auma®
Solutions for a world in motion

Ex

Part-turn actuators

SGExC 05.1 – SGExC 12.1

AUMA NORM (without controls)

Operation instructions Assembly, operation, commissioning

Read operation instructions first.

- Observe safety instructions.
- These operation instructions are part of the product.
- Retain 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.

Table of contents

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).

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

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

⚠ CAUTION **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.**

NOTICE **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

⚠ DANGER **Type of hazard and respective source!**

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

→ Measures to avoid the danger

→ Further measure(s)

Safety alert symbol ⚠ warns of a potential personal injury hazard.

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

1.4 References and symbols

The following references and symbols are used in these instructions:

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

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

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

< > **Reference to other sections**

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

2. Identification

2.1 Name plate

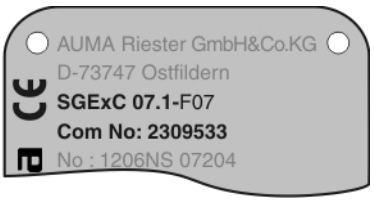
Each device component (actuator, motor) is equipped with a name plate.

Figure 1: Arrangement of name plates

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

Data for identification

Figure 2: Actuator name plate



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

Figure 3: 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

Version: NORM (without actuator controls)

Commission number

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

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.

Actuators without controls can be equipped with AUMA controls at a later date. The local controls are included in the AUMA controls. For enquiries and more information, please state our commission no. (refer to actuator name plate).

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.

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

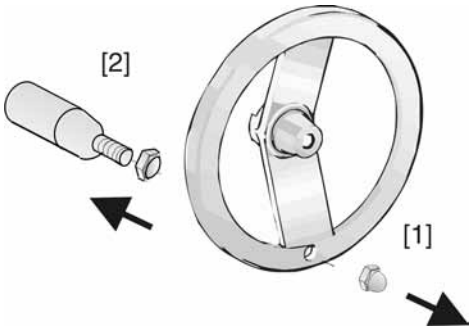
AUMA actuators can be operated without restriction in any mounting position.

4.2 Ball handle: fit to handwheel

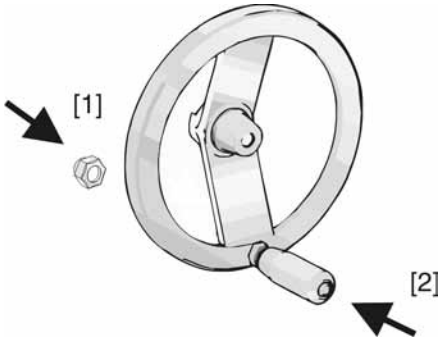
To avoid damage during transport, the ball handle is fitted at the rear of the handwheel.

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

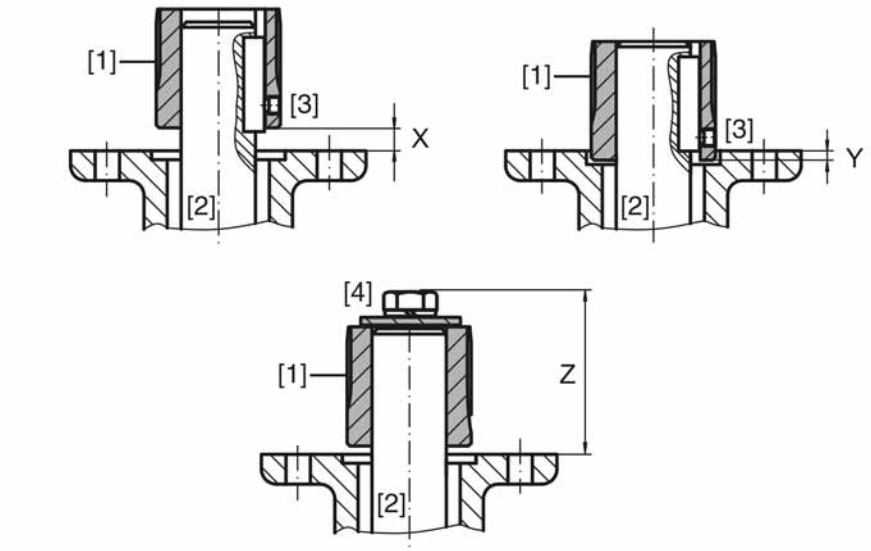
Danger of corrosion due to damage to paint finish and condensation!

→ 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 6: 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

5. Electrical connection

5.1 Basic information

WARNING

Danger due to incorrect electrical connection

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

→ The electrical connection must be carried out exclusively by suitably qualified personnel.

→ Prior to connection, observe basic information contained in this chapter.

→ After connection but prior to applying the voltage, observe the <Commissioning> and <Test run> chapters.

Wiring diagram/terminal plan

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

NOTICE

Valve damage for connection without controls!

→ NORM actuators require controls: Connect motor via controls only (reversing contactor circuit).

→ Observe the type of seating specified by the valve manufacturer.

→ Observe wiring diagram.

Delay time

The delay time is the time from the tripping of the limit or torque switches to the motor power being switched off. To protect the valve and the actuator, we recommend a delay time < 50 ms. Longer delay times are possible provided the operating time, output drive type, valve type, and the type of installation are considered. We recommend switching off the corresponding contactor directly by limit or torque switch.

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 value for respective sizing is derived from the current consumption of the motor (refer to electrical data sheet).

Protection via thermal motor protection

- Version with thermoswitches as motor protection:
  According to EN 60079-14, a thermal overload protection device (e.g. motor protection switch) must be installed for explosion-proof actuators in addition to the thermoswitches.
- Version with PTC thermistor:
  PTC thermistors additionally require a suitable tripping device in the controls.

Limit and torque switches

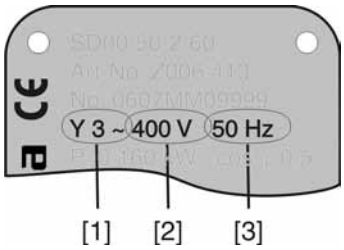
Limit and torque switches can be provided as single, tandem, or triple switches. Only the same potential can be switched on the two circuits (NC/NO contact) of each single switch. If different potentials are to be switched simultaneously, tandem switches or triple switches are required. When using tandem/triple switches:

- For signalling use the leading contacts TSC1, TSO1, LSC1, LSO1.
- For switching off use the lagging contacts TSC, TSO, LSC, LSO.

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 7: Motor name plate (example)



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

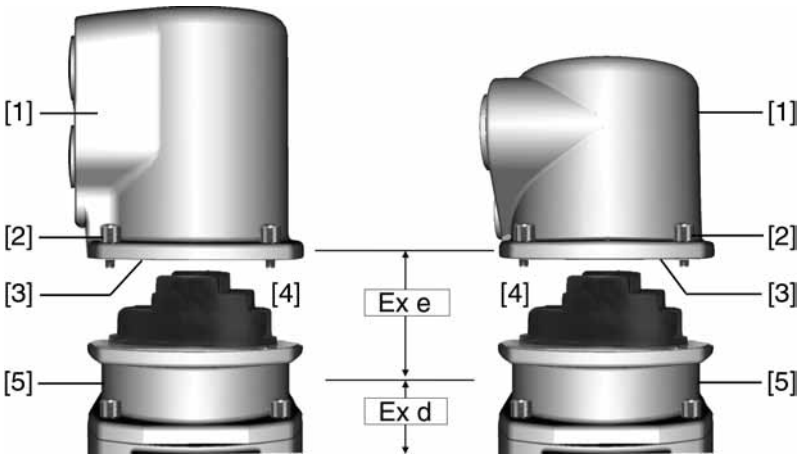
Connecting cables

- 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 8: Plug/socket connector KPH, KP



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

DANGER

Hazardous voltage!

Risk of electric shock.

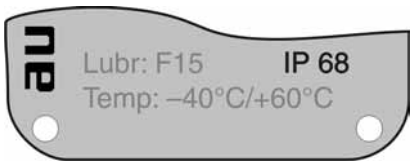
→ Disconnect device from the mains before opening.

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 IP68.



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 3: 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 mm² (flexible or solid)	2 Nm
Control contacts (1 to 50)	0.75 – 1.5 mm² (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).

⚠ WARNING

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

Risk of electric shock.

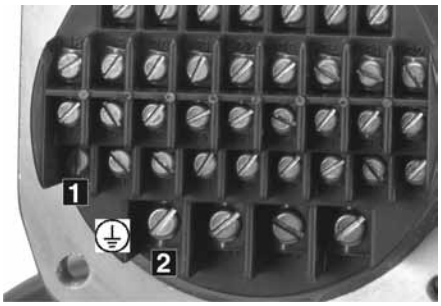
→ Connect all protective earth conductors.

→ Connect PE connection to external protective earth conductor of connecting cables.

→ Start running the device only after having connected the protective earth conductor.

5. Tighten protective earth firmly to PE connection

Figure 10: PE connection



[1] PE connection, control cable

[2] PE connection, motor cable

⚠ CAUTION

Without motor protection, impermissibly high temperatures at the actuator may occur: Ignition hazard, risk of explosion!

Risk of death, serious injury or motor damage. Our warranty for the motor will lapse if the motor protection is not connected.

→ Connect PTC thermistors or thermoswitches to external controls.

NOTICE

Danger of corrosion: Damage due to condensation!

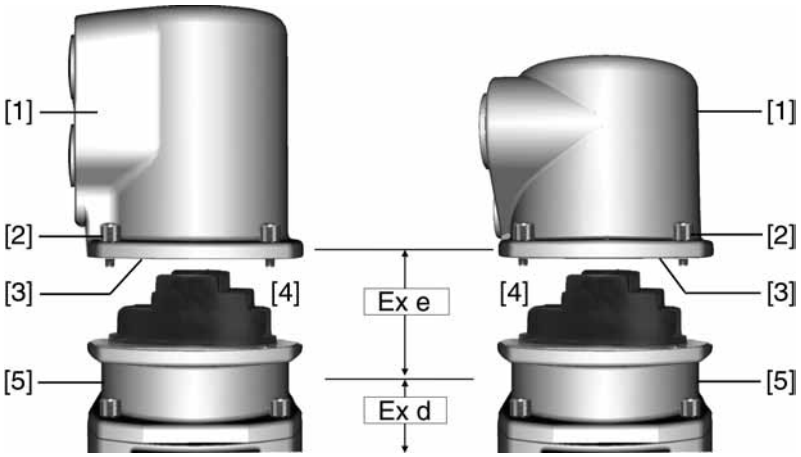
→ After mounting, commission the device immediately to ensure that heater minimises condensation.

Information

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

5.2.3 Terminal compartment: close

Figure 11: Plug/socket connector KPH, KP



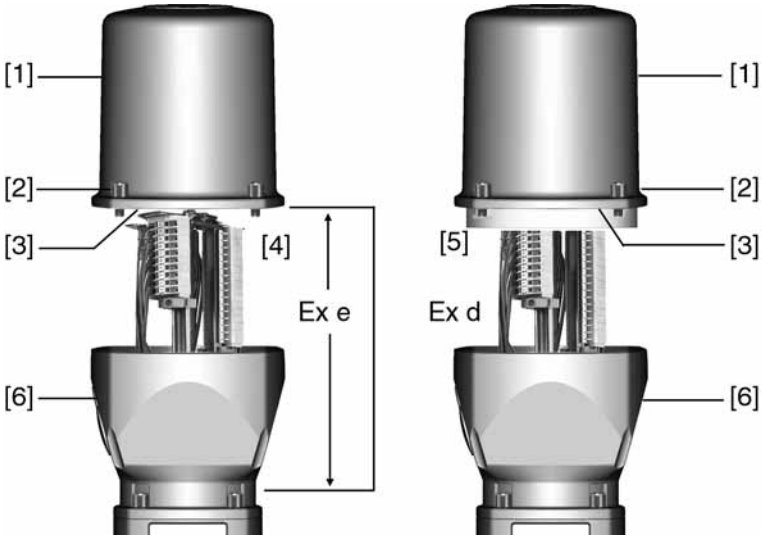
[1] Cover
[2] Screws for cover
[3] O-ring
[4] Terminal compartment
[5] Terminal board

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 12: 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

DANGER

Hazardous voltage!

Risk of electric shock.

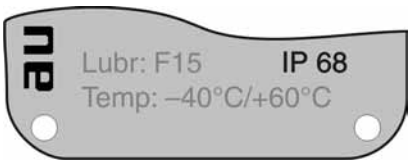
→ Disconnect device from the mains before opening.

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

➥ Terminal compartments [4] and [5] are 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 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 IP68.



3. Seal cable entries unused cable entries 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 required enclosure protection.

5.3.2 Cable connection

Table 4: Terminal cross sections and tightening torques

Type	Terminal cross sections	Tightening torques
Power terminals (U, V, W)	max. 10 mm² (flexible or solid)	1.5 – 1.8 Nm
PE connection	max. 10 mm² (flexible or solid)	3.0 – 4.0 Nm
Control contacts (1 to 50)	max.2.5 mm² (flexible or solid)	0.6 – 0.8 Nm

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

WARNING

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

Risk of electric shock.

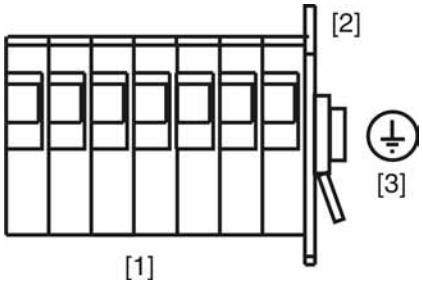
→ Connect all protective earth conductors.

→ Connect PE connection to external protective earth conductor of connecting cables.

→ Start running the device only after having connected the protective earth conductor.

4. Tighten protective earth firmly to PE connection

Figure 14: PE connection



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

CAUTION

Without motor protection, impermissibly high temperatures at the actuator may occur: Ignition hazard, risk of explosion!

Risk of death, serious injury or motor damage. Our warranty for the motor will lapse if the motor protection is not connected.

→ Connect PTC thermistors or thermoswitches to external controls.

NOTICE

Danger of corrosion: Damage due to condensation!

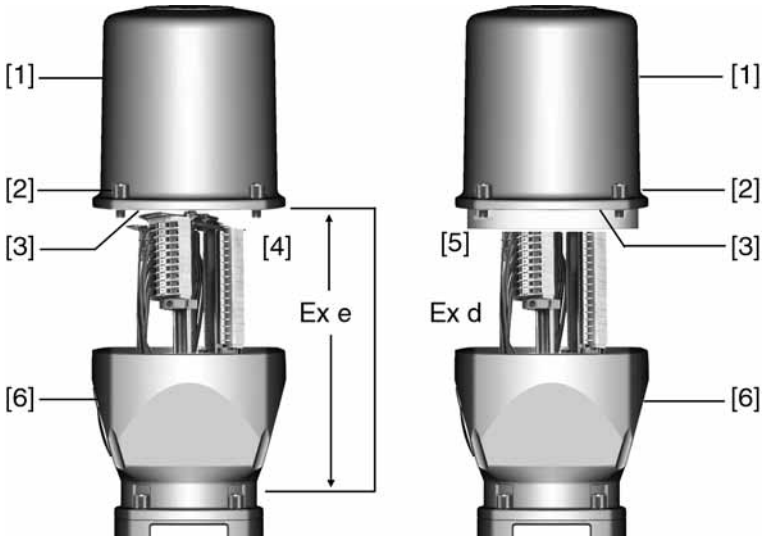
→ After mounting, commission the device immediately to ensure that heater minimises condensation.

Information

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

5.3.3 Terminal compartment: close

Figure 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

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

⚠ WARNING

Flameproof enclosure, danger of explosion!

Risk of death or serious injury.

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

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

5.4 Accessories for electrical connection

— Option —

5.4.1 Parking frame

Application

Parking frame for safe storage of a disconnected plug.

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

Figure 16: Parking frame and plug/socket connector with screw-type terminals (KP/KPH)

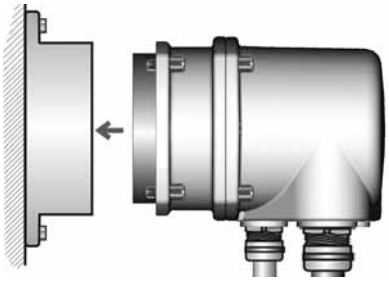
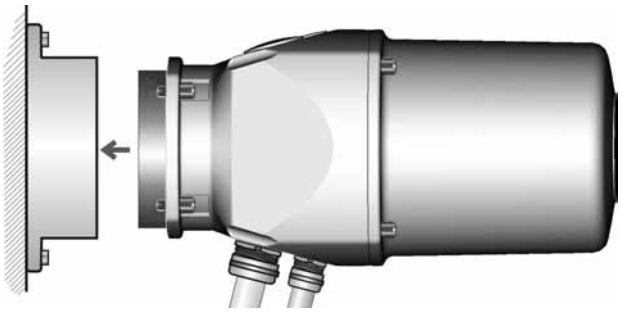


Figure 17: Parking frame and plug/socket connector with terminal blocks (KES)



5.4.2 Protection cover

Protection cover for plug compartment when plug is removed.

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

6. Operation

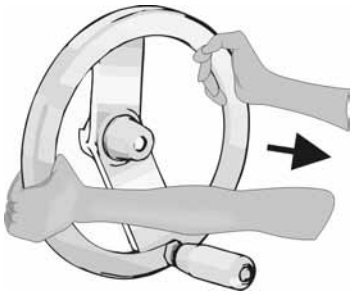
6.1 Manual operation

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

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

NOTICE

Valve damage due to incorrect setting!

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

Controls are required to operate an actuator during motor operation. If the actuator is to be operated locally, additional local controls are required.

1. Switch on power supply.
2. To close the valve, switch on motor operation in direction CLOSE.

➥ Valve shaft turns clockwise in direction CLOSE.

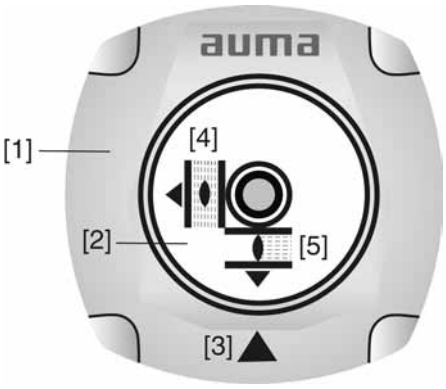
7. Indications

7.1 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 19: Mechanical position indicator



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

8. Signals

8.1 Feedback signals from actuator

Information The switches can be provided as single switches (1NC and 1 NO), as tandem switches (2 NC and 2 NO) or as triple switches (3 NC and 3 NO). The precise version is indicated in the terminal plan or on the order-related technical data sheet.

Feedback signal	Type and designation in terminal plan	
End position OPEN/CLOSED reached	Setting via limit switching Switches: 1 NC and 1 NO (standard)	
	LSC	Limit switch, closing, clockwise rotation
	LSO	Limit switch, opening, counterclockwise rotation
Intermediate position reached	Setting via DUO limit switching Switches: 1 NC and 1 NO (standard)	
	LSA	Limit switch, DUO, clockwise rotation
	LSB	Limit switch, DUO, counterclockwise rotation
Torque OPEN/CLOSED reached	Setting via torque switching Switches: 1 NC and 1 NO (standard)	
	TSC	Torque switch, closing, clockwise rotation
	TSO	Torque switch, opening, counterclockwise rotation
Motor protection tripped	Thermoswitches or PTC thermistors, depending on version	
	F1, Th	Thermoswitches
	R3	PTC thermistors
Running indication	Switches: 1 NC (standard)	
	S5, BL	Blinker transmitter
Valve position	Via potentiometer or electronic position transmitter RWG, depending on version	
	R2	Potentiometer
	R2/2	Potentiometer in tandem arrangement (option)
	B1/B2, RWG	3- or 4-wire system (0/4 – 20 mA)
	B3/B4, RWG	2-wire system (4 – 20 mA)

9. Commissioning

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.

⚠ CAUTION

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:

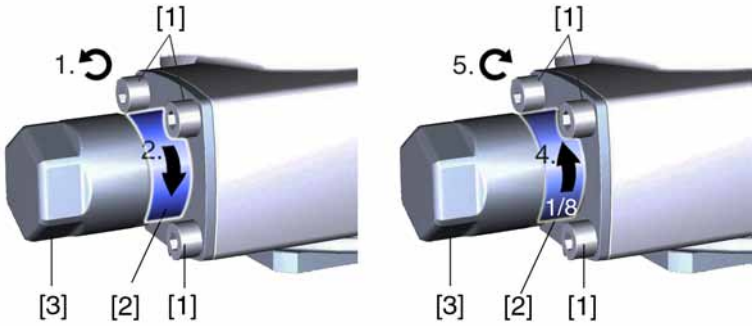
- Recommendations for **butterfly valves**: Set end position CLOSED first.
- Recommendations for **ball valves**: Set end position OPEN first.

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 20: End stop



[1] Screws

[2] End stop nut

[3] Protective cap

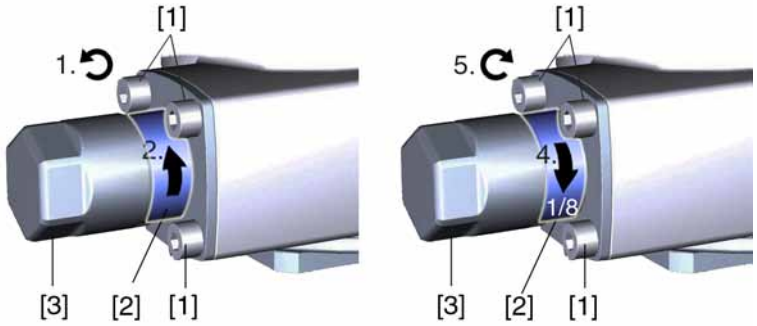
1. If the four screws [1] are fastened: Unfasten the screws [1] with approx. 3 turns.
2. Move valve to end position CLOSED with handwheel. Check whether end stop nut [2] rotates simultaneously.
   → Otherwise: Turn end stop nut [2] **clockwise** until end stop is reached.
3. In case end position CLOSED 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 21: 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.

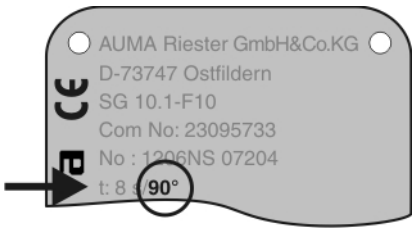
➥ Thus, the end stop OPEN within the part-turn actuator is set to a slightly higher swing angle (approx. 1°) than the valve end position.

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.

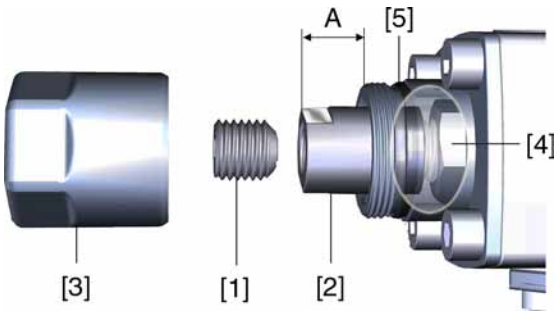
The swing angle set in the factory is indicated on the name plate.



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 23: 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 Switch compartment: open

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

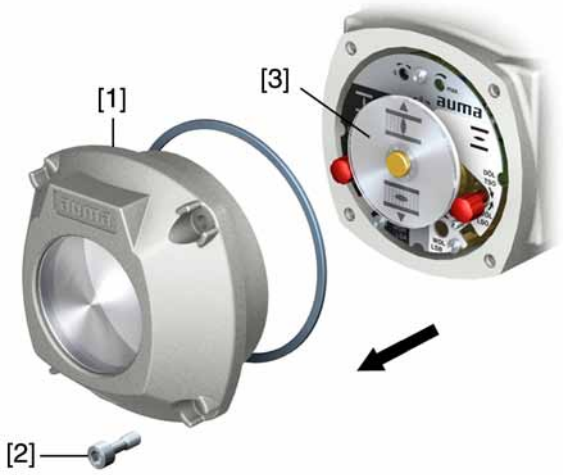
⚠ WARNING

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 24:



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 25:

9.4 Torque switching: set

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

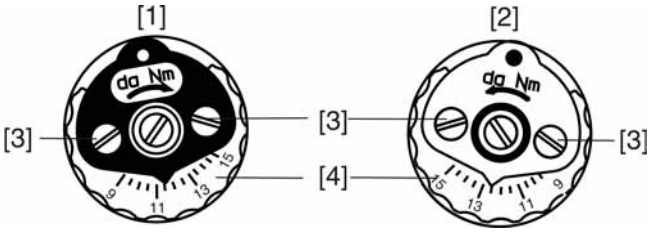
Information The torque switches may also trip during manual operation.

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 26: 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.

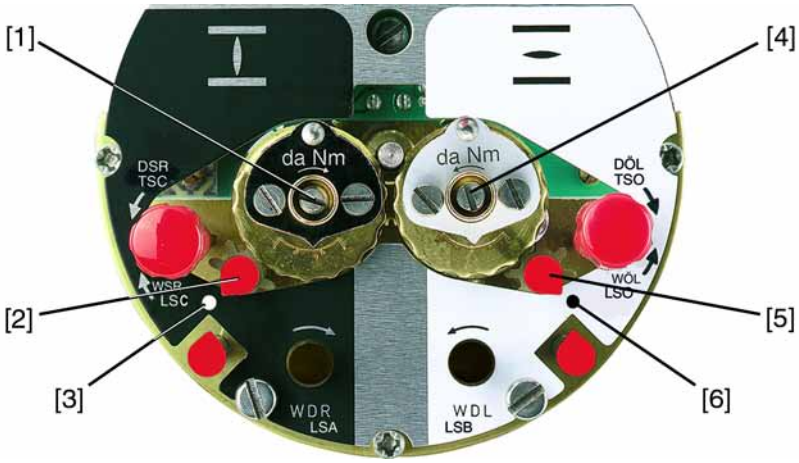
Example: The figure above shows the following settings:

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

9.5 Limit switching: set

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

Figure 27: 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

9.5.1 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.

9.5.2 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.

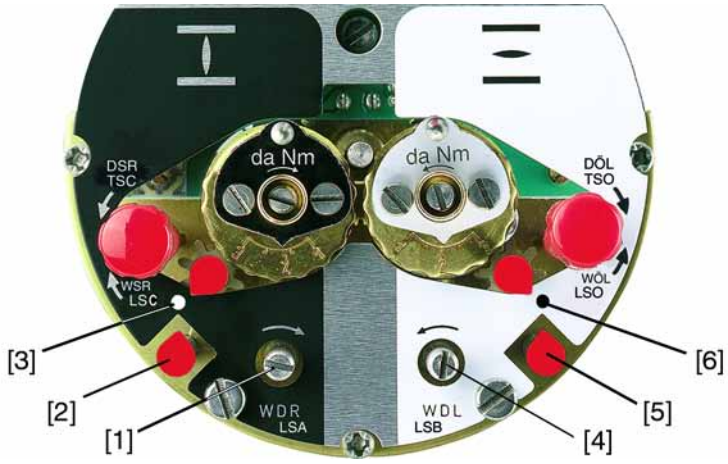
7. If you override the tripping point inadvertently (ratchet click is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

9.6 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 28: 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

9.6.1 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.

9.6.2 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.

9.7 Test run

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

9.7.1 Direction of rotation: check

NOTICE

Valve damage due to incorrect direction of rotation!

→ If the direction of rotation is wrong, switch off immediately.

→ Correct phase sequence.

→ Repeat test run.

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**.

9.7.2 Limit switching: check

1. Move actuator manually into both end positions of the valve.

➥ The limit switching is set correctly if:

- LSC switch trips in end position CLOSED
- LSO switch trips in end position OPEN
- the switches release the contacts after turning back the handwheel

2. If the end position setting is incorrect: Reset limit switching.
3. If the end position setting is correct and no options (e.g. potentiometer, position transmitter) are available: Close switch compartment.

9.8 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 30: 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).

9.9 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 5: Technical data RWG 4020

Wiring		**3- or 4-wire system**	**2-wire system**
Terminal plan	TPA	9th position = E or H	9th position = C, D or G
Output current	I_A	0 – 20 mA, 4 – 20 mA	4 – 20 mA
Power supply	U_V	24 V DC, ±15 % smoothed	14 V DC +(I x R_B), max. 30 V
Max. current consumption	I	24 mA at 20 mA output current	20 mA
Max. load	R_B	600 Ω	(U_V – 14 V) /20 mA

Figure 31: 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]. If no value can be measured:
   3.1 Check, whether external load is connected to customer connection XK (terminals 23/24) (observe max. load R_B), or
   3.2 Connect terminals 23/24 across customer connection XK (terminals 23/24).
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.

9.10 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.

9.11 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.

9.12 Operating time: set

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

Table 6: 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 35: 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 7: 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).
Position transmitter RWG No value can be measured at measuring points.	Current loop via RWG is open. (Position feedback 0/4 – 20 mA only functions if the current loop is closed across the RWG.)	Connect terminals 23/24 to XK across RWG. Connect external load to XK, e.g. remote indication. Consider maximum load R_B.
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 Motor protection (thermal monitoring)

In order to protect against overheating and impermissibly high temperatures at the actuator, PTC thermistors or thermoswitches are embedded in the motor winding. They trip as soon as the max. permissible winding temperature has been reached.

Behaviour during failure

If the signals are correctly wired within the controls, the actuator is stopped and can only resume its operation once the motor has cooled down.

Possible causes

Overload, running time exceeded, max. number of starts exceeded, ambient temperature is too high.

Remedy

Check cause, eliminate if possible.

11. Servicing and maintenance

⚠ CAUTION

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 IP68

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.

⚠ WARNING

Flameproof enclosure, danger of explosion!

Risk of death or serious injury.

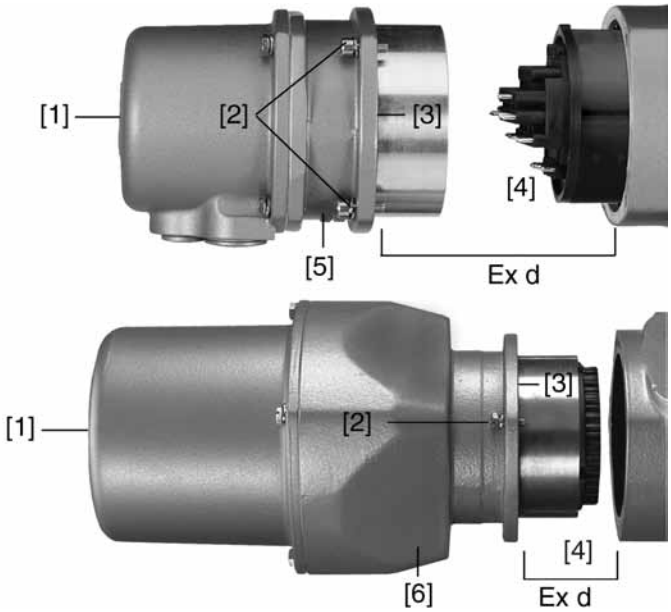
→ Before opening, ensure that there is no explosive gas and no voltage.

→ Handle cover and housing parts with care.

→ Joint surfaces must not be damaged or soiled in any way.

→ Do not jam cover during fitting.

Figure 37: 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: • 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	• Ex **d** flameproof enclosure: - Motor compartment - Switch compartment - Terminal compartment (for electrical connection: KES-Exd) • Ex **e** increased safety: - Terminal compartment (for electrical connections: KP, KPH, KES) • **c** constructional safety: - 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)[2)] Option: Thermoswitches (NC)[3)]
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: • Single switches (1 NC and 1 NO; not galvanically isolated) for each end position Options: • 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: Self-regulating PTC heater, 5 – 20 W, 110 – 250 V AC/DC Option: 24 – 48 V AC/DC or 380 – 400 V AC
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
Electrical connection	Standard: Plug/socket connector with screw-type terminals (KP, KPH)
Threads for cable entries	Standard: Metric threads Options: Pg-threads, NPT-threads, G-threads
Terminal plan	Terminal plan according to commission number attached with delivery
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.
2) PTC thermistors require additionally a suitable tripping device in the controls
3) According to EN 60079-14, a thermal overcurrent protection device (e.g. motor protection switch) must be installed for explosion-proof actuators in addition to the thermoswitches.

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 Service conditions

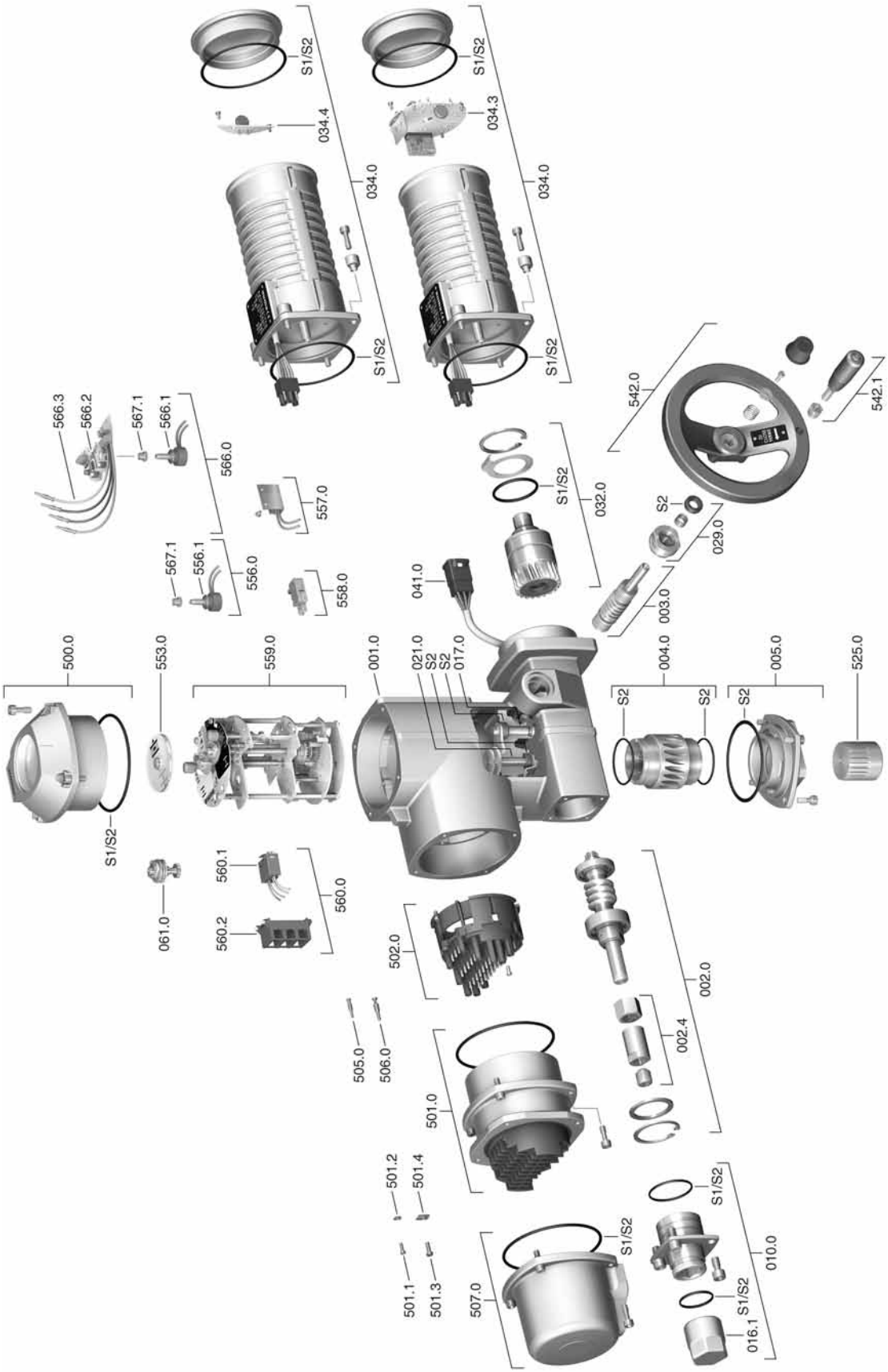
Mounting position	Any position
Use	Approved for indoor and outdoor installation
Enclosure protection according to EN 60529	Refer to name plate Standard: • IP67 Options: • IP68 According to AUMA definition, enclosure protection IP68 meets the following requirements: • Water depth: Maximum 6 m head of 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 (IP67 and IP68) 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: • KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration • KX-G: same as KX, however aluminium-free version (outer parts)
Installation altitude	Standard: ≤ 2 000 m above sea level Option: > 2 000 m above sea level, please contact AUMA
Finish coating	Standard: Two-component iron-mica coating
Colour	Standard: AUMA silver-grey (similar to RAL 7037)
Ambient temperature	Refer to name plate Standard: • –40 °C to +40 °C Options: • –50 °C to +40 °C • –60 °C to +60 °C
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

12.3 Further information

EU Directives	• ATEX Directive: (94/9/EC) • Electromagnetic Compatibility (EMC): (2004/108/EC) • Low Voltage Directive: (2006/95/EC) • Machinery Directive: (2006/42/EC)

13. Spare parts

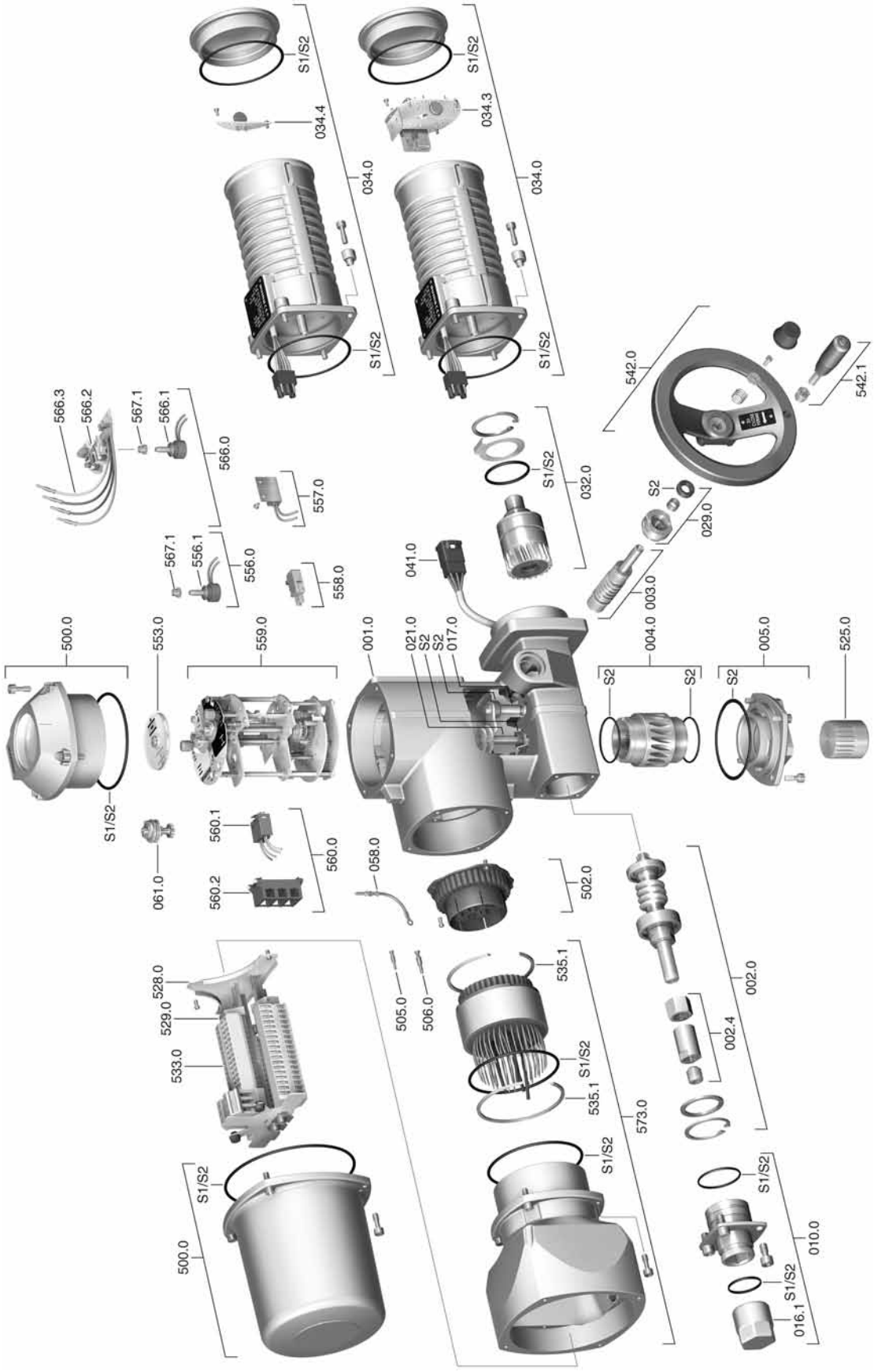
13.1 Part-turn actuators SGExC 05.1 – SGExC 12.1 via plug/socket connector with screw-type terminals (KP, KPH)



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

No.	Designation	Type
001.0	Housing	Sub-assembly
002.0	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 Part-turn actuators SGExC 05.1 – SGExC 12.1 via plug/socket connector with terminal blocks (KES)



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

No.	Designation	Type
001.0	Housing	Sub-assembly
002.0	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
058.0	Wire for protective earth	Sub-assembly
061.0	Torque switching head	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
525.0	Coupling	
528.0	Terminal frame (without terminals)	Sub-assembly
529.0	End piece	Sub-assembly
533.0	Terminals for motor/controls	Sub-assembly
535.1	Circlip	
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
573.0	Plug-in electrical connection	Sub-assembly
S1	Seal kit, small	Set
S2	Seal kit, large	Set

14. Certificates

14.1 Declaration of Incorporation and EC Declaration of Conformity

AUMA Riester GmbH & Co. KG
Aumastr. 1
79379 Müllheim, Germany
www.auma.com

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Fax +49 7631 809-1250
Riester@auma.com

auma®
Solutions for a world in motion

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 Muellheim

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: 2009	EN 60079-15: 2005	EN 13463-5: 2011
EN 60079-1: 2007	EN 60079-27: 2008	EN 1127-1: 2011
EN 60079-7: 2007	EN 60079-31: 2009	
EN 60079-11: 2007	EN 13463-1: 2009	

The EC type examination certificate PTB 01 ATEX 1119 issued by the Physikalisch Technische Bundesanstalt and the EC type examination certificate KEMA 08ATEX0108 X issued by the DEKRA Certification B.V. are available for the part-turn actuators mentioned above.

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

EN 61000-6-4: 2007 + A1: 2011
EN 61000-6-2: 2005
EN 61800-3: 2004 + A1: 2011

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

EN 60204-1: 2006	EN 60034-1: 2010
EN 50178: 1997	EN 61010-1: 2001

Muellheim, 2013-04-01

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

CERTIFICATE

EC-Type Examination

(1)

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

(3) EC-Type Examination Certificate Number: **KEMA 08ATEX0108 X** Issue Number: **3**

(4) Equipment: **Part-turn actuator, types SGExC 05.1 to SGExC 12.1 versions AUMA NORM, AUMA SEMIPACT, AUMA MATIC and AUMATIC.**

(5) Manufacturer: **Auma Riester GmbH & Co. KG**

(6) Address: **Aumastrasse 1, 79379 Müllheim, Germany**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) DEKRA Certification B.V., notified body number 0344 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 confidential test report number NL/KEM/ExTR09.0040/xx.

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

EN 60079-0 : 2009 **EN 60079-1 : 2007** **EN 60079-7 : 2007** **EN 60079-11 : 2007**
EN 60079-15 : 2005 **EN 60079-27 : 2006/2008** **EN 60079-31 : 2009**

(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 according 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	Ex d ... T4 or T3 Gb	) refer to (15) of the schedule
II 2(3) G	Ex d ... [... Gc] T4 or T3 Gb	) to this certificate
II 2 D	Ex tb IIIC T130°C or T190°C Db IP6x	

This certificate is issued on 22 March 2012 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

DEKRA Certification B.V.

C.G. van Es
Certification Manager

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All testing, inspection, auditing and certification activities of the former KEMA Quality are an integral part of the DEKRA Certification Group

DEKRA Certification B.V. Utrechtseweg 310, 6812 AR Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands
T +31 26 3 56 20 00 F +31 26 3 52 58 00 www.dekra-certification.com Registered Arnhem 09085396

DEKRA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 08ATEX0108 X** Issue No. **3**

(15) **Description**

The Part-turn actuators, types SGExC 05.1 to SGExC 12.1 version AUMA NORM comprise a motor, a switch mechanism compartment and a terminal compartment. Versions AUMA SEMIPACT, AUMA MATIC and AUMATIC comprise a motor, a switch mechanism compartment, integral controls and a terminal compartment.

The motor is in type of protection Ex d. In order to guarantee the temperature class, the motor is equipped either with thermo switches and a thermal overload relay or with three PTC's integrated in each winding and a suitable electronic device for switching off in case of over temperature.

The switch mechanism compartment is in type of protection Ex d and may optionally also be provided with the position transmitter type RWG5020.2Ex in type of protection Ex ib.

Terminal compartment type KES-Exd is in type of protection Ex d. Terminal compartments types KP, KPH and KES are in type of protection Ex e.

The integral controls housing is in type of protection Ex d. The optional integral controls type AUMATIC may optionally be provided with a FNICO Fieldbus interface in type of protection Ex nL and/or a FISCO Fieldbus interface in type of protection Ex ic.

All Part-turn actuators are in type of protection Ex tb for explosive dust atmospheres.

Thermal data

Ambient temperature range -20 °C to +60 °C.

The Part-turn actuators are classified for temperature class T4/T130 °C and may be classified for temperature class T3/T190 °C if required, for instance for prolonged running times.

Marking

The marking of the Part-turn actuator for use in explosive gas atmospheres includes the following:

Fieldbus interface	Terminal compartment	Position transmitter	Marking
--	KES-Exd	--	II 2 G Ex d IIC T4 or T3 Gb
		RWG5020.2Ex	II 2 G Ex d ib IIC T4 or T3 Gb
	KP, KPH and KES	--	II 2 G Ex d e IIC T4 or T3 Gb
		RWG5020.2Ex	II 2 G Ex d e ib IIC T4 or T3 Gb
FISCO	KES-Exd	--	II 2(3) G Ex d [ic Gc] IIC T4 or T3 Gb
		RWG5020.2Ex	II 2(3) G Ex d ib [ic Gc] IIC T4 or T3 Gb
	KP, KPH and KES	--	II 2(3) G Ex d e [ic Gc] IIC T4 or T3 Gb
		RWG5020.2Ex	II 2(3) G Ex d e ib [ic Gc] IIC T4 or T3 Gb
FNICO	KES-Exd	--	II 2(3) G Ex d [nL Gc] IIC T4 or T3 Gb
		RWG5020.2Ex	II 2(3) G Ex d ib [nL Gc] IIC T4 or T3 Gb
	KP, KPH and KES	--	II 2(3) G Ex d e [nL Gc] IIC T4 or T3 Gb
		RWG5020.2Ex	II 2(3) G Ex d e ib [nL Gc] IIC T4 or T3 Gb

DEKRA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 08ATEX0108 X** Issue No. **3**

Type designation

Part-turn actuator:

SG Ex C 05 . 1 - F05
I II III IV V VI

Designation	Explanation	Value	Explanation
I	General	SG	Part-turn actuator
II	Area classification	Ex	For use in explosive atmospheres
III	Equipment group	C	Group IIC / Group IIIC
IV	Actuator size	05 07 10 12	Indicator for standardized actuator sizes
V	Design series	1	Indicator for design series
VI	Flange size	F**	Indicator for standardized flange sizes

Optional integral controls:

AM Ex C 01 . 1
I II III IV V

Designation	Explanation	Value	Explanation
I	Controls indicator	AM AMB SEM AC	AUMA MATIC AUMA MATIC Basic AUMA SEMIPACT AUMATIC
II	Area classification	Ex	For use in explosive atmospheres
III	Equipment group	C	Group IIC / Group IIIC
IV	Size	01	Indicator for standardized actuator sizes
V	Design series	1 2	Design series 1 Design series 2, ACExC controls only

Versions without optional controls are called AUMA NORM.

DEKRA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 08ATEX0108 X** Issue No. **3**

Electrical data

Motor type: DC shunt motor, collector motor
Motor voltage: 24 – 240 V DC
Nominal power: 70 – 140 W
Operation type: S2

Motor type: 3 – phase AC asynchronous motor
Motor voltage: 200 – 690 V
Nominal Power: 30 – 120 W
Frequency: 50/60 Hz
Circuit type: star or delta circuit (voltage dependent)
Operation type: S2

Motor type: 1- phase AC collectormotor
Motor voltage: 110 – 120 V/ 220 – 240 V
Nominal Power: 75 – 150 W
Frequency: 50/60 Hz
Circuit type: star or delta circuit (voltage dependent)
Operation type: S2

Position Transmitter 4..20 mA RWG5020.2Ex:
in type of protection intrinsic safety Ex ib IIC, only for connection to a certified intrinsically safe circuit, with the following maximum values:
U_i = 28,5 V; I_i = 200 mA; P_i = 0,9 W; C_i and L_i are negligible.
From a safety point of view the circuit is considered to be connected to earth.

Fieldbus interface:
in type of protection energy limitation Ex nL IIC in accordance with FNICO and intrinsic safety Ex ic IIC in accordance with FISCO.

Installation instructions

The instructions provided with the equipment shall be followed in detail to assure safe operation.

(16) **Test Report**

No. NL/KEM/ExTR09.0040/xx.

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

For information regarding the dimensions of the flameproof joints the manufacturer shall be contacted.

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. NL/KEM/ExTR09.0040/xx.

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W

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