



Part-turn actuators

SQEx 05.2 – SQEx 14.2

SQREx 05.2 – SQREx 14.2

with actuator controls

AUMA MATIC BASIC AMBExC 01.1



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.

Reference documents:

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
- Continuous submersion (observe enclosure protection)
- Potentially explosive areas of zones 0 and 20
- Potentially explosive areas of group I (mining)
- Radiation exposed areas in nuclear power plants

No liability can be assumed for inappropriate or unintended use.

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

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

1.3. Warnings and notes

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



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



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



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



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

Arrangement and typographic structure of the warnings



Type of hazard and respective source!

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

- Measures to avoid the danger
- Further measure(s)

Safety alert symbol  warns of a potential personal injury hazard.
The signal word (here: DANGER) indicates the level of hazard.

1.4. References and symbols

The following references and symbols are used in these instructions:

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

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

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

< > **Reference to other sections**

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

2. Identification

2.1. Name plate

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

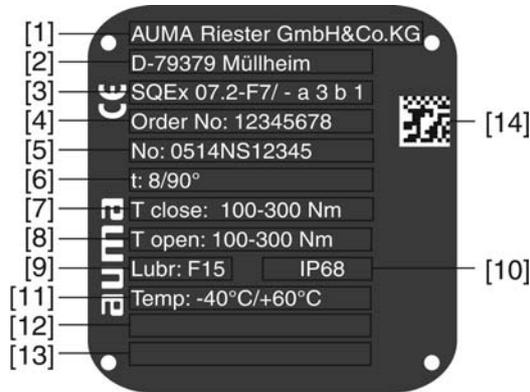
Figure 1: Arrangement of name plates



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

Description of actuator name plate

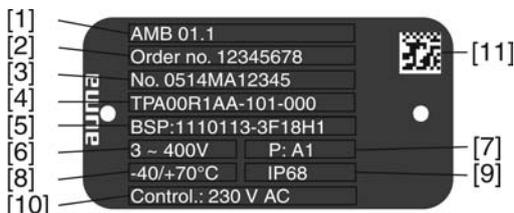
Figure 2: Actuator name plate (example)



- [1] Name of manufacturer
- [2] Address of manufacturer
- [3] **Type designation**
- [4] **Order number**
- [5] **Serial number**
- [6] Operating time in [s] for a part-turn movement of 90°
- [7] Torque range in direction CLOSE
- [8] Torque range in direction OPEN
- [9] Type of lubricant
- [10] Enclosure protection
- [11] Permissible ambient temperature
- [12] Can be assigned as an option upon customer request
- [13] Can be assigned as an option upon customer request
- [14] **Data Matrix code**

Description of actuator controls name plate

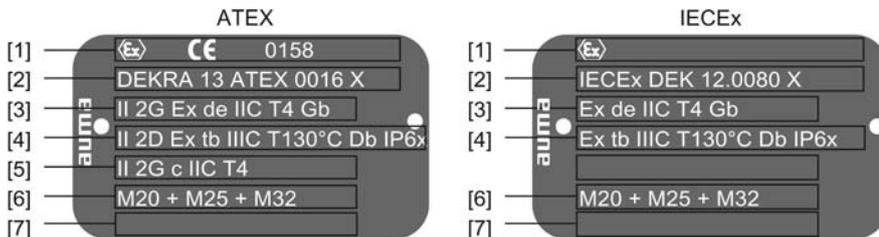
Figure 3: Actuator controls name plate



- [1] **Type designation**
- [2] **Order number**
- [3] **Serial number**
- [4] Actuator terminal plan
- [5] Actuator controls terminal plan
- [6] Mains voltage
- [7] **AUMA power class for switchgear**
- [8] Permissible ambient temperature
- [9] Enclosure protection
- [10] **Control**
- [11] **Data Matrix code**

Description of approval plate in explosion-proof version

Figure 4: Approval plates in explosion-proof version (examples)



- [1] Ex symbol, CE mark, number of test authority
- [2] Ex certificate (number)
- Classification:**
- [3] Electrical gas explosion protection
- [4] Electrical dust explosion protection
- [5] Non-electrical explosion protection
- [6] Threads for line bushings at electrical connection
- [7] Not used

Descriptions

Type designation Figure 5: Type designation (example)



- 1. Type and size of actuator
- 2. Flange size
- 3. Ex marking

Type and size

These instructions apply to the following devices types and sizes:

SQEx 05,2, 07.2, 10.2, 12.2, 14.2 = part-turn actuators for open-close duty

SQREx 05,2, 07.2, 10.2, 12.2, 14.2 = part-turn actuators for modulating duty

AMBExC 01.1/02.1 = AUMA MATIC BASIC actuator controls

Ex marking

Table 1: Marking for explosion protection (with example)

/	-	a	3	b	-	
1st position: Not used						
	-					
2nd position: Motor type						
		a	SDX or VDX: 3-phase AC motor			
3rd position: Protection type of electrical connection						
			3	Terminal compartment Ex e increased safety: Types: KP, KPH or KES		
			4	Terminal compartment Ex d flameproof enclosure: Type: KES-Exd		
4th position: Protection type of position transmitter						
			a	Without intrinsically safe electric circuit		
			b	Electric circuit Ex i Intrinsic safety: Type: Type: RGW 5020.2Ex		
5th position: Not used						

Order number The product can be identified using this number and the technical data as well as order-related data pertaining to the device can be compiled.

Please always state this number for any product inquiries.

On the Internet at <http://www.auma.com>, we offer a service allowing authorised users to download order-related documents such as wiring diagrams and technical data (both in German and English), inspection certificates and the operation instructions when entering the order number.

Actuator serial number

Table 2: Description of serial number (with example)

05	14	NS12345	
1st + 2nd position: Assembly in week			
05	Week 05		
3rd + 4th position: Year of manufacture			
	14	Year of manufacture: 2014	
All other positions			
		NS12345	Internal number for unambiguous product identification

AUMA power class for switchgear

The switchgear used in the actuator controls (reversing contactors/thyristors) are classified according to AUMA power classes (e.g. A1, B1,). The power class defines the max. permissible rated power (of the motor) the switchgear has been designed for. The rated power (nominal power) of the actuator motor is indicated in kW on the motor name plate. For the assignment of the AUMA power classes to the nominal power of the motor types, refer to the separate electrical data sheets.

For switchgear without assignment to any power classes, the actuator controls name plate does not indicate the power class but the max. rated power in kW.

Control

Table 3: Control examples (indications on controls name plate)

Input signal	Description
24 V DC	Control voltage 24 V DC for OPEN-CLOSE control via digital inputs (OPEN, STOP, CLOSE)
115 V AC	Control voltage 115 V AC for OPEN-CLOSE control via digital inputs (OPEN, STOP, CLOSE)
230 V AC	Control voltage 230 V AC OPEN-CLOSE control via digital inputs (OPEN, STOP, CLOSE)

Data Matrix code When registered as authorised user, you may use the **AUMA Support App** to scan the Data Matrix code and directly access the order-related product documents without having to enter order number or serial number.

Figure 6: Link to the App store:



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 AUMA MATIC actuator controls are used to operate AUMA actuators and are supplied ready for use. The controls can be mounted directly to the actuator but also separately on a wall bracket. The electro-mechanical version of the AUMA MATIC controls includes switchgear for control in OPEN - CLOSE duty and a logic for various indications via contacts
- Local controls** Operation (via push buttons), setting and indication can be performed directly at the controls (contents of these instructions).

3. Transport, storage and packaging

3.1. Transport

For transport to place of installation, use sturdy packaging.

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.

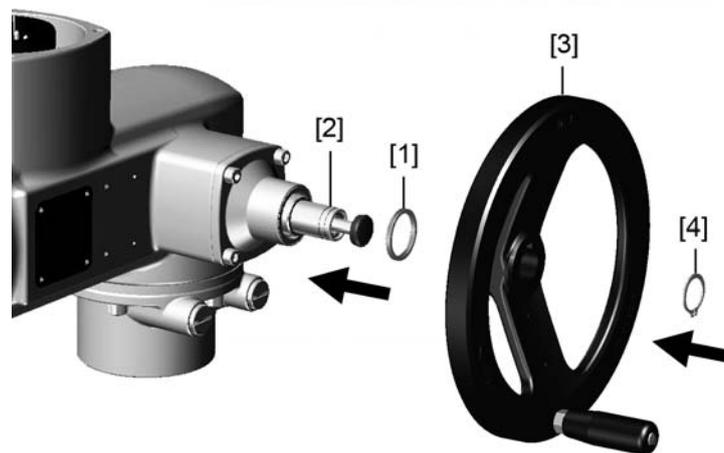
4. Assembly

4.1. Mounting position

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

4.2. Handwheel fitting

Figure 7: Handwheel



- [1] Spacer
- [2] Input shaft
- [3] Handwheel
- [4] Circlip

1. If required, fit spacer [1] onto input shaft [2].
2. Slip handwheel [3] onto input shaft.
3. Secure handwheel [3] using the circlip [4] supplied.

4.3. Actuator: mount to valve

NOTICE

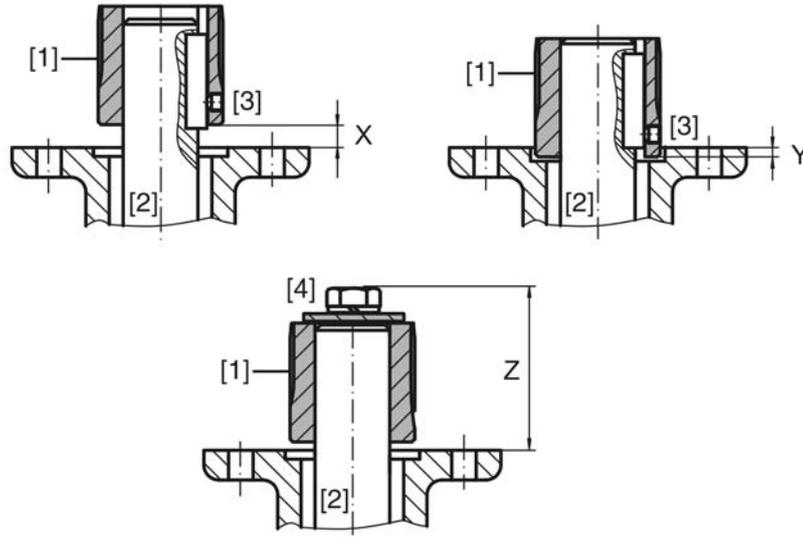
Danger of corrosion due to damage to paint finish and condensation!

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

The actuator is mounted to the valve using a coupling (standard) or via lever. Separate instructions are available for actuator mounting to the valve when equipped with base and lever.

4.3.1. Valve attachment via coupling

Dimensions Figure 8: Coupling fitting dimensions



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

Table 4: Coupling fitting dimensions

Type, size - output mounting flange	X max [mm]	Y max [mm]	Z max [mm]
SQEx/SQREx 05.2-F05/F07	3	2	40
SQEx/SQREx 07.2-F05/F07	3	2	40
SQEx/SQREx 07.2-F10	3	2	66
SQEx/SQREx 10.2-F10	4	5	50
SQEx/SQREx 10.2-F12	4	5	82
SQEx/SQREx 12.2-F12	5	10	61
SQEx/SQREx 12.2-F14	5	10	101
SQEx/SQREx 14.2-F14	8	10	75
SQEx/SQREx 14.2-F16	8	10	125

Assembly

Information: Mount valve and actuator in the same end position.

- For butterfly valves: Recommended mounting position is end position CLOSED.
- For ball valves: Recommended mounting position is end position OPEN.

1. Thoroughly degrease mounting faces of output mounting flanges.
2. Apply a small quantity of grease to the valve shaft [2].
3. Use handwheel to run actuator to mechanical end stop.
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 applying liquid thread sealing material to the screws to avoid contact corrosion.

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

Table 5: Tightening torques for screws

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

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 9: Mounting positions A and B



Figure 10: Mounting positions C and D



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.

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

Cable damage due to twisting or pinching!

Risk of functional failures.

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

5. Fasten screws evenly crosswise.

5. Electrical connection

5.1. Basic information



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 (both in German and English) is attached to the device in a weather-proof bag, together with these operation instructions. It can also be requested from AUMA (state order number, refer to name plate) or downloaded directly from the Internet (<http://www.auma.com>).

Protection on site

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

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

Table 6: Current consumption controls

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

Table 7: Maximum permissible protection

Switchgear	Rated power	Max. protection
Reversing contactor	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.

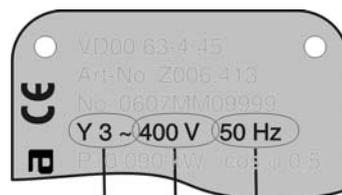
Power supply for the controls (electronics)

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

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 11: Motor name plate (example)



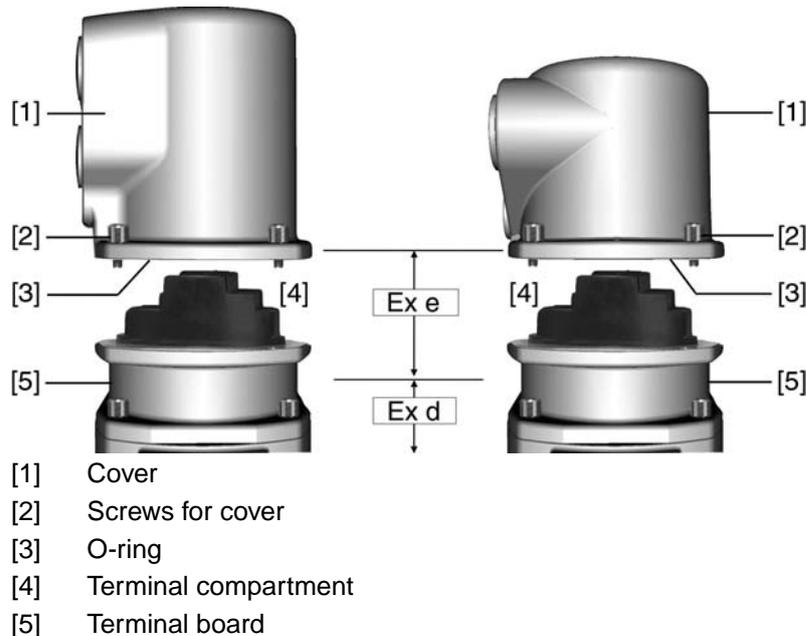
- [1] Type of current
- [2] Mains voltage
- [3] Mains frequency (for 3-ph and 1-ph AC motors)

- 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 Ex plug/socket connector with screw-type terminals (KP, KPH)

5.2.1. Terminal compartment: open

Figure 12: Ex plug/socket connector KPH, KP



Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
 - Terminal compartment [4] is designed for explosion protection Ex e (increased safety). The flameproof compartment (type of protection Ex d) remains hereby closed.
2. Insert cable glands with Ex e approval and of size suitable for connection cables.
 - The enclosure protection IP... stated on the name plate is only ensured if suitable cable glands are used. Example: Name plate shows enclosure protection 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 8: Cross sections and tightening torques

Type	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 38)	0.75 – 1.5 mm ² (flexible or solid)	1 Nm

1) with small clamp washers

NOTICE

Danger of corrosion: Damage due to condensation!

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

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

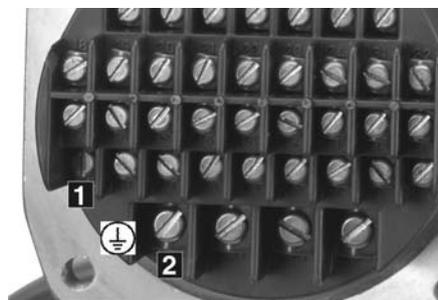
In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!

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 13: PE connection

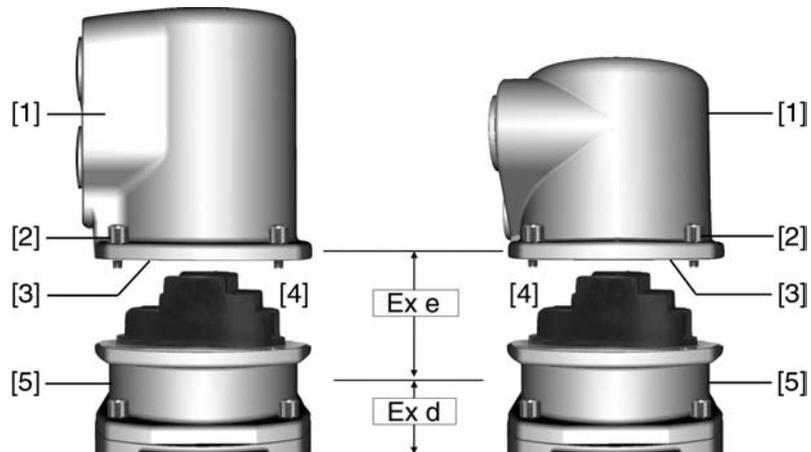


- [1] PE connection, control cable
- [2] PE connection, motor cable

Information Some actuators are equipped with an additional motor heater. The motor heater minimises condensation in the motor.

5.2.3. Terminal compartment: close

Figure 14: Ex plug/socket connector KPH, KP



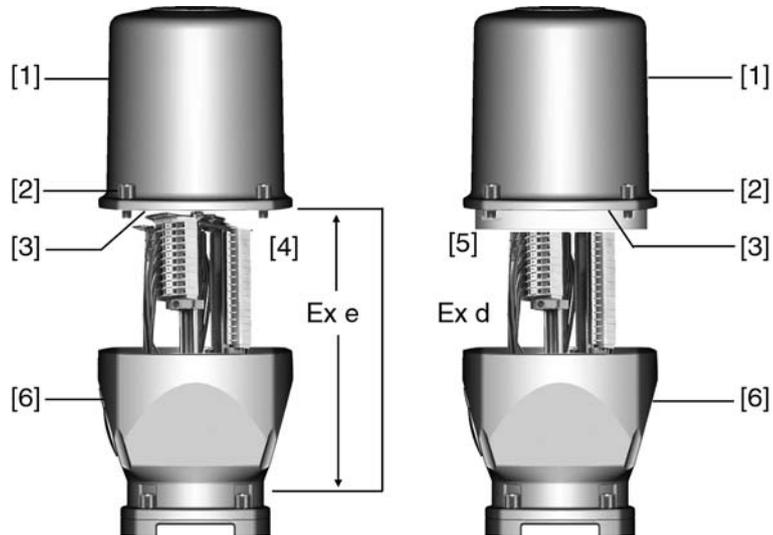
- [1] Cover
- [2] Screws for cover
- [3] O-ring
- [4] Terminal compartment
- [5] Terminal board

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 Ex plug/socket connector with terminal blocks (KES)

5.3.1. Terminal compartment: open

Figure 15: Ex 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

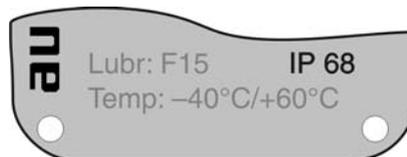


Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
 - ➔ Terminal compartments [4] and [5] 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 9: Cross sections and tightening torques

Type	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 max. 4 mm ² (solid)	0.6 – 0.8 Nm

NOTICE

Danger of corrosion: Damage due to condensation!

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

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

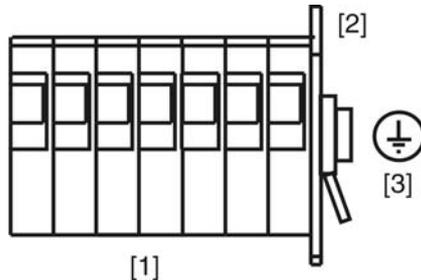
WARNING

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 16: PE connection

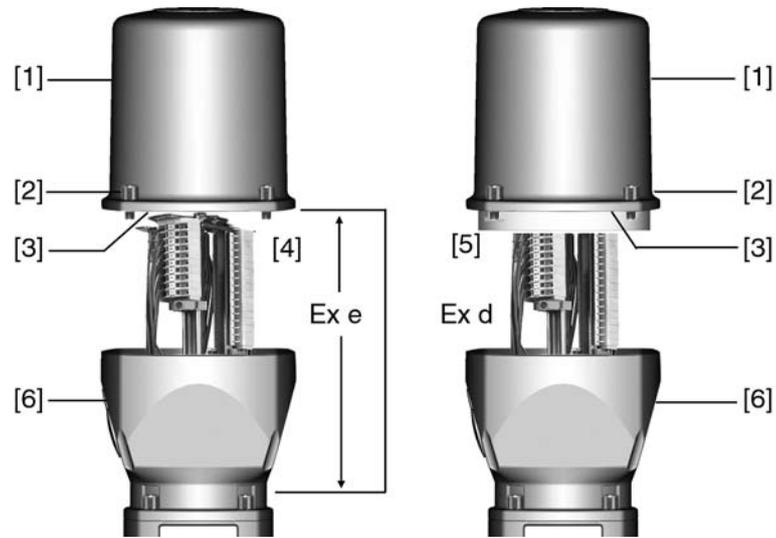


- [1] Terminal blocks
- [2] Terminal housing
- [3] PE connection, symbol: ⊕

Information Some actuators are equipped with an additional motor heater. The motor heater minimises condensation in the motor.

5.3.3. Terminal compartment: close

Figure 17: Ex 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. Ex 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

5.4.1. Parking frame

— Option —

Application

Parking frame for safe storage of a disconnected plug.
 For protection against touching the bare contacts and against environmental influences.

Figure 18: Parking frame and Ex plug/socket connector with screw-type terminals (KP/KPH)

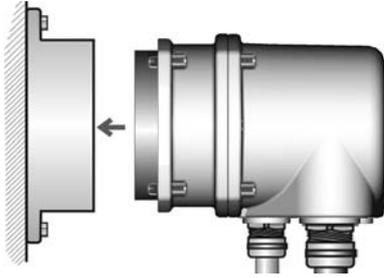
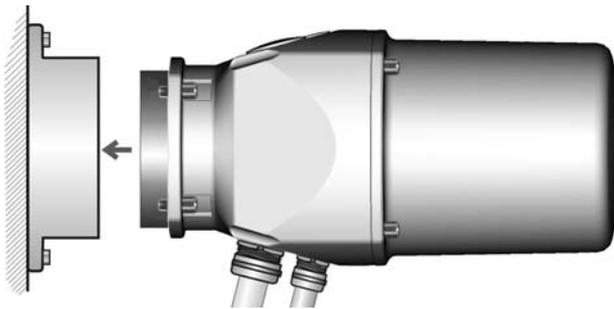


Figure 19: Parking frame and Ex plug/socket connector with terminal blocks (KES)



5.4.2. Protection cover

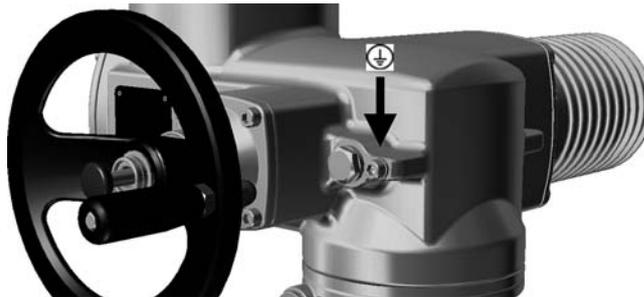
— Option —

Application Protection cover for plug compartment when plug is removed.
The open terminal compartment can be closed using a protective cover (not illustrated).

5.4.3. External earth connection

Application External earth connection (terminal clamp) for connection to equipotential compensation.

Figure 20: Earth connection



Cross sections of earth connection:

- 2 x 2.5 mm² to 6 mm² (solid and stranded conductors) or
- 2 x 1.5 mm² to 4 mm² (fine stranded conductors)

6. Operation

6.1. Manual operation

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

6.1.1. Manual operation: engage

NOTICE

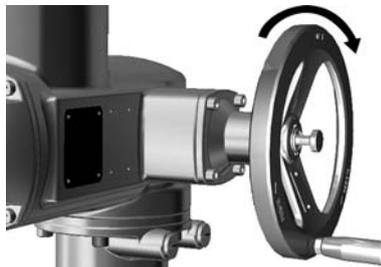
Damage at the motor coupling due to faulty operation!

→ Engage manual operation only during motor standstill.

1. Press push button.



2. Turn handwheel in desired direction.
→ To close the valve, turn handwheel clockwise:
➔ Drive shaft (valve) turns clockwise in direction CLOSE.



6.1.2. Manual operation: disengage

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

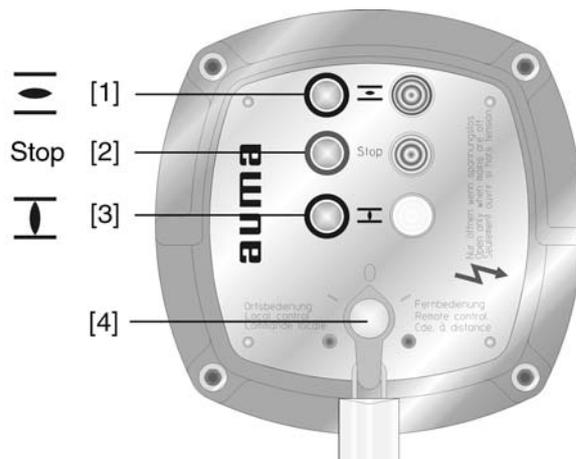
6.2. Motor operation

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

6.2.1. Local operation

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

Figure 21: Local controls



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



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

Danger of burns

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

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



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

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

6.2.2. Actuator operation from remote

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

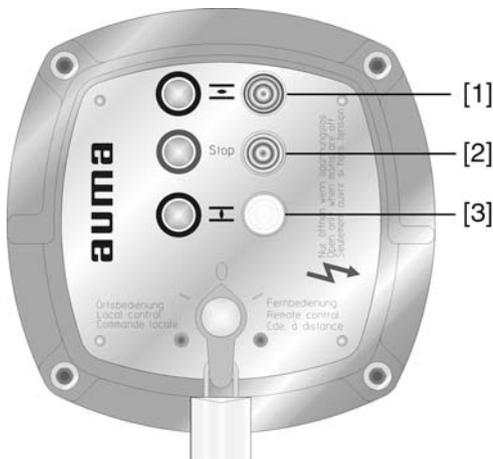


- Now, it is possible to operate the actuator via remote control, via operation commands (OPEN, STOP, CLOSE).

7. Indications

7.1. Indication lights

Figure 22: Local controls with indication lights



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

Fault signal (option) The fault signal (red indication light) indicates the following events:

- Torque fault: The set torque was exceeded before reaching an end position.
- Thermal fault: Motor protection has tripped, i.e. the motor is overheated.

7.2. 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 23: 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 (binary)

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 wiring diagram
End position OPEN/CLOSED reached	Signalling via limit switches (NO), non potential-free Value of the output signal depends on control voltage (refer to wiring diagram)
	LSC Limit switch, closing, clockwise rotation
	LSO Limit switch, opening, counterclockwise rotation
	Option: Tandem switch with additional potential-free contacts LSC1 and LSO1
Intermediate position reached (option)	Potential-free signal via switches (NC/NO) Condition: DUO limit switching in the actuator
	LSA DUO limit switch, clockwise rotation
	LSB DUO limit switch, counterclockwise rotation
Torque o.k./ Torque fault	Potential-free signal via contacts, terminals XK 15 and XK 16 Condition: Relay board A5 within the controls Output contact XK 15 closed = no torque fault Output contact XK 16 = torque fault, i.e. the set torque was exceeded before reaching an end position.
Torque OPEN/CLOSED reached (option)	Potential-free signal via switches (NC/NO) Condition: Torque switch in tandem arrangement with TSC/TSO
	TSC1 Torque switch, closing, clockwise rotation
	TSO 1 Torque switch, opening, counterclockwise rotation
Motor protection tripped (option)	Potential-free signal via contacts, terminal XK 13 Condition: Relay board A5 within the controls Thermoswitch tripped (NO contact) = Output contact closed
	F1, Th Thermoswitches
	F7 Thermal overload relay
Selector switch position (option)	Potential-free signal via switches (2 x NC) Condition: Selector switch with 2 levels indicates selector switch position LOCAL/REMOTE
Running indication (option)	Potential-free signal via switch (NC) Contact opens and closes (blinks) during an actuator operation
	S5, BL Blinker transmitter

8.2. Feedback signals (analogue)

Feedback signal	Type and designation in wiring diagram
Valve position (option)	Depending on version either with potentiometer or electronic position transmitter EWG/RWG
	R2 Potentiometer
	R2/2 Potentiometer in tandem arrangement (option)
	B1/B2, EWG/RWG 3-wire or 4-wire system (0/4– 20 mA)
	B3/B4, EWG/RWG 2-wire system (4 – 20 mA)

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 should be set by suitably qualified personnel only.
- Never completely remove the setting screws [2] and [4] to avoid grease leakage.
- Observe dimension T_{\min} .

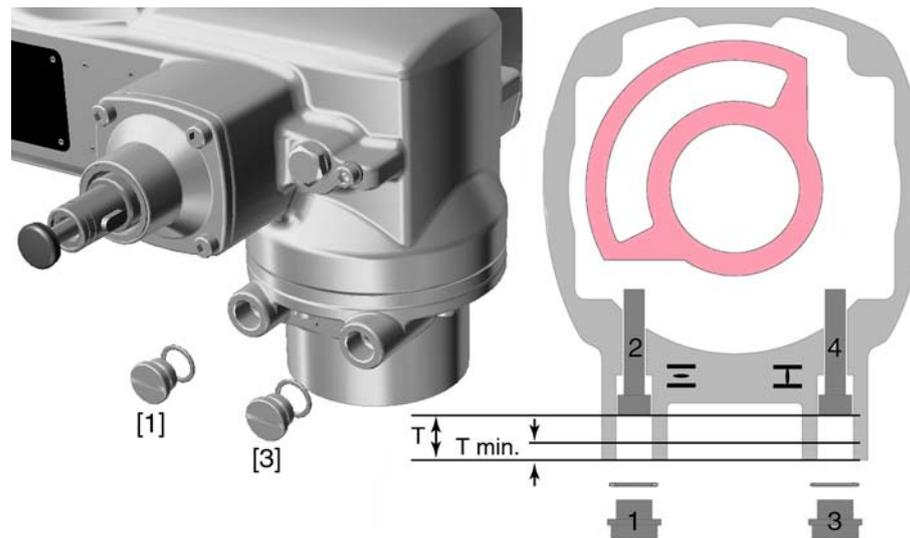
Information

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



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

Figure 24: End stop



- [1] Screw plug for end stop OPEN
- [2] Setting screw for end stop OPEN
- [3] Screw plug for end stop CLOSED
- [4] Setting screw for end stop CLOSED

Dimensions/sizes	05.2	07.2	10.2	12.2	14.2
T (for 90°)	17	17	20	23	23
T _{min.}	11	11	12	13	12

9.1.1. End stop CLOSED: set

1. Remove screw plug [3].
2. Move valve to end position CLOSED with handwheel.
3. If the valve end position is not reached:
 - Slightly turn setting screw [4] counterclockwise until valve end position CLOSED can be safely set.
 - ➔ Turning the setting screw [4] clockwise results in a smaller swing angle.
 - ➔ Turning the setting screw [4] counterclockwise results in a larger swing angle.



4. Turn setting screw [4] clockwise to the stop.
 - ➔ This completes the setting of end stop CLOSED.
5. Check O-ring in screw plug and replace if damaged.
6. Fasten and tighten screw plug [3].

Having completed this procedure, the end position detection CLOSED can be set immediately.

9.1.2. End stop OPEN: set

Information In general, the end stop OPEN does not have to be set.

1. Remove screw plug [1].
2. Move valve to end position OPEN with handwheel.

3. If the valve end position is not reached:
 - Slightly turn setting screw [2] counterclockwise until valve end position OPEN can be safely set.
 - ➔ Turning the setting screw [2] clockwise results in a smaller swing angle.
 - ➔ Turning the setting screw [2] counterclockwise results in a larger swing angle.



4. Turn setting screw [2] clockwise to the stop.
 - ➔ This completes the setting of end stop OPEN.
5. Check O-ring in screw plug and replace if damaged.
6. Fasten and tighten screw plug [1].

Having completed this procedure, the end position detection OPEN can be set immediately.

9.2. Switch compartment: open

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

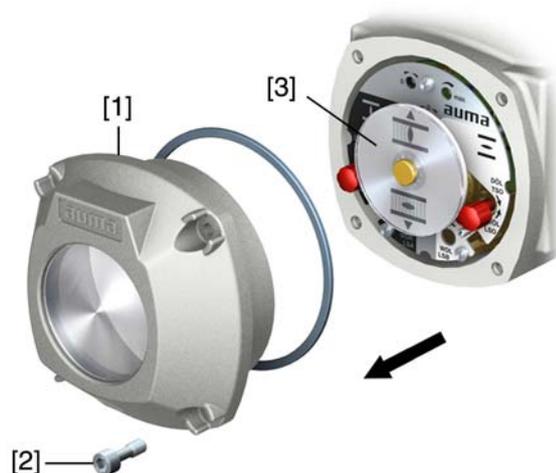


Flameproof enclosure, danger of explosion!

Risk of death or serious injury.

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

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



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.



9.3. Torque switching: set

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

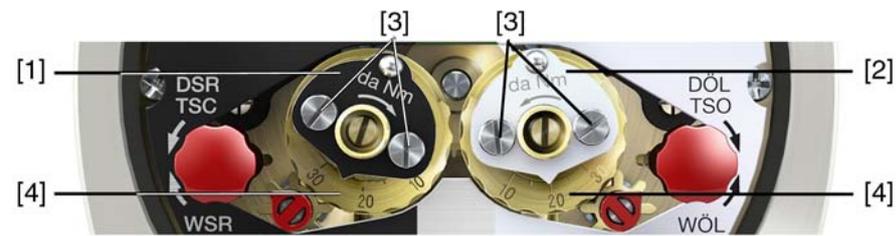
Information The torque switches may also trip during manual operation.

NOTICE

Valve damage due to excessive tripping torque limit setting!

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

Figure 25: Torque measuring 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). Example:
 - Black torque switching head set to approx. 25 da Nm $\hat{=}$ 250 Nm for direction CLOSE
 - White torque switching head set to approx. 20 da Nm $\hat{=}$ 200 Nm for direction OPEN
3. Fasten lock screws [3] again.

Information: Maximum tightening torque: 0.3 – 0.4 Nm

- ➔ The torque switch setting is complete.

9.4. Limit switching: set

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

Figure 26: Setting elements for limit switching



Black section:

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

White section:

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

9.4.1. End position CLOSED (black section): set

1. Engage manual operation.
2. Turn handwheel clockwise until valve is closed.
3. **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 end position CLOSED setting 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.

9.4.2. End position OPEN (white section): set

1. Engage manual operation.
2. Turn handwheel counterclockwise until valve is open.
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 end position OPEN setting is complete.
6. If you override the tripping point inadvertently (ratchet click is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

9.5. 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 27: 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

9.5.1. Running direction CLOSE (black section): set

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

9.5.2. Running direction OPEN (white section): set

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

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

9.6. Test run

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

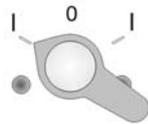
9.6.1. Direction of rotation: check

NOTICE

Valve damage due to incorrect direction of rotation!

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

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



3. Switch on actuator in 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 counterclockwise**.



9.6.2. Limit switching: check

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



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

9.7. Electronic position transmitter EWG 01.1

— Option —

The electronic position transmitter EWG 01.1 signals the remote position or the valve position. On the basis of the actual valve position sensed by hall sensor, a current signal between 0 – 20 mA or 4 – 20 mA is generated.

Technical data

Table 10: EWG 01.1

Data	3-wire or 4-wire system	2-wire system
Output current I_a	0 – 20 mA, 4 – 20 mA	4 – 20 mA
Power supply U_V ¹⁾	24 V DC (18 – 32 V)	24 V DC (18 – 32 V)
Max. current consumption	LED off = 26 mA, LED on = 27 mA	20 mA
Max. load R_B	600 Ω	$(U_V - 12 V)/20 \text{ mA}$
Impact of power supply		0.1 %
Load influence		0.1 %
Temperature impact		< 0.1 ‰/K
Ambient temperature ²⁾		-60 °C to +80 °C

- 1) Power supply possible via: AC, AM controls or external power supply
- 2) Depending on temperature range of the actuator: Refer to name plate

Setting elements

The EWG is housed in the actuator switch compartment. The switch compartment must be opened to perform any settings. Refer to <Switch compartment: open>.

All settings are made via the two push buttons [S1] and [S2].

Figure 28: View on control unit when switch compartment is open



- [S1] Push button: Set 0/4 mA
- [S2] Push button: Set 20 mA
- LED Optical aid for setting
- [1] Measuring point (+) 0/4 – 20 mA
- [2] Measuring point (-) 0/4 – 20 mA

The output current (measuring range 0 – 20 mA) can be checked at measuring points [1] and [2].

Table 11: Short overview on push button functions

Push buttons	Function
[S1] + [S2]	→ press simultaneously for 5 s: Activate setting mode
[S1]	→ press in setting mode for 3 s: Set 4 mA → press in setting mode for 6 s: Set 0 mA → press in operation for 3 s: Switch on/off LED end position signalling. → touch in end position: Reduce current value by 0.02 mA
[S2]	→ press in setting mode for 3 s: Set 20 mA → press in operation for 3 s: Switch on/off LED end position signalling. → touch in end position: Increase current value by 0.02 mA

9.7.1. Measuring range: set

For measuring range setting, voltage must be applied at the position transmitter.

- Information**
- Both measuring ranges 0/4 – 20 mA and 20 – 0/4 mA (inverse operation) can be set. During setting process, the measuring range (normal or inverse operation) is assigned to the end positions by push button S1/S2 assignment.
 - Setting mode activating clears the setting in both end positions and sets the output current to a value of 3.5 mA. After activation, both end values (0/4 mA and 20 mA) need to be reset.
 - In case of inadvertent incorrect adjustment, the settings can always be reset by renewed activation of the setting mode (simultaneous pressing of [S1] and [S2]).

Activate setting mode 1. Press both push buttons [S1] and [S2] and hold down for 5 seconds:



➔ By pulsing double flashes, the LED indicates that the setting mode is correctly activated:



➔ For any other LED flash sequence (single/triple flashing): Refer to <Faults during commissioning>.

Set measuring range 2. Operate valve in one of the end positions (OPEN/CLOSED).

3. Set desired output current (0/4 mA or 20 mA):

- for **4 mA**: Hold down push button [S1] for approx. 3 seconds, until **LED is slowly blinking** .
- for **0 mA**: Hold down push button [S1] for approx. 6 seconds, until **LED is blinking fast** .
- for **20 mA**: Hold down push button [S2] for approx. 3 seconds, until **LED is illuminated** .

4. Operate valve into opposite end position.

➔ The value set in end position (0/4 mA or 20 mA) does not change during travel in setting mode.

5. Perform setting in the second end position following the same steps.

6. Approach both end positions again to check the setting.
 - If the measuring range cannot be set:
Refer to <Faults during commissioning>.
 - If the current values (0/4/20 mA) are incorrect:
Refer to <Current values: adjust>.
 - If the current value fluctuates (e.g. between 4.0 – 4.2 mA):
<LED end position signalling: switch on/off>.

9.7.2. Current values: adjust

The current values (0/4/20 mA) set in end positions can be adjusted at any time. Conventional values are e.g. 0.1 mA (instead of 0 mA) or 4.1 mA (instead of 4 mA).

Information If the current value fluctuates (e.g. between 4.0 – 4.2 mA), the <LED end position signalling> must be switched on for current adjustment.

- Operate valve in desired end position (OPEN/CLOSED).
 - Reduce current value: Press push button [S1]
(the current is reduced by 0.02 mA every time the push button is pressed)
 - Increase current value: Press push button [S2]
(the current is increased by 0.02 mA every time the push button is pressed)

9.7.3. LED end position signalling: switch on/off

The LED behaviour for end position reached can be set as follows: blinking/continuous illumination or no illumination. During setting mode, end positions signalling is switched on.

- Switching on and off**
1. Operate valve in one of the end positions (OPEN/CLOSED).
 2. Hold down push buttons [S1] or [S2] for approx. 3 seconds.
- ➡ End position signalling is switched on or off.

Table 12: LED behaviour when end position signalling is switched on

Set output current	LED behaviour in end position
4 mA	 LED is blinking slowly
0 mA	 LED is blinking fast
20 mA	 LED is illuminated

9.8. Potentiometer

— Option —

The potentiometer is used as travel sensor and records the valve position.

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

Setting elements The potentiometer is housed in the actuator switch compartment. The switch compartment must be opened to perform any settings. Refer to <Switch compartment: open>.

Setting is made via potentiometer [1].

Figure 29: View on control unit



[1] Potentiometer

9.8.1. Potentiometer setting

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

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

9.9. Electronic position transmitter RWG

— 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.

Technical data

Table 13: RWG 4020

Data	3-wire or 4-wire system	2-wire system
Output current I_a	0 – 20 mA, 4 – 20 mA	4 – 20 mA
Power supply U_V ¹⁾	24 V DC (18 – 32 V)	14 V DC + $(I \times R_B)$, max. 30 V
Max. current consumption	24 mA at 20 mA output current	20 mA
Max. load R_B	600 Ω	$(U_V - 14 V)/20 \text{ mA}$
Impact of power supply	0.1 %/V	0.1 %/V
Load influence	0.1 %/(0 – 600 Ω)	0.1 %/100 Ω
Temperature impact	< 0.3 %/K	
Ambient temperature ²⁾	–60 °C to +80 °C	
Transmitter potentiometer	5 k Ω	

1) Power supply possible via: AC, AM controls or external power supply

2) Depending on temperature range of the actuator: Refer to name plate

Setting elements

The RWG is housed in the actuator switch compartment. The switch compartment must be opened to perform any settings. Refer to <Switch compartment: open>.

Setting is made via three potentiometers [1], [2] and [3].

Figure 30: View on control unit when switch compartment is open



- [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

The output current (measuring range 0 – 20 mA) can be checked at measuring points [4] and [5].

9.9.1. Measuring range: set

For measuring range setting, voltage must be applied at the position transmitter.

1. Move valve to end position CLOSED.
2. Connect measuring equipment for 0 – 20 mA to measuring points [4] and [5].
If no value can be measured:
 - Check whether external load is connected to customer connection XK (for standard wiring: terminals 23/24). Consider maximum load R_B .
 - Or connect link across customer connection XK (for standard wiring: terminals 23/24).
3. Turn potentiometer [1] clockwise to the stop.
4. Turn potentiometer [1] slightly in opposite direction.
5. Turn potentiometer [2] clockwise until output current starts to increase.
6. 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.
7. Move valve to end position OPEN.
8. Set potentiometer [3] to end value 20 mA.
9. 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

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.

10. Commissioning – controls settings

The controls are set in the factory according to the order. The settings only have to be changed if the device is used for applications other than those specified in the order.

The following settings are described in these operation instructions:

- Setting the type of seating (limit or torque seating)
- Setting push-to-run operation or self-retaining
- Feedback signals setting via output contacts (option)

10.1. Local controls: remove



Flameproof enclosure, danger of explosion!

Risk of death or serious injury.

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

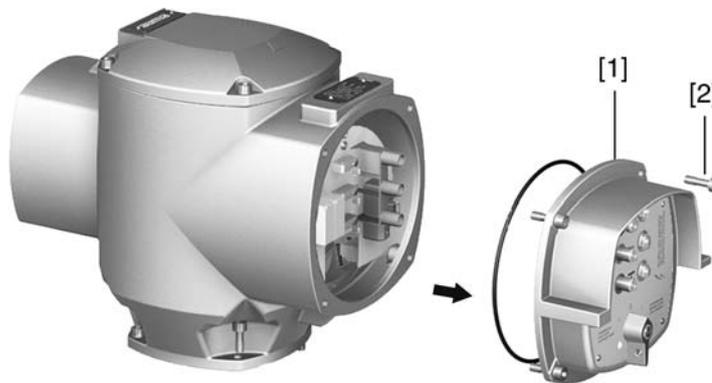
NOTICE

Electrostatic discharge ESD!

Risk of damage to electronic components.

- Earth both operators and devices.

- Loosen screws [2] and carefully remove local controls [1].



10.2. Type of seating: set

NOTICE

Valve damage due to incorrect setting!

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

The type of seating can be set via a toggle switch on the signal and control board.

Limit seating

The limit switching is set in such a way that the actuator switches off at the desired switching points. The torque switching acts as overload protection for the valve.

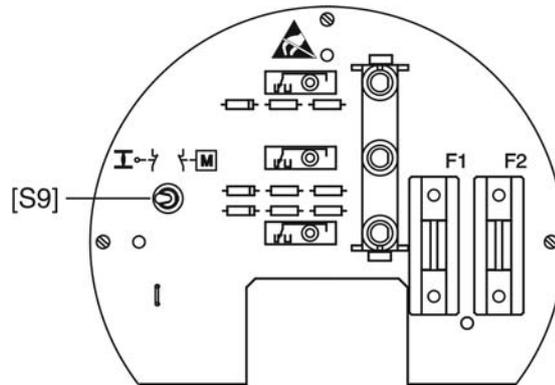
Torque seating

The torque switching is set to the desired tripping torque. After reaching the tripping torque, the actuator is turned off.

The limit switching is used for signalling and must be set to trip shortly **before** reaching the set tripping torque.

→ Set type of seating via toggle switch [S9].

Figure 31: Signal and control board



[S9] Toggle switch
 in position $\text{I} \circ \text{M}$ = limit seating
 in position M = torque seating

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

The operation behaviour for operation commands (OPEN, STOP, CLOSE) can be set separately via the push buttons on the local controls or for operation commands from Remote.

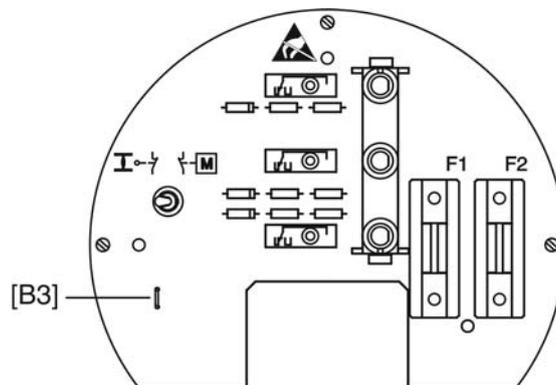
Push-to-run operation Actuator only runs in directions OPEN or CLOSE while an operation command is being received. The actuator stops if the operation command is cancelled.

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

10.3.1. Push-to-run operation or self-retaining for operation commands via push buttons

Push-to-run operation or self-retaining for operation commands is set in the factory and usually remains unchanged. Subsequent modification is however possible but by interrupting or soldering a link on the signal and control board.

Figure 32: Signal and control board



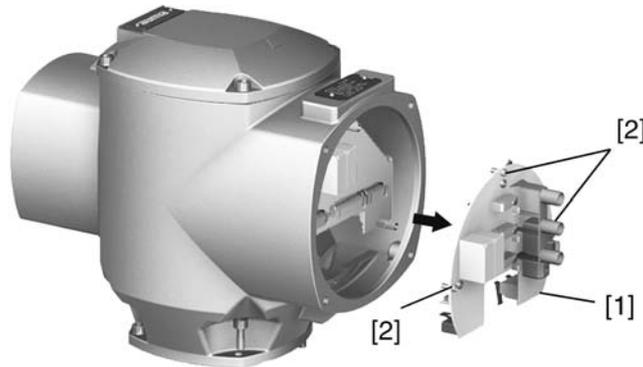
[B3] Soldering link closed = self-retaining LOCAL
 [B3] Soldering link interrupted = push-to-run operation LOCAL

10.3.2. Push-to-run operation or self-retaining for operation commands from Remote

The settings for push-to-run operation or self-retaining from Remote is made via a jumper on the wiring board.

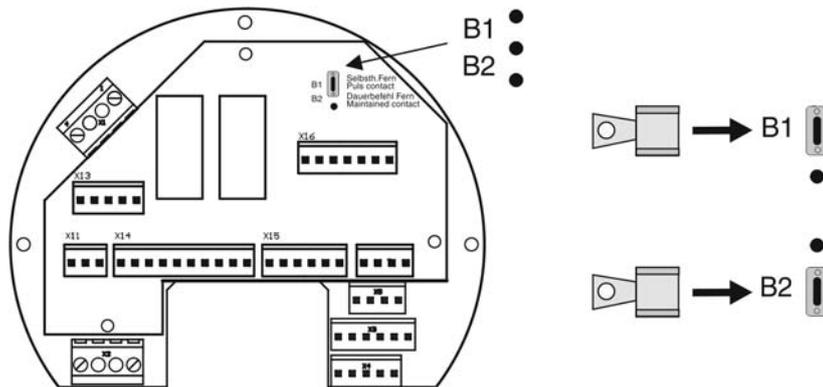
- Loosen all 3 screws [2] on the signal and control board [1] and remove board.
Information: Make sure not to disconnect the jumpers.

Figure 33: Remove signal and control board



- Set push-to-run operation or self-retaining via red jumper on wiring board.
 → Link via B1 = self-retaining REMOTE
 → Link via B2 = push-to-run operation REMOTE (continuous signal REMOTE)

Figure 34: Wiring board

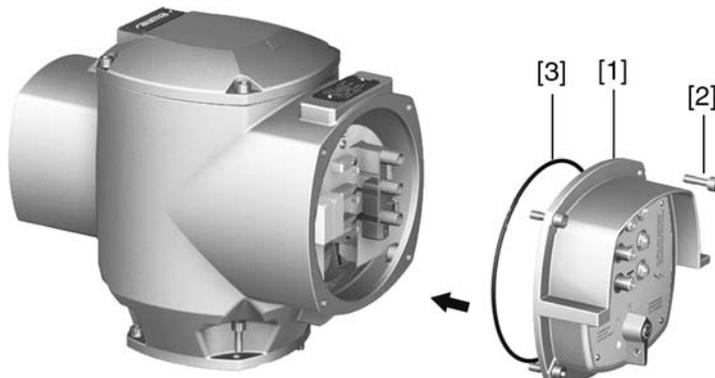


- Fasten signal and control board [2] again.

10.4. Local controls: mount

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

Figure 35:



- Fit local controls [1].

NOTICE

Cable damage due to twisting or pinching!

Risk of functional failures.

→ Carefully mount local controls.

6. Fasten screws evenly crosswise.

10.5. Controls: open

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.

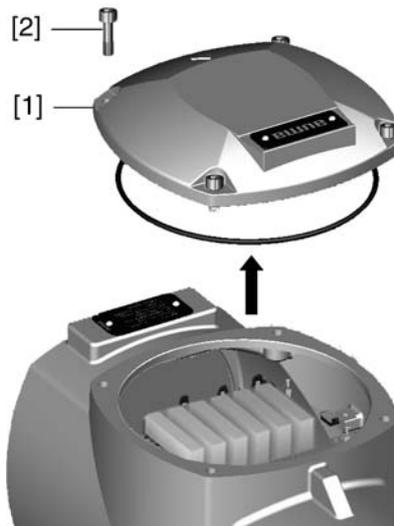
NOTICE

Electrostatic discharge ESD!

Risk of damage to electronic components.

→ Earth both operators and devices.

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



10.6. Feedback signals setting via output contacts

— (Option) —

Only valid for versions (B02 and B04) with output contacts K6, K7, K8 on relay board.

Setting

Feedback signals can be set via two jumpers on the relay board. Refer to the <Feedback signals setting> table for the set functions

Information

The jumpers for feedback signal setting are preset in the factory as specified in the order. The wiring diagram pertaining to the order has been coded accordingly and the connections for the signals (terminals XK) have been entered. In case of subsequent change of the setting (rewiring of the jumpers), the wiring diagram provided will no longer correspond to the changed settings. For this reason, setting changes may exclusively be performed by the AUMA service.

Figure 36: Relay board; left: version B02, right: version B04

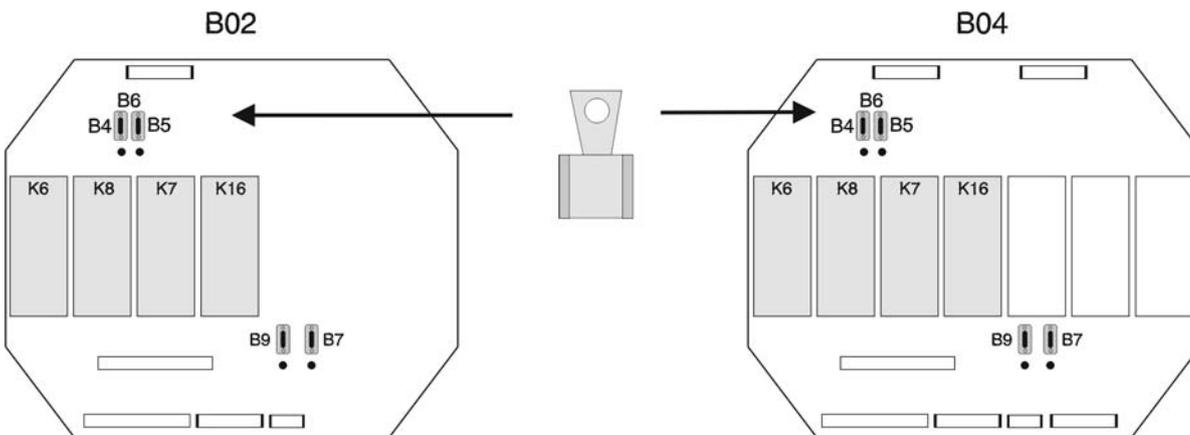


Table 14: Feedback signals setting

Function (Signal at terminal XK ... ¹⁾ active, if function matches)	Signal at terminal	Link
Torque switch tripped in mid-travel and/or Thermoswitch or thermal overload relay tripped	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
No thermoswitch or no thermal overload relay tripped	XK 13	
Torque switch tripped in mid-travel	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
No function	XK 13	
Torque switch tripped in mid-travel	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
No thermoswitch or no thermal overload relay tripped	XK 13	
Torque switch tripped in mid-travel	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
Thermoswitch or thermal overload relay tripped	XK 13	
Torque switch tripped in mid-travel	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
No function	XK 13	
Common connection	XK 14	

1) refer to order-related wiring diagram BSP ...

→

10.7. EMERGENCY command (EMERGENCY - OPEN/EMERGENCY - CLOSE): set

— (Option) —

EMERGENCY behaviour

In case an EMERGENCY command is issued, the actuator will run to the defined end position:

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

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

Connection

The EMERGENCY command is initiated by a signal at the ESD COMMAND input (refer to wiring diagram).

The ESD COMMAND input must be connected via an NC contact to the control voltage (quiescent current principle). If an EMERGENCY command is issued (signal is cancelled = NO contact activated), the actuator runs to the defined end position.



Risk of immediate actuator operation when switching on!

Risk of personal injuries or damage to the valve

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

Setting

Settings for the EMERGENCY command are performed via a jumper on the relay board. For the set EMERGENCY behaviour, refer to the <EMERGENCY command setting> table

Information

The jumper for EMERGENCY command setting is present in the factory as specified in the order. The wiring diagram pertaining to the order has been coded accordingly and the connection for the input (terminals XK) has been entered. In case of subsequent change of the setting (rewiring of the jumper), the wiring diagram will no longer correspond to the changed settings. For this reason, setting changes may exclusively be performed by the AUMA service.

Figure 37: Relay board

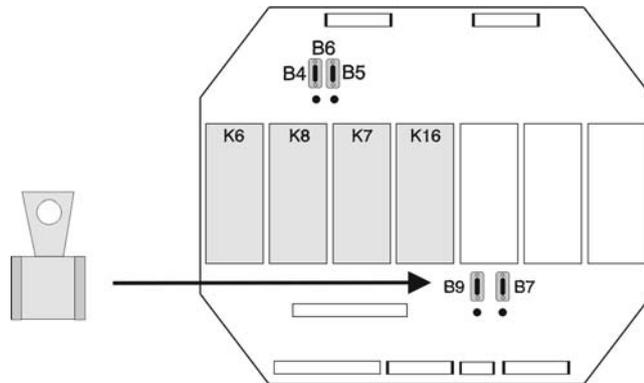


Table 15: EMERGENCY command setting

Link [B9]	EMERGENCY command (EMERGENCY behaviour)
	EMERGENCY - CLOSE (Actuator runs to end position CLOSED.)
	EMERGENCY - OPEN (Actuator runs to end position OPEN.)

10.8. Controls: close

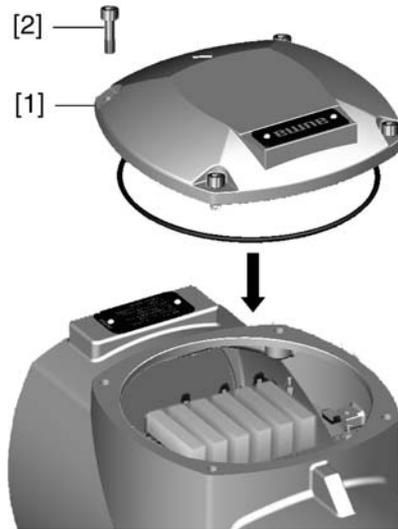


Danger of corrosion due to damage to paint finish!

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

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

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



Flameproof enclosure, danger of explosion!

Risk of death or serious injury.

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

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

11. Corrective action

11.1. Faults during commissioning

Table 16: Faults during commissioning

Fault description	Possible causes	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
Fault in end position Actuator runs to end stop although the limit switches work properly.	The overrun was not considered when setting the limit switching. The overrun is generated by the inertia of both the actuator and the valve and the delay time of the controls.	Determine overrun: Overrun = travel covered from switching off until complete standstill. Set limit switching again considering the overrun (turn handwheel back by the amount of the overrun).
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. The red indication light (fault) on the local controls is illuminated.
3. Turn test button [2] in direction of the TSO arrow: Torque switch OPEN trips. The red indication light (fault) on the local controls is illuminated.

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

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

11.2. Fuses

11.2.1. Fuses within the actuator controls

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



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 38: Access to fuses



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

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

F3 Internal 24 V DC supply

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

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

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

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

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

Information Only use fuses of same type and value for replacement.

→ After replacing the fuses, fasten local controls again.

NOTICE

Cable damage due to twisting or pinching!

Risk of functional failures.

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

11.2.2. Motor protection (thermal monitoring)

In order to protect against overheating and impermissibly high surface temperatures at the actuator, 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 stopped and the red indication light (option) on the local controls is illuminated.

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

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

12. Servicing and maintenance



Damage caused by inappropriate maintenance!

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

AUMA Service & Support

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

12.1. Preventive measures for servicing and safe operation

The following measures are required to ensure safe device operation:

6 months after commissioning and then every year

- Carry out visual inspection:
Cable entries, cable glands, blanking plugs, etc. have to be checked for correct tightness and sealing.
Respect torques according to manufacturer's details.
- Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>.
- When rarely operated: Perform test run.

For 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.

12.2. Disconnection from the mains

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

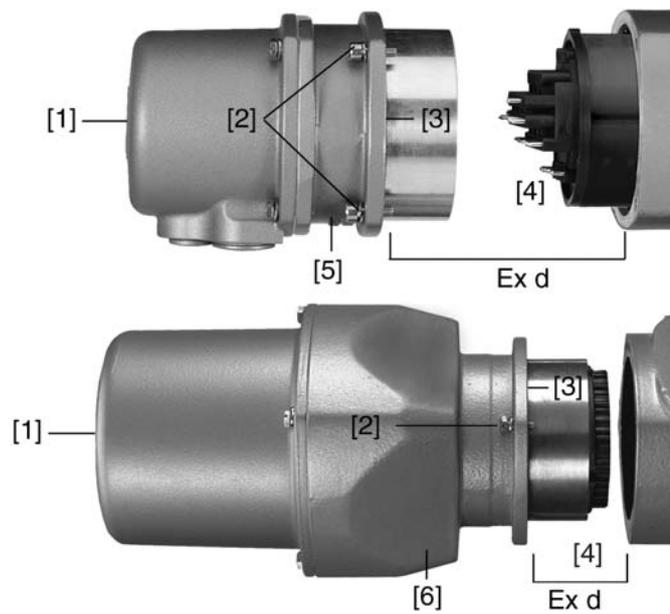


Flameproof enclosure, danger of explosion!

Risk of death or serious injury.

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

Figure 39: top: KP/KPH, bottom: KES



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

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

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

12.3. Maintenance

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

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

Notes regarding the maintenance

- We recommend exchanging the seals when changing the grease.
- No additional lubrication of the gear housing is required during operation.
- Perform visual inspection of actuator. Ensure that no outside damage or changes are visible.
- Electrical connection cables must be placed properly and in perfect condition.
- Thoroughly touch up any possible damage to painting 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 own EC type examination certificate.
- Check whether Ex connections are fastened correctly.
- Take care of possible discolouration of the terminals and wires. This would indicate an increased temperature.
- For Ex housings, pay special attention to a possible collection of water. This may originate from "breathing" due to severe temperature variations (e. g. change of night and day), from damaged seals etc. Remove any water immediately.
- Check the flame path gaps of flameproof enclosures for dirt and corrosion.
- Since the dimensions of all flameproof joints are strictly defined and inspected, no mechanical work (such as grinding) shall be performed on them. The joint surfaces have to be cleaned chemically (e. g. with Esso-Varsol).
- Prior to fitting, preserve joint surfaces with an acid-free corrosion protection agent (e. g. Esso Rust-BAN 397).
- Ensure that all housing covers are handled carefully and that the seals are checked.
- All cable and motor protection components have to be checked.
- If defects impairing the safety are detected during maintenance, repair measures have to be initiated without delay.
- Any kind of surface coating for the joint surfaces is not permitted.
- When exchanging parts, seals etc. only original spare parts shall be used.

12.4. Disposal and recycling

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

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

The following generally applies:

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

13. Technical data

Information The following technical data includes standard and optional features. For detailed information on the customer-specific version, refer to the order-related data sheet. The technical data sheet can be downloaded from the Internet at www.auma.com in both German and English (please state the order number).

13.1. Technical data Part-turn actuator

Features and functions					
Explosion protection	<table border="1"> <tr> <td>Standard:</td> <td>Standard version (ATEX): II2G Ex de IIC T4 or T3 Gb II2G c IIC T4 or T3 II2D Ex tb IIIC T130 °C or T190 °C Db IP6x Standard version (IECEX): Ex de IIC T4 or T3 Gb Ex tb IIIC T130 °C or T190 °C Db IP6x</td> </tr> <tr> <td colspan="2">For actual version, refer to actuator name plate</td> </tr> </table>	Standard:	Standard version (ATEX): II2G Ex de IIC T4 or T3 Gb II2G c IIC T4 or T3 II2D Ex tb IIIC T130 °C or T190 °C Db IP6x Standard version (IECEX): Ex de IIC T4 or T3 Gb Ex tb IIIC T130 °C or T190 °C Db IP6x	For actual version, refer to actuator name plate	
Standard:	Standard version (ATEX): II2G Ex de IIC T4 or T3 Gb II2G c IIC T4 or T3 II2D Ex tb IIIC T130 °C or T190 °C Db IP6x Standard version (IECEX): Ex de IIC T4 or T3 Gb Ex tb IIIC T130 °C or T190 °C Db IP6x				
For actual version, refer to actuator name plate					
EC type examination certificate	DEKRA 13 ATEX 0016 X IECEX DEK 12.0080X				
Type of duty	Short-time duty S2 - 15 min (part-turn actuators for open-close duty with 3-phase AC motors) Intermittent duty S4 - 25 % (part-turn actuators for modulating duty with 3-phase AC motors) For nominal voltage and 40 °C ambient temperature and at average load with 35 % of the max. torque				
Motors	Standard: 3-ph AC asynchronous motor, type IM B9 according to IEC 60034				
Mains voltage, mains frequency	Refer to motor name plate Permissible variation of mains voltage: ±10 % Permissible variation of mains frequency: ±5 %				
Overvoltage category	Category III according to IEC 60364-4-443				
Insulation class	Standard: F, tropicalized Option: H, tropicalized				
Motor protection	Standard: Thermoswitches (NC) in the actuator and in the thermal overload relay of controls Option: –				
Motor heater (option)	Voltages: 110 – 120 V AC, 220 – 240 V AC or 400 V AC (externally supplied) Power: 12.5 W				
Swing angle	Standard: 75° to < 105° adjustable Option: 15° to < 45°, 45° to < 75°, 105° to < 135°				
Self-locking	Yes (Part-turn actuators are self-locking if the valve position cannot be changed from standstill while torque acts upon the output drive.)				
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation. Option: Handwheel lockable Handwheel stem extension				
Indication for manual operation (option)	Indication whether manual operation is active/not active via switch (1 change-over contact)				
Spined coupling for connection to the valve shaft	Standard: Coupling without bore Option: 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 without spigot				

With base and lever (option)

Swing lever	Made of spheroidal cast iron with two or three bores for fixing a lever arrangement. Considering the installation conditions, the lever may be mounted to the output shaft in any desired position.
Ball joints (option)	Two ball joints matching the lever, including lock nuts and two welding nuts, suitable for pipe according to dimension sheet
Fixing	Base with four holes for fastening screws

Electromechanical control unit	
Limit switching	Counter gear mechanism for end positions OPEN and CLOSED
	Standard: Single switches (1 NC and 1 NO) for each end position, not galvanically isolated
	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 switch (DUO limit switching), adjustable for any position
Torque switching	Torque switching adjustable for directions OPEN and CLOSE
	Standard: Single switches (1 NC and 1 NO) for each direction, not galvanically isolated
	Options: Tandem switches (2 NC and 2 NO) for each direction, switches galvanically isolated
Position feedback signal, analogue (option)	Potentiometer or 0/4 – 20 mA (EWG/RWG)
Mechanical position indicator (option)	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED
Running indication	Blinker transmitter (option for modulating actuators)
Heater in switch compartment	Standard: Self-regulating PTC heater, 5 – 20 W, 110 – 250 V AC/DC
	Options: 24 – 48 V AC/DC or 380 – 400 V AC
	A resistance type heater of 5 W, 24 V AC is installed in the actuator in combination with AM or AC actuator controls.

Technical data for limit and torque switches	
Mechanical lifetime	2 x 10 ⁶ starts
Silver plated contacts:	
U min.	24 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)

Technical data for handwheel activation switches	
Mechanical lifetime	10 ⁶ starts
Silver plated contacts:	
U min.	12 V DC
U max.	250 V AC
I max. AC current	3 A at 250 V (inductive load, cos phi = 0.8)
I max. DC current	3 A at 12 V (resistive load)

Service conditions	
Use	Indoor and outdoor use permissible
Mounting position	Any position
Installation altitude	≤ 2 000 m above sea level > 2 000 m above sea level on request
Ambient temperature	Standard: –40 °C to +60 °C (3-phase AC motors)
	Options: –60 °C to +60 °C
	For actual version, refer to actuator name plate.
Enclosure protection according to EN 60529	Standard: IP68 For special motors differing enclosure protection: refer to name plate.
	According to AUMA definition, enclosure protection IP68 meets the following requirements: <ul style="list-style-type: none"> • Depth of water: maximum 8 m head of water • Duration of continuous immersion in water: Max. 96 hours • Up to 10 operations during continuous immersion Modulating duty is not possible during continuous immersion.
	For actual version, refer to actuator name plate.
Pollution degree	Pollution degree 4 (when closed) according to EN 50178
Vibration resistance according to IEC 60068-2-6	2 g, from 10 to 200 Hz Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this. Valid for part-turn actuators in version AUMA NORM (with AUMA plug/socket connector, without actuator controls). Not valid in combination with gearboxes.
Corrosion protection	Standard: KS: Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
	Option: KX: Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
	KX-G: Same as KX, however aluminium-free version (outer parts)
Finish coating	Powder coating
Colour	Standard: AUMA silver-grey (similar to RAL 7037)
	Option: Available colours on request.
Lifetime	AUMA part-turn actuators meet or even exceed the lifetime requirements of EN 15714-2. Detailed information can be provided on request.

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)

13.2. Technical data Actuator controls

Features and functions	
Explosion protection	Standard: Standard version (ATEX): <ul style="list-style-type: none"> • II 2G Ex de IIC (IIB, IIB+H₂) T4 (T3) Gb • II 2D Ex tb IIIC T130°C (T190°C) Db IP68 Standard version (IECEX): <ul style="list-style-type: none"> • Ex de IIC (IIB, IIB+H₂) T4 (T3) Gb • Ex tb IIIC T130°C (190°C) Db IP68
	Option: II2G Ex d IIC T4 or T3
	For exact version, refer to actuator controls name plate.
EC type examination certificate	In combination with SQEx: DEKRA 13ATEX0016 X

Features and functions					
Power supply Mains frequency	<p>Refer to name plates at controls and motor. Permissible variation of mains voltage: $\pm 10\%$ Permissible variation of mains frequency: $\pm 5\%$ Current consumption of controls depending on mains voltage: 100 to 120 V AC = max. 575 mA 208 to 240 V AC = max. 275 mA 380 to 690 V AC = max. 160 mA</p> <p>For exact version, refer to actuator controls name plate.</p>				
Overvoltage category	Category III according to IEC 60364-4-443				
Rated power	The controls are designed for the rated motor power, refer to motor name plate				
Switchgear	<table border="1"> <tr> <td>Standard:</td> <td>Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2</td> </tr> <tr> <td>Options:</td> <td> Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2 with additional contacts, 1 NC + 1 NO each Reversing contactors (mechanically and electrically interlocked) for AUMA power class A3 </td> </tr> </table> <p>Reversing contactors are designed for a lifetime of 2 million starts. For the assignment of AUMA power classes, please refer to Electrical data Multi-turn actuators/Part-turn actuators.</p>	Standard:	Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2	Options:	Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2 with additional contacts, 1 NC + 1 NO each Reversing contactors (mechanically and electrically interlocked) for AUMA power class A3
Standard:	Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2				
Options:	Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2 with additional contacts, 1 NC + 1 NO each Reversing contactors (mechanically and electrically interlocked) for AUMA power class A3				
Control	<table border="1"> <tr> <td>Standard:</td> <td>Control inputs OPEN - STOP - CLOSE, 230 V AC, internally supplied (non potential-free) EMERGENCY input (non potential-free) for EMERGENCY-STOP function from position of the selector switch</td> </tr> <tr> <td>Option:</td> <td>Control inputs , OPEN - STOP - CLOSE, 24 V DC, externally supplied (with galvanic isolation via contact), current consumption: approx. 15 mA per input Control inputs OPEN - STOP - CLOSE, 24 V DC, internally supplied (non potential-free) Control inputs OPEN - STOP - CLOSE, 115 V AC, internally supplied (non potential-free)</td> </tr> </table>	Standard:	Control inputs OPEN - STOP - CLOSE, 230 V AC, internally supplied (non potential-free) EMERGENCY input (non potential-free) for EMERGENCY-STOP function from position of the selector switch	Option:	Control inputs , OPEN - STOP - CLOSE, 24 V DC, externally supplied (with galvanic isolation via contact), current consumption: approx. 15 mA per input Control inputs OPEN - STOP - CLOSE, 24 V DC, internally supplied (non potential-free) Control inputs OPEN - STOP - CLOSE, 115 V AC, internally supplied (non potential-free)
Standard:	Control inputs OPEN - STOP - CLOSE, 230 V AC, internally supplied (non potential-free) EMERGENCY input (non potential-free) for EMERGENCY-STOP function from position of the selector switch				
Option:	Control inputs , OPEN - STOP - CLOSE, 24 V DC, externally supplied (with galvanic isolation via contact), current consumption: approx. 15 mA per input Control inputs OPEN - STOP - CLOSE, 24 V DC, internally supplied (non potential-free) Control inputs OPEN - STOP - CLOSE, 115 V AC, internally supplied (non potential-free)				
Status signals	<table border="1"> <tr> <td>Standard:</td> <td>Output signals for end positions OPEN/CLOSED, 230 V AC, internally supplied (non potential-free) for external indication lights OPEN/CLOSE ($P_{max} = 2.5\text{ W}$)</td> </tr> <tr> <td>Options:</td> <td> <ul style="list-style-type: none"> • 5 potential-free output signals with one common, max. 250 V AC, 2 A (resistive load) <ul style="list-style-type: none"> - Motor protection tripped (thermal fault) - Torque fault - No torque fault • Selector switch position LOCAL/REMOTE </td> </tr> </table>	Standard:	Output signals for end positions OPEN/CLOSED, 230 V AC, internally supplied (non potential-free) for external indication lights OPEN/CLOSE ($P_{max} = 2.5\text{ W}$)	Options:	<ul style="list-style-type: none"> • 5 potential-free output signals with one common, max. 250 V AC, 2 A (resistive load) <ul style="list-style-type: none"> - Motor protection tripped (thermal fault) - Torque fault - No torque fault • Selector switch position LOCAL/REMOTE
Standard:	Output signals for end positions OPEN/CLOSED, 230 V AC, internally supplied (non potential-free) for external indication lights OPEN/CLOSE ($P_{max} = 2.5\text{ W}$)				
Options:	<ul style="list-style-type: none"> • 5 potential-free output signals with one common, max. 250 V AC, 2 A (resistive load) <ul style="list-style-type: none"> - Motor protection tripped (thermal fault) - Torque fault - No torque fault • Selector switch position LOCAL/REMOTE 				
Voltage output	<table border="1"> <tr> <td>Standard:</td> <td>230 V AC $\pm 10\%$, max. 2.5 W for supply of the control inputs, galvanically isolated from internal voltage supply</td> </tr> <tr> <td>Option:</td> <td>24 V DC $\pm 5\%$, max. 10 mA for supply of the control inputs, galvanically isolated from internal voltage supply 115 V AC $\pm 10\%$, max. 30 mA for supply of the control inputs, galvanically isolated from internal voltage supply</td> </tr> </table>	Standard:	230 V AC $\pm 10\%$, max. 2.5 W for supply of the control inputs, galvanically isolated from internal voltage supply	Option:	24 V DC $\pm 5\%$, max. 10 mA for supply of the control inputs, galvanically isolated from internal voltage supply 115 V AC $\pm 10\%$, max. 30 mA for supply of the control inputs, galvanically isolated from internal voltage supply
Standard:	230 V AC $\pm 10\%$, max. 2.5 W for supply of the control inputs, galvanically isolated from internal voltage supply				
Option:	24 V DC $\pm 5\%$, max. 10 mA for supply of the control inputs, galvanically isolated from internal voltage supply 115 V AC $\pm 10\%$, max. 30 mA for supply of the control inputs, galvanically isolated from internal voltage supply				
Local controls	<table border="1"> <tr> <td>Standard:</td> <td>Selector switch LOCAL - OFF - REMOTE (lockable in all three positions) Push buttons OPEN, STOP, CLOSE 2 indication lights: End position CLOSED (yellow), end position OPEN (green)</td> </tr> <tr> <td>Options:</td> <td>3 indication lights: End position CLOSED (yellow), collective fault signal (red), end position OPEN (green) Special colours for the indication lights Protection cover, lockable</td> </tr> </table>	Standard:	Selector switch LOCAL - OFF - REMOTE (lockable in all three positions) Push buttons OPEN, STOP, CLOSE 2 indication lights: End position CLOSED (yellow), end position OPEN (green)	Options:	3 indication lights: End position CLOSED (yellow), collective fault signal (red), end position OPEN (green) Special colours for the indication lights Protection cover, lockable
Standard:	Selector switch LOCAL - OFF - REMOTE (lockable in all three positions) Push buttons OPEN, STOP, CLOSE 2 indication lights: End position CLOSED (yellow), end position OPEN (green)				
Options:	3 indication lights: End position CLOSED (yellow), collective fault signal (red), end position OPEN (green) Special colours for the indication lights Protection cover, lockable				
Functions	<table border="1"> <tr> <td>Standard:</td> <td> Standard: <ul style="list-style-type: none"> • Switch-off mode adjustable <ul style="list-style-type: none"> - Limit or torque seating for end positions OPEN and CLOSED • Overload protection against excessive torques across the whole travel • Phase failure monitoring with automatic phase correction • Push-to-run operation or self-retaining in REMOTE • Push-to-run operation or self-retaining in LOCAL Selectable type of seating, limit or torque seating for end position OPEN and end position CLOSED </td> </tr> </table>	Standard:	Standard: <ul style="list-style-type: none"> • Switch-off mode adjustable <ul style="list-style-type: none"> - Limit or torque seating for end positions OPEN and CLOSED • Overload protection against excessive torques across the whole travel • Phase failure monitoring with automatic phase correction • Push-to-run operation or self-retaining in REMOTE • Push-to-run operation or self-retaining in LOCAL Selectable type of seating, limit or torque seating for end position OPEN and end position CLOSED		
Standard:	Standard: <ul style="list-style-type: none"> • Switch-off mode adjustable <ul style="list-style-type: none"> - Limit or torque seating for end positions OPEN and CLOSED • Overload protection against excessive torques across the whole travel • Phase failure monitoring with automatic phase correction • Push-to-run operation or self-retaining in REMOTE • Push-to-run operation or self-retaining in LOCAL Selectable type of seating, limit or torque seating for end position OPEN and end position CLOSED				

Features and functions		
Motor protection evaluation	Standard:	Thermal overload relay in controls combined with thermostiches within actuator
Electrical connection	Standard:	AUMA plug/socket connector with screw-type connection
	Options:	Terminals or crimp connection
		Gold-plated control plug (sockets and plugs)
Threads for cable entries	Standard:	Metric threads
	Options:	Pg-threads, NPT-threads, G-threads
Wiring diagram	Refer to name plate	

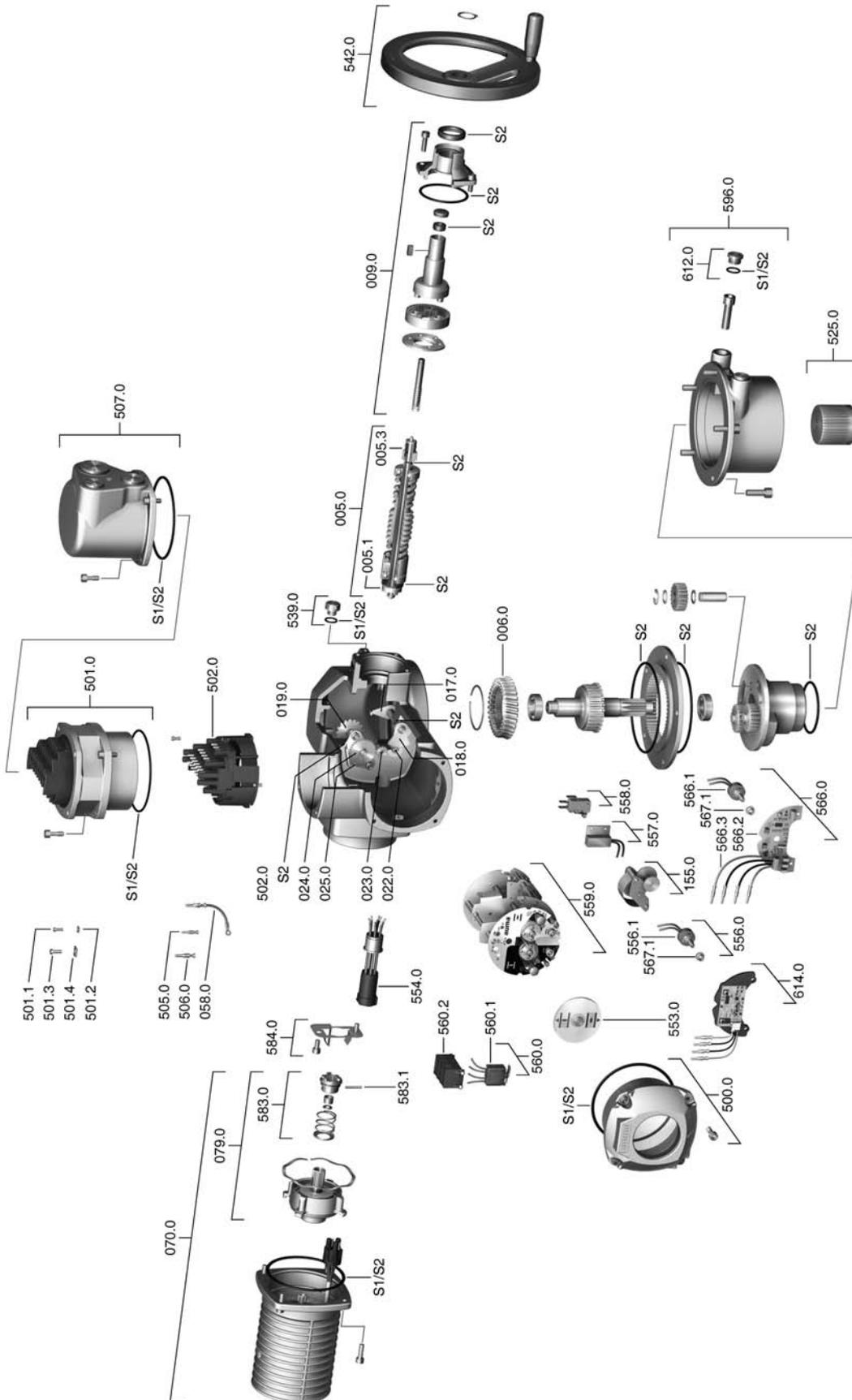
Further options for version with EWG/RWG in actuator	
Position feedback signal (option)	Analogue output E2 = 0/4 – 20 mA (load max. 500 Ω)

Service conditions		
Use	Indoor and outdoor use permissible	
Mounting position	Any position	
Installation altitude	≤ 2 000 m above seal level > 2,000 m above sea level on request	
Ambient temperature	Standard:	–40 °C to +40 °C/+60 °C
	Options:	–60 °C to +40 °C/+60 °C, extreme low temperature version incl. heating system
		Low temperature versions incl. heating system for connection to external power supply 230 V AC or 115 V AC.
For exact version, refer to actuator controls name plate.		
Enclosure protection according to EN 60529	Standard:	IP68 with AUMA 3-phase AC motor/1-phase AC motor DS Terminal compartment additionally sealed against interior (double sealed)
	According to AUMA definition, enclosure protection IP68 meets the following requirements:	
	<ul style="list-style-type: none"> • Depth of water: maximum 8 m head of water • Duration of continuous immersion in water: Max. 96 hours 	
For exact version, refer to actuator controls name plate.		
Pollution degree	Pollution degree 4 (when closed) according to EN 50178	
Vibration resistance according to IEC 60068-2-6	1 g, from 10 to 200 Hz Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this. Valid for multi-turn actuators in version AUMA NORM (with AUMA plug/socket connector, without actuator controls). Not valid in combination with gearboxes.	
Corrosion protection	Standard:	KS: Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
	Option:	KX: Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
Finish coating	Powder coating Two-component iron-mica combination	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Other colours available on request

Further information	
Weight	Approx. 7 kg (with AUMA plug/socket connector)
EU Directives	ATEX Directive: (94/9/EC) Electromagnetic Compatibility (EMC): (2004/108/EC) Low Voltage Directive: (2006/95/EC) Machinery Directive: (2006/42/EC)

14. Spare parts

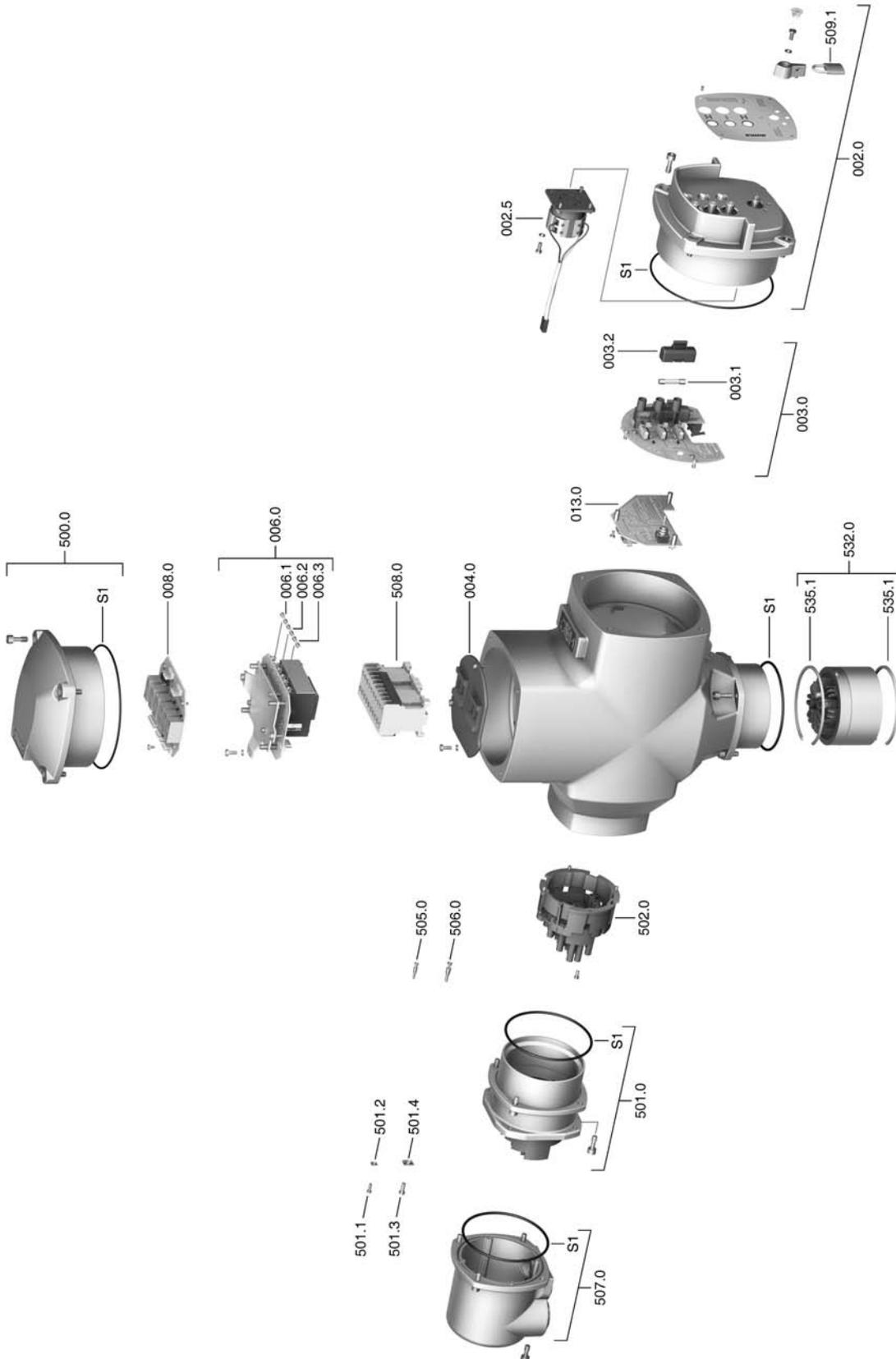
14.1. Part-turn actuator SQEx 05.2 – SQEx 14.2/SQREx 05.2 – SQREx 14.2 with Ex plug/socket connector and screw-type terminals (KP, KPH)



Information: Please state device type and our order number (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.

Ref. No.	Designation	Type	Ref. No.	Designation	Type
005.0	Drive shaft	Sub-assembly	539.0	Screw plug	
005.1	Motor coupling	Sub-assembly	542.0	Handwheel with ball handle Handwheel with ball handle	Sub-assembly
005.3	Manual drive coupling	Sub-assembly	553.0	Mechanical position indicator	Sub-assembly
006.0	Worm wheel		554.0	Socket carrier for motor plug/socket connector with cable harness	Sub-assembly
009.0	Planetary gear for manual drive	Sub-assembly	556.0	Potentiometer for position transmitter	Sub-assembly
017.0	Torque lever	Sub-assembly	556.1	Potentiometer without slip clutch	Sub-assembly
018.0	Gear segment		557.0	Heater	Sub-assembly
019.0	Crown wheel	Sub-assembly	558.0	Blinker transmitter including pins at wires (without impulse disc and insulation plate)	Sub-assembly
022.0	Drive pinion II for torque switching		559.0	Control unit with torque switching heads and switches	Sub-assembly
023.0	Output drive wheel for limit switching	Sub-assembly	559.0	Control unit with magnetic limit and torque transmitter (MWG) for Non-intrusive version in combination with AUMATIC integral controls	Sub-assembly
024.0	Drive wheel for limit switching	Sub-assembly	560.0	Switch stack for direction OPEN	Sub-assembly
025.0	Locking plate	Sub-assembly	560.0	Switch stack for direction CLOSE	Sub-assembly
058.0	Wire for protective earth	Sub-assembly	560.1	Switch for limit/torque switching	Sub-assembly
070.0	Motor (VD motor incl. ref.no. 079.0)	Sub-assembly	560.2	Switch case	
079.0	Planetary gear for motor drive (SQ 05.2 - 14.2 for VD motor)	Sub-assembly	566.0	Position transmitter RWG	Sub-assembly
155.0	Reduction gearing	Sub-assembly	566.1	Potentiometer for RWG without slip clutch	Sub-assembly
500.0	Cover	Sub-assembly	566.2	Position transmitter board for RWG	Sub-assembly
501.0	Ex plug/socket connector with screw-type terminals (KP, KPH)	Sub-assembly	566.3	Wire harness for RWG	Sub-assembly
501.1	Screw for control terminal	Sub-assembly	567.1	Slip clutch for potentiometer	Sub-assembly
501.2	Washer for control terminal	Sub-assembly	583.0	Motor coupling on motor shaft	Sub-assembly
501.3	Screw for power terminal	Sub-assembly	583.1	Pin for motor coupling	Sub-assembly
501.4	Washer for power terminal		584.0	Retaining spring for motor coupling	
502.0	Pin carrier without pins	Sub-assembly	596.0	Output drive flange with end stop	Sub-assembly
505.0	Pin for controls	Sub-assembly	612.0	Screw plug for end stop	Sub-assembly
506.0	Pin for motor	Sub-assembly	614.0	Position transmitter EWG	Sub-assembly
507.0	Cover for electrical connection	Sub-assembly	S1	Seal kit, small	Set
525.0	Coupling	Sub-assembly	S2	Seal kit, large	Set

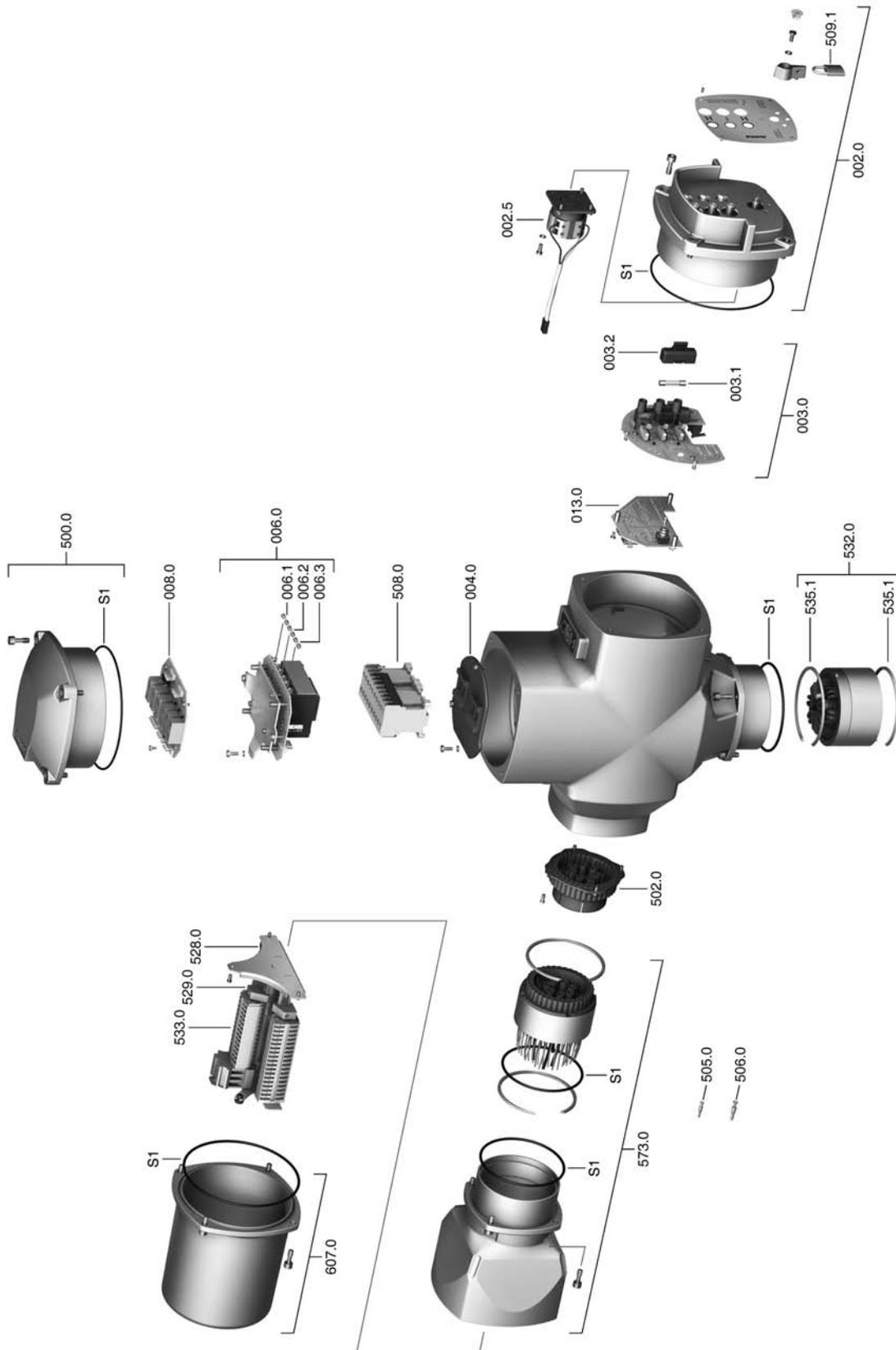
14.2. Actuator controls AUMA Matic BASIC AMBExC 01.1 with Ex plug/socket connector with screw-type connection (KP, KPH)



Information: Please state device type and our order number (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.

Ref. no.	Designation	Type
002.0	Local controls	Sub-assembly
002.5	Selector switch	Sub-assembly
003.0	Signal and control board	Sub-assembly
003.1	Primary fuse F1/F2	Sub-assembly
003.2	Cover for fuse	
004.0	Carrier for contactors	
006.0	Power supply unit	
006.1	Secondary fuse F3	Sub-assembly
006.2	Secondary fuse F4	
006.3	Secondary fuse F5	
008.0	Relay board	Sub-assembly
013.0	Wiring board	Sub-assembly
500.0	Cover	Sub-assembly
501.0	Ex plug/socket connector with screw-type terminals (KP, KPH)	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	Cover for electrical connection	Sub-assembly
508.0	Switchgear	Sub-assembly
509.1	Padlock	
532.0	Line bushing (actuator connection)	Sub-assembly
535.1	Circlip	
S	Seal kit	Set

14.3. Actuator controls AUMA MATIC BASIC AMBExC 01.1 with Ex plug/socket connector and terminal blocks (KES)



Information: Please state device type and our order number (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.

Ref. no.	Designation	Type
002.0	Local controls	Sub-assembly
002.5	Selector switch	Sub-assembly
003.0	Signal and control board	Sub-assembly
003.1	Primary fuse F1/F2	
003.2	Cover for fuse	
004.0	Carrier for contactors	
006.0	Power supply unit	Sub-assembly
006.1	Secondary fuse F3	
006.2	Secondary fuse F4	
006.3	Secondary fuse F5	
008.0	Relay board	Sub-assembly
013.0	Wiring 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	
528.0	Terminal frame (without terminals)	Sub-assembly
529.0	End clamp	
532.0	Line bushing (actuator connection)	Sub-assembly
533.0	Terminals for motor/controls	
535.1	Circlip	
573.0	Ex plug/socket connector with terminal blocks (KES)	Sub-assembly
607.0	Cover	Sub-assembly
S	Seal kit	Set

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

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

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Fax +49 7631 809-1250
Riester@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 Actuators of the type ranges

Multi-turn actuators	SAEx 07.2 – SAEx 16.2 and SAREx 07.2 – SAREx 16.2
Part-turn actuators	SQEx 05.2 – SQEx 14.2 and SQREx 05.2 – SQREx 14.2

in versions **AUMA NORM, AUMA SEMIPACT, AUMA MATIC** or **AUMATIC**.

AUMA Riester GmbH & Co. KG as manufacturer declares herewith, that the above mentioned multi-turn and 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 ISO 12100: 2010 EN ISO 5211: 2001
EN ISO 5210: 1996

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

AUMA multi-turn and part-turn actuators are designed to be installed on industrial valves. AUMA multi-turn and 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 multi-turn and 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: 2012	EN 60079-11: 2012	EN 13463-1: 2009
EN 60079-1: 2007	EN 60079-31: 2009	EN 1127-1: 2011
EN 60079-7: 2007	EN 13463-5: 2011	

The EC type examination certificate DEKRA 11ATEX0008 X issued by the DEKRA Certification B.V. is available for the multi-turn actuators mentioned above.

The EC type examination certificate DEKRA 13ATEX0016 X issued by the DEKRA Certification B.V. is available for the part-turn actuators mentioned above.

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

EN 61000-6-4: 2007 / A1: 2011
EN 61000-6-2: 2005 / AC: 2005

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

EN 60204-1: 2006 / AC: 2010
EN 60034-1: 2010 / AC: 2010
EN 50178: 1997

Müllheim, 2014-01-01

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.

Y006.331/003/en

15.2. ATEX certificate



CERTIFICATE

(1) **EC-Type Examination**

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

(3) EC-Type Examination Certificate Number: **DEKRA 13ATEX0016 X** Issue Number: **2**

(4) Equipment: **Part-Turn actuator, Types SQ.Ex 05.2 to SQ.Ex 14.2 in version AUMA NORM, AUMA SEMIPACT, AUMA MATIC or AUMATIC and wall bracket WH01.1**

(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/DEK/ExTR13.0014/**.

(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 ...IIC T4 or T3 Gb
II 2 (3) G Ex d ... [... Gc] IIC T4 or T3 Gb
II 2 D Ex tb IIIC T130°C or T190°C Db IP6x

This certificate is issued on 27 November 2013 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.

T. Pijpker
 Certification Manager

Page 1/6



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(13) **SCHEDULE**
(14) to EC-Type Examination Certificate DEKRA 13ATEX0016 X Issue No. 2

Type designation

Part-turn actuator:

SQ . Ex 05 . 2 - F05 / - a 3 a 1
I II III IV V VI VII VIII IX X XI

Designation	Explanation	Value	Explanation
I	General	SO	Part-turn actuator
II	Duty	none	short-time duty S2 xx min or Class A or Class B
III	Area classification	Ex	intermittent duty S4 xx % or Class C For use in environments containing flammable gas / vapour combustible dust substances
IV	Actuator size	05 07 10 12 14	Indicator for standardized actuator sizes
V	Design generation	2	Indicator for generation series
VI	Flange size	F***	Indicator for standardized flange sizes
VII	Blank	-	not used yet
VIII	Motor	a	Type 3ph VDX or SDX
IX	Terminal connection	3 4	Type KP or KPH or KES (Ex e) Type KES-Exd (Ex d)
X	Position transmitter	A B	without RWGS020.2Ex with RWGS020.2Ex (Ex i)
XI	Ex-Fieldbus	1 2 3	without Ex-Fieldbus with FNICO (Ex nL) with FISCO (Ex ic)

Optional integral controls:

AM ExC 01 . 1
I II III IV

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 environments containing flammable gas / vapour combustible dust substances.
III	Size	01	Indicator for standardized actuator sizes
IV	Design generation	1 2	Design series 1 Design series 2, ACEXC controls only

Versions without optional controls are called AUMA NORM.



(13) **SCHEDULE**
(14) to EC-Type Examination Certificate DEKRA 13ATEX0016 X Issue No. 2

Description

The Part-turn actuators, types SQ.Ex.05.2 to SQ.Ex.14.2 in version AUMA NORM comprise a motor, a switch mechanism compartment and a terminal compartment. Version AUMA SEMIPACT, AUMA MATIC and AUMATIC comprise a motor, a switch mechanism compartment, integral controls and a terminal compartment. The integral controls can be mounted on an explosion proof wall bracket type WH01.1.

The motor is in the 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 Part-turn actuators are classified for explosion group IIC and temperature class T4.

The switch mechanism compartment is in type of protection Ex d and may optionally also be provided with the position indicator type RWGS020.2Ex in the type of protection Ex.i.b.

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

The integral controls are in type of protection Ex d.

The integral control type AUMATIC, ACEXC 01.1 may optionally be provided with a FNICO Fieldbus interface in type of protection Ex nL and/or a FISCO Fieldbus interface in the type of protection Ex ic.

The integral control type AUMATIC, ACEXC 01.2 may optionally be provided with a FISCO Fieldbus interface in the type of protection Ex ic.

The integral controls may optionally be installed on a wall-bracket type WH01.1. The electrical connection of the wall-bracket is in type of protection Ex e or in type of protection Ex d.

All Part-turn actuators are in type of protection Ex t Db for environments containing combustible dust substances.



(13) **SCHEDULE**
 to EC-Type Examination Certificate DEKRA 13ATEX0016 X Issue No. 2

Electrical data

3-phase AC motor:

Actuator size	Motor size	Power (1)
SQ.Ex 05.2	VDX 63	0.02 – 0.06 kW
	SDX 63	0.01 kW
SQ.Ex 07.2 (2)	VDX 63	0.03 – 0.12 kW
	SDX 63	0.01 kW
SQ.Ex 10.2	VDX 63	0.10 – 0.19 kW
	SDX 63	0.02 – 0.06 kW
SQ.Ex 12.2	VDX 63	0.10 – 0.19 kW
	SDX 63	0.04 – 0.06 kW
SQ.Ex 14.2 (2)	VDX 63	0.10 – 0.19 kW
	SDX 63	0.06 kW

1) Nominal power at operating torque (corresponds to approx. 35% of maximum torque).
 2) Size SQ.Ex 05.2 and SQ.Ex 07.2 uses the same actuators housing, the difference is only in the size of the flange

Motor type: 3-phase AC squirrel cage motor
 Motor voltage: 690 V max.
 Motor current: 25 A max.
 Control voltage: 250 V max.
 Control current: 5 A max.
 Frequency: 50/60 Hz
 Isolation class: F or H
 Type of connection: Star or triangle connection
 Operation type: S2 - ... % or Class B
 S4 - ... % or Class C

Position Transmitter 4...20 mA type RWG5020.2Ex according PTB 03 ATEX 2176;
 Only for connection to certified intrinsically safe circuit.
 Maximum values of RWG5020.2EX:
 UI = 28.5 V; Ii = 200 mA, Pi = 0.9 W; Ci and Li are negligible small.
 The electronic position transmitter is considered as being earthed in terms of safety.

Fieldbus interface: FISCO and FISCO;
 In type of protection energy limitation Ex nL IIC in accordance with FISCO (ACEXC 01.1) and/or intrinsic safety Ex ic IIC in accordance with FISCO (ACEXC 01.1 and ACEXC 01.2).

Installation instructions

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

Test Report

No. NL/DEK/ExTR13.0014/**.



(13) **SCHEDULE**
 to EC-Type Examination Certificate DEKRA 13ATEX0016 X Issue No. 2

Thermal data

Ambient temperature range: -60 °C to +60 °C or
 -20 °C to +60 °C in combination with ACEXC 01.1
 with cylindrical joint and special fasteners M6

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

Marking

The marking of the Part-turn actuators types SQ.Ex 05.2 to SQ.Ex 14.2 for use in explosive gas atmospheres includes the following:

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

For use in explosive dust atmospheres, the marking of the Part-turn actuators additionally or alternately includes the following: II 2 D Ex tb IIC T130 °C or T190 °C Db



- (13) **SCHEDULE**
- (14) **to EC-Type Examination Certificate DEKRA 13ATEX0016 X** Issue No. 2
- (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. NIJDEKEXTR13.0014/”.

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