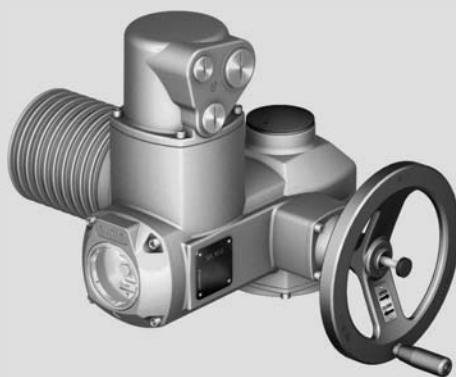




## Multi-turn actuators

SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2

AUMA NORM (without controls)



**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.

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## 1. Safety instructions

### 1.1. Basic information on safety

<b>Standards/directives</b>	<p>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.</p> <p>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.</p>
<b>Safety instructions/warnings</b>	<p>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.</p>
<b>Qualification of staff</b>	<p>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.</p> <p>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.</p>
<b>Commissioning</b>	<p>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.</p>
<b>Operation</b>	<p>Prerequisites for safe and smooth operation:</p> <ul style="list-style-type: none"> <li>• Correct transport, proper storage, mounting and installation, as well as careful commissioning.</li> <li>• Only operate the device if it is in perfect condition while observing these instructions.</li> <li>• Immediately report any faults and damage and allow for corrective measures.</li> <li>• Observe recognised rules for occupational health and safety.</li> <li>• Observe the national regulations.</li> <li>• During operation, the housing warms up and surface temperatures &gt; 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.</li> </ul>
<b>Protective measures</b>	<p>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.</p>
<b>Maintenance</b>	<p>To ensure safe device operation, the maintenance instructions included in this manual must be observed.</p> <p>Any device modification requires prior consent of the manufacturer.</p>

### 1.2. Range of application

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

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

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

- Industrial trucks according to EN ISO 3691
- Lifting appliances according to EN 14502
- Passenger lifts according to DIN 15306 and 15309
- Service lifts according to EN 81-1/A1

- Escalators
- Continuous duty
- Buried service
- Permanent submersion (observe enclosure protection)
- Potentially explosive areas, with the exception of zone 22
- 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. Applications in Ex zone 22 (option)

Actuators of the indicated series basically meet the requirements for applications in dust hazardous locations of ZONE 22 in compliance with the ATEX directive 94/9/EC.

The actuators are designed to meet enclosure protection IP68 and fulfil the requirements of EN 50281-1-1:1998 section 6 - Electrical apparatus for use in presence of combustible dust, requirements for category 3 electrical equipment - protected by enclosures.

To comply with all requirements of EN 50281-1-1:1998, it is imperative that the following points are observed:

- In compliance with the ATEX directive 94/9/EC, the actuators must be equipped with an additional identification – II3D IP6X T150 °C.
- The maximum surface temperature of the actuators, based on an ambient temperature of +40 °C in accordance with EN 50281-1-1 section 10.4, is +150 °C. In accordance with section 10.4, an increased dust deposit on the equipment was not considered for the determination of the maximum surface temperature.
- The correct connection of the thermostiches or the PTC thermistors as well as fulfilling the requirements of the duty type and the technical data are pre-requisites for compliance with the maximum surface temperature of devices.
- The connection plug may only be plugged in or pulled out when device is disconnected from the mains.
- The cable glands used also have to meet the requirements of category II3 D and must at least comply with enclosure protection IP67.
- The actuators must be connected by means of an external ground connection (accessory part) to the potential compensation or integrated into an earthed piping system.
- The threaded plug (part no. 511.0) or the stem protection tube with protective cap (part nos. 568.1 and 568.2) for sealing the hollow shaft must imperatively be mounted to guarantee tightness and therefore the combustible dust hazard protection.
- As a general rule, the requirements of EN 50281-1-1 must be respected in dust hazardous locations. During commissioning, service, and maintenance, special care as well as qualified and trained personnel are required for the safe operation of actuators.

### 1.4. 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.


## 1.5. References and symbols

The following references and symbols are used in these instructions:

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

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

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

#### < > Reference to other sections

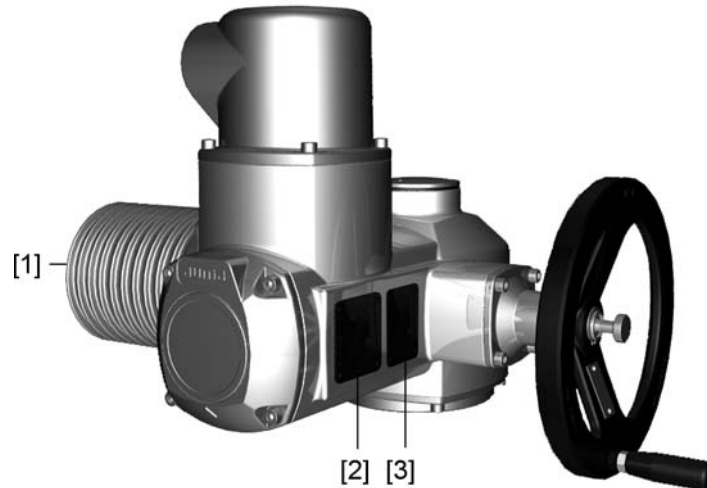
Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

## 2. Identification

### 2.1. Name plate

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

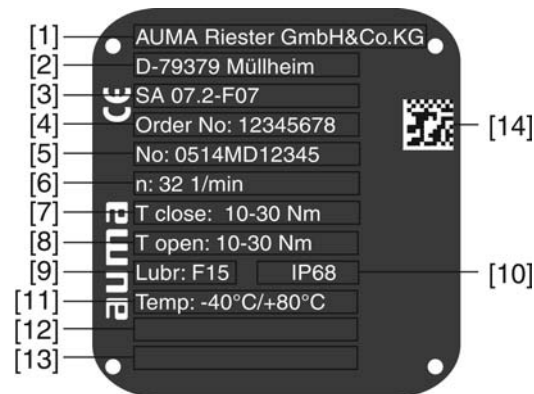
Figure 1: Arrangement of name plates



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

### 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] Speed
- [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**

**Type designation** Figure 3: Type designation (example)

SA 07.2 - F07

1. 2.

1. Type and size of actuator
2. Flange size

#### Type and size

These instructions apply to the following devices types and sizes:

Multi-turn actuators for open-close duty: SA 07.2, 07.6, 10.2, 14.2, 14.6, 16.2

Multi-turn actuators for modulating duty: SAR 07.2, 07.6, 10.2, 14.2, 14.6, 16.2

**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.

**Serial number** Table 1: Description of serial number (with example)

05	14	MD12345
<b>1<sup>st</sup>+2<sup>nd</sup> position: Assembly in week</b>		
05	Week 05	
<b>3<sup>rd</sup>+4<sup>th</sup> position: Year of production</b>		
	14	Year of production: 2014
<b>All other positions</b>		
	MD12345	Internal number for unambiguous product identification

**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 of serial number.

Figure 4: Link to the App store:



## 2.2. Short description

**Multi-turn actuator** Definition in compliance with EN ISO 5210:

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

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

Actuators without controls can be equipped with AUMA actuator controls at a later date. For more information, please state our order number (refer to actuator name plate).



### 3. Transport, storage and packaging

#### 3.1. Transport

For transport to place of installation, use sturdy packaging.



#### Hovering load!

*Risk of death or serious injury.*

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

#### 3.2. Storage



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

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

#### Long-term storage

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

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

#### 3.3. Packaging

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

## 4. Assembly

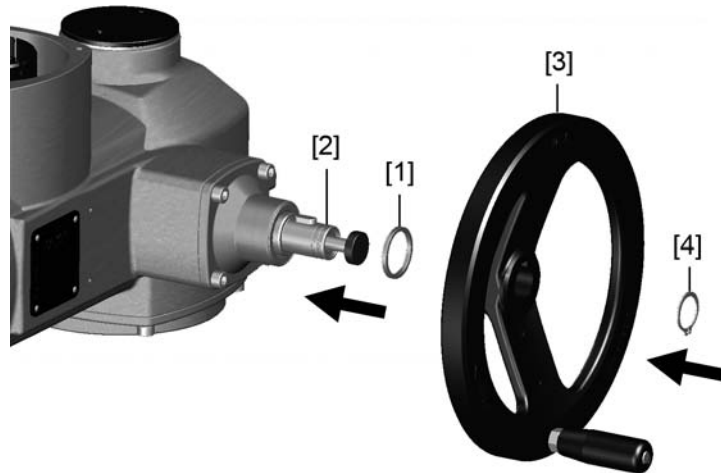
### 4.1. Mounting position

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

### 4.2. Handwheel fitting

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

Figure 5: 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. Multi-turn actuator: mount to valve/gearbox

#### NOTICE

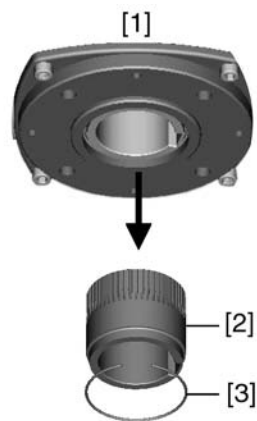
#### Danger of corrosion due to damage to paint finish and condensation!

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

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

- Application**
- For rotating, non-rising valve stem
  - Not capable of withstanding thrust
- Design** Output drive bore with keyway:
- Types B1 – B4 with bore according to EN ISO 5210
  - Types B and E with bore according to DIN 3210
  - Later change from B1 to B3, B4, or E is possible.

Figure 6: Output drive



- [1] Output drive types B, B1 – B4, E and C  
 [2] Output drive sleeve/output drive plug sleeve with bore and keyway  
 [3] Circlip

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

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

1. Check if mounting flanges fit together.
2. Check whether bore and keyway match the input shaft.
3. Apply a small quantity of grease to the input shaft.
4. Place multi-turn actuator.  
**Information:** Ensure that the spigot fits uniformly in the recess and that the mounting faces are in complete contact.
5. Fasten multi-turn actuator with screws according to table.  
**Information:** We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.
6. Fasten screws crosswise to a torque according to table.

Table 2: Tightening torques for screws

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

#### 4.3.2. Output drive type A

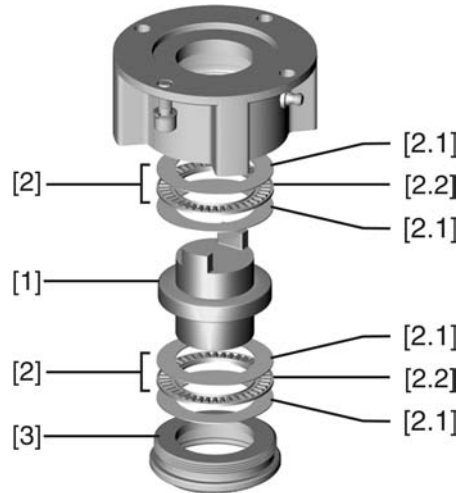
- Application**
- Output drive for rising, non-rotating valve stem
  - Capable of withstanding thrust

**Information** To adapt the actuators to output drive types A available on site with flanges F10 and F14 (year of manufacture: 2009 and earlier), an adapter is required. The adapter can be ordered from AUMA.

#### 4.3.2.1. Stem nut: finish machining

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

Figure 7: Design of output drive type A

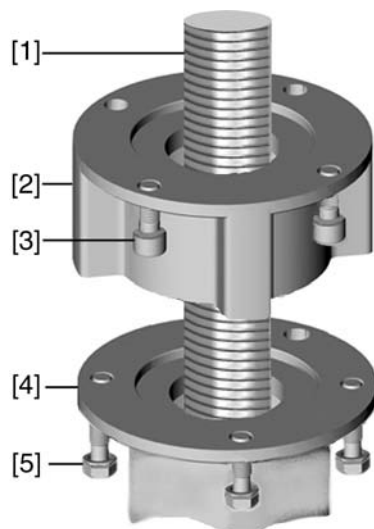


- [1] Stem nut
- [2] Bearing
- [2.1] Bearing race
- [2.2] Bearing rim
- [3] Spigot ring

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

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

Figure 8: Assembly with output drive type A



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

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

Table 3: Tightening torques for screws

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

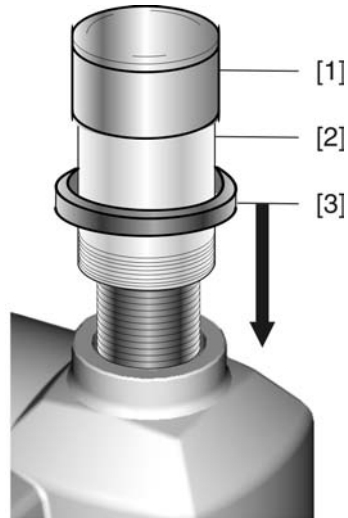
11. Turn multi-turn actuator with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

#### 4.4. Accessories for assembly

##### 4.4.1. Stem protection tube for rising valve stem

— Option —

Figure 9: Assembly of the stem protection tube



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

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

## 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>).

#### NOTICE

#### Valve damage for connection without controls!

- NORM actuators require controls: Connect motor via controls only (reversing contactor circuit).
- Observe the type of seating specified by the valve manufacturer.
- Observe wiring diagram.

#### Delay time

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

#### Protection on site

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

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

#### Limit and torque switches

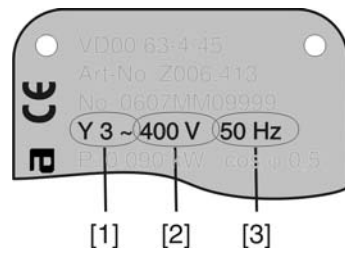
Limit and torque switches can be provided as single, tandem, or triple switches. Only the same potential can be switched on the two circuits (NC/NO contact) of each single switch. If different potentials are to be switched simultaneously, tandem switches or triple switches are required. When using tandem/triple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

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

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

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

Figure 10: Motor name plate (example)



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

**Connecting cables**

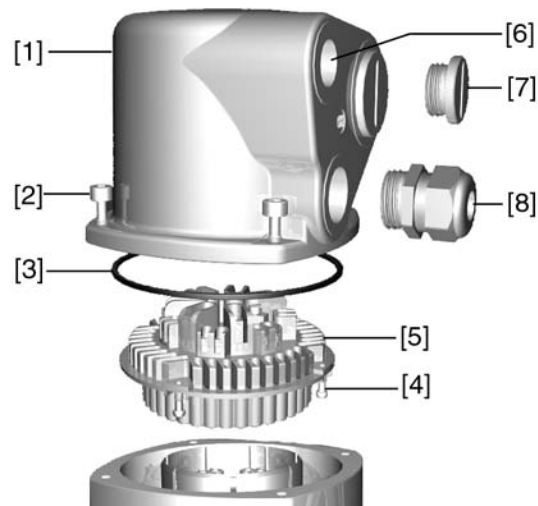
- For device insulation, appropriate (voltage-proof) cables must be used. Specify cables for the highest occurring rated voltage.
- Use connecting cable with appropriate minimum rated temperature.
- For connecting cables exposed to UV radiation (outdoor installation), use UV resistant cables.

**5.2. Connection with AUMA plug/socket connector****Cross sections AUMA plug/socket connector:**

- Power terminals (U1, V1, W1, U2, V2, W2): max. 6 mm<sup>2</sup> flexible/10 mm<sup>2</sup> solid
- PE connection Ⓢ: max. 6 mm<sup>2</sup> flexible/10 mm<sup>2</sup> solid
- Control contacts (1 to 50): max. 2.5 mm<sup>2</sup>

**5.2.1. Terminal compartment: open**

Figure 11: Connection AUMA plug/socket connector, version S



- [1] Cover  
 [2] Screws for cover  
 [3] O-ring  
 [4] Screws for socket carrier  
 [5] Socket carrier  
 [6] Cable entry  
 [7] Blanking plug  
 [8] Cable gland (not included in delivery)

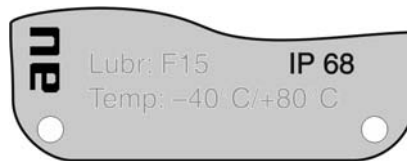


**DANGER****Hazardous voltage!***Risk of electric shock.*

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
2. Loosen screws [4] and remove socket carrier [5] from cover [1].
3. Insert cable glands [8] suitable for connecting cables.
- ➔ The enclosure protection IP... stated on the name plate is only ensured if suitable cable glands are used.

Figure 12: Example: Name plate shows enclosure protection IP68



4. Seal unused cable entries [6] with suitable blanking plugs [7].
5. Insert the cables into the cable glands [8].

**5.2.2. Cable connection**

✓ Observe permissible cross sections.

**NOTICE****Danger of motor damage if PTC thermistors or thermostats are not connected!***Our warranty for the motor will lapse if the motor protection is not connected.*

→ Connect PTC thermistors or thermostats to external controls.

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

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

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



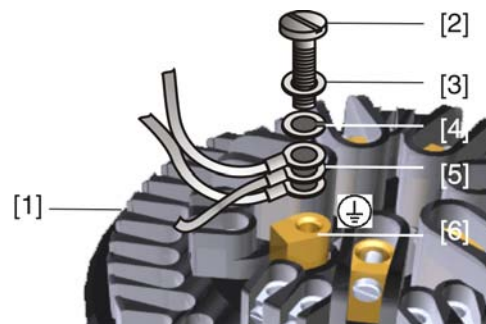
**In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!**

*Risk of electric shock.*

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

5. Tighten PE conductors firmly to PE connection using ring lugs (flexible cables) or loops (rigid cables).

Figure 13: PE connection

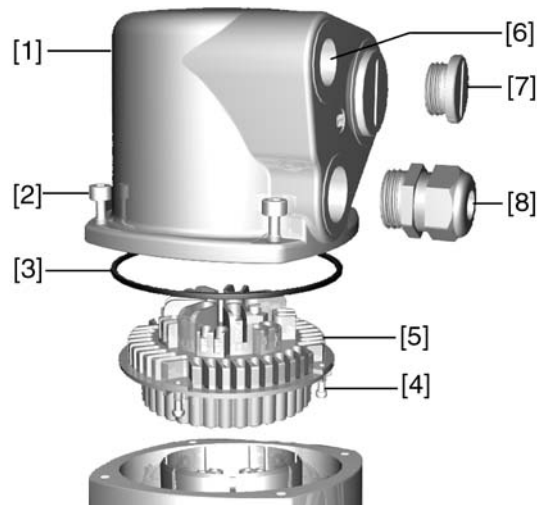


- [1] Socket carrier
- [2] Screw
- [3] Washer
- [4] Lock washer
- [5] Protective earth with ring lugs/loops
- [6] PE connection, symbol: ⊕

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

### 5.2.3. Terminal compartment: close

Figure 14: Example: Version S



- [1] Cover
- [2] Screws for cover
- [3] O-ring
- [4] Screws for socket carrier
- [5] Socket carrier
- [6] Cable entry
- [7] Blanking plug
- [8] Cable gland (not included in delivery)

#### WARNING

#### Short-circuit due to pinching of cables!

*Risk of electric shock and functional failures.*

→ Carefully fit socket carrier to avoid pinching the cables.

1. Insert the socket carrier [5] into the cover [1] and fasten with screws [4].
2. Clean sealing faces of cover [1] and housing.
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.
5. Fit cover [1] and fasten screws [2] evenly crosswise.
6. Fasten cable glands [8] applying the specified torque to ensure the required enclosure protection.

### 5.3. Accessories for electrical connection

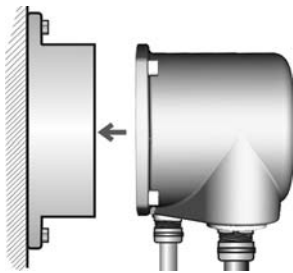
— Option —

#### 5.3.1. Parking frame

**Application** Parking frame for safe storage of a disconnected plug.

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

Figure 15: Parking frame



### 5.3.2. Protection cover

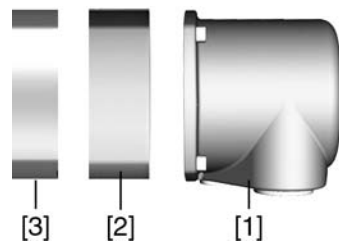
Protection cover for plug compartment when plug is removed.

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

### 5.3.3. Double sealed intermediate frame

When removing the electrical connection or due to leaky cable glands, ingress of dust and water into the housing may occur. This is prevented effectively by inserting the double sealed intermediate frame [2] between the plug/socket connector [1] and the housing of the device. The enclosure protection of the device (IP68) will not be affected, even if the electrical connection [1] is removed.

Figure 16: Electrical connection with double sealed intermediate frame



- [1] Electrical connection
- [2] Double sealed intermediate frame
- [3] Actuator housing

### 5.3.4. Earth connection, external

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

Figure 17: Earth connection



## 6. Operation

### 6.1. Manual operation

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

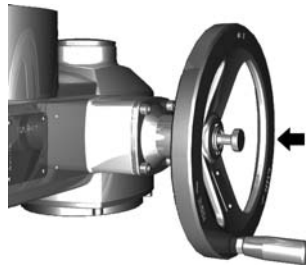
#### 6.1.1. Manual operation: engage

**NOTICE**

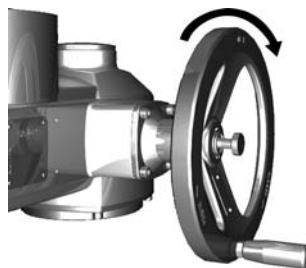
**Damage at the motor coupling due to faulty operation!**

→ 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

**NOTICE**

**Valve damage due to incorrect setting!**

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

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

1. Switch on power supply.
2. To close the valve, switch on motor operation in direction CLOSE.
  - ➔ Valve shaft turns clockwise in direction CLOSE.

## 7. Indications

### 7.1. Mechanical position indicator/running indication

— Option —

Mechanical position indicator:

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

Figure 18: Mechanical position indicator



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

## 8. Signals

### 8.1. Feedback signals from actuator

**Information** The switches can be provided as single switches (1 NC 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.

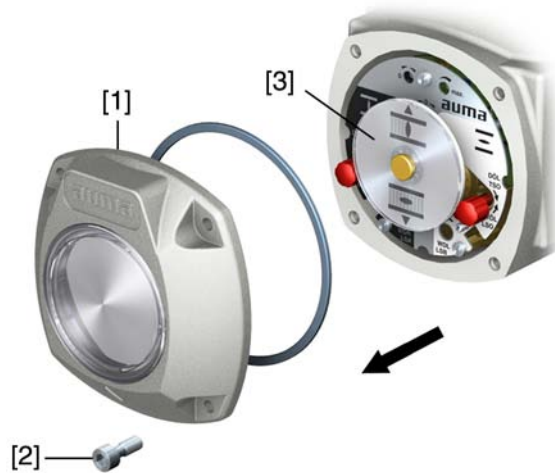
Feedback signal	Type and designation in wiring diagram	
<b>End position OPEN/CLOSED reached</b>	Setting via limit switching Switches: 1 NC and 1 NO (standard)	
	LSC	Limit switch, closing, clockwise rotation
	LSO	Limit switch, opening, counterclockwise rotation
<b>Intermediate position reached (option)</b>	Setting via DUO limit switching Switches: 1 NC and 1 NO (standard)	
	LSA	DUO limit switch, clockwise rotation
	LSB	DUO limit switch, counterclockwise rotation
<b>Torque OPEN/CLOSED reached</b>	Setting via torque switching Switches: 1 NC and 1 NO (standard)	
	TSC	Torque switch, closing, clockwise rotation
	TSO	Torque switch, opening, counterclockwise rotation
<b>Motor protection tripped</b>	Thermoswitches or PTC thermistors, depending on the version	
	F1, Th	Thermoswitches
	R3	PTC thermistors
<b>Running indication (option)</b>	Switches: 1 NC (standard)	
	S5, BL	Blinker transmitter
<b>Valve position (option)</b>	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)
<b>Manual operation active (option)</b>		Switches

## 9. Commissioning

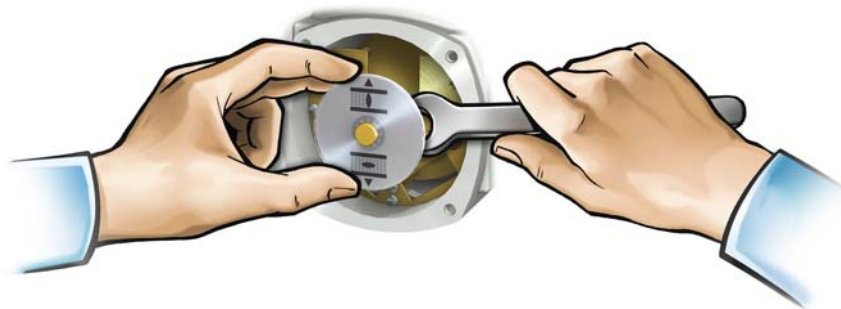
### 9.1. Switch compartment: open

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

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.



### 9.2. 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.

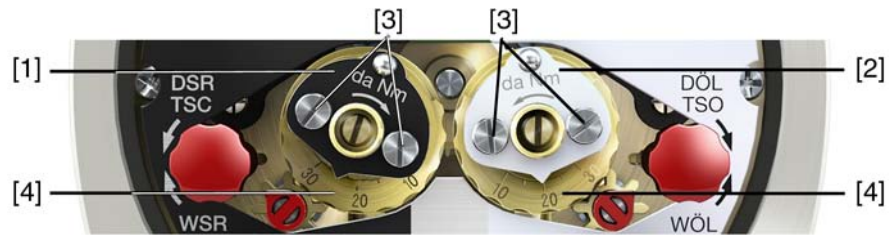
#### NOTICE

#### 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 19: 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.

### 9.3. Limit switching: set

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

Figure 20: 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

#### 9.3.1. End position CLOSED (black section): set

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

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

### 9.3.2. End position OPEN (white section): set

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

### 9.4. 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 21: Setting elements for limit switching



#### Black section:

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

#### White section:

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

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

#### 9.4.1. 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.

#### 9.4.2. 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.

#### 9.5. Test run

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

#### 9.5.1. Direction of rotation: check

##### NOTICE

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

- If the direction of rotation is wrong, switch off immediately.
- Correct phase sequence.
- Repeat test run.

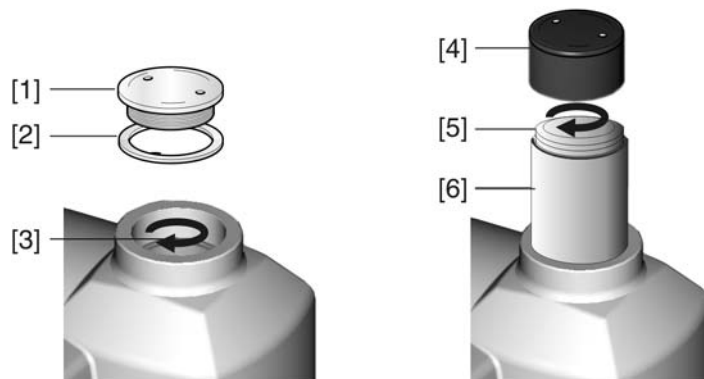
1. Move actuator manually to intermediate position or to sufficient distance from end position.
2. Switch on actuator in running direction CLOSE and observe the direction of rotation:  
with indicator disc: step 3  
without indicator disc: step 4 (hollow shaft)  
→ Switch off before reaching the end position.

3. With indicator disc:
  - Observe direction of rotation.
  - The direction of rotation is correct, if **actuator runs in direction CLOSE** and **indicator disc turns counterclockwise**.



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

Figure 22: Hollow shaft/stem



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

### 9.5.2. Limit switching: check

1. Move actuator manually into both end positions of the valve.
  - The limit switching is set correctly if:
    - LSC switch trips in end position CLOSED
    - LSO switch trips in end position OPEN
    - the switches release the contacts after turning back the handwheel
2. If the end position setting is incorrect: Reset limit switching.
3. If the end position setting is correct and no options (e.g. potentiometer, position transmitter) are available: Close switch compartment.

## 9.6. 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 4: 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 $U_V$ <sup>1)</sup>	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 $\Omega$	$(U_V - 12 V)/20 \text{ mA}$
Impact of power supply		0.1 %
Load influence		0.1 %
Temperature impact		< 0.1 %/K
Ambient temperature <sup>2)</sup>		-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 23: 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 5: 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

**9.6.1. 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>.

**9.6.2. 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 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)

### 9.6.3. 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 6: 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

### 9.7. Potentiometer

#### — Option —

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

#### 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 24: View on control unit



[1] Potentiometer

#### 9.7.1. 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).

## 9.8. 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 7: 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 $U_V$ <sup>1)</sup>	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 $\Omega$	$(U_V - 14 V)/20 \text{ mA}$
Impact of power supply	0.1 %/V	0.1 %/V
Load influence	0.1 %/(0 – 600 $\Omega$ )	0.1 %/100 $\Omega$
Temperature impact	< 0.3 %/K	
Ambient temperature <sup>2)</sup>	–60 °C to +80 °C	
Transmitter potentiometer	5 k $\Omega$	

- 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 25: 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].

### 9.8.1. 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.



**Information** If the maximum value cannot be reached, the selection of the reduction gearing must be checked.

### 9.9. Mechanical position indicator: set



#### — Option —

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



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

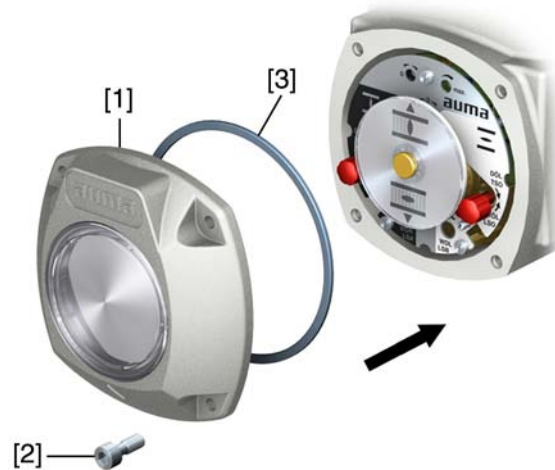


6. Move valve to end position CLOSED again.
7. Check settings:
  - If the symbol  (CLOSED) is no longer in alignment with mark  on the cover:
    - 7.1 Repeat setting procedure.
    - 7.2 Check whether the appropriate reduction gearing has been selected, if required.

**9.10. Switch compartment: close****NOTICE****Danger of corrosion due to damage to paint finish!**

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

1. Clean sealing faces of housing and cover.
2. 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. Place cover [1] on switch compartment.
5. Fasten screws [2] evenly crosswise.

## 10. Corrective action

### 10.1. Faults during commissioning

Table 8: Faults during commissioning

Fault	Description/cause	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
In spite of correct setting of limit switching, actuator operated into the valve end position.	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.	<ul style="list-style-type: none"> <li>Determine overrun: Overrun = travel covered from switching off until complete standstill.</li> <li>Set limit switching again considering the overrun (turn handwheel back by the amount of the overrun).</li> </ul>
No value can be measured at measuring points of the RWG.	Current loop across RWG is open. (Position feedback 0/4 – 20 mA is only possible if the current loop is closed across the RWG.)	<ul style="list-style-type: none"> <li>Connect link across RWG to XK (terminals 23/24)</li> <li>Connect external load to XK, e.g. remote indication.</li> <li>Observe maximum load <math>R_B</math>.</li> </ul>
Measuring range 0/4 – 20 mA or maximum value 20 mA at position transmitter cannot be set or supplies an incorrect value.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
The measuring range 0/4 – 20 mA at EWG position transmitter cannot be set.	The LED on the EWG either flashes in setting mode a) single flash or b) triple flash:  a) EWG is not calibrated. b) Magnet positions of EWG are not aligned.	Call AUMA service.
Limit and/or torque switches do not trip.	Switch is defective or switch setting is incorrect.	<ul style="list-style-type: none"> <li>Check setting, if required, reset end positions.</li> <li>Refer to &lt;Check switches&gt; and replace the switches if required.</li> </ul>

#### Switch check

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



- Turn test button [1] in direction of the TSC arrow: Torque switch CLOSED trips.
- Turn test button [2] in direction of the TSO arrow: Torque switch OPEN trips.

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

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

### 10.2. Motor protection (thermal monitoring)

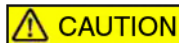
In order to protect against overheating and impermissibly high temperatures at the actuator, PTC thermistors or thermostiches are embedded in the motor winding. They trip as soon as the max. permissible winding temperature has been reached.

Corrective action

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<b>Behaviour during failure</b>	If the signals are correctly wired within the controls, the actuator is stopped and can only resume its operation once the motor has cooled down.
<b>Possible causes</b>	Overload, running time exceeded, max. number of starts exceeded, ambient temperature is too high.
<b>Remedy</b>	Check cause, eliminate if possible.

## 11. Servicing and maintenance



### Damage caused by inappropriate maintenance!

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

### AUMA Service & Support

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

### 11.1. Preventive measures for servicing and safe operation

The following measures are required to ensure safe device operation:

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

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

Figure 26: Output drive type A



- [1] Output drive type A
- [2] Grease nipple

Table 9: Grease quantities for bearing of output drive type A

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

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

#### For enclosure protection IP68

After continuous immersion:

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

### 11.2. Maintenance

- Lubrication**
  - In the factory, the gear housing is filled with grease.

- Grease change is performed during maintenance
  - Generally after 4 to 6 years for modulating duty.
  - Generally after 6 to 8 years if operated frequently (open-close duty).
  - Generally after 10 to 12 years if operated rarely (open-close duty).
- We recommend exchanging the seals when changing the grease.
- No additional lubrication of the gear housing is required during operation.

### 11.3. Disposal and recycling

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

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

The following generally applies:

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

## 12. Technical data

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

### 12.1. Technical data Multi-turn actuators

Features and functions	
Type of duty	Standard: Short-time duty S2 - 15 min (multi-turn actuators for open-close duty) Intermittent duty S4 - 25 % (multi-turn actuators for modulating duty)
	Option: Short-time duty S2 - 30 min (multi-turn actuators for open-close duty) Intermittent duty S4 - 50 % (multi-turn actuators for modulating duty) Intermittent duty S5 - 25 % (multi-turn actuators for modulating duty) S5 - 25 % only in combination with insulation class H
	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
	Option: 1-phase AC motor, type IM B9 according to IEC 60034 DC shunt motor, type IM B14 according to IEC 60034 DC compound motor, type IM B14 according to IEC 60034
Mains voltage, mains frequency	Refer to motor name plate Permissible variation of mains voltage: $\pm 10\%$ Permissible variation of mains frequency: $\pm 5\%$ (for 3-phase AC and 1-phase AC current)
Overvoltage category	Category III according to IEC 60364-4-443
Insulation class	Standard: F, tropicalized
	Option: H, tropicalized
Motor protection	Standard: 3-phase and 1-phase AC motors: Thermostiches (NC) DC motors: Without
	Option: PTC thermistors (according to DIN 44082) <sup>1)</sup>
Self-locking	Self-locking: Output speeds up to 90 rpm (50 Hz), 108 rpm (60 Hz) NOT self-locking: Output speeds up to 125 rpm (50 Hz), 150 rpm (60 Hz) Multi-turn actuators are self-locking, if the valve position cannot be changed from standstill while torque acts upon the output drive.
Motor heater (option)	Voltages: 110 – 120 V AC, 220 – 240 V AC or 400 V AC (externally supplied)
	Power depending on the size 12.5 – 25 W
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation.
	Option: Handwheel lockable Handwheel stem extension Power tool for emergency operation with square 30 mm or 50 mm
Indication for manual operation (option)	Indication whether manual operation is active/not active via single switch (1 change-over contact)
Electrical connection	Standard: AUMA plug/socket connector with screw-type connection Motor connection for some DC motors via separate motor terminal board
	Option: Terminals or crimp connection Gold-plated control plug (sockets and plugs)
Threads for cable entries	Standard: Metric threads
	Option: Pg-threads, NPT-threads, G-threads
Terminal plan	Terminal plan according to order number enclosed with delivery
Valve attachment	Standard: B1 according to EN ISO 5210
	Option: A, B2, B3, B4 according to EN ISO 5210 A, B, D, E according to DIN 3210 C according to DIN 3338
	Special output drive types: AF, AK, AG, B3D, ED, DD, IB1, IB3 A prepared for permanent lubrication of stem

1) PTC thermistors additionally require a suitable tripping device within the controls

## Technical data

Electromechanical control unit	
Limit switching	Counter gear mechanism for end positions OPEN and CLOSED Turns per stroke: 2 to 500 (standard) or 2 to 5,000 (option)
	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	$2 \times 10^6$ starts
<b>Silver plated contacts:</b>	
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, $L/R = 3 \mu s$ ) 7 A at 30 V (resistive load) 5 A at 30 V (inductive load, $L/R = 3 \mu s$ )
<b>Gold plated contacts</b>	
U min.	5 V
U max.	30 V
I min.	4 mA
I max.	400 mA

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



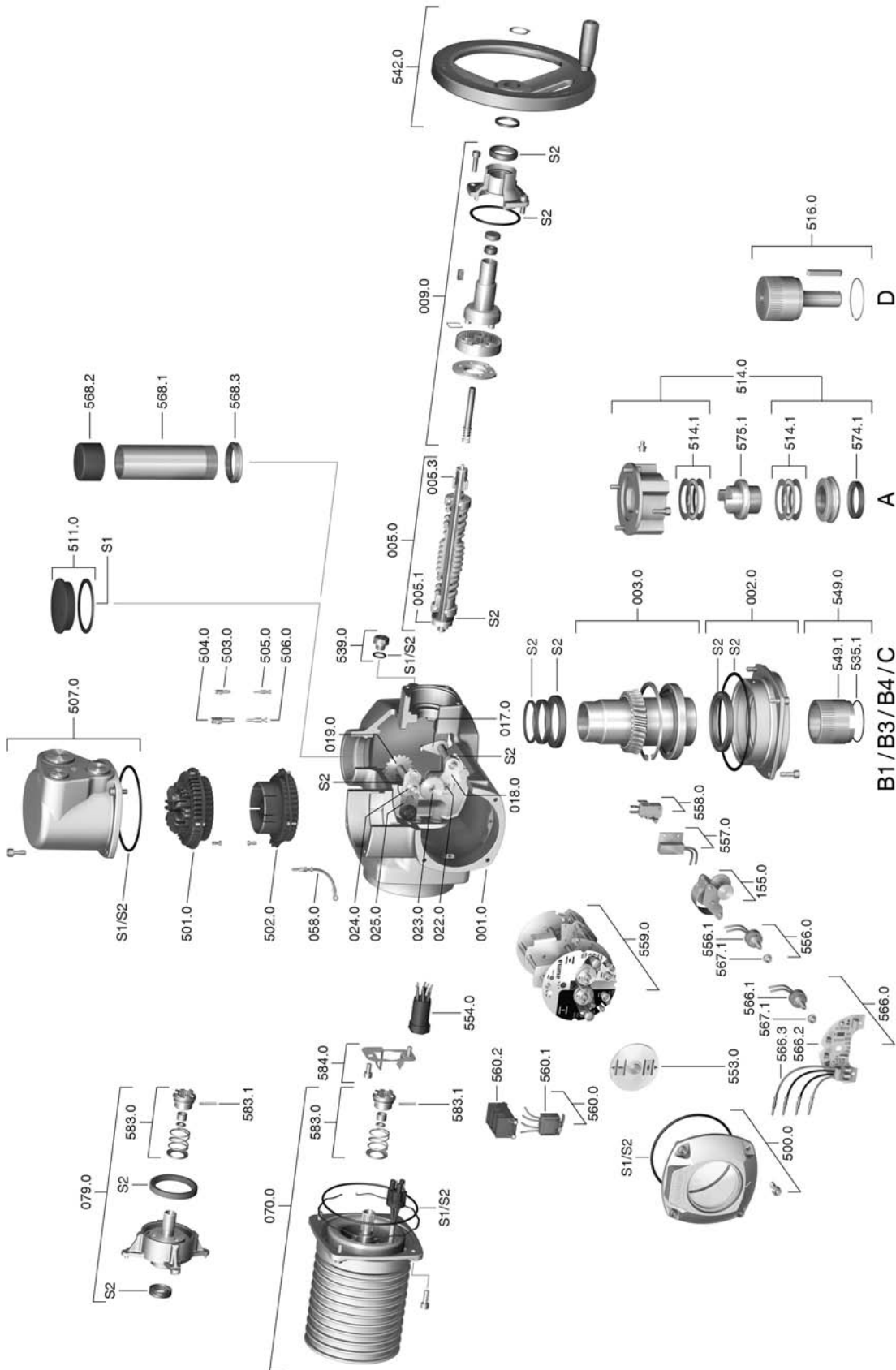
Technical data for handwheel activation switches	
Mechanical lifetime	10 <sup>6</sup> starts
<b>Silver plated contacts:</b>	
U min.	12 V DC
U max.	250 V AC
I max. AC current	3 A at 250 V (inductive load, cos phi = 0.8)
I max. DC current	3 A at 12 V (resistive load)

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, please contact AUMA
Ambient temperature	Standard: -40 °C to +80 °C -40 °C to +60 °C (multi-turn actuators for modulating duty with DC motors)
	Options: -50 °C to +60 °C (1-phase AC motors) -60 °C to +60 °C (3-phase AC motors) 0 °C to +120 °C (multi-turn actuators for modulating duty with 3-phase AC motors) For exact version, refer to actuator name plate.
Enclosure protection according to EN 60529	Standard: IP68 For special motors differing enclosure protection: refer to name plate.
	Option: 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"> <li>• Depth of water: maximum 8 m head of water</li> <li>• Duration of continuous immersion in water: max. 96 hours</li> <li>• Up to 10 operations during flooding.</li> </ul> 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 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 installation in industrial units, in water or power plants with a low pollutant concentration as well as for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. wastewater treatments plants, chemical industry)
	Option: KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration KX-G : same as KX, however aluminium-free version (outer parts)
Finish coating	Powder coating Two-component iron-mica combination
Colour	Standard: AUMA silver-grey (similar to RAL 7037)
	Option: Other colours are possible on request.
Lifetime	AUMA multi-turn actuators meet or exceed the lifetime requirements of EN 15714-2. For further details, please contact AUMA

Further information	
EU Directives	Electromagnetic Compatibility (EMC): (2004/108/EC) Low Voltage Directive: (2006/95/EC) Machinery Directive: (2006/42/EC)

### 13. Spare parts

#### 13.1. Multi-turn actuators SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2



**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
001.0	Housing	Sub-assembly	539.0	Screw plug	Sub-assembly
002.0	Bearing flange	Sub-assembly	542.0	Handwheel with ball handle	Sub-assembly
003.0	Hollow shaft	Sub-assembly	549.0	Output drive B1/B3/B4/C	Sub-assembly
005.0	Drive shaft	Sub-assembly	549.1	Output drive sleeve B1/B3/B4/C	
005.1	Motor coupling		553.0	Mechanical position indicator	Sub-assembly
005.3	Manual drive coupling		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		558.0	Blinker transmitter including pins at wires (without impulse disc and insulation plate)	Sub-assembly
022.0	Drive pinion II for torque switching	Sub-assembly	559.0-1	Control unit with torque switching heads and switches	Sub-assembly
023.0	Output drive wheel for limit switching	Sub-assembly	559.0-2	Control unit with magnetic limit and torque transmitter (MWG) for Non-intrusive version in combination with AUMATIC integral controls	Sub-assembly
024.0	Drive wheel for limit switching	Sub-assembly	560.0-1	Switch stack for direction OPEN	Sub-assembly
025.0	Locking plate	Sub-assembly	560.0-2	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 (SA/SAR 07.2 — 16.2 for VD motor)	Sub-assembly	566.0	Position transmitter EWG/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	Socket carrier (complete with sockets)	Sub-assembly	566.3	Wire harness for RWG	Sub-assembly
502.0	Pin carrier without pins	Sub-assembly	567.1	Slip clutch for potentiometer	Sub-assembly
503.0	Socket for controls	Sub-assembly	568.1	Stem protection tube (without cap)	
504.0	Socket for motor	Sub-assembly	568.2	Cap for stem protection tube	
505.0	Pin for controls	Sub-assembly	568.3	V-seal	
506.0	Pin for motor	Sub-assembly	574.1	Radial seal for output drive type A with ISO flange	
507.0	Cover for electrical connection	Sub-assembly	575.1	Stem nut A (without thread)	
511.0	Threaded plug	Sub-assembly	583.0	Motor coupling on motor shaft	Sub-assembly
514.0	Output drive form A (without stem nut)	Sub-assembly	583.1	Pin for motor coupling	
514.1	Axial needle roller bearing	Sub-assembly	584.0	Retaining spring for motor coupling	Sub-assembly
516.0	Output drive D		S1	Seal kit, small	Set
535.1	Snap ring		S2	Seal kit, large	Set

## 14. Certificates

### 14.1. Declaration of Incorporation and EC Declaration of Conformity

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 79379 Müllheim, Germany        Riester@auma.com  
 www.auma.com



#### Original Declaration of Incorporation of Partly Completed Machinery (EC Directive 2006/42/EC) and EC Declaration of Conformity in compliance with the Directives on EMC and Low Voltage

for electric AUMA Actuators of the type ranges

<b>Multi-turn actuators</b>	<b>SA 07.2 – SA 16.2 and SAR 07.2 – SAR 16.2</b>
<b>Part-turn actuators</b>	<b>SQ 05.2 – SQ 14.2 and SQR 05.2 – SQR 14.2</b>

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

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

**(2) 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.

Y006.332/003/en





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