



Multi-turn actuators

SA 07.1 – SA 16.1/SAR 07.1 – SAR 16.1

AUMA NORM (without controls)



Read operation instructions first.

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

Purpose of the document:

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

Table of contents	Page
1. Safety instructions.....	4
1.1. Basic information on safety	4
1.2. Range of application	4
1.3. Applications in Ex zone 22 (option)	5
1.4. Warnings and notes	5
1.5. References and symbols	6
2. Identification.....	7
2.1. Name plate	7
2.2. Short description	7
3. Transport, storage and packaging.....	8
3.1. Transport	8
3.2. Storage	8
3.3. Packaging	8
4. Assembly.....	9
4.1. Mounting position	9
4.2. Handwheel fitting	9
4.3. Multi-turn actuator: mount to valve/gearbox	10
4.3.1 Output drive types B, B1 – B4 and E	10
4.3.1.1 Multi-turn actuator (with output drive types B1 – B4 or E): mount to valve/gearbox	10
4.3.2 Output drive type A	11
4.3.2.1 Stem nut: finish machining	11
4.3.2.2 Multi-turn actuator (with output drive A): mount to valve	12
4.4. Accessories for assembly	13
4.4.1 Stem protection tube for rising valve stem	13
5. Electrical connection.....	14
5.1. Basic information	14
5.2. Connection with AUMA plug/socket connector	15
5.2.1 Terminal compartment: open	15
5.2.2 Cable connection	16
5.2.3 Terminal compartment: close	17
5.3. Accessories for electrical connection	18
5.3.1 Parking frame	18
5.3.2 Protection cover	18
5.3.3 Double sealed intermediate frame	18
5.3.4 Earth connection, external	18

6.	Operation.....	20
6.1.	Manual operation	20
6.1.1	Manual operation: engage	20
6.1.2	Manual operation: disengage	20
6.2.	Motor operation	21
7.	Indications.....	22
7.1.	Mechanical position indicator/running indication	22
8.	Signals.....	23
8.1.	Feedback signals from actuator	23
9.	Commissioning.....	24
9.1.	Switch compartment: open	24
9.2.	Torque switching: set	24
9.3.	Limit switching: set	25
9.3.1	End position CLOSED (black section): set	25
9.3.2	End position OPEN (white section): set	26
9.4.	Intermediate positions: set	26
9.4.1	Running direction CLOSE (black section): set	27
9.4.2	Running direction OPEN (white section): set	27
9.5.	Test run	27
9.5.1	Direction of rotation: check	27
9.5.2	Limit switching: check	28
9.6.	Potentiometer setting	29
9.7.	Electronic position transmitter RWG: set	29
9.8.	Mechanical position indicator: set	30
9.9.	Switch compartment: close	31
10.	Corrective action.....	32
10.1.	Faults during commissioning	32
10.2.	Motor protection (thermal monitoring)	32
11.	Servicing and maintenance.....	33
11.1.	Preventive measures for servicing and safe operation	33
11.2.	Maintenance	33
11.3.	Disposal and recycling	34
12.	Technical data.....	35
12.1.	Features and functions of actuator	35
12.2.	Service conditions	36
12.3.	Further information	37
13.	Spare parts.....	38
13.1.	Multi-turn actuators SA 07.1 – SA 16.1/SAR 07.1 – SAR 16.1	38
14.	Certificates.....	40
14.1.	Declaration of Incorporation and EC Declaration of Conformity	40
15.	Index.....	43
	Addresses.....	45

1. Safety instructions

1.1 Basic information on safety

Standards/directives	<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>
Safety instructions/warnings	<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>
Qualification of staff	<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>
Commissioning	<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>
Operation	<p>Prerequisites for safe and smooth operation:</p> <ul style="list-style-type: none"> • 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	<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>
Maintenance	<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 operation
- 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 IP 67 or IP 68 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 prerequisites 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 IP 67.
- 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 screw 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

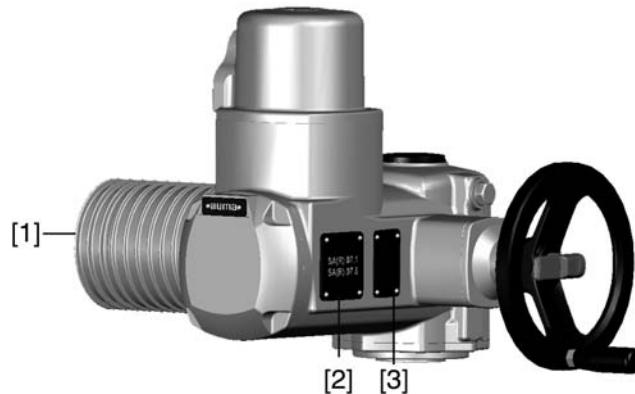
Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

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)

Data for identification

Figure 2: Actuator name plate



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

Type and size

These instructions apply to the following devices:

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

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

Version: NORM (without actuator controls)

Commission number

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

2.2 Short description

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 controls at a later date. The local controls are included in the AUMA controls. For enquiries and more information, please state our commission no. (refer to actuator name plate).

3. Transport, storage and packaging

3.1 Transport

For transport to place of installation, use sturdy packaging.



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

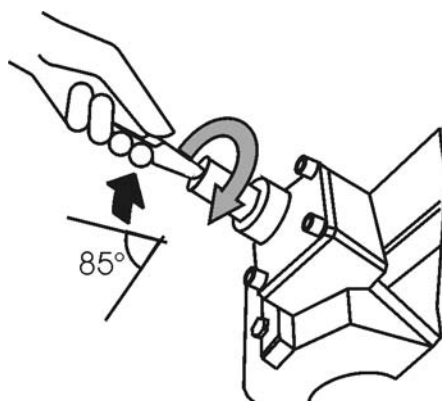
Information For transport purposes, handwheels from a diameter of 400 mm are supplied separately.

NOTICE

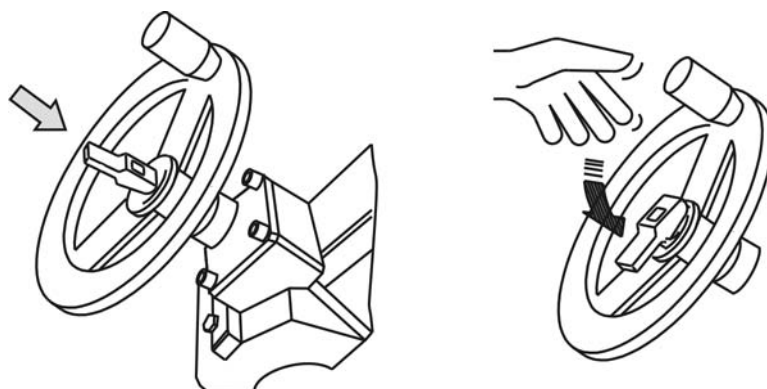
Damage at the change-over mechanism due to incorrect assembly!

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

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



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



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

4.3 Multi-turn actuator: mount to valve/gearbox

NOTICE

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

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

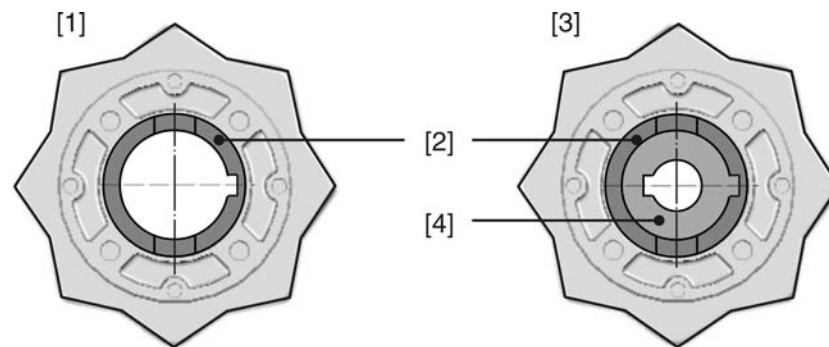
4.3.1 Output drive types B, B1 – B4 and E

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

Design Output drive bore with keyway:

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

Figure 5: Output drives



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

Information Spigot at flanges should be loose fit.

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

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

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

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

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

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

Table 1: Tightening torques for screws

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

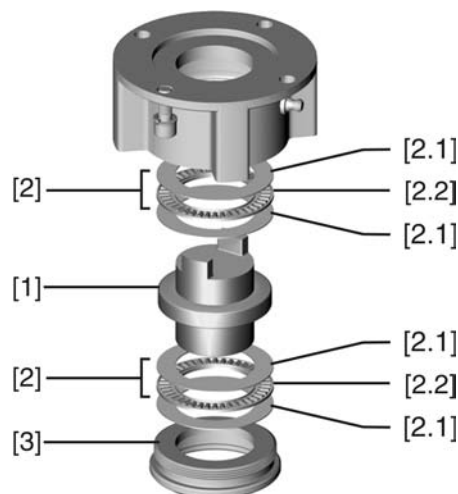
4.3.2 Output drive type A

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

4.3.2.1 Stem nut: finish machining

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

Figure 6: Design of output drive type A

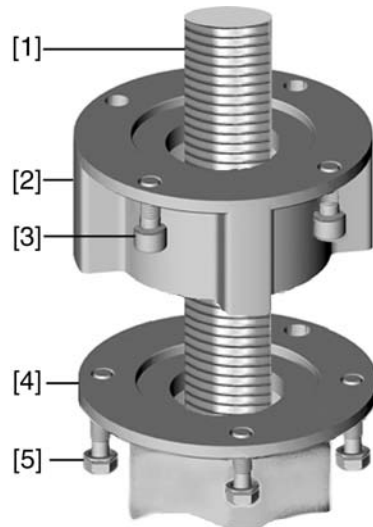


- [1] Stem nut
 [2] Bearing
 [2.1] Bearing race
 [2.2] Bearing rim
 [3] Spigot ring

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 A): mount to valve

Figure 7: Assembly with output drive type A



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

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

Table 2: Tightening torques for screws

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

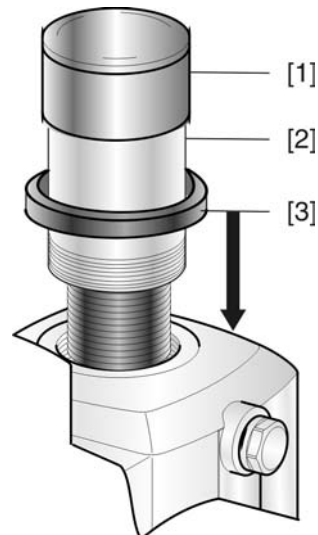
11. Turn multi-turn actuator with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

4.4 Accessories for assembly

4.4.1 Stem protection tube for rising valve stem

— Option —

Figure 8: 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 is attached to the device in a weather-proof bag, together with these operation instructions. It can also be obtained from AUMA (state commission no., refer to name plate) or downloaded directly from the Internet (www.auma.com).

NOTICE

Valve damage for connection without controls!

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

Delay time

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

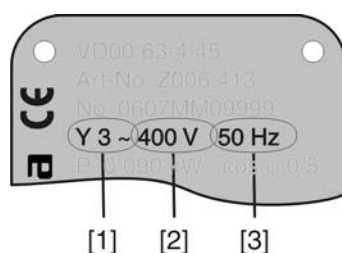
Limit and torque switches can be provided as single, tandem, or triple switches. Only the same potential can be switched on the two circuits (NC/NO contact) of each single switch. If different potentials are to be switched simultaneously, tandem switches or triple switches are required. When using tandem/triple 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 9: 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

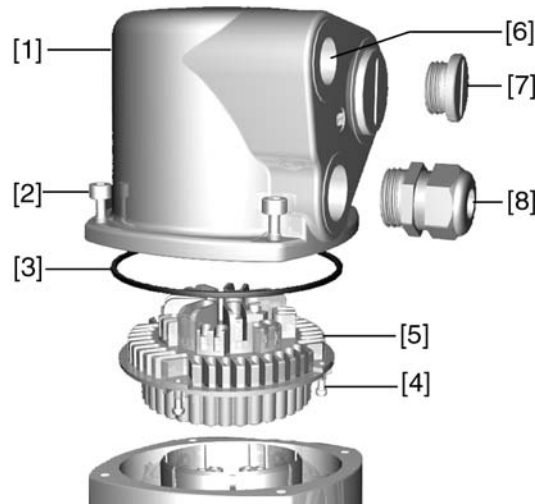
Cross sections AUMA plug/socket connector:

- Power terminals (U1, V1, W1, U2, V2, W2): max. 6 mm² flexible/10 mm² solid
- PE connection Ⓢ: max. 6 mm² flexible/10 mm² solid
- Control contacts (1 to 50): max. 2.5 mm²

Information For some special motors, the connection of the power terminals (U1, V1, W1, U2, V2, W2) is **not** performed via the AUMA plug/socket connector but via a terminal board at the motor.

5.2.1 Terminal compartment: open

Figure 10: 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)



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. Example: Name plate shows enclosure protection IP 68.



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.
 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.



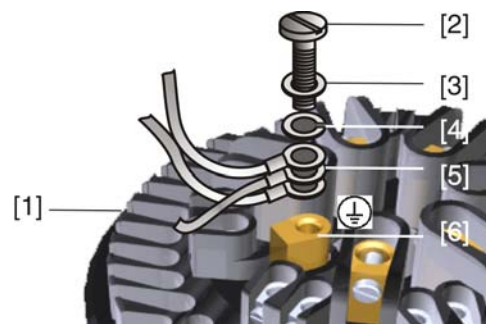
In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!

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 12: PE connection



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

NOTICE**Danger of motor damage if PTC thermistors or thermostiches are not connected!**

Our warranty for the motor will lapse if the motor protection is not connected.

→ Connect PTC thermistors or thermostiches to external controls.

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

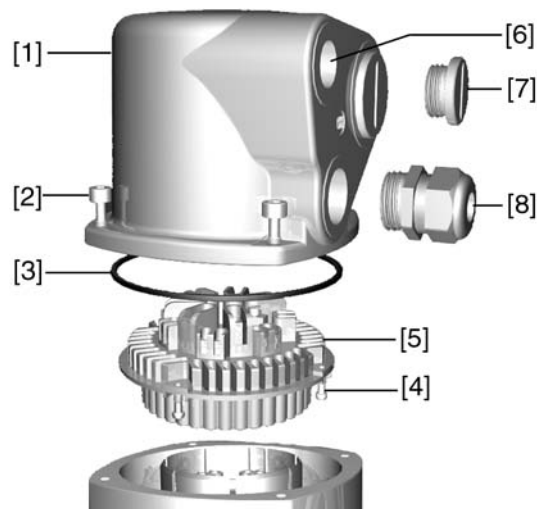
→ After mounting, commission the device immediately to ensure that heater minimises condensation.

Information

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

5.2.3 Terminal compartment: close

Figure 13: 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

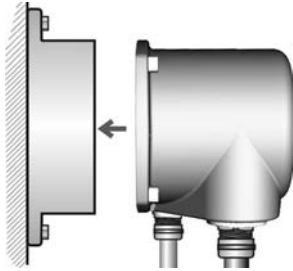
— Option —

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 14: Parking frame



5.3.2 Protection cover

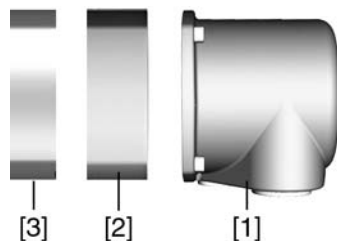
Protection cover for plug compartment when plug is removed.

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 (IP 68) will not be affected, even if the electrical connection [1] is removed.

Figure 15: Electrical connection with double sealed intermediate frame

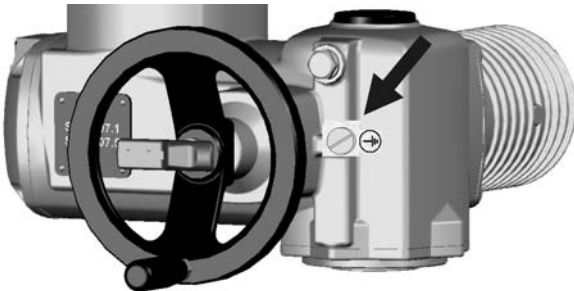


- [1] Electrical connection
- [2] Double sealed intermediate frame
- [3] Actuator housing

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 16: Earth connection



6. Operation

6.1 Manual operation

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

6.1.1 Manual operation: engage

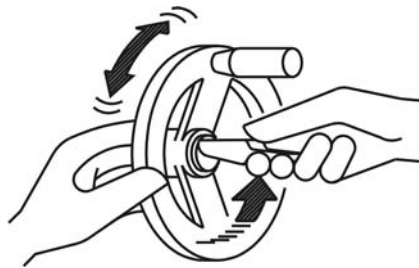
Information When using brake motors, note that the motor is disengaged during manual operation. For this reason, the brake motor cannot sustain any load during manual operation. The load must be sustained via the handwheel.

NOTICE

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

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

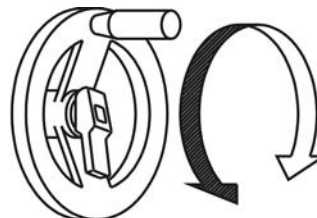
1. Pivot change-over lever manually to approx. 85° while slightly turning the handwheel back and forth until manual operation engages.



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



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



6.1.2 Manual operation: disengage

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

6.2 Motor operation

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

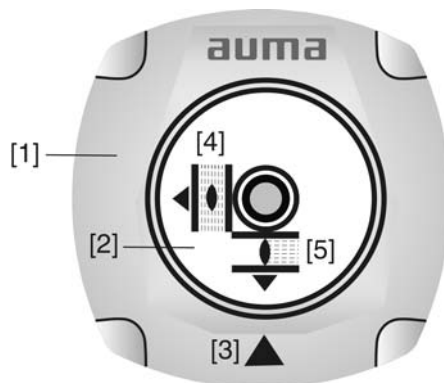
7.1 Mechanical position indicator/running indication

— 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 20: Mechanical position indicator



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

8. Signals

8.1 Feedback signals from actuator

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

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

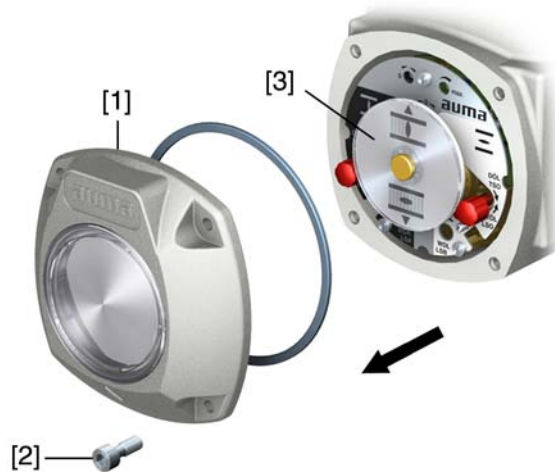
9. Commissioning

9.1 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.

Figure 21:

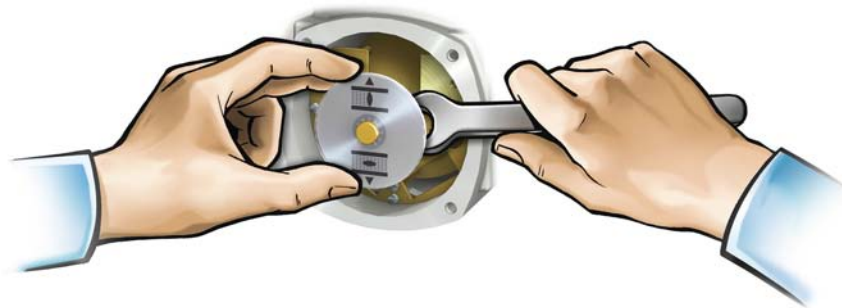


2. If indicator disc [3] is available:

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

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

Figure 22:



9.2 Torque switching: set

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

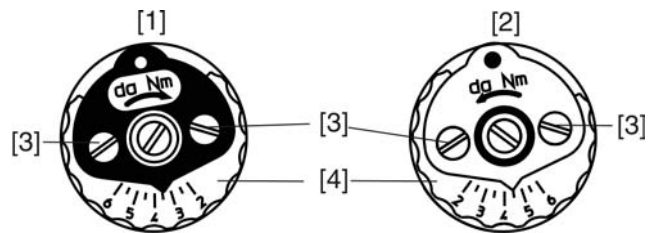
Information The torque switches may also trip during manual operation.

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 23: Torque switching heads



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

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

Information: Maximum tightening torque: 0.3 – 0.4 Nm

➔ The torque switch setting is complete.

Example: The figure above shows the following settings:

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

9.3 Limit switching: set

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

Figure 24: 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

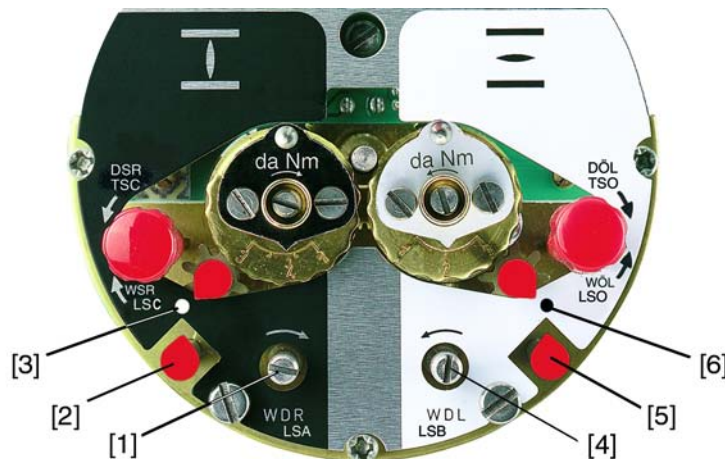
1. Engage manual operation.
2. Turn handwheel counterclockwise until valve is open.
3. Turn handwheel by approximately half a turn (overrun) in the opposite direction.
4. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet 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 25: 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.

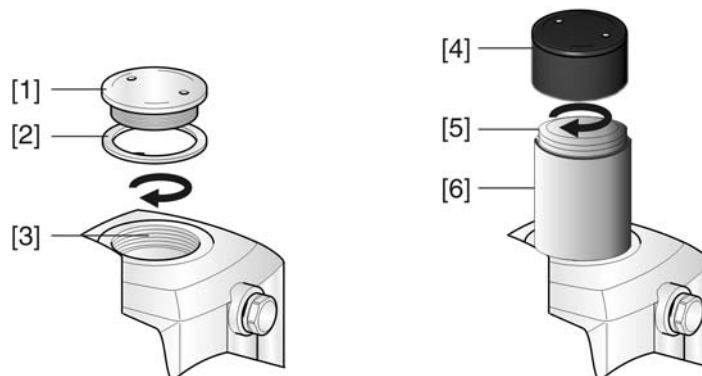
1. Move actuator manually to intermediate position or to sufficient distance from end position.
2. Switch on actuator in running direction CLOSE and observe the direction of rotation:
with indicator disc: step 3
without indicator disc: step 4 (hollow shaft)
→ Switch off before reaching the end position.

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 screw 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 27: Hollow shaft/stem



- [1] Screw 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 Potentiometer setting

— Option —

The potentiometer as travel sensor records the valve position.

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

Figure 28: View of control unit



[1] Potentiometer

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

9.7 Electronic position transmitter RWG: set

— Option —

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

Table 3: Technical data RWG 4020

Wiring		3- or 4-wire system	2-wire system
Terminal plan	KMS	TP_4/ _ _ _	TP_4 / _ _ _ TP_5 / _ _ _
Output current	I_A	0 – 20 mA, 4 – 20 mA	4 – 20 mA
Power supply	U_V	24 V DC, $\pm 15\%$ smoothed	14 V DC $+(I \times R_B)$, max. 30 V
Max. current consumption	I	24 mA at 20 mA output current	20 mA
Max. load	R_B	600 Ω	$(U_V - 14 V) / 20 \text{ mA}$

Figure 29: View of control unit





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

1. Connect voltage to electronic position transmitter.
2. Move valve to end position CLOSED.
3. Connect ammeter for 0 – 20 mA to measuring points [4 and 5]. If no value can be measured:
 - 3.1 Check, whether external load is connected to customer connection XK (terminals 23/24) (observe max. load R_B), or
 - 3.2 Connect terminals 23/24 across customer connection XK (terminals 23/24).
4. Turn potentiometer [1] clockwise to the stop.
5. Turn potentiometer [1] slightly in opposite direction.
6. Turn potentiometer [2] clockwise until output current starts to increase.
7. Turn potentiometer [2] in opposite direction until the following value is reached:
 - for 0 – 20 mA approx. 0.1 mA
 - for 4 – 20 mA approx. 4.1 mA
- ➔ This ensures that the signal remains above the dead and live zero point.
8. Move valve to end position OPEN.
9. Set potentiometer [3] to end value 20 mA.
10. Approach end position CLOSED again and check minimum value (0.1 mA or 4.1 mA). If necessary, correct the setting.


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

9.8 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.

9.9 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 4: Faults during commissioning

Fault description	Possible causes	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
Fault in end position Actuator runs to end stop although the limit switches work properly.	The overrun was not considered when setting the limit switching. The overrun is generated by the inertia of both the actuator and the valve and the delay time of the controls.	Determine overrun: Overrun = travel covered from switching off until complete standstill. Set limit switching again considering the overrun (turn handwheel back by the amount of the overrun).
Position transmitter RWG No value can be measured at measuring points.	Current loop via RWG is open. (Position feedback 0/4 – 20 mA only functions if the current loop is closed across the RWG.)	Connect terminals 23/24 to XK across RWG. Connect external load to XK, e.g. remote indication. Consider maximum load R_B .
Position transmitter RWG Measurement range 4 – 20 mA or maximum value 20 mA cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
Limit and/or torque switches do not trip.	Switch is defective or switch setting is incorrect.	Check setting, if required, reset end positions. → Check switches and replace them, if required.

Switch check

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



1. Turn test button [1] in direction of the TSC arrow: Torque switch CLOSED trips.
 2. Turn test button [2] in direction of the TSO arrow: Torque switch OPEN trips.
- If the actuator is equipped with a DUO limit switching (option), the intermediate position switches (LSA and LSB) will be operated at the same time as the torque switches.
1. Turn test button [1] in direction of the LSC arrow: Limit switch CLOSED trips.
 2. Turn test button [2] in direction of the LSO arrow: Limit switch OPEN trips.

10.2 Motor protection (thermal monitoring)

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

Behaviour during failure

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

Possible causes

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

Remedy

Check cause, eliminate if possible.

11. Servicing and maintenance



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.
- Only perform servicing and maintenance tasks when the device is switched off.

Service

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

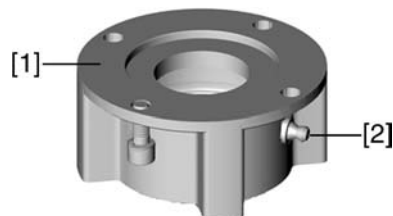
11.1 Preventive measures for servicing and safe operation

The following measures are required to ensure safe device operation:

6 months after commissioning and then every year

- Carry out visual inspection:
Cable entries, cable glands, blanking plugs, etc. have to be checked for correct tightness and sealing.
Respect torques according to manufacturer's details.
- Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>.
- When rarely operated: Perform test run.
- For 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 34: Output drive type A



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

Table 5: 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] ¹⁾	1.5	2	3	5

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

For enclosure protection IP 68

After continuous immersion:

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

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-relevant data sheet. This data sheet can be downloaded from the Internet at <http://www.auma.com> (indication of commission number required).

12.1 Features and functions of actuator

Type of duty ¹⁾	Standard: <ul style="list-style-type: none"> SA: Short-time duty S2 - 15 min SAR: Intermittent duty S4 - 25 % Options: <ul style="list-style-type: none"> SA: Short-time duty S2 - 30 min SAR: Intermittent duty S4 - 50 % SAR: Intermittent duty S5 – 25 %
Torque range	Refer to actuator name plate
Output speed	Refer to actuator name plate
Motor	Standard: 3-ph AC asynchronous motor, type IM B9 according to IEC 60034
Insulation class	Standard: F, tropicalized Option: H, tropicalized
Motor protection	Standard: Thermostats (NC) Option: PTC thermistors (according to DIN 44082) ²⁾
Self-locking	Self-locking: Output speeds up to 90 rpm (50 Hz), 108 rpm (60 Hz) NOT self-locking: Output speeds up to 125 rpm (50 Hz), 150 rpm (60 Hz) Multi-turn actuators are self-locking, if the valve position cannot be changed from standstill while torque acts upon the output drive.
Limit switching	Counter gear mechanism for end positions CLOSED and OPEN Turns per stroke: 1 to 500 (standard) or 1 to 5,000 (option) Standard: <ul style="list-style-type: none"> Single switches (1 NC and 1 NO; not galvanically isolated) for each end position Options: <ul style="list-style-type: none"> Tandem switches (2 NC and 2 NO) for each end position, switches galvanically isolated Triple switches (3 NC and 3 NO) for each end position, switches galvanically isolated Intermediate position switch (DUO limit switching), adjustable for any position
Torque switching	Torque switching adjustable for directions OPEN and CLOSE Standard: <ul style="list-style-type: none"> Single switches (1 NC and 1 NO; not galvanically isolated) for each direction Option: <ul style="list-style-type: none"> Tandem switches (2 NC and 2 NO) for each direction, switches galvanically isolated
Position feedback signal, analogue (option)	Potentiometer or 0/4 – 20 mA (RWG)
Mechanical position indicator (option)	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED
Running indication	Blinker transmitter (standard for SA, option for SAR)
Motor heater (option)	Voltages: 110 – 220 V AC, 220 – 240 V AC or 400 V AC Power depending on the size 12.5 – 25 W
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation. Option: Handwheel lockable
Electrical connection	Standard: AUMA plug/socket connector with screw-type connection Options: Terminals or crimp connection

Technical data

Threads for cable entries	Standard: Metric threads Options: Pg-threads, NPT-threads, G-threads
Terminal plan	Terminal plan according to commission number attached with delivery
Valve attachment	Standard: B1 according to EN ISO 5210 Options: A, B2, B3, B4 according to EN ISO 5210 A, B, D, E according to DIN 3210 C according to DIN 3338 Special output drive types: AF, B3D, ED, DD, IB1, IB3 A with stem lubrication

- 1) For nominal voltage and 40 °C ambient temperature and an average load with running torque or modulating torque according to separate technical data. The type of duty must not be exceeded.
- 2) PTC thermistors additionally require a suitable tripping device within the controls

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

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

12.2 Service conditions

Mounting position	Any position
Use	Indoor and outdoor use permissible
Enclosure protection according to EN 60529	Standard: <ul style="list-style-type: none"> • IP 67 with AUMA 3-ph AC motor/1-ph AC motor • IP 55 with DC motor For actual version, refer to actuator name plate.
Corrosion protection	Standard: KS: Suitable for installation in industrial units, in water or power plants with a low pollutant concentration as well as for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. in wastewater treatment plants, chemical industry) Options: <ul style="list-style-type: none"> • KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration • KX-G : same as KX, however aluminium-free version (outer parts)

Installation altitude	Standard: ≤ 2,000 m above sea level Option: > 2,000 m above sea level, please contact AUMA
Finish coating	Standard: Paint based on polyurethane (powder coating)
Colour	Standard: AUMA silver-grey (similar to RAL 7037)
Ambient temperature	Standard: <ul style="list-style-type: none"> • Open-close duty: –40 °C to +80 °C • Modulating duty: –40 °C to +60 °C For actual version, refer to actuator name plate.
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. Not valid in combination with gearboxes.
Lifetime	Open-close duty (operating cycles (OPEN - CLOSE - OPEN)): SA 07.1/07.5 – SA 10.1: 20,000 SA 14.1/14.5 – SA 16.1: 15,000 Modulating duty: ¹⁾ SAR 07.1/07.5 – SAR 10.1: 5.0 million modulating steps SAR 14.1/14.5 – SAR 16.1: 3.5 million modulating steps
Weight	Refer to separate technical data

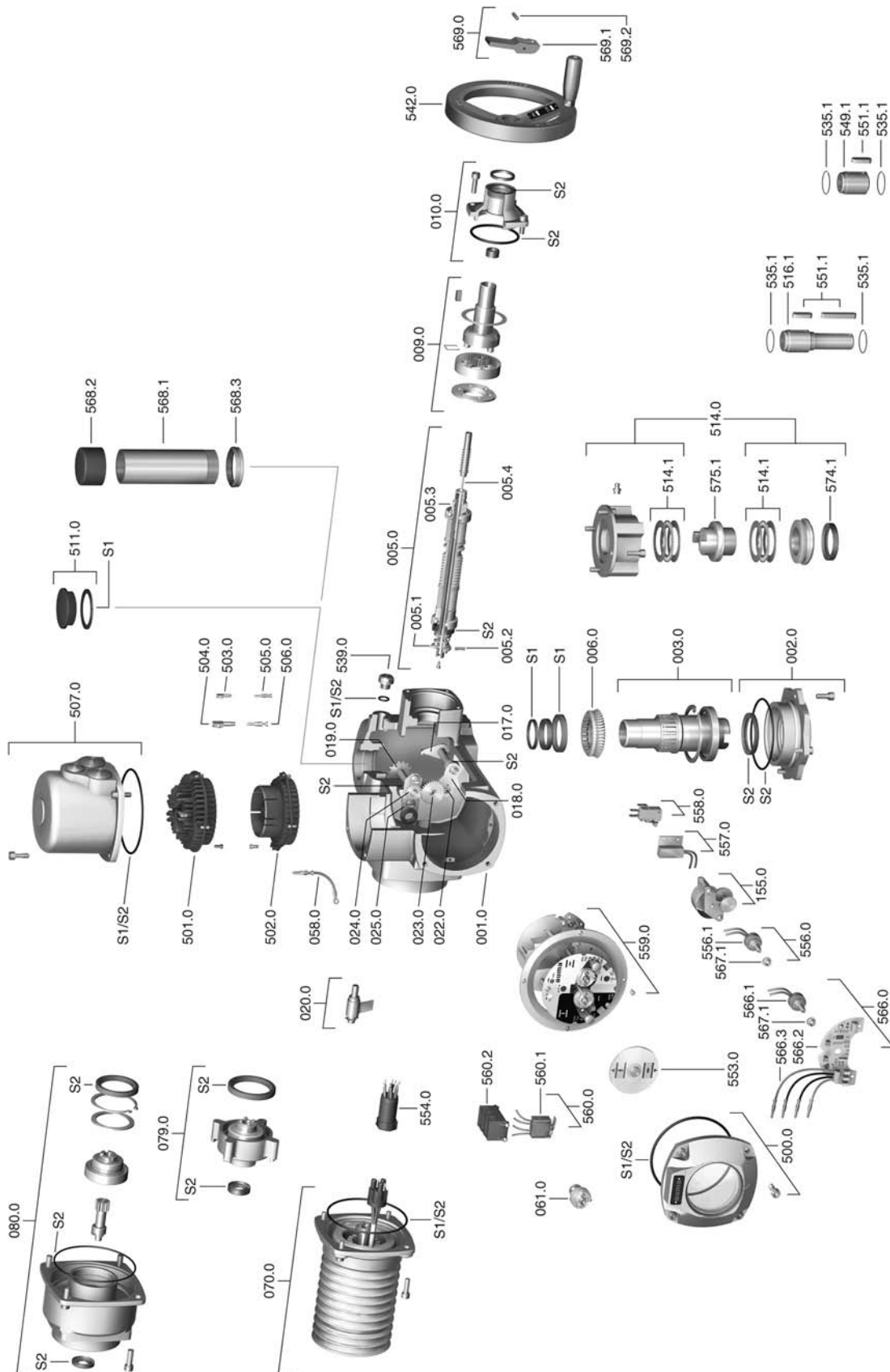
- 1) The lifetime depends on the load and the number of starts. A high starting frequency will rarely improve the modulating accuracy. To reach the longest possible maintenance and fault-free operating time, the number of starts per hour chosen should be as low as permissible for the process.

12.3 Further information

EU Directives	<ul style="list-style-type: none"> • 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 07.1 – SA 16.1/SAR 07.1 – SAR 16.1



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

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

14. Certificates

14.1 Declaration of Incorporation and EC Declaration of Conformity

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

Tel +49 7631 809-0
 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 and Low Voltage

for electric AUMA multi-turn actuators of the type ranges **SA 07.1 – SA 48.1** and **SAR 07.1 – SAR 30.1**
 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 actuators meet the following basic requirements of the EC Machinery Directive 2006/42/EC: Annex I, articles 1.1.2, 1.1.3, 1.1.5, 1.2.1; 1.2.6, 1.3.1, 1.3.7, 1.5.1, 1.6.3, 1.7.1, 1.7.3, 1.7.4

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

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

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

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

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

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

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

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

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

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

Year of affixing of the CE marking: 2010

Müllheim, 2009-12-29

H. Newerla, General Management

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

Y004.922/002/en

Index**A**

Accessories (electrical connection)	18
Accessories for assembly	13
Ambient temperature	37
Applications	4
Assembly	9

C

Commission number	7
Commissioning	4 , 24
Corrective action	32
Corrosion protection	8 , 36
Cross sections	15
Current consumption	14

D

DUO limit switching	26
Declaration of Incorporation	40
Delay time	14
Direction of rotation	27
Directives	4
Disposal	34
Double sealed	18

E

EC Declaration of Conformity	40
Earth connection	18
Electrical connection	14
Electronic position transmitter	29
Enclosure protection	36

H

Handwheel	9
-----------	---

I

Identification	7
Indications	22
Indicator disc	22 , 30
Inspection record	7
Intermediate frame	18
Intermediate positions	26

L

Limit switches	14
Limit switching	25 , 28
Lubrication	33

M

Mains frequency	14
Mains voltage	14
Maintenance	4 , 33 , 33
Manual operation	20
Mechanical position indicator	22 , 30
Motor heater	17
Motor operation	21
Motor protection	32

N

Name plate	7 , 14
------------	--------

O

Operation	4 , 20
Output drive type A	11
Output drive types B, B1, B2, B3, B4, and E	10

P

PTC thermistors	32
Packaging	8
Parking frame	18
Position indicator	30
Position transmitter RWG	29
Potentiometer	29
Power supply	14
Protection cover	18
Protection on site	14
Protective measures	4

Q

Qualification of staff	4
------------------------	---

R

RWG	29
Range of application	4
Recycling	34
Running indication	22

S

Safety instructions	4
Safety instructions/warnings	4
Service	33
Service conditions	36
Servicing	33
Short-circuit protection	14
Signals	23
Spare parts	38
Standards	4
Stem nut	11
Stem protection tube	13
Storage	8
Switch check	32
Switches	14

T

Tandem switches	14
Technical data	35
Technical data for switches	36
Terminal plan	7 , 14
Test run	27
Thermal monitoring	32
Thermoswitches	32
Torque switches	14
Torque switching	24
Transport	8
Type and size	7
Type of current	14

Index

V

Valve stem 13

W

Wiring diagram 14

Europe**AUMA Riester GmbH & Co. KG**

Plant Müllheim
DE 79373 Müllheim
 Tel +49 7631 809 - 0
 Fax +49 7631 809 - 1250
 riester@auma.com
 www.auma.com

Plant Ostfildern - Nellingen
DE 73747 Ostfildern
 Tel +49 711 34803 - 0
 Fax +49 711 34803 - 3034
 riester@wof.auma.com

Service-Center Köln
DE 50858 Köln
 Tel +49 2234 2037 - 900
 Fax +49 2234 2037 - 9099
 service@sck.auma.com

Service-Center Magdeburg
DE 39167 Niederndodeleben
 Tel +49 39204 759 - 0
 Fax +49 39204 759 - 9429
 Service@scm.auma.com

Service-Center Bayern
DE 85386 Eching
 Tel +49 81 65 9017- 0
 Fax +49 81 65 9017- 2018
 Riester@scb.auma.com

AUMA Armaturentriebe GmbH
AT 2512 Tribuswinkel
 Tel +43 2252 82540
 Fax +43 2252 8254050
 office@auma.at
 www.auma.at

AUMA (Schweiz) AG
CH 8965 Berikon
 Tel +41 566 400945
 Fax +41 566 400948
 RettichP.ch@auma.com

AUMA Servopohony spol. s.r.o.
CZ 250 01 Brandýs n.L.-St.Boleslav
 Tel +420 326 396 993
 Fax +420 326 303 251
 auma-s@auma.cz
 www.auma.cz

OY AUMATOR AB
FI 02230 Espoo
 Tel +358 9 5840 22
 Fax +358 9 5840 2300
 auma@aumator.fi
 www.aumator.fi

AUMA France S.A.R.L.
FR 95157 Taverny Cedex
 Tel +33 1 39327272
 Fax +33 1 39321755
 info@auma.fr
 www.auma.fr

AUMA ACTUATORS Ltd.
UK Clevedon, North Somerset BS21 6TH
 Tel +44 1275 871141
 Fax +44 1275 875492
 mail@auma.co.uk
 www.auma.co.uk

AUMA ITALIANA S.r.l. a socio unico
IT 20023 Cerro Maggiore (MI)
 Tel +39 0331 51351
 Fax +39 0331 517606
 info@auma.it
 www.auma.it

AUMA BENELUX B.V.
NL 2314 XT Leiden
 Tel +31 71 581 40 40
 Fax +31 71 581 40 49
 office@benelux.auma.com
 www.auma.nl

AUMA Polska Sp. z o.o.
PL 41-219 Sosnowiec
 Tel +48 32 783 52 00
 Fax +48 32 783 52 08
 biuro@auma.com.pl
 www.auma.com.pl

OOO Priwody AUMA
RU 124365 Moscow a/ya 11
 Tel +7 495 221 64 28
 Fax +7 495 221 64 38
 aumarussia@auma.ru
 www.auma.ru

ERICH S ARMATUR AB
SE 20039 Malmö
 Tel +46 40 311550
 Fax +46 40 945515
 info@erichsarmatur.se
 www.erichsarmatur.se

GRØNBECH & SØNNER A/S
DK 2450 København SV
 Tel+45 33 26 63 00
 Fax+45 33 26 63 21
 GS@g-s.dk
 www.g-s.dk

IBEROPLAN S.A.
ES 28027 Madrid
 Tel+34 91 3717130
 Fax+34 91 7427126
 iberoplan@iberoplan.com

D. G. Bellos & Co. O.E.
GR 13671 Acharnai Athens
 Tel+30 210 2409485
 Fax+30 210 2409486
 info@dgbellos.gr

SIGURD SØRUM AS
NO 1300 Sandvika
 Tel+47 67572600
 Fax+47 67572610
 post@sigum.no

INDUSTRA
PT 2710-297 Sintra
 Tel+351 2 1910 95 00
 Fax+351 2 1910 95 99
 industria@talis-group.com

MEGA Endüstri Kontrol Sistemleri Tic. Ltd. Sti.
TR 06810 Ankara
 Tel+90 312 217 32 88
 Fax+90 312 217 33 88
 megaendustri@megaendustri.com.tr
 www.megaendustri.com.tr

AUMA Technology Automations Ltd.
UA 02099 Kiyiv
 Tel+38 044 586-53-03
 Fax+38 044 586-53-03
 auma-tech@aumatech.com.ua

Africa

AUMA South Africa (Pty) Ltd.
ZA 1560 Springs
 Tel +27 11 3632880
 Fax +27 11 8185248
 aumasa@mweb.co.za

A.T.E.C.
EG Cairo
 Tel +20 2 23599680 - 23590861
 Fax +20 2 23586621
 atec@intouch.com

CMR Contrôle Maintenance Régulation
TN 1002 Tunis
 Tel +216 71 903 577
 Fax +216 71 903 575
 instrum@cmr.com.tn
 www.cmr-tunisie.net

MANZ INCORPORATED LTD.
NG Port Harcourt
 Tel +234-84-462741
 Fax +234-84-462741
 mail@manzincorporated.com
 www.manzincorporated.com

America

AUMA ACTUATORS INC.
US PA 15317 Canonsburg
 Tel +1 724-743-AUMA (2862)
 Fax +1 724-743-4711
 mailbox@auma-usa.com
 www.auma-usa.com

AUMA Argentina Representative Office
AR 1609 Boulogne
 Tel/Fax +54 232 246 2283
 contacto@aumaargentina.com.ar

AUMA Automação do Brasil Ltda.
BR São Paulo
 Tel +55 11 8114-6463
 bitzco@uol.com.br

AUMA Chile Representative Office
CL 9500414 Buin
 Tel +56 2 821 4108
 Fax +56 2 281 9252
 aumachile@adsl.tie.cl

TROY-ONTOR Inc.
CA L4N 8X1 Barrie Ontario
 Tel +1 705 721-8246
 Fax +1 705 721-5851
 troy-ontor@troy-ontor.ca

Ferrostaal de Colombia Ltda.
CO Bogotá D.C.
 Tel +57 1 401 1300
 Fax+57 1 416 5489
 dorian.hernandez@ferrostaal.com
 www.ferrostaal.com

PROCONTIC Procesos y Control
 Automático
EC Quito
 Tel +593 2 292 0431
 Fax +593 2 292 2343
 info@procontic.com.ec

Corsusa International S.A.C.
PE Miraflores - Lima
 Tel +511444-1200 / 0044 / 2321
 Fax +511444-3664
 corsusa@corsusa.com
 www.corsusa.com

PASSCO Inc.
PR 00936-4153 San Juan
 Tel +18 09 78 77 20 87 85
 Fax +18 09 78 77 31 72 77
 Passco@prtc.net

Suplibarca
VE Maracaibo Estado, Zulia
 Tel +58 261 7 555 667
 Fax +58 261 7 532 259
 suplibarca@intercable.net.ve

Asia

AUMA Actuators (Tianjin) Co., Ltd.
CN 300457 Tianjin
 Tel +86 22 6625 1310
 Fax +86 22 6625 1320
 mailbox@auma-china.com
 www.auma-china.com

AUMA INDIA PRIVATE LIMITED
IN 560 058 Bangalore
 Tel +91 80 2839 4656
 Fax +91 80 2839 2809
 info@auma.co.in
 www.auma.co.in

AUMA JAPAN Co., Ltd.
JP 210-0848 Kawasaki-ku, Kawasaki-shi Kanagawa
 Tel +91 80 2839 4655
 Fax +81 44 366 2472
 mailbox@auma.co.jp
 www.auma.co.jp

AUMA ACTUATORS (Singapore) Pte Ltd.
SG 569551 Singapore
 Tel +65 6 4818750
 Fax +65 6 4818269
 sales@auma.com.sg
 www.auma.com.sg

AUMA Actuators Middle East W.L.L.
AE 15268 Salmabad 704
 Tel +973 17877377
 Fax +973 17877355
 Naveen.Shetty@auma.com

PERFECT CONTROLS Ltd.
HK Tsuen Wan, Kowloon
 Tel +852 2493 7726
 Fax +852 2416 3763
 joeip@perfectcontrols.com.hk

DW Controls Co., Ltd.
KR 153-702 Seoul
 Tel +82 2 2624 3400
 Fax +82 2 2624 3401
 sichoi@actuatorbank.com
 www.actuatorbank.com

Sunny Valves and Intertrade Corp. Ltd.
TH 10120 Yannawa Bangkok
 Tel +66 2 2400656
 Fax +66 2 2401095
 sunnyvalves@inet.co.th
 www.sunnyvalves.co.th/

Top Advance Enterprises Ltd.
TW Jhonghe City Taipei Hsien (235)
 Tel +886 2 2225 1718
 Fax +886 2 8228 1975
 support@auma-taiwan.com.tw
 www.auma-taiwan.com.tw

Australia

BARRON GJM Pty. Ltd.
AU NSW 1570 Artarmon
 Tel +61 294361088
 Fax +61 294393413
 info@barron.com.au
 www.barron.com.au

auma®

Solutions for a world in motion

AUMA Riester GmbH & Co. KG

P.O.Box 1362

D 79373 Muellheim

Tel +49 7631 809 - 0

Fax +49 7631 809 - 1250

riester@auma.com

www.auma.com



Y000.009/003/en/3.12