list-style-type: none"> Check operation commands (send one operation command only). Set parameter Positioner to Function active. Check setpoint. <p>Press push button Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).</p>
Sel. sw. not REMOTE	Selector switch is not in position REMOTE.	Set selector switch to position REMOTE.
Service active	Operation via service interface (Bluetooth) and service software AUMA ToolSuite.	Exit service software.
Disabled	Actuator is in operation mode Disabled.	Check setting and status of function <Local controls enable>.
EMCY stop active	The EMERGENCY stop switch has been operated. The motor control power supply (contactors or thyristors) is disconnected.	<ul style="list-style-type: none"> Enable EMERGENCY stop switch. Reset EMERGENCY stop state by means of Reset command.
EMCY behav. active	Operation mode EMERGENCY is active (EMERGENCY signal was sent). 0 V are applied at the EMERGENCY input.	<ul style="list-style-type: none"> Detect cause for EMERGENCY signal. Verify failure source. Apply +24 V DC at EMERGENCY input.
I/O interface	The actuator is controlled via the I/O interface (parallel).	Check I/O interface.
Handwheel active	Manual operation is activated.	Start motor operation.
FailState fieldbus	Fieldbus connection available, however no process data transmission by the master.	Verify master configuration
Local STOP	A local STOP is active. Push button STOP of local controls is operated.	Release push button STOP.
Interlock	An interlock is active.	Check interlock signal.
Interlock by-pass	By-pass function is interlocked.	Check states of main and by-pass valve.
PVST active	Partial Valve Stroke Test (PVST) is active.	Wait until PVST function is complete.

10.3 Fuses

10.3.1 Fuses within the actuator controls

Fuses used

F1/F2 Primary fuses on power supply unit

G fuse	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
Thyristor units for motor power up to 1.5 kW	1 A T; 500 V	K002.277
Thyristor units for motor power up to 3.0 kW		
Thyristor units for motor power up to 5.5 kW		

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	2.0 A T; 250 V	K006.106
Voltage output (power supply unit) = 115 V	2.0 A T; 250 V	K006.106

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	1.25 A T; 250 V	K001.184
Voltage output (power supply unit) = 115 V	—	—

F5 Automatic reset fuse as short-circuit protection for external 24 V DC supply for customer (see wiring diagram)

Replace fuses F1/F2

Information Only valid for version with electrical connection of KES type.

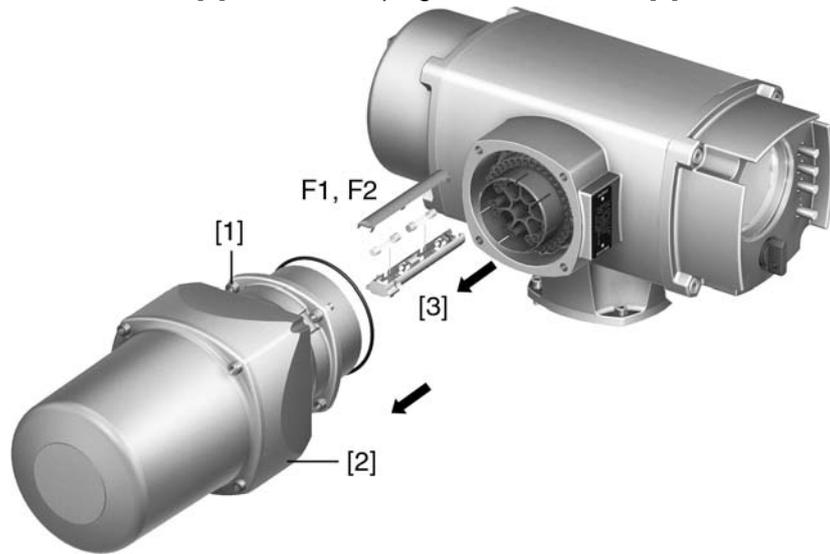


Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

1. Loosen screws [1] and remove plug/socket connector [2].

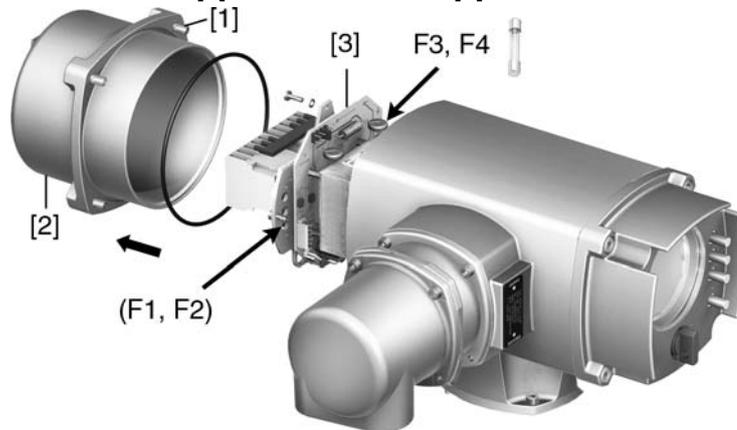


2. Pull fuse holder [3] out of pin carrier, open fuse cover and replace old fuses by new ones.

Fuses F3/F4 (F1/F2): test /replace

Information For versions with electrical connection type KP/KPH, the fuses (F1/F2) are located on the PSU board.

1. Loosen screws [1] and remove cover [2] on the rear of the actuator controls.



The power supply unit has measurement points (solder pins) allowing to perform a resistance (continuity) measurement:

Verifying	Measuring points
F1	MTP1 – MTP2
F2	MTP3 – MTP4
F3	MTP5 – MTP6
F4	MTP7 – MTP8

2. To replace defective fuses: Carefully loosen power supply unit [3] and pull out. (The fuses are on the equipped part of the power supply board).

NOTICE

Cable damage due to pinching!

Risk of functional failures.

→ Carefully assemble power supply unit to avoid pinching the cables.

10.3.2 Motor protection (thermal monitoring)

In order to protect against overheating and impermissibly high surface temperatures at the actuator, PTC thermistors or thermostiches are embedded in the motor winding. The thermostat is tripped as soon as the max. permissible winding temperature has been reached.

The actuator is switched off and the following signals are given:

- LED 3 (thermal fault) on the local controls is illuminated.
- Status indication **S0007** displays an error. The error **Thermostat** is displayed when selecting **Details**.

The motor has to cool down before the operation can be resumed. Depending on the parameter setting, the fault signal is either automatically reset or the fault signal has to be reset using the push button **Reset** in selector switch position LOCAL.

For further information to this topic, please refer to Manual (Operation and setting).

11. 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) .

11.1 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 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.

11.2 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.

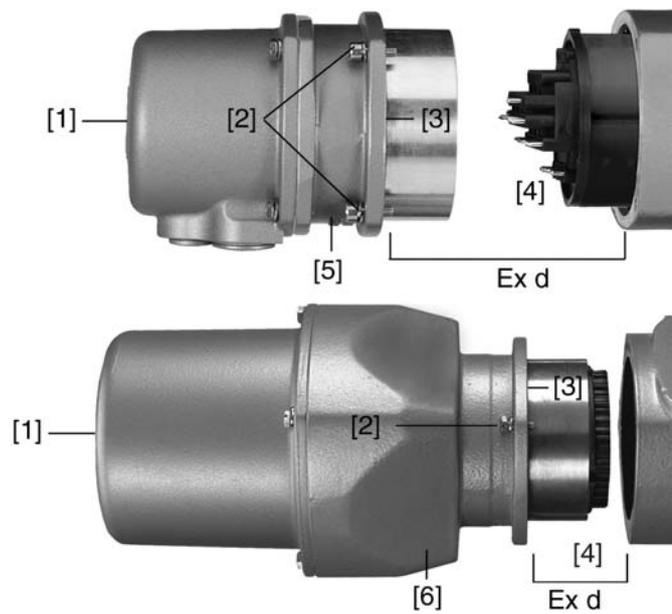


Flameproof enclosure, danger of explosion!

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 80: 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.

11.3 Maintenance

Maintenance intervals After 3 years at the latest for Ex certified products.

- Lubrication**
- In the factory, the gear housing is filled with grease.
 - Change of grease or re-lubrication will be required in case of lubrication loss only.

- Notes regarding the maintenance**
- 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.

11.4 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.

12. 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).

12.1 Features and functions of actuator

Explosion protection	Standard: <ul style="list-style-type: none"> • II2G Ex de IIC T4 • II2D Ex tD A21 IP6x T130°C • II2G c IIC T4 For actual version, refer to actuator name plate.
EC type examination certificate	PTB 01 ATEX 1119
Protection types	<ul style="list-style-type: none"> • Ex d flameproof enclosure: <ul style="list-style-type: none"> - Motor compartment - Switch compartment - Controls housing - Terminal compartment (for electrical connection: KES-Exd) • Ex e increased safety: <ul style="list-style-type: none"> - Terminal compartment (for electrical connections: KP, KPH, KES) • c constructional safety: <ul style="list-style-type: none"> - Gear housing
Type of duty ¹⁾	SG: Short-time duty S2 - 10 min
Torque range	Refer to actuator name plate
Operating time for 90°	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	Yes
Swing angle	Standard: 80° to 110° adjustable between min. and max. values Option: 30° – 40°, 40° – 55°, 55° – 80°, 110° – 160°, 160° – 230° or 230° – 320°
Limit switching	Counter gear mechanism for end positions CLOSED and OPEN Standard: <ul style="list-style-type: none"> • Single switches (1 NC and 1 NO; not galvanically isolated) for each end position Options: <ul style="list-style-type: none"> • Tandem switches (2 NC and 2 NO) for each end position, switches galvanically isolated • Triple switches (3 NC and 3 NO) for each end position, switches galvanically isolated • Intermediate position switches (DUO limit switching), adjustable for any position
Torque switching	Torque switching adjustable for directions OPEN and CLOSE Standard: Single switch (1 NC and 1 NO; not galvanically isolated) for each direction Option: Tandem switches (2 NC and 2 NO) for each direction, switches galvanically isolated
Position feedback signal, analogue (option)	Potentiometer or 0/4 – 20 mA (RWG)
Mechanical position indicator	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED
Running indication	Blinker transmitter
Heater in switch compartment	Standard: Resistance type heater, 5 W, 24 V DC, (internal supply)
Motor heater (option)	Voltages: 110 – 220 V AC, 220 – 240 V AC or 400 V AC Power: 12.5 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
Coupling	Standard: Coupling without bore Options: Machined coupling with bore and keyway, square bore or bore with two-flats according to EN ISO 5211
Valve attachment	Dimensions according to EN ISO 5211

- 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 ⁶ starts
Silver plated contacts:	
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)
Gold plated contacts:	
U min.	5 V
U max.	30 V
I min.	4 mA
I max.	400 mA

Technical data for blinker transmitter	
Mechanical lifetime	10 ⁷ starts
Silver plated contacts:	
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)

12.2 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: $\pm 30\%$
External supply of the electronics (option)	24 V DC $+20\%$ / -15% Current consumption: Basic version approx. 250 mA, with options up to 500 mA The external power supply must have a reinforced insulation against the mains voltage in accordance with IEC 61010-1 and may only be supplied by a circuit limited to 150 VA in accordance with IEC 61010-1.
Current consumption	Current consumption of the controls depending on the mains voltage: For permissible variation of mains voltage by $\pm 10\%$: <ul style="list-style-type: none"> • 100 to 120 V AC = max. 740 mA • 208 to 240 V AC = max. 400 mA • 380 to 500 V AC = max. 250 mA • 515 to 690 V AC = max. 200 mA For permissible variation of mains voltage by $\pm 30\%$: <ul style="list-style-type: none"> • 100 to 120 V AC = max. 1,200 mA • 208 to 240 V AC = max. 750 mA • 380 to 500 V AC = max. 400 mA • 515 to 690 V AC = max. 400 mA Motor current consumption: Refer to motor name plate
Overvoltage category	Category III according to IEC 60634-4-443
Rated power	The controls are designed for the rated motor power, refer to motor name plate
Switchgear ^{1) 2)}	Standard: Reversing contactors (mechanically and electrically interlocked) for motor power up to power class A1 Options: <ul style="list-style-type: none"> • Thyristor unit for mains voltage up to 500 V AC (recommended for modulating actuators) for AUMA power class B1
Control	Standard: Via digital inputs OPEN, STOP, CLOSE, EMERGENCY (via opto-isolator, OPEN, STOP, CLOSE with one common), respect minimum pulse duration for modulating actuators Option: Additional enable inputs for directions OPEN and CLOSE
Voltage and current values for control inputs ³⁾	Standard: 24 V DC, current consumption: approx. 10 mA per input Options: 48 V DC, current consumption: approx. 7 mA per input 60 V DC, current consumption: approx. 9 mA per input 110 V DC, current consumption: approx. 8 mA per input 115 V DC, current consumption: approx. 15 mA per input 115 V AC, current consumption: approx. 15 mA per input

Status signals	<p>Standard: 6 programmable output contacts:</p> <ul style="list-style-type: none"> • 5 potential-free NO contacts with one common, max. 250 V AC, 1 A (resistive load) <ul style="list-style-type: none"> - Default configuration: End position CLOSED, end position OPEN, selector switch in REMOTE, torque fault CLOSE, torque fault OPEN • 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load) <ul style="list-style-type: none"> - Default configuration: Collective fault signal (torque fault, phase failure, motor protection tripped) <p>Options: 6 programmable output contacts:</p> <ul style="list-style-type: none"> • 5 change-over contacts with one common, max. 250 V AC, 5 A (resistive load) • 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load) <p>12 programmable output contacts:⁴⁾</p> <ul style="list-style-type: none"> • 10 potential-free NO contacts, one common for respectively 5 contacts, max. 250 V AC, 1 A (resistive load) • 2 potential-free change-over contacts, max. 250 V AC, 5 A (resistive load) <p>6 programmable output contacts:</p> <ul style="list-style-type: none"> • 6 potential-free change-over contacts without one common, per contact max. 250 V AC, 5 A (resistive load) <p>10 programmable output contacts:⁴⁾</p> <ul style="list-style-type: none"> • 10 potential-free change-over contacts without one common, per contact max. 250 V AC, 5 A (resistive load) <p>All output signals must be supplied with the same potential.</p>
Position feedback signal	Galvanically isolated analogue output E2 = 0/4 – 20 mA (load max. 500 Ω)
Voltage output	<p>Standard: Auxiliary voltage 24 V DC, max. 100 mA for supply of the control inputs, galvanically isolated from internal voltage supply</p> <p>Option: Auxiliary voltage 115 V AC, max. 30 mA to supply the control inputs⁵⁾, galvanically isolated from internal voltage supply</p>
Local controls	<p>Standard:</p> <ul style="list-style-type: none"> • Selector switch LOCAL - OFF - REMOTE (lockable in all three positions) • Push buttons OPEN, STOP, CLOSE, RESET • 6 indication lights: <ul style="list-style-type: none"> - End position CLOSED (yellow), torque fault CLOSE (red), motor protection tripped (red), torque fault OPEN (red), end position and running indication OPEN (green), Bluetooth (blue) • Graphic LC display, illuminated <p>Options:</p> <ul style="list-style-type: none"> • Special colours for the 5 indication lights: <ul style="list-style-type: none"> - End position CLOSED (green), torque fault CLOSE (blue), torque fault OPEN (yellow), motor protection tripped (white), end position OPEN (red)
Bluetooth Communication interface	<p>Bluetooth class II chip, version 2.0 with a range up to 10 m in industrial environments. Supports the SPP Bluetooth profile (Serial Port Profile).</p> <p>Programming software: AUMA ToolSuite, commissioning and diagnostic tool for windows based PCs, PDAs and smart phones</p>
Application functions	<p>Standard:</p> <ul style="list-style-type: none"> • Switch-off mode adjustable <ul style="list-style-type: none"> - Limit or torque seating for end position OPEN and end position CLOSED • Torque by-pass, adjustable up to 5 seconds (no torque monitoring during this time) • Start and end of stepping mode as well as ON and OFF time (1 up to 1,800 seconds) can be programmed individually for directions OPEN and CLOSE. • Any 8 intermediate positions between 0 and 100 %, reaction and signal behaviour programmable <p>Options:</p> <ul style="list-style-type: none"> • Positioner <ul style="list-style-type: none"> - Position setpoint via analogue input E1 = 0/4 – 20 mA - Automatic adaptation of the dead band (adaptive behaviour can be selected) - Split Range operation - MODE input for selecting between OPEN - CLOSE duty and modulating duty

Failure functions	<p>Standard:</p> <ul style="list-style-type: none"> • EMERGENCY operation, behaviour programmable <ul style="list-style-type: none"> - Digital input low active, reaction can be selected: Stop, move to end position CLOSED, move to end position OPEN, move to intermediate position - Torque monitoring can be by-passed during EMERGENCY operation. - Thermal protection can be by-passed during EMERGENCY operation (only in combination with thermoswitch in the actuator, not with PTC thermistor). <p>Options:</p> <ul style="list-style-type: none"> • Enabling local controls via digital input Enable LOCAL. Thus, the actuator operation can be enabled or disabled via push buttons on the local controls. • Local Stop <ul style="list-style-type: none"> - The actuator can be stopped via push button Stop of local controls if the selector switch is in position REMOTE. Not activated when leaving the factory. • EMERGENCY stop button (latching) interrupts electrical operation irrespective of the selector switch position. • Interlock, enabling the operation commands OPEN or CLOSE via digital inputs Interlock OPEN or Interlock CLOSE
Monitoring functions	<p>Standard:</p> <ul style="list-style-type: none"> • Torque monitoring: Valve overload protection (adjustable), results in switching off and generates fault indication • Motor temperature monitoring (thermal monitoring), results in switching off and generates fault indication • Monitoring the heater within the actuator, generates warning signal • Monitoring of permissible on-time and number of starts (adjustable), generates warning signal • Operation time monitoring (adjustable), generates warning signal • Phase failure monitoring, results in switching off and generates fault indication • Automatic correction of the direction of rotation upon wrong phase sequence (3-phase AC current)
Diagnostic functions	<ul style="list-style-type: none"> • Electronic device ID with order and product data • Logging of operating data: A resettable counter and a lifetime counter each for: <ul style="list-style-type: none"> - Motor running time, number of starts, torque switch trippings in end positions CLOSED, limit switch trippings in end position CLOSED, torque switch trippings in end position OPEN, limit switch trippings in end position OPEN, torque faults CLOSE, torque faults OPEN, motor protection trippings • Time-stamped event report with setting, operation and fault history: <ul style="list-style-type: none"> - Status signals in compliance with NAMUR recommendation NE 107: "Failure", "Function check", "Out of specification", "Maintenance required" • Torque characteristics <ul style="list-style-type: none"> - 3 torque characteristics (torque-travel characteristic) for opening and closing directions, can be saved separately. Torque characteristics stored can be shown on the display.
Electrical connection	<p>Standard: 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"> • Plug/socket connector with terminal blocks (KES) Ex e (increased safety) • Plug/socket connector with terminal blocks (KES) Ex d (flameproof enclosure) • Pg-threads, NPT-threads, G-threads, special threads • Parking frame for wall mounting of the disconnected plug • Protection cover for plug compartment (when plug is removed)
Wiring diagram	Refer to name plate

- 1) The reversing contactors are designed for a lifetime of 2 million starts.
- 2) For the assignment of AUMA power classes, please refer to electrical data on actuator.
- 3) All input signals must be supplied with the same potential.
- 4) Not possible for low temperature versions with heating system
- 5) Not possible in combination with PTC tripping device

12.3 Service conditions

Mounting position	Any position
Use	Approved for indoor and outdoor installation
Enclosure protection according to EN 60529	Refer to name plate Standard: <ul style="list-style-type: none"> IP 67 Options: <ul style="list-style-type: none"> IP 68 According to AUMA definition, enclosure protection IP 68 meets the following requirements: <ul style="list-style-type: none"> Water depth: Maximum 6 m head of water Duration of continuous immersion in water: maximum of 72 hours Up to 10 operations during flooding Modulating duty is not possible during continuous immersion. For both enclosure protection types (IP 67 and IP 68) the terminal compartment is additionally sealed against the interior - Double Sealed
Corrosion protection	Standard: 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) Option: <ul style="list-style-type: none"> KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration
Installation altitude	Standard: ≤ 2 000 m above sea level Option: > 2 000 m above sea level, please contact AUMA
Humidity	Up to 100 % relative humidity across the total permissible temperature range
Pollution degree	Within actuator controls: pollution degree 2 Outside actuator controls (in closed condition): pollution degree 4
Finish coating	Standard: Two-component iron-mica coating
Colour	Standard: AUMA silver-grey (similar to RAL 7037)
Ambient temperature	Refer to name plate Standard: <ul style="list-style-type: none"> -40 °C to +40 °C Options: <ul style="list-style-type: none"> -50 °C to +40 °C -60 °C to +60 °C Low temperature versions incl. heating system for connection to external power supply 230 V AC or 115 V AC.
Lifetime	Open-close duty (operating cycles OPEN - CLOSE - OPEN): SG 05.1 – SG 07.1: 20,000 SG 10.1: SG 15,000 SG 12.1: 10, 000
Weight	Refer to separate technical data

12.4 Accessories

Wall bracket ¹⁾	AUMATIC mounted separately from the actuator, including plug/socket connector. Connecting cables on request. Recommended for high ambient temperatures, difficult access, or in case of heavy vibration during service
Programming software for PC	AUMA ToolSuite

1) Cable length between actuator and AUMATIC max. 100 m. Not suitable for version with potentiometer in the actuator. Instead of the potentiometer, an RWG has to be used.

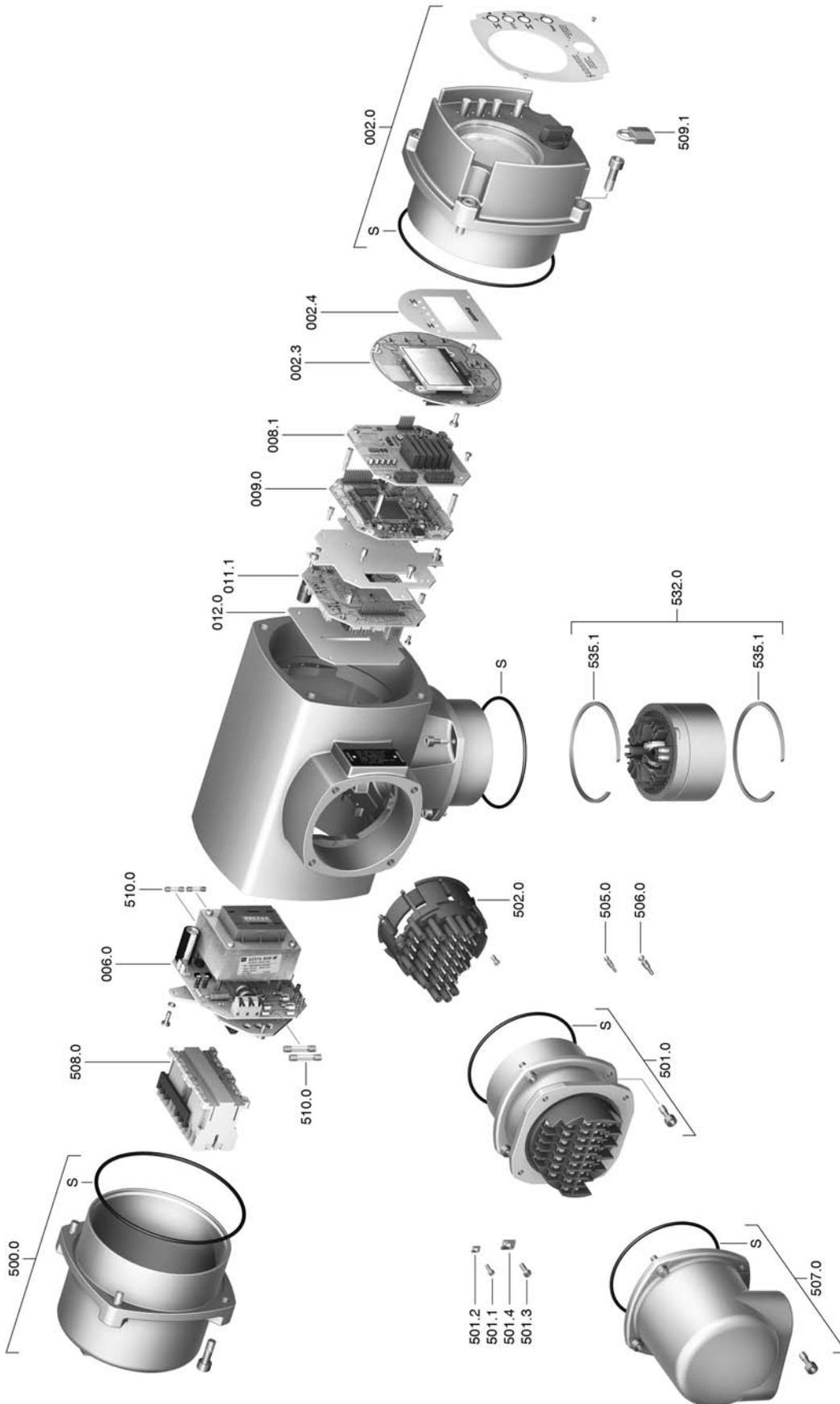
12.5 Further information

EU Directives	<ul style="list-style-type: none">• ATEX Directive: (94/9/EC)• Electromagnetic Compatibility (EMC): (2004/108/EC)• Low Voltage Directive: (2006/95/EC)• Machinery Directive: (2006/42/EC)
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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
001.0	Housing	Sub-assembly
002.0	Worm shaft	Sub-assembly
002.4	End stop nut (included in sub-assembly 002.0)	
003.0	Manual drive worm	Sub-assembly
004.0	Worm wheel	Sub-assembly
005.0	Mounting flange	Sub-assembly
010.0	End stop	Sub-assembly
016.1	Protective cap	
017.0	Torque finger	Sub-assembly
021.0	Limit drive finger	Sub-assembly
029.0	Manual drive bearing	Sub-assembly
032.0	Planetary gearing	Sub-assembly
034.0	Motor	Sub-assembly
034.3	Motor electronic board	Sub-assembly
034.4	Varistor board	Sub-assembly
041.0	Socket carrier with motor cable harness	Sub-assembly
061.0	Torque switching head	Sub-assembly
500.0	Cover	Sub-assembly
501.0	Socket carrier (complete with sockets)	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
525.0	Coupling	
542.0	Handwheel	Sub-assembly
542.1	Ball handle	Sub-assembly
553.0	Mechanical position indicator	Sub-assembly
556.0	Potentiometer for position transmitter	Sub-assembly
556.1	Potentiometer without slip clutch	
557.0	Heater	Sub-assembly
558.0	Blinker transmitter including pins at wires (without impulse disc and insulation plate)	Sub-assembly
559.0-1	Control unit without torque switching heads and switches	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
560.0-1	Switch stack for direction OPEN	Sub-assembly
560.0-2	Switch stack for direction CLOSE	Sub-assembly
560.1	Switch for limit/torque switching	
560.2	Switch case	
566.0	Position transmitter RWG	Sub-assembly
566.1	Potentiometer for RWG without slip clutch	Sub-assembly
566.2	Electronic board RWG	Sub-assembly
566.3	Wire harness for RWG	Sub-assembly
567.1	Slip clutch for potentiometer	Sub-assembly
S1	Seal kit, small	Set
S2	Seal kit, large	Set

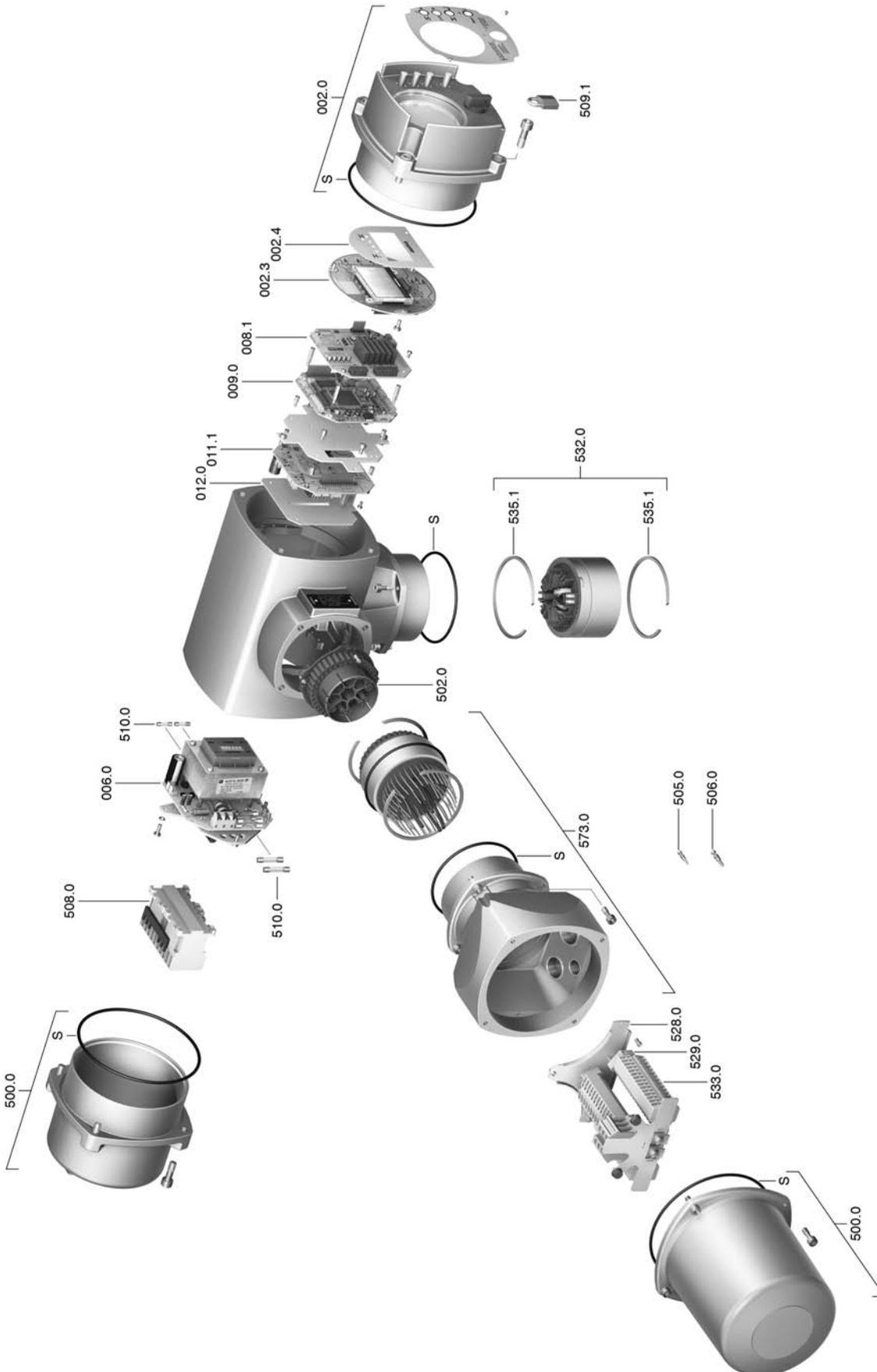
13.2 Actuator controls AUMATIC ACExC 01.2 with plug/socket connector and screw-type terminals (KP, KPH)



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 in these instructions.

No.	Designation	Type
002.0	Local controls	Sub-assembly
002.3	Local controls board	Sub-assembly
002.4	Face plate for display	Sub-assembly
006.0	Power supply unit	Sub-assembly
008.1-1	I/O board	Sub-assembly
008.1-2	Fieldbus board	Sub-assembly
009.0	Logic board	Sub-assembly
011.1	Relay board	Sub-assembly
012.1	Option board	Sub-assembly
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	
510.0	Fuse kit	Sub-assembly
532.0	Cable conduit (actuator connection)	Sub-assembly
535.1	Circlip	
S	Seal kit	Set

13.3 Actuator controls AUMATIC ACExC 01.2 with plug/socket connector and 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 in these instructions.

No.	Designation	Type
002.0	Local controls	Sub-assembly
002.3	Local controls board	Sub-assembly
002.4	Face plate for display	Sub-assembly
006.0	Power supply unit	Sub-assembly
008.1-1	I/O board	Sub-assembly
008.1-2	Fieldbus board	Sub-assembly
009.0	Logic board	Sub-assembly
011.1	Relay board	Sub-assembly
012.1	Option board	Sub-assembly
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	
510.0	Fuse kit	Sub-assembly
528.0	Terminal frame (without terminals)	Sub-assembly
529.0	End piece	
532.0	Cable conduit (actuator connection)	Sub-assembly
533.0	Terminals for motor/controls	
535.1	Circlip	
573.0	Plug-in electrical connection	Sub-assembly
S	Seal kit	Set

14. Certificates**14.1 Declaration of Incorporation and EC Declaration of Conformity**

AUMA Riester GmbH & Co. KG Tel +49 7631 809-0
 Aumastr. 1 Fax +49 7631 809-1250
 79379 Müllheim, Germany Riester@auma.com
 www.auma.com



**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 **SGExC 05.1 – SGExC 12.1**, in versions **AUMA NORM, AUMA SEMIPACT, AUMA MATIC** or **AUMATIC**.

AUMA Riester GmbH & Co. KG as manufacturer declares herewith, that the above mentioned part-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 5211: 2001
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 part-turn actuators are designed to be installed on industrial valves. AUMA part-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 part-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 01 ATEX 1119 issued by the Physikalisch Technische Bundesanstalt (EU number 0102) is available for the part-turn actuators mentioned above.

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

EN 61000-6-4: 2007
 EN 61000-6-2: 2005
 EN 61800-3: 2004

(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. Y004.931/002/en

14.2 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 01 ATEX 1119



(4) Equipment: multi-turn actuator type SGExC 05.1 - SGExC 07.1
design Auma Norm and Auma Matic

(5) Manufacturer: Werner Riester GmbH & Co. KG

(6) Address: Renkenrunsstr. 20, 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 01-19012.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997+A1+A2

EN 50018:1994

EN 50019:1994

(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 EEx de IIC T4

Zertifizierungsstelle Explosionsschutz

Braunschweig, October 23, 2001

By order

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

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 1119**

(15) **Description of equipment**
The apparatus is a part-turn actuator in the type of protection flameproof enclosure "d" for the motor, the controls and the switch compartment. The terminal compartment is designed for protection type increased safety "e". In order to guarantee the temperature class, the motor is equipped either with thermostats and a thermal overload relay (e. g. motor protection switch) or with PTC integrated in each winding and a suitable electronic for switching-off, depending on the operation mode.

The reference data of the electric versions of the types SGExC 05.1 – SGExC 07.1 are fixed by the type test performed by the manufacturer in accordance with the test authority.
The type designation is composed as follows:

Multi-turn actuators

SGExC 05.1-F05

Part-turn actuators SG
explosion proof version for group IIC
Size 05.1, 07.1
Designation for mounting flange

Example: SGExC 07.1 - F07 part-turn actuator in type of duty S2...min

Integral Controls

AMExC 01.1

Type of controls
AM = AUMA Matic
AMMC = AUMA Matic MC
SEM = SEMIPACT
AMB = AUMA Matic Basic

explosion proof version for group IIC
Size 01.1

Example: AMBExC 01.1 integral controls type AUMA Matic Basic (reversing contactors)

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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SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 1119

(16) **Test report** PTB Ex 01-19012

(17) **Special conditions for safe use**
none
Special notes for the safe operation:
The mode of operation has to be guaranteed with suitable measures by the operator.
The actuators may only be operated in the mode of operation and under the environmental conditions for which they have been submitted to the type test. When using a PTC and a suitable electronic device for switching-off, the thermal overload relay can be omitted. The actuators are suitable for service at ambient temperatures down to -50 °C in case the routine test is performed with over-pressure. The corresponding data can be seen on the name plate.
Components which may be installed or added are only permitted if their technology corresponds to at least the standard mentioned on the cover sheet.
Monitoring equipment have to fulfill the requirements of directive 94/9/EC, appendix II, sub-clause 1.5.5 and EN 1127-1.

Note:
An evaluation of the gearbox compartment is not issued together with this test.

(18) **Essential health and safety requirements**
Covered by the above mentioned standards.

Braunschweig, October 23, 2001

Zertifizierungsstelle Explosionsschutz
Dr.-Ing. U. Klausmeyer
Regierungsdirektor



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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Braunschweig und Berlin

1st SUPPLEMENT
according to Directive 94/9/EC Annex III.6
to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 1119
(Translation)

Equipment: Part turn actuator, types SGExC 05.1 to SGExC 12.1 version Auma Norm, Auma Matic and AUMATIC

Marking:  II 2 G EEx de IIC T4

Manufacturer: Werner Riestler GmbH & Co. KG

Address: Renkennsstraße 20
79379 Müllheim, Germany

Description of supplements and modifications
The part turn actuators of types SGExC 05.1 to SGExC 07.1 will be manufactured with the following modifications:

- The range of part turn actuators will be extended to include sizes 10.1 and 12.1. The type designation will be expanded as follows:
SGExC 10.1 and SGExC 12.1
- The slewing motion actuators will alternatively be provided with a new integrated controls AUMATIC ACExC01.1. The cable bushing with integrated connector will be provided between enclosure and terminal compartment.
- A flameproof terminal compartment may be used alternatively. The terminal compartment may alternatively be fitted with additional components (e.g. optical-fibre converters). Cable entry is by means of direct cable entries or conduits. The short-form symbol for the type of protection will then be: **EEx d IIC T4**.
- The bevels at the flameproof joints will be standardised on the basis of the drawings submitted with the application.
- The special fasteners may also come without spring washers. The length of the screws will in that case be made to match.
- The integrated controls AUMATIC AMExC01.1 housing may also be used with the increased volume as shown in the application drawing.

Sheet 1/2

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

1st SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 1119

7. The switch mechanism compartment of the part turn actuators with terminal compartment may optionally be designed to type of protection Increased Safety. The components mounted are covered by their own examination certificate. Intrinsically safe components as certified in a separate examination certificate may be used optionally. The short-form symbol for the type of protection will then be:

EEx ed IIC T4 or EEx ed ib IIC T4

The intrinsically safe components shall be mounted in the enclosure in such a way that the clearance and creepage distances that are required according to EN 50020 between intrinsically safe and non-intrinsically safe circuits are duly considered.
If system installation and layout does not provide for the clearance requirements for connectors in accordance with EN 50020, wiring that meets the quality criteria Increased Safety "e" shall be used, or the wiring shall be mechanically fall safe as specified in EN 50020.
Should these clearance requirements not be met, local wiring work may be performed only if an explosion risk can positively be excluded along all the lines.
When connecting more than one intrinsically safe circuit, the rules and regulations for interconnection shall duly be observed.

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

Test report: PTB Ex 02-12092

Notes for installation and use
The part turn actuators may also be connected by means of suitable cable entries or conduit systems that meet the requirements of EN 50018, sections 13.1 and 13.2, and for which a separate examination certificate has been issued.
Openings not used shall be closed as required in EN 50018, section 11.
This supplement and the EC-type examination certificate on which it is based, as well as any future supplements thereto shall at the same time be regarded as supplements for Certificate of Conformity PTB Nr. Ex-85/1068.

Performance assessment
The tests and the favourable results these have produced reveal that the part turn actuators meet the requirements of directive 94/9/EC as well as those of the standards quoted on the cover sheet.

Braunschweig, October 31, 2002

Zertifizierungsstelle Explosionsschutz
Dr.-Ing. U. Klausmeyer
Regierungsdirektor



Sheet 2/2

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



2nd SUPPLEMENT
 according to Directive 94/9/EC Annex III.6
 to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 1119
 (Translation)

Equipment: Part-turn actuator, types SGExC 05.1 - SGExC 12.1
 Marking: II 2 G EEx de Ib IIC T4 or T3 and EEx de IIC T4 or T3
 II 2 D Ex tD A21 IP 6x T 130 °C or T 190 °C
 Manufacturer: AUMA Riester GmbH & Co. KG Previously: Werner Riester GmbH & Co. KG
 Address: Aumastraße 1
 79379 Müllheim, Germany

- Description of supplements and modifications
 The part-turn actuators, types SGExC 05.1 to SGExC 12.1, AUMA NORM, AUMA MATIC and AUMATIC design, may be manufactured with the following modifications:
- The part-turn actuators may alternatively be equipped with the SKE080-... DC motor.
 - The part-turn actuators are suited for ambient temperatures between -50 °C and 60 °C.
 - The enclosure geometry of the AMExC 01.1 control unit will be modified. This is why only one version of the flameproof enclosure cover is used.
 - The switch cover of the ACExC 01.1 control unit will be modified to adapt it to the interface boards.
 - Modified sightglasses may alternatively be used.
 - The part-turn actuators are also suited for use in "dust" hazardous areas category II 2D.
 - If required, e.g. longer runtimes, the part-turn actuators may also be classified as temperature class T3 / T 190 °C elements.
 - A cable bushing with integrated plug-type connector and screwed contacts for drives SGExC 05.1 to SGExC 12.1 and for control units AMExC 01.1 and ACExC 01.1 may alternatively be used in the EEx d area.
 - The part-turn actuators may alternatively be powder coated to protect them against corrosion.
 - The flameproof switch mechanism compartment of the AUMA NORM, AUMA MATIC and AUMATIC part-turn actuators may optionally also be equipped with intrinsically safe components for which a separate test certificate has been issued.

Sheet 1/2

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Physikalisch-Technische Bundesanstalt
 Braunschweig und Berlin



2nd SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 1119

Applied standards
 EN 50014:1997 + A1 + A2 EN 50018:2000 EN 50019:2000
 EN 50020:2002 EN 50281-1-1:1998

Test report: PTB Ex 07-16251

Zertifizierungsstelle Explosionsschutz Braunschweig, October 10, 2007
 By order:



Sheet 2/2

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