auma®
Solutions for a world in motion

Multi-turn actuators

SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2

Control unit: electromechanic

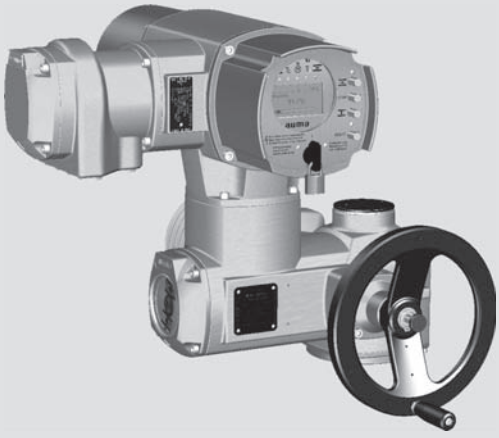
with actuator controls

AUMATIC AC 01.2 Intrusive

Control

Parallel

→ Profibus DP



Operation instructions Assembly, operation, commissioning

Read operation instructions first.

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

Purpose of the document:

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

Reference documents:

- Manual (Operation and setting) AUMATIC AC 01.2 Profibus DP
- Manual (Device integration Fieldbus) AUMATIC AC 01.2 Profibus DP

Reference documents can be downloaded from the Internet (www.auma.com) or ordered directly from AUMA (refer to <Addresses>).

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1. Safety instructions

1.1 Basic information on safety

Standards/directives

AUMA products are designed and manufactured in compliance with recognised standards and directives. This is certified in a Declaration of Incorporation and an EC Declaration of Conformity.

The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation.

They include among others applicable configuration guidelines for fieldbus applications.

Safety instructions/warnings

All personnel working with this device must be familiar with the safety and warning instructions in this manual and observe the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.

Qualification of staff

Assembly, electrical connection, commissioning, operation, and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or contractor of the plant only.

Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety.

Commissioning

Prior to commissioning, it is important to check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.

Operation

Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the device if it is in perfect condition while observing these instructions.
- Immediately report any faults and damage and allow for corrective measures.
- Observe recognised rules for occupational health and safety.
- Observe the national regulations.
- During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend checking the surface temperature using an appropriate thermometer and wearing protective gloves, if required, prior to working on the device.

Protective measures

The end user or the contractor are responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.

Maintenance

To ensure safe device operation, the maintenance instructions included in this manual must be observed.

Any device modification requires prior consent of the manufacturer.

1.2 Range of application

AUMA 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
- Roller conveyors according to EN 14673 (draft)
- 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 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 thermoswitches 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).

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

⚠ WARNING	**Indicates a potentially hazardous situation with a medium level of risk. Failure to observe this warning could result in death or serious injury.**
⚠ CAUTION	**Indicates a potentially hazardous situation with a low level of risk. Failure to observe this warning may result in minor or moderate injury. May also be used with property damage.**
NOTICE	**Potentially hazardous situation. Failure to observe this warning may result in property damage. Is not used for personal injury.**

Arrangement and typographic structure of the warnings

⚠ DANGER

Type of hazard and respective source!

Possible 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.

M ▷ **Via the menu to parameter**

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

< > **Reference to other sections**

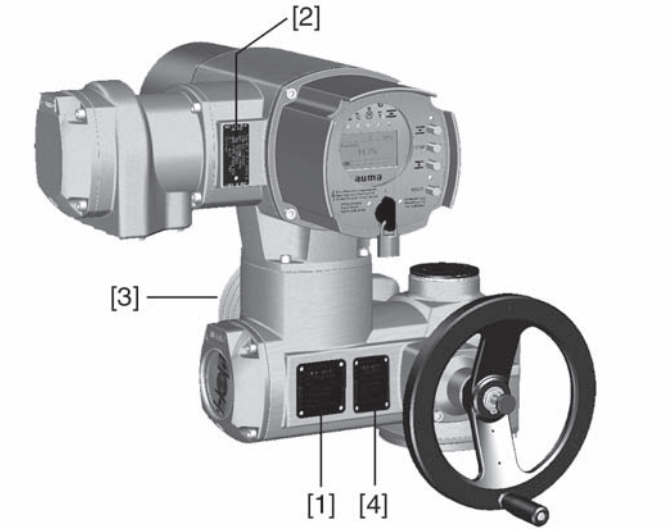
Terms in the brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

2. Identification

2.1 Name plate

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

Figure 1: Arrangement of name plates



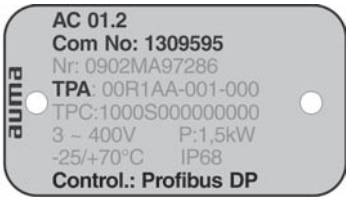
[1] Actuator name plate
[2] Controls name plate
[3] Motor name plate
[4] Additional plate, e.g. KKS plate (Power Plant Classification System)

Data for identification

Figure 2: Actuator name plate

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

Figure 3: Controls name plate



[1] Type and size of the controls
[2] Commission number
[3] Wiring diagram
[4] Control

Type and size

These instructions apply to the following devices:

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: SA**R** 07.2, 07.6, 10.2, 14.2, 14.6, 16.2

AC 01.2 = Actuator controls AUMATIC

Commission number

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

Wiring diagram

The 9th position in the **TPA** wiring diagram: Position transmitter (actuator)

Control unit: electromechanical:

0 = without position transmitter

A, B, J, K, L, N = potentiometer

C, D, E, G, H, M = RWG (electronic position transmitter)

Control

Profibus DP = Control via Profibus DP interface.

Profibus DP-V1 = Control via Profibus DP-V1 interface.

Profibus DP-V2 = Control via Profibus DP-V1 interface.

Profibus DP/24 V DC = Control via Profibus DP interface and parallel interface at 24 V DC.

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.

Actuator controls

The AUMATIC actuator controls are used to operate AUMA actuators and are supplied ready for use. The controls may be mounted directly to the actuator or separately on a wall bracket.

The functions of the AUMATIC controls include standard valve control in OPEN - CLOSE duty, positioning, process control, logging of operating data, diagnostic functions right through control via fieldbus.

Local controls/PC ToolSuite

Operation, setting, and display can be performed on site directly at the controls or alternatively from REMOTE via a fieldbus interface.

On site it is possible to

- operate the actuator via the local controls (push buttons and display) and perform settings (contents of these instructions).
- read in or out data or modify and save settings via the PC ToolSuite software (option), using a computer (laptop or PC). The connection between computer and AUMATIC is wireless via Bluetooth interface (not included in these instructions).

Intrusive - Non-Intrusive

- Intrusive version (control unit: electromechanical):
  Limit and torque setting is performed via switches in the actuator.
- Non-Intrusive version (control unit: electronic):
  Limit and torque setting is performed via the controls, actuator and controls housings do not have to be opened. For this purpose, the actuator is equipped with an MWG (magnetic limit and torque transmitter), also supplying analogue torque feedback signals/torque indication and analogue position feedback signals/position indication.

3. Transport, storage and packaging

3.1 Transport

For transport to place of installation, use sturdy packaging.

DANGER

Hovering load!

Risk of death or serious injury.

→ Do NOT stand below hovering load.

→ Attach ropes or hooks for the purpose of lifting by hoist only to housing and NOT to handwheel.

→ Actuators mounted on valves: Attach ropes or hooks for the purpose of lifting by hoist to valve and NOT to actuator.

→ Actuators mounted to gearboxes: Attach ropes or hooks for the purpose of lifting by hoist only to the gearbox using eyebolts and NOT to the actuator.

→ Actuators mounted to controls: Attach ropes or hooks for the purpose of lifting by hoist only to the actuator and NOT to the controls.

3.2 Storage

NOTICE

Danger of corrosion due to inappropriate storage!

→ Store in a well-ventilated, dry room.

→ Protect against floor dampness by storage on a shelf or on a wooden pallet.

→ Cover to protect against dust and dirt.

→ Apply suitable corrosion protection agent to uncoated surfaces.

NOTICE

Damage on display caused by temperatures below permissible level!

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

Long-term storage

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

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

3.3 Packaging

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

4. Assembly

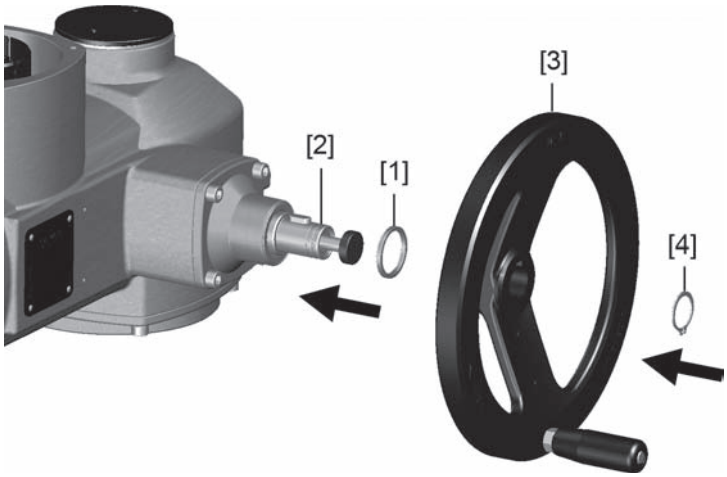
4.1 Mounting position

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

4.2 Handwheel fitting

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

Figure 4: 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

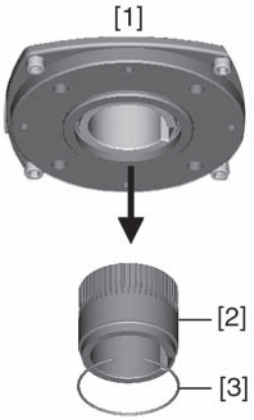
Application

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

Design Output drive bore with keyway:

- Types B1 – B4 with bore according to 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 drive



[1] Output drive types B, B1 – B4, E and C
[2] Output socket/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 1: Fastening torques for screws

Screws	**Fastening 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

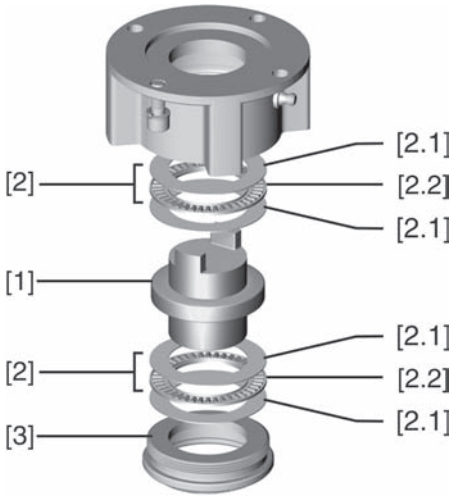
Application
- Output drive for rising, non-rotating valve stem
- Capable of withstanding thrust

Information To adapt the actuators to available output drive types A with flanges F10 and F14 (year of manufacture: 2008 and earlier), an adapter is required. The adapter can be ordered from AUMA.

4.3.2.1 Stem nut: finish machine

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

Figure 6: Design of output drive type A

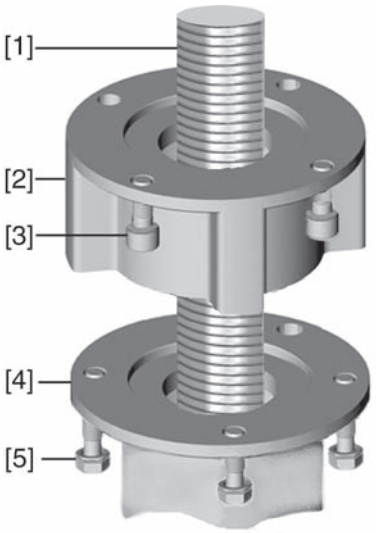


[1] Stem nut
[2] Bearing
[2.1] Bearing race
[2.2] Bearing rim
[3] Spigot ring

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 socket.

➥ 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: Fastening torques for screws

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

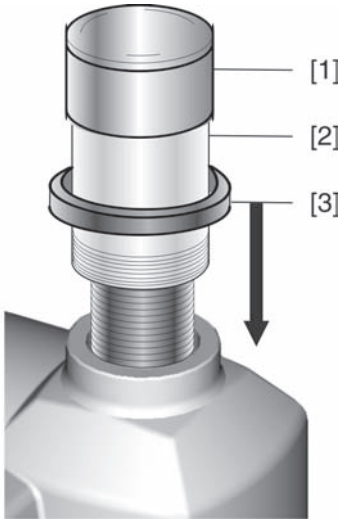
11. Turn multi-turn actuator with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

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.

4.5 Mounting positions of local controls

The mounting position of the local controls is designed according to the order. If, after mounting the actuator to the valve or the gearbox on site, the local controls are in an unfavourable position, the mounting position can be changed at a later date. Four mounting positions are possible.

Figure 9: Mounting positions A and B

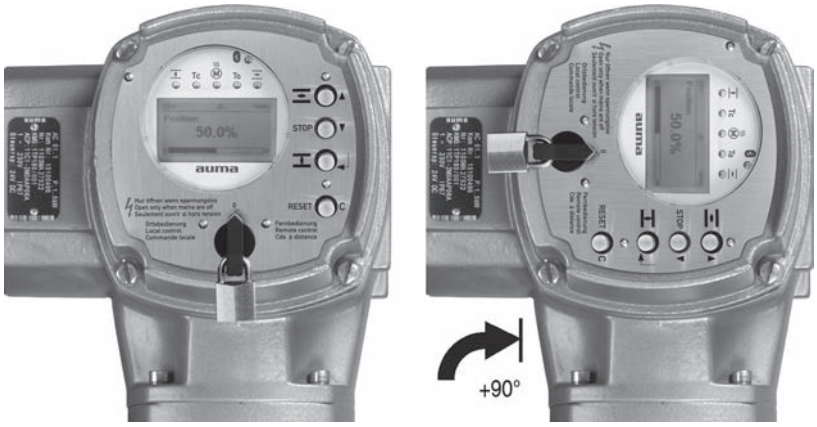
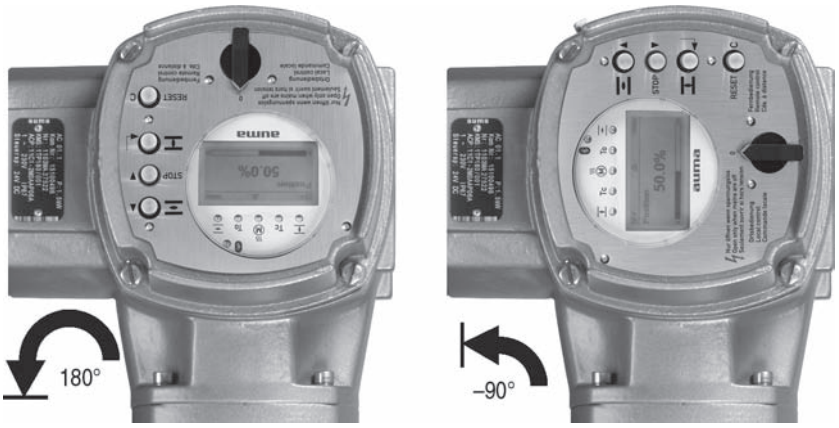


Figure 10: Mounting positions C and D



4.5.1 Mounting positions: modify

DANGER

Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

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

NOTICE

Cable damage due to twisting or pinching!

Risk of functional failures.

→ Turn local controls by a maximum of 180°.

→ Carefully assemble local controls to avoid pinching the cables.

4. Fasten screws evenly crosswise.

5. Electrical connection

5.1 Basic information

⚠ WARNING

Danger due to incorrect electrical connection

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

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

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

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

Wiring diagram/terminal plan

The pertaining wiring diagram/terminal plan 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).

Protection on site

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

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

Table 3: Current consumption controls

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

Table 4: Maximum permissible protection

Switchgear	Rated power	Max. protection
Reversing contactor	up to 1.5 kW	16 A (gL/gG)
Reversing contactor	up to 7.5 kW	32 A (gL/gG)
Reversing contactor	up to 11 kW	63 A (gL/gG)
Thyristor	up to 1.5 kW	16 A (g/R) I^2t<1,500A^2s
Thyristor	up to 3 kW	32 A (g/R) I^2t<1,500A^2s
Thyristor	up to 5.5 kW	63 A (g/R) I^2t<5,000A^2s

- If controls are mounted separately from actuator (controls on wall bracket): Consider length and cross section of connecting cable when defining the protection required.
- Use appropriate earth leakage monitors when working in power installations.
- We recommend to refrain from using residual current devices (RCD). However, if an RCD is used within the mains, the residual current device must be of type B.

Power supply for the controls (electronics)

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

Safety standards

All externally connected devices shall comply with the relevant safety standards .

Cable installation in accordance with EMC

Signal and bus cables are susceptible to interference.

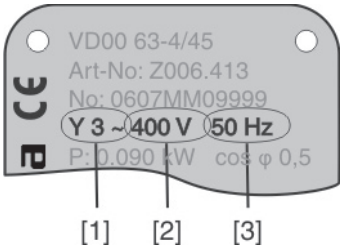
Motor cables are interference sources.

- Lay cables being susceptible to interference or sources of interference at the highest possible distance from each other.
- The interference immunity of signal and bus cables increases if the cables are laid close to the ground potential.
- If possible, avoid laying long cables and make sure that they are installed in areas being subject to low interference.
- Avoid long parallel paths with cables being either susceptible to interference or interference sources.
- For the connection of remote position transmitters, screened cables must be used.

Type of current, mains voltage and mains frequency

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

Figure 11: Motor name plate (example)



[1] Type of current

[2] Mains voltage

[3] Mains frequency (for 3-ph and 1-ph AC motors)

Connecting cables

For device insulation, appropriate (voltage-proof) cables must be used. Specify cables for the highest occurring rated voltage or physically separate the cables as required.

Use connecting cable with appropriate minimum rated temperature.

When specifying the connection cables, consider UV radiation.

Bus cables

Only cables complying with IEC 61158 or IEC 61784, cable type A, may be used for Profibus DP wiring.

Cable recommendation:

Impedance:	135 to 165 Ohm, at a measurement frequency between 3 and 20 MHz
Cable capacity:	< 30 pF per metre
Wire diameter:	> 0.64 mm
Wire cross section:	> 0.34 mm², corresponds to AWG 22
Loop resistance:	< 110 Ohm per km
Screening:	CU shielding braid or shielding braid and shielding foil

Prior to installation, please note:

- Connect maximum 32 devices to one segment.
- If more devices are to be connected:
  - Allot devices to different segments.
  - Connect segments using repeaters.
- Respect a distance of minimum 20 cm between the bus cable and other cables.
- If possible, bus cables should be laid in a separate, conductive, and earthed cable tray.

- Make sure to avoid potential differences between the individual devices on the bus (perform an equipotential earth bonding).

Baud rate [kbit/s]	≥ 93.75	187.5	500	1,500
Maximum segment length [m]	1,200	1,000	400	200

5.2 Connection with AUMA plug/socket connector

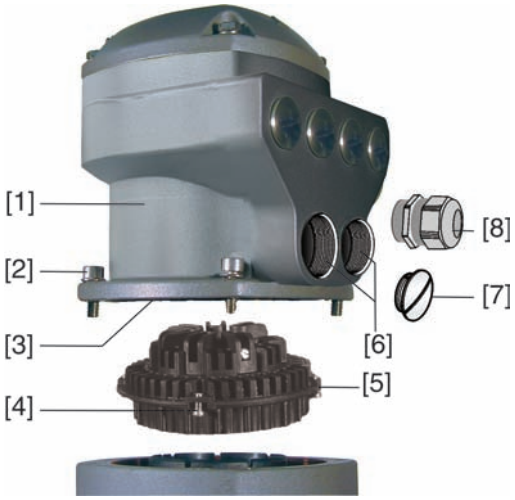
Cross sections AUMA plug/socket connector:

- 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

5.2.1 Terminal compartment: open

Information The bus connection can be separately accessed from the mains connection (refer to <Bus terminal compartment: open>).

Figure 12: Mains connection AUMA plug/socket connector SD bus



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

Information Bus operation is **not** interrupted when removing the connection housing [1].

DANGER

Hazardous voltage!

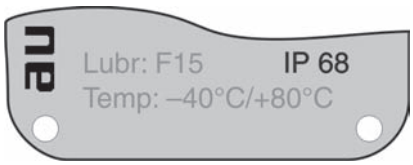
Risk of electric shock.

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove connection housing [1].
2. Loosen screws [4] and remove socket carrier [5] from connection housing [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 for 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.

WARNING

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

Risk of electric shock.

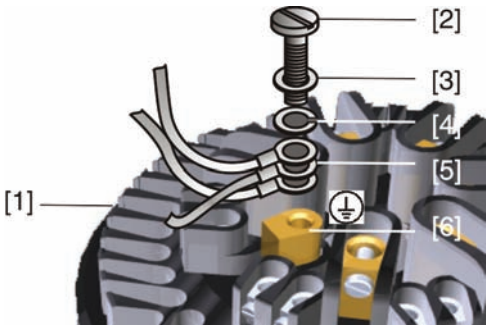
→ Connect all protective earth conductors.

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

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

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

Figure 14: PE connection



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

NOTICE

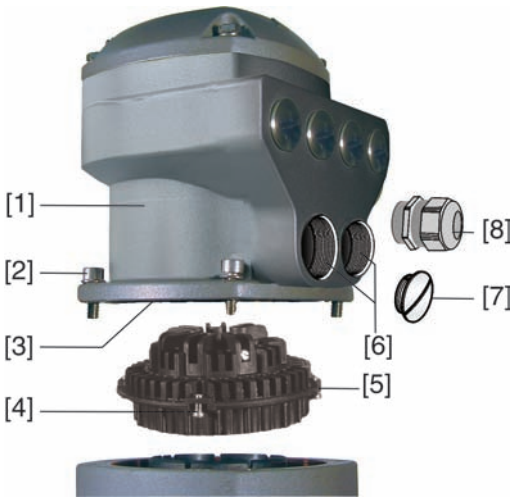
Danger of corrosion: damage due condensation!

→ After mounting, connect the device immediately to electrical mains 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 15: AUMA plug/socket connector SD bus



[1] Connection housing
[2] Screws for connection housing
[3] O-ring
[4] Screws for socket carrier
[5] Socket carrier
[6] Cable entry for mains
[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.

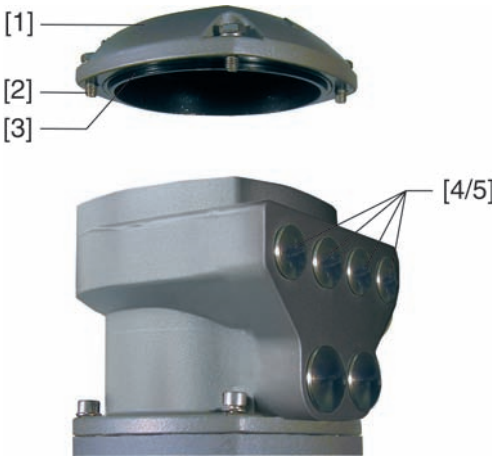
→ Carefully fit socket carrier to avoid pinching the cables.

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

5.2.4 Bus terminal compartment: open

The AUMA plug/socket connector (SD bus) is equipped with a connection board for connecting the bus cables. When removing the cover [1] the connection board is easily accessible.

Figure 16: AUMA plug/socket connector SD bus



[1] Cover (Bus terminal compartment)
[2] Screws for cover
[3] O-ring
[4] Cable entries for bus cables
[5] Blanking plug

DANGER

Hazardous voltage!

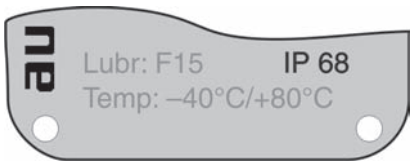
Risk of electric shock.

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
2. Insert cable glands suitable for bus cables.

➥ The enclosure protection IP… stated on the name plate is only ensured if suitable cable glands are used.

➥ Example: Name plate for enclosure protection IP 68.



3. Seal unused cable entries [4] with suitable blanking plugs [5].
4. Insert the wires into the cable glands.

5.2.5 Bus cables: connect

Versions

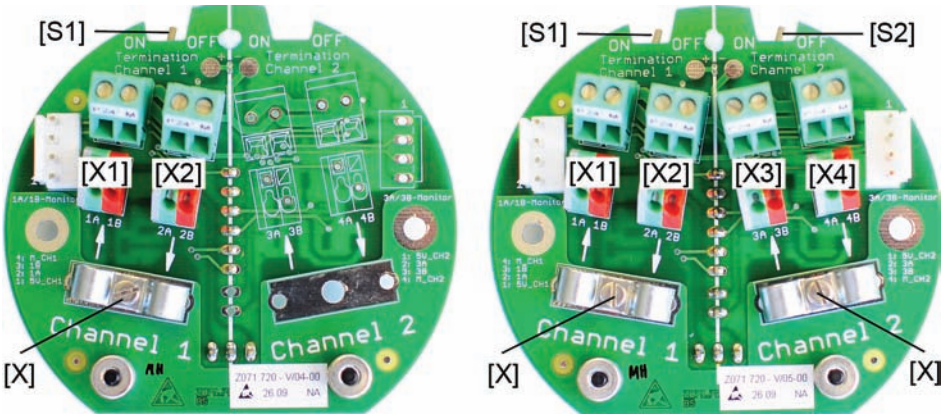
The bus connection described in this chapter applies to the following versions of the connection board:

- Standard version (1 channel)
- Version for redundancy (2 channels)
- Version with overvoltage protection up to 4 kV (1 channel)
- Version for redundancy (2 channels) with overvoltage protection up to 4 kV

Information

For the connection via fibre optic cable (FOC) refer to Short instructions FOC connection.

Figure 18: Connection boards: 1 channel left, 2 channels right



[S1] Bus termination channel 1
[S2] Bus termination channel 2
[X] Shielding clamp
[X1] 1A 1B ↑ channel 1: to previous device
[X2] 2A 2B ↑ channel 1: to next device
[X3] 3A 3B ↑ channel 2: to previous device
[X4] 4A 4B ↑ channel 2: to next device

Table 5: Switch functions [S1] and [S2]

[S1]	ON	Bus termination channel 1 ON
	OFF	Bus termination channel 1 OFF
[S2]	ON	Bus termination channel 2 ON (option)
	OFF	Bus termination channel 2 OFF (option)

Information Upon delivery, the switches [S1] and [S2] are set to position OFF.

Connecting bus cables:

1. Connect bus cables.

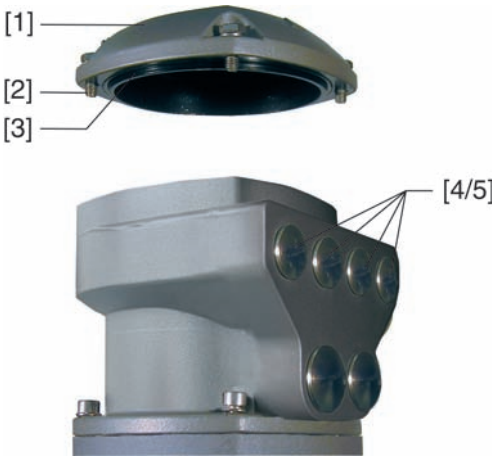
Table 6: Assignment of fieldbus cables

Fieldbus cables	AUMA labelling on connection board	SUB-D 9 connector pin (for other fieldbus devices)	Colour
A	1A	8	green
B	1B	3	red
A	2A		green
B	2B		red
A	3A		green
B	3B		red
A	4A		green
B	4B		red

2. If the actuator is the final device in the bus segment:
   2.1 Switch on the termination resistor for channel 1 using switch [S1] (position ON).
   2.2 For redundancy: Switch on the termination resistor for channel 2 using switch [S2] (position ON).
   Information: As soon as the termination resistors are switched on, the connection to the next fieldbus device is automatically interrupted to avoid multiple terminations (not applicable for overvoltage protection).
3. Connect cable shield largely to shielding clamp [X].

5.2.6 Bus terminal compartment: close

Figure 19: AUMA plug/socket connector SD bus



[1] Cover
[2] Screws for cover
[3] O-ring
[4] Cable entries for bus cables
[5] Blanking plug

1. Clean sealing faces of cover [1] and housing.
2. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the sealing faces.
3. Check whether O-ring [3] is in good condition, correctly insert O-ring.
4. Fit cover [1] and fasten screws [2] evenly crosswise.
5. Fasten cable glands with the specified torque to ensure the required enclosure protection.

5.3 Accessories for electrical connection

— Option —

5.3.1 Controls mounted to wall bracket

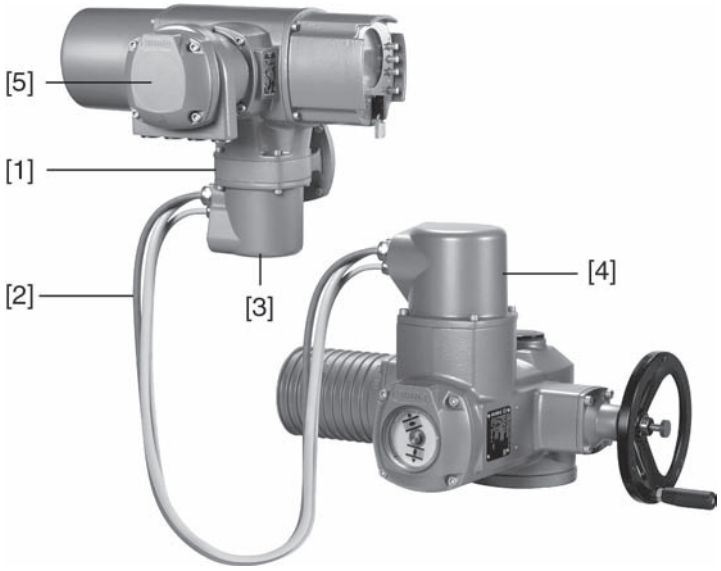
The wall bracket allows separate mounting of controls and actuator.

Application

- If the actuator cannot be accessed.
- If the actuator is subjected to high temperatures.
- In case of heavy vibration of the valve.

Design

Figure 20: Design principle with wall bracket



[1] Wall bracket
[2] Connecting cables
[3] Electrical connection of wall bracket (XM)
[4] Electrical connection of actuator (XA)
[5] Electrical connection/bus connection of controls (XK) - customer plug

Observe prior to connection

- Permissible length of connecting cables: max. 100 m.
- If the actuator is equipped with a position transmitter (RWG): Connecting cables must be available as shielded version.
- Versions with potentiometer in the actuator are not suitable.
- We recommend: AUMA cable set LSW1.
- If the AUMA cable set is not used: Use suitable flexible and screened connecting cables.
- When using connecting cables, e.g. of the heater or switch, requiring direct wiring from the actuator to the XK customer connector (XA-XM-XK, refer to wiring diagram), these connecting cables must be subject to an insulation test in compliance with EN 50178. Connecting cables of position transmitters (RWG, IWG, potentiometer) do not belong to this group. They may **not** be subject to an insulation test.

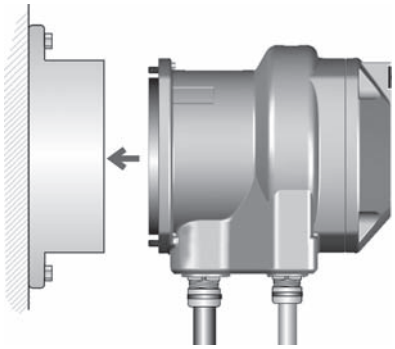
5.3.2 Parking frame

Application

Parking frame for safe storage of a disconnected plug.

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

Figure 21: Parking frame



5.3.3 Protection cover

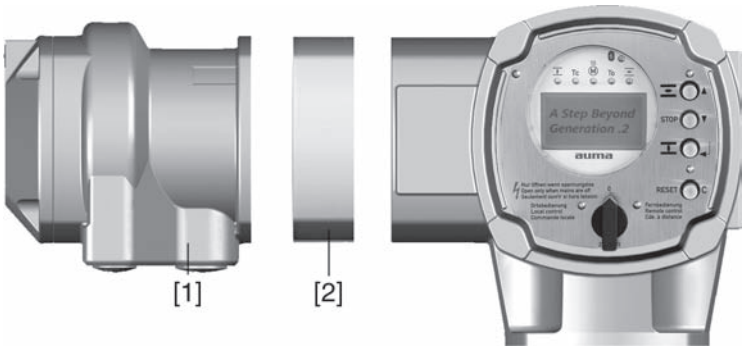
Protection cover for plug compartment when plug is removed.

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

5.3.4 Double sealed intermediate frame

When removing the electrical connection or due to leaky cable glands, ingress of dust and water into the housing is possible. 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 22: Electrical connection with double sealed intermediate frame



[1] Electrical connection
[2] Double sealed intermediate frame

5.3.5 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 23: Earth connection

6. Operation

NOTICE

Valve damage due to incorrect basic setting!

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

6.1 Manual operation

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

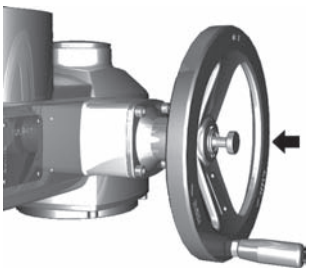
6.1.1 Manual operation: engage

NOTICE

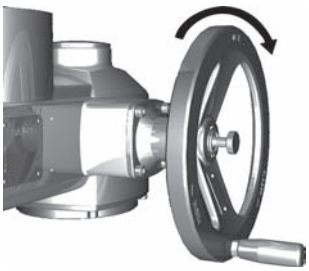
Damage at the motor coupling due to faulty operation!

→ Engage manual operation only during motor standstill.

1. Press push button.



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



6.1.2 Manual operation: disengage

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

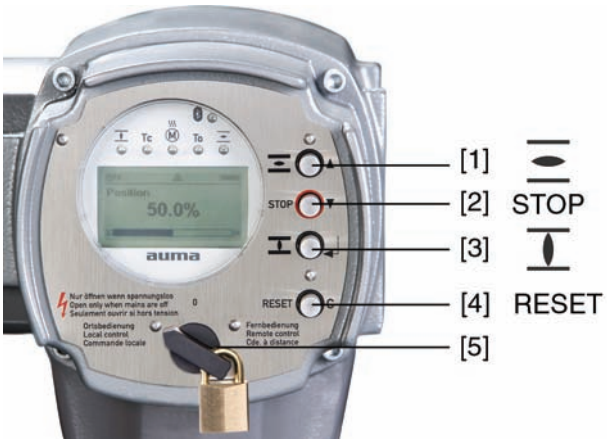
6.2 Motor operation

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

6.2.1 Local actuator operation

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

Figure 26: Local controls



[1] Push button for operation command in direction OPEN
[2] Push button STOP
[3] Push button for operation command in direction CLOSE
[4] Push button RESET
[5] Selector switch

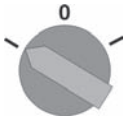
⚠ CAUTION

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

Danger of burns

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

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



➥ The actuator can now be operated using the push buttons [1 – 3].

- Run actuator in direction OPEN: Press push button [1].
- Stop actuator: Press push button STOP [2].
- Run actuator in direction CLOSE: Press push button [3].

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

6.2.2 Actuator operation from remote

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

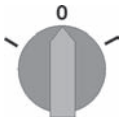
➥ Now, the actuator can be remote-controlled via fieldbus.

Information For actuators equipped with a positioner, it is possible to select between **open-close control** (Remote OPEN-CLOSE) and **setpoint control** (Remote SETPOINT). For further information, please refer to the Manual (Operation and setting).

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

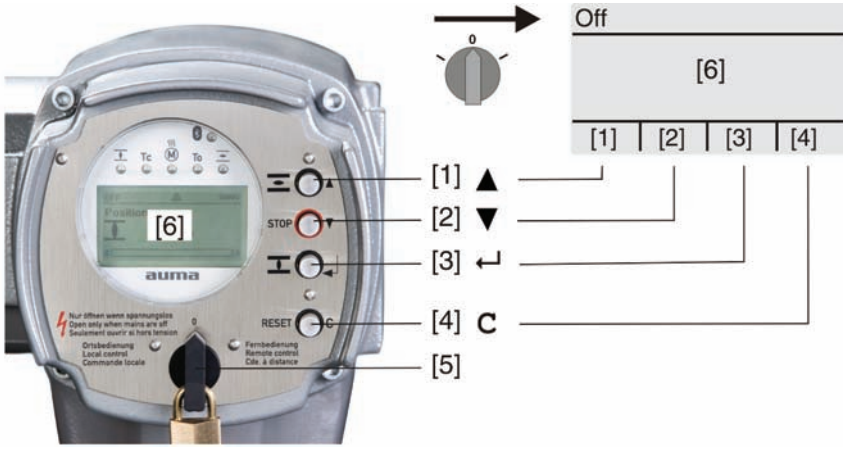
Menu navigation for display and setting is made via the push buttons [1 – 4] of the local controls.

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



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

Figure 30:



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

Table 7: Important push button functions for menu navigation

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

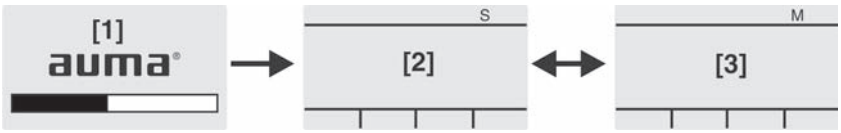
Backlight

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

6.3.1 Menu layout and navigation

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

Figure 31: Groups



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

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

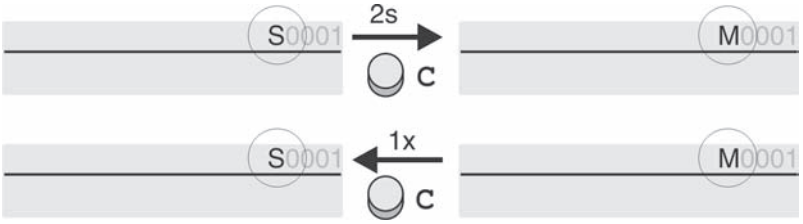
Figure 32: Marking with ID

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

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

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

Figure 33: Select menu groups

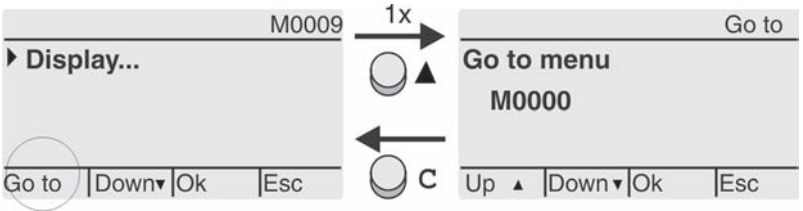


You return to the status menu if:

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

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

Figure 34: Direct display (example)



Display indicates in the bottom row: Go to

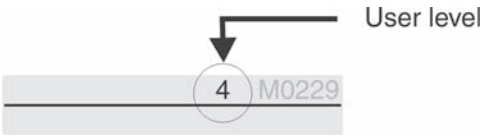
1. Press push button ▲ Go to.
   Display indicates: Go to menu M0000
2. Use push buttons ▲ ▼ Up ▲ Down ▼ to select figures 0 to 9.
3. Press push button ↵ Ok to confirm first digit.
4. Repeat steps 2 and 3 for all further digits.
5. To cancel the process: Press **C** Esc.

6.4 User level, password

A password must be entered to allow parameter modification. The display indicates: Password 0***

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

Figure 35: User level display (example)



A specific password is assigned to each user level and permits different actions.

Table 8: User levels and authorisations

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

6.4.1 Password entry

Display indicates: Password 0***

1. Use push buttons ▲▼ Up ▲ Down ▼ to select figures 0 to 9.
2. Confirm first digit of password via push button ↵ Ok.
3. Repeat steps 1 and 2 for all further digits.

➥ Having confirmed the last digit with ↵ Ok, access to all parameters within one user level is possible if the password entry is correct.

Information If no entry is made over a longer period of time (approx. 1 min), the display automatically returns to the previous display screen.

6.4.2 Password change

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

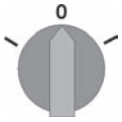
Example: The user is signed in as Specialist (4). This authorises him to modify the passwords between user levels (1) to (4).

M ▷ Device configuration M0053
Service functions M0222
Change passwords M0229

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

Select main menu

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



2. Press push button **C** Setup and hold it down for approx. 3 seconds.

➥ Display goes to main menu and indicates: ▸ Display...

Change passwords

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

- For user level 1 (view only), passwords cannot be changed. To change passwords, you must change to a higher user level. For this, enter a password via a parameter.

4. For a user level between 2 and 6: Press push button ↵ Ok.
➥ The display indicates the highest user level, e.g.: For user 4
5. Select user level via push buttons ▲▼ Up ▲ Down ▼ and confirm with ↵ Ok.
➥ Display indicates: ▸ Change passwords Password 0***
6. Enter current password (→ enter password).
➥ Display indicates: ▸ Change passwords Password (new) 0***
7. Enter new password (→ enter password).
➥ Display indicates: ▸ Change passwords For user 4 (example)
8. Select next user level via push buttons ▲▼ Up ▲ Down ▼ or cancel the process via Esc.

6.5 Language in the display

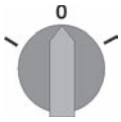
The AUMATIC display is multilingual.

6.5.1 Change language

M ▷ Display... M0009
Language M0049

Select main menu

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



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

Change language

3. Press ↵ Ok.
➥ Display indicates: ▸ Language
4. Press ↵ Ok.
➥ Display indicates the selected language, e.g.: ▸ Deutsch
5. The bottom row of the display indicates:
   → Save → continue with step 10
   → Edit → continue with step 6
6. Press ↵ Edit.
➥ Display indicates: ▸ Observer (1)
7. Select user level via ▲▼ Up ▲ Down ▼ resulting in the following significations:
   → black triangle: ▸ = current setting
   → white triangle: ▹ = selection (not saved yet)
8. Press ↵ Ok.
➥ Display indicates: Password 0***

9. Enter password (→ enter password).

➥ Display indicates: ▸ Language and Save (bottom row)

Language selection

10. Select new language via ▲▼ Up ▲ Down ▼ resulting in the following significations:
    - → black triangle: ▸ = current setting
    - → white triangle: ▹ = selection (not saved yet)
11. Confirm selection via ↵ Save.

➥ The display changes to the new language. The new language selection is saved.

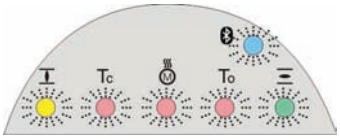
7. Indications

7.1 Indications during commissioning

LED test

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

Figure 39: LED test



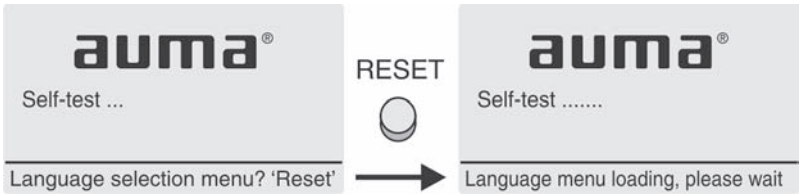
Language selection

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

Activate language selection:

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

Figure 40: Self-test

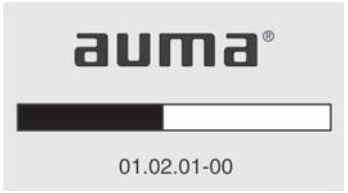


The language selection menu follows the startup menu.

Startup menu

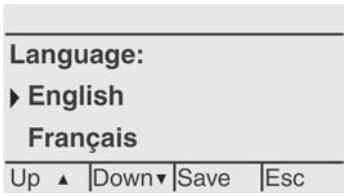
The current firmware version is displayed during the startup procedure:

Figure 41: Startup menu with firmware version: 01.02.01–00



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

Figure 42: Language selection



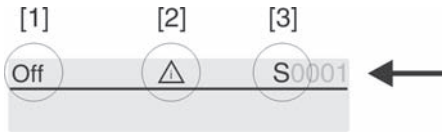
If no entry is made over a longer period of time (approx. 1 minute), the display automatically returns to the first status indication.

7.2 Indications in the display

Status bar

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

Figure 43: Information in the status bar (top)

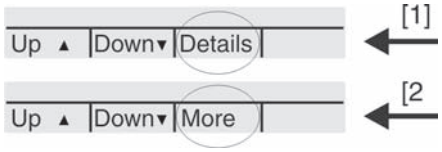


[1] Operation mode
[2] Error symbol (only for faults and warnings)
[3] ID number: S = Status page

Navigation support

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

Figure 44: Navigation support (bottom)



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

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

7.2.1 Feedback indications from actuator and valve

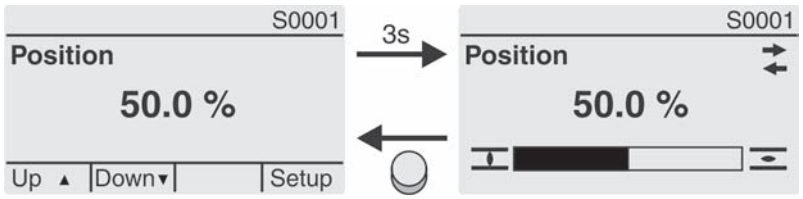
Display indications depend on the actuator version.

Valve position (S0001)

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

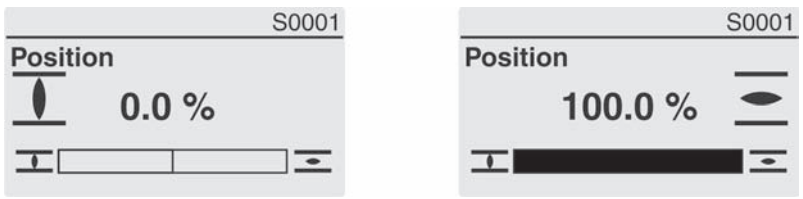
- S0001 on the display indicates the valve position in % of the travel.
- The bargraph display appears after approx. 3 seconds.
- When issuing an operation command, an arrow indicates the direction (OPEN/CLOSE).

Figure 45: Valve position and direction of operation



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

Figure 46: End position CLOSED/OPEN reached



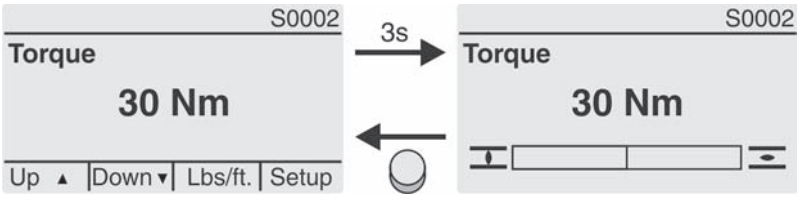
0% Actuator is in end position CLOSED
100% Actuator is in end position OPEN

Torque (S0002)

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

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

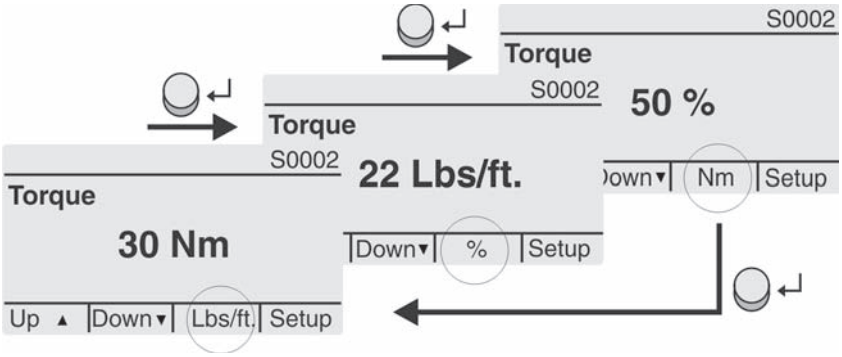
Figure 47: Torque



Select unit

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

Figure 48: Units of torque



Display in percent

100 % indication equals the max. torque indicated on the name plate of the actuator.

Example: SA 07.5 with 20 – 60 Nm.

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

Operation commands (S0003)

The display S0003 indicates:

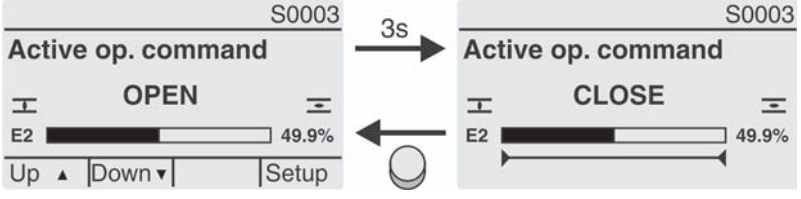
- active operation commands, like e.g.: Operation in direction CLOSE or in direction OPEN
- the actual value E2 as bargraph indication and as value between 0 and 100 %.
- for setpoint control (positioner): setpoint E2
- for stepping mode or for intermediate positions with operation profile: pivot points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

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

OPEN - CLOSE control

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

Figure 49: Display for OPEN - CLOSE control



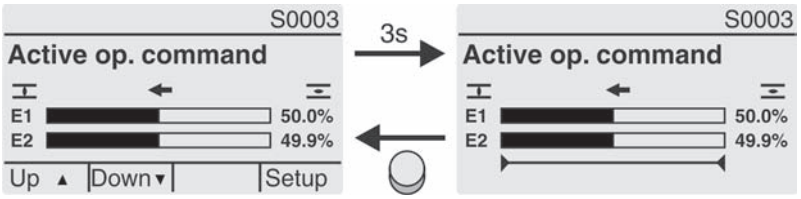
E2 Actual position value

Setpoint control

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

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

Figure 50: Display for setpoint control (positioner)



E1 Position setpoint

E2 Actual position value

Pivot point axis

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

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

Operation profile M0294

Step function CLOSE M0156

Step function OPEN M0206

Figure 51: Examples: on the left pivot points (intermediate positions); on the right stepping mode

Table 9: Symbols along the pivot point axis

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

7.2.2 Status indications according to AUMA classification

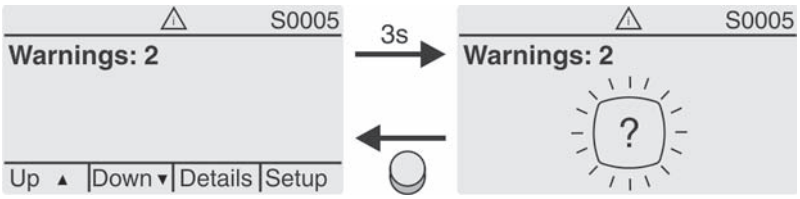
These indications are available, if the Diagnostic classific. M0539 parameter is set to AUMA.

Warnings (S0005)

If a warning has occurred, the display shows S0005:

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

Figure 52: Warnings



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

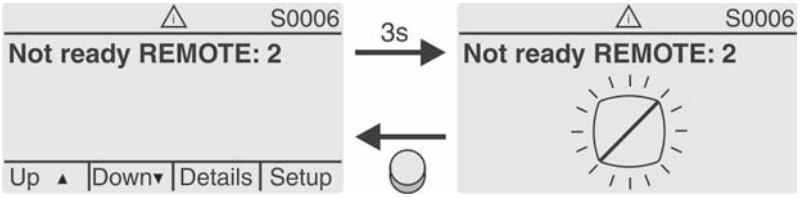
Not ready REMOTE (S0006)

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

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

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

Figure 53: Not ready REMOTE indications



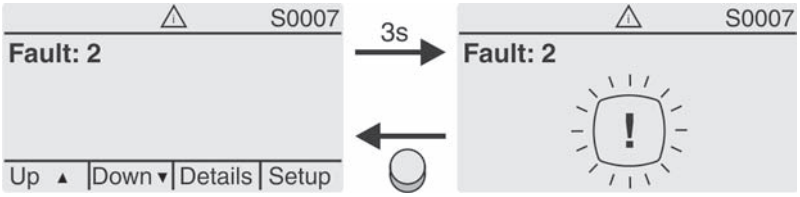
For further information, please also refer to <Corrective action>.

Fault (S0007)

If a fault has occurred, the display shows S0007:

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

Figure 54: Fault



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

7.2.3 Status indications according to NAMUR recommendation

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

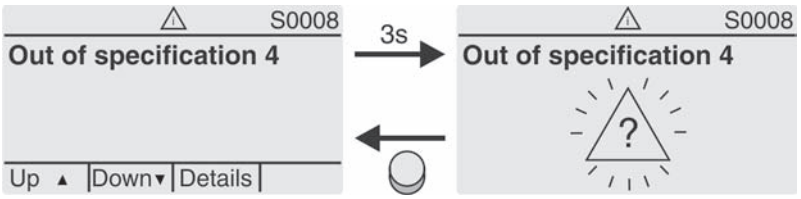
Out of Specification (S0008)

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

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

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

Figure 55: Out of specification



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

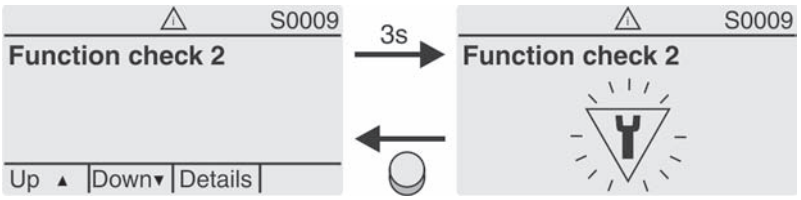
Function check (S0009)

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

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

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

Figure 56: Function check



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

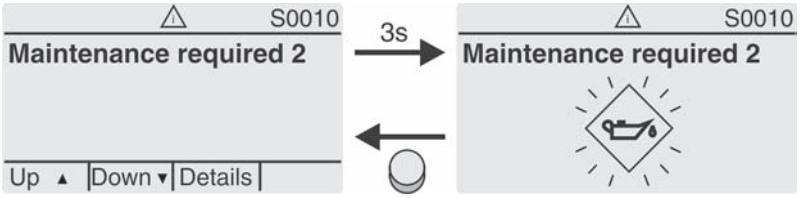
Maintenance required (S0010)

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

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

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

Figure 57: Maintenance required



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

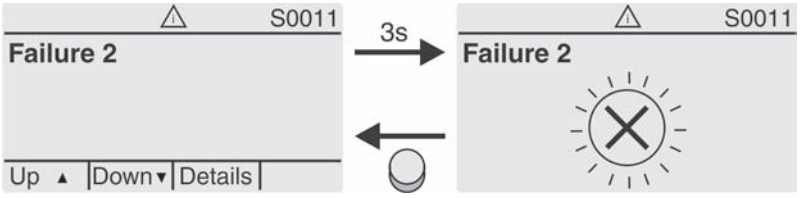
Failure (S0011)

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

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

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

Figure 58: Failure



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

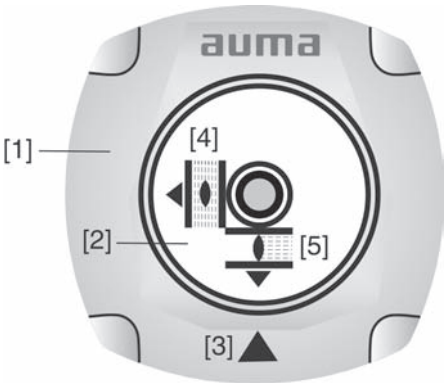
7.3 Mechanical position indicator/running indication

— Option —

Mechanical position indicator:

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

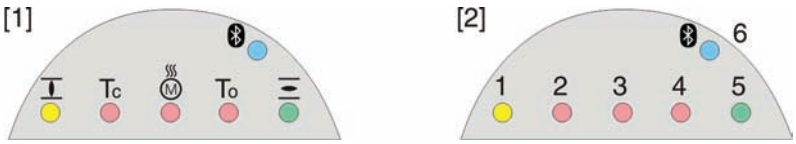
Figure 59: Mechanical position indicator



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

7.4 Indication lights

Figure 60: Arrangement and signification of indication lights



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

Modify indication light assignment (indications)

Different indications can be assigned to LEDs 1 – 5.

M ▷ Device configuration M0053
Local controls M0159
Indication light 1 (left) M0093
Indication light 2 M0094
Indication light 3 M0095
Indication light 4 M0096

Indicat. light 5 (right) M0097
Signal interm. pos. M0167

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

Further setting values:

Refer to Manual (Operation and setting).

8. Signals

8.1 Signals via fieldbus

Feedback signals via fieldbus can be configured. Configuration is possible for both data structure and data contents.

Configuration is defined via the GSD file only.

Information If required, download the GSD file (General Station Description) from the Internet:
www.auma.com

For information on the feedback signals via fieldbus and the configuration of the parameters via fieldbus interface, refer to Manual (Device integration fieldbus) Profibus DP.

8.2 Output contacts

— (Option) —

Characteristics Output contacts are used to send status signals (e.g. reaching the end positions, selector switch position, faults...) as binary signals to the control room. Depending on the version, the AC is equipped with up to 12 output contacts (digital outputs).

8.2.1 Assignment of outputs

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

Required user level: Specialist (4) or higher.

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

Default values:

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

8.2.2 Encoding of outputs

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

- High active = output contact closed = signal active
- Low active = output contact open = signal not active

Required user level: Specialist (4) or higher.

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

Default values for DOUT 1 – 12: High active

8.3 Analogue signals

— (Option) —

Analogue feedback signals are only available if the following conditions are met:

- In addition to the fieldbus interface, the AC is equipped with a parallel interface.
- The actuator is equipped with a position transmitter (potentiometer or RWG).

Valve position

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

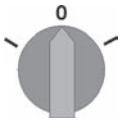
Designation in the wiring diagram:

ANOUT1 (position)

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

9. Commissioning (basic settings)

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



Information: The selector switch is not a mains switch. When positioned to **0** (OFF), the actuator cannot be operated. The controls' power supply is maintained.

2. Switch on the power supply.

Information: Please consider the heat-up time for ambient temperatures below –20 °C.

3. Perform basic settings.

9.1 Type of seating: set

NOTICE

Valve damage due to incorrect setting!

→ The type of seating must suit the valve.

→ Only change the setting with the consent of the valve manufacturer.

M ▷ Customer settings M0041
Type of seating M0012
End position CLOSED M0086
End position OPEN M0087

Default value: Limit

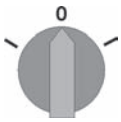
Setting values:

Limit Seating in end positions via limit switching.

Torque Seating in end positions via torque switching.

Select main menu

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



2. Press push button **C** Setup and hold it down for approx. 3 seconds.

➥ Display goes to main menu and indicates: ▸ Display...

Modify type of seating

3. Select parameter either:

→ click via the menu M ▷ to parameter, or

→ via direct display: press ▲ and enter IDs M0086 or M0087

➥ Display indicates: End position CLOSED

4. Select via ▲ ▼ Up ▲ Down ▼:

→ ▸ End position CLOSED

→ ▸ End position OPEN

➥ The black triangle ▸ indicates the current selection.

5. Press ↵ Ok.

➥ display indicates the current setting: Limit or Torque

6. The bottom row of the display indicates:
   → Edit → continue with step 7
   → Save → continue with step 11
7. Press ↵ Edit.

➥ Display indicates: ▸ Observer (1)

8. Select access level via ▲▼ Up ▲ Down ▼ resulting in the following significations:
   → black triangle: ▸ = current setting
   → white triangle: ▹ = selection (not saved yet)

   Information: Required access level: Specialist (4) or superior.
9. Press ↵ Ok.

➥ Display indicates: Password 0***

10. Enter password (→ enter password).

➥ The screen indicates the pre-set type of seating (▸ Limit or ▸ Torque) by means of a black triangle ▸.

11. Select new setting ▲▼ Up ▲ Down ▼ resulting in the following significations:
    → black triangle: ▸ = current setting
    → white triangle: ▹ = selection (not saved yet)
12. Confirm selection via ↵ Save.

➥ The setting for the type of seating is complete.

9.2 Bus address (slave address): set

M ▷ Customer settings M0041
Profibus DP M0016
DP1 slave address M0098
DP2 slave address M0295

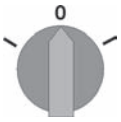
Default value: 126

Setting range: 0 – 126

Information Parameter DP2 slave address is only available if redundancy (option) is available.

Select main menu

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



2. Press push button **C** Setup and hold it down for approx. 3 seconds.

➥ Display goes to main menu and indicates: ▸ Display...

Set bus address

3. Select parameter either:
   → M ▷ (by clicking through the menu)
   → or press ▲ and enter IDs M0098 or M0295 (direct selection)

➥ Display indicates: DP1 slave address

4. Select via ▲▼ Up ▲ Down ▼:
   → ▸ DP1 slave address
   → ▸ DP2 slave address

➥ The black triangle ▸ indicates the current selection.

5. Press ↵ Ok.

➥ Display shows the set address.

6. The bottom row of the display indicates:
   → Edit → continue with step 7
   → Up ▲ Down ▼ → continue with step 11
7. Press ↵ Edit.

➥ Display indicates: Observer (1)

8. Select access level via ▲▼ Up ▲ Down ▼, resulting in the following significations:
   → black triangle: ▸ = current setting
   → white triangle: ▹ = selection (not saved yet)
   Information: Required access level:Specialist (4) or higher
9. Press ↵ Ok.

➥ Display indicates: Password 0***

10. Enter password (→ enter password).

➥ Display shows the set address.

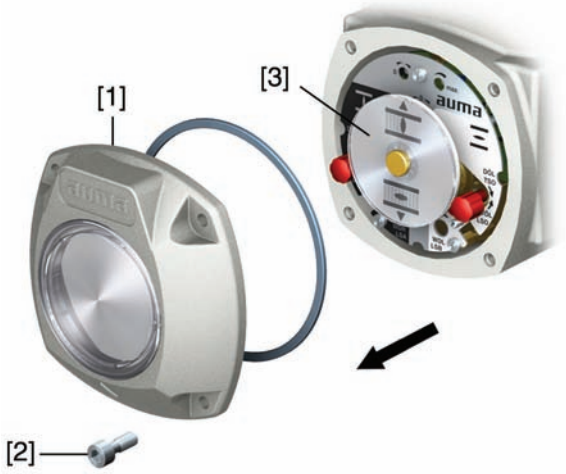
11. Enter new address via ▲▼ Up ▲ Down ▼.
    Information: The address range is displayed in round brackets on the screen.
12. Confirm selection via ↵ Save.

➥ The setting for the Profibus address is complete.

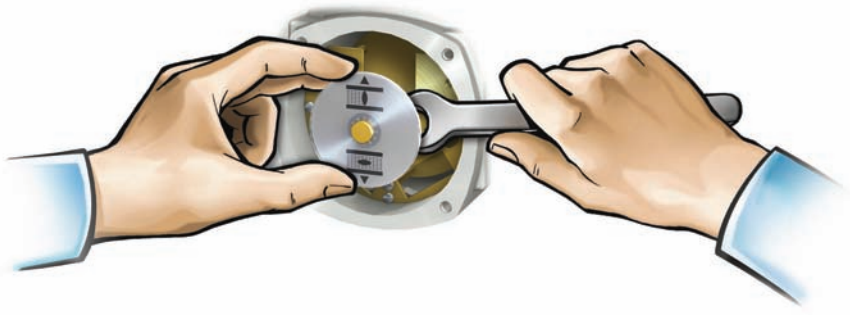
9.3 Switch compartment: open

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.



9.4 Torque switching: set

The torque switching acts as overload protection over full travel, also when stopping in the end positions by limit switching.

Information The torque switches may also trip during manual operation.

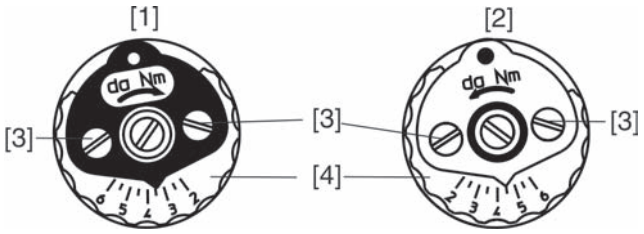
NOTICE

Valve damage due to excessive torque setting!

→ The torque must suit the valve.

→ Only change the setting with the consent of the valve manufacturer.

Figure 66: Torque switching heads



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

1. Loosen both lock screws [3] at the indicator disc.
2. Turn torque dial [4] to set the required torque (1 da Nm = 10 Nm).
3. Fasten lock screws [3] again.
   Information: Maximum fastening torque: 0,3 – 0,4 Nm

➥ The torque switch setting is complete.

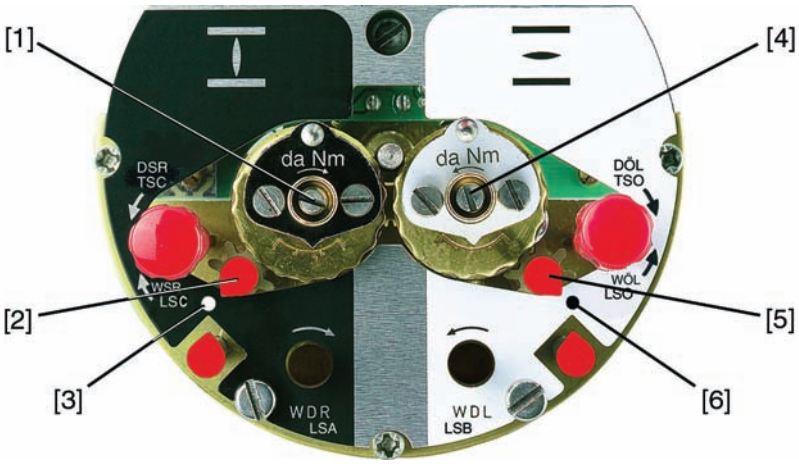
Example: The figure above shows the following settings:

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

9.5 Limit switching: set

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

Figure 67: Setting elements for limit switching



Black section:

[1] Setting spindle: End position CLOSED

[2] Pointer: End position CLOSED

[3] Mark: End position CLOSED is set

White section:

[4] Setting spindle: End position OPEN

[5] Pointer: End position OPEN

[6] Mark: End position OPEN is set

9.5.1 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.

9.5.2 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.

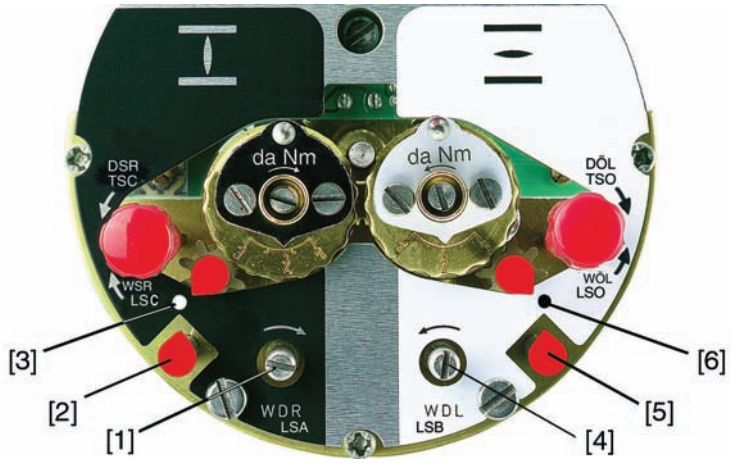
7. If you override the tripping point inadvertently (ratchet click is heard after the pointer has snapped): Continue turning the setting spindle in the same direction and repeat setting process.

9.6 Intermediate positions: set

— Option —

Actuators equipped with DUO limit switching contain two intermediate position switches. One intermediate position may be set for each running direction.

Figure 68: Setting elements for limit switching



Black section:

[1] Setting spindle: Running direction CLOSE

[2] Pointer: Running direction CLOSE

[3] Mark: Intermediate position CLOSED is set

White section:

[4] Setting spindle: Running direction OPEN

[5] Pointer: Running direction OPEN

[6] Mark: Intermediate position OPEN is set

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.

9.6.1 Running direction CLOSE (black section): set

1. Move valve in direction CLOSE to desired intermediate position.
2. If you override the tripping point inadvertently: Turn valve in opposite direction and approach intermediate position again in direction CLOSE.

   Information: Always approach the intermediate position in the same direction as in later electrical operation.
3. **Press down** and turn setting spindle [1] with screw driver in direction of the arrow and observe the pointer [2]: While a ratchet click is felt and heard, the pointer [2] moves 90° every time.
4. If the pointer [2] is 90° from mark [3]: Continue turning slowly.
5. If the pointer [2] moves to mark [3]: Stop turning and release setting spindle.

➥ The intermediate position setting in running direction CLOSE is complete.

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

9.6.2 Running direction OPEN (white section): set

1. Move valve in direction OPEN to desired intermediate position.
2. If you override the tripping point inadvertently: Move valve in opposite direction and approach intermediate position again in direction OPEN (always approach the intermediate position in the same direction as in later electrical operation).

3. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet click is felt and heard, the pointer [5] moves 90° every time.
4. If the pointer [5] is 90° from mark [6]: Continue turning slowly.
5. If the pointer [5] moves to mark [6]: Stop turning and release setting spindle.

➥ The intermediate position setting in running direction OPEN is complete.

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

9.7 Test run

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

9.7.1 Direction of rotation: check

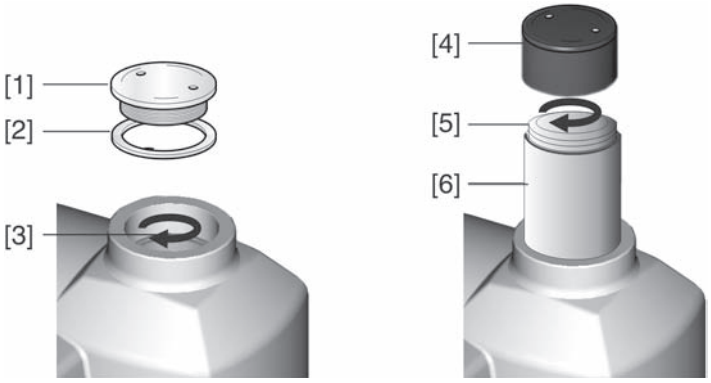
1. Move actuator manually to intermediate position or to sufficient distance from end position.
2. Set selector switch to position **Local control** (LOCAL).

3. Switch on actuator in running direction CLOSE and observe the direction of rotation:
   with indicator disc: step 4
   without indicator disc: step 5 (hollow shaft)
   → Switch off before reaching the end position.
4. With indicator disc:
   → Observe direction of rotation.
   ➥ The direction of rotation is correct, if **actuator runs in direction CLOSE** and **indicator disc turns counterclockwise**.

5. 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**.

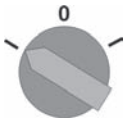
Figure 71: Hollow shaft/stem



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

9.7.2 Limit switching: check

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



2. Operate actuator using push buttons OPEN - STOP - CLOSE.

➥ The limit switching is set correctly if (default indication):

- the yellow indication light/LED1 is illuminated in end position CLOSED
- the green indication light/LED5 is illuminated in end position OPEN
- the indication lights go out after travelling into opposite direction.

➥ The limit switching is set incorrectly if:

- the actuator comes to a standstill before reaching the end position
- one of the red indication lights/LEDs is illuminated (torque fault)
- the status indication S0007 in the display signals a fault.

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

9.7.3 Reference operation position feedback: perform

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

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

If no reference operation is performed after changing the limit switching, the feedback signal via the bus is not correct. The bus signals the missing reference operation as a warning.

9.8 Potentiometer setting

— Option —

The potentiometer as travel sensor records the valve position.

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

Figure 73: 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).

9.9 Electronic position transmitter RWG: set

— Option —

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

Table 10: Technical data RWG 4020

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

Figure 74: View of control unit

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

1. Connect voltage to electronic position transmitter.
2. Move valve to end position CLOSED.
3. Connect ammeter for 0 – 20 mA to measuring points [4 and 5].
4. Turn potentiometer [1] 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.)

9.10 Mechanical position indicator: set

— Option —

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

4. Move actuator to end position OPEN.

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

6. Move valve to end position CLOSED again.
7. Check settings:

   If the symbol (CLOSED) is no longer in alignment with mark ▲ on the cover:

   7.1 Repeat setting procedure.

   7.2 Check whether the appropriate reduction gearing has been selected, if required.

9.11 Switch compartment: close

NOTICE

Danger of corrosion due to damage to paint finish!

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

1. Clean sealing faces of housing and cover.
2. 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 11: 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 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 Fault indications and warning indications

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

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

The following table shows all possible screen displays to be indicated via the status pages.

The Diagnostic classific. M0539 parameter determines which status pages will be displayed:

- For Diagnostic classific. = AUMA, the status pages according to AUMA classification are displayed: S0005, S0006 and S0007.
- For Diagnostic classific. = NAMUR, the status pages according NAMUR recommendation are displayed: S0008 to S0011.

For further indications, for example indications on output contacts, please refer to the Manual (Operation and setting).

Table 12: Faults and warnings on status indications

Indication on display	Description/cause	Remedy
Warnings S0005	Collective signal 02: Indicates the number of active warnings.	For value > 0: Press push button ↵ Details to display a list of detailed indications.
Not ready REMOTE S0006	Collective signal 04: Indicates the number of active signals. The actuator cannot be operated from REMOTE. The actuator can only be operated via the local controls.	For value > 0: Press push button ↵ Details to display a list of detailed indications.
Fault S0007	Collective signal 03: Indicates the number of active faults. The actuator cannot be operated.	For value > 0: Press push button ↵ Details to display a list of detailed indications.
Out of specification S0008	Collective signal 07: Indication according to NAMUR recommendation NE 107 Actuator is operated outside the normal operation conditions.	For value > 0: Press push button ↵ Details to display a list of detailed indications.
Function check S0009	Collective signal 08: Indication according to NAMUR recommendation NE 107 The actuator is being worked on; output signals are temporarily invalid.	For value > 0: Press push button ↵ Details to display a list of detailed indications.
Maintenance required S0010	Collective signal 09: Indication according to NAMUR recommendation NE 107 Recommendation to perform maintenance.	For value > 0: Press push button ↵ Details to display a list of detailed indications.
Failure S0011	Collective signal 10: Indication according to NAMUR recommendation NE 107 Actuator function failure, output signals are invalid	For value > 0: Press push button ↵ Details to display a list of detailed indications.
Detailed indications		
Config. warning	Collective signal 06: No analogue input defined	Configure analogue input AIN 1 or AIN 2, refer to <Input for setpoint position>
Internal warning	Collective signal 15: Internal warning The device can still be operated with restrictions. Device warnings	AUMA service Replacing a sub-assembly may be possibly required.
Wrn BackupInUse	Internal warning: Backup is being used.	
24 V DC control volt.	The 24 V DC customer auxiliary supply to control the digital inputs has failed.	Check 24 V DC inputs (DIN).
24 V DC internal	Internal fault: The internal 24 V DC power supply of the controls used to provide the electronics components (sub-assemblies within the AC 01.2 controls and in the actuator, e.g. RWG, MWG) has exceeded the power supply limits .	AUMA service
24 V DC external	The external 24 V AC voltage supply of the controls has exceeded the power supply limits.	
Wrn on time running	Warning: Max. running time/h exceeded	
Wrn on time starts	Warning: Max. number of motor starts (starts) exceeded	
RTC not set	The real time clock has not yet been set on the basis of valid values.	• Set time. • Exchange button cell.
Op. time warning	The set time (Perm.op. time, manual M0570 parameter) has been exceeded. The preset operating time is exceeded for a complete travel from end position OPEN to end position CLOSED.	The warning indications are automatically cleared once a new operation command is executed. • Check valve. • Check Perm.op. time, manual M0570 parameter.

Indication on display	Description/cause	Remedy
Wrn no reaction	No actuator reaction to operation commands within the set reaction time.	
Wrn heater	Heater failure within the actuator (control unit)	
Wrn actual position	Warning: Actual position of actuator: Possible causes: • Input signal for setpoint E1 = 0 (signal loss) • Signal range of the actual position is too low. • No reference operation actual position actuator	Verify E1 wiring.
Wrn controls temp.	Temperature within the controls housing too high	
Wrn motor temp.	Temperature within the motor winding too high	
Wrn gearbox temp.	Temperature within the actuator gear housing too high	
Wrn input AIN 1	Warning: Loss of signal analogue input 1	Check wiring.
Wrn input AIN 2	Warning: Loss of signal analogue input 2	Check wiring.
Wrn setpoint position	Input signal for actual value E2 = 0 (signal loss)	Verify E2 wiring.
Wrong oper. cmd	Collective signal 13: Possible causes: • Several operation commands (e.g. OPEN and CLOSE simultaneously, or OPEN and SETPOINT operation simultaneously) • One setpoint is present (E1 or E4) and the positioner is not active • For fieldbus: Setpoint exceeds 100.0 %	• Check operation commands (send one operation command only). • Set Positioner parameter to Function active. • Check setpoint.
I/O interface	The actuator is controlled via the I/O interface (parallel).	
[Power Off]	Operation mode Power Off Power supply has failed.	Check power supply.
EMCY behav. active	Operation mode EMERGENCY is active (EMERGENCY signal was sent). 0 V are applied at the EMERGENCY input.	• Detect cause for EMERGENCY signal. • Verify failure source. • Apply +24 V DC at EMERGENCY input.
Interlock active	Interlock operation mode is active.	Disable Interlock function.
Service active	Operation via service interface (Bluetooth) and service software PC ToolSuite.	Exit service software.
EMCY stop active	The EMERGENCY Stop switch has been operated. The motor control power supply (contactors or thyristors) is disconnected.	• Enable EMERGENCY Stop switch. • Reset EMERGENCY Stop state by means of Reset command.
Handwheel active	Manual operation is activated.	
LnkNr_NoReaction_Error	No valid communication via fieldbus (despite available connection)	
Sel. sw. not REMOTE	Selector switch is in position **Local control** (LOCAL) or **0** (OFF).	Set selector switch to position **Remote control** (REMOTE).
Local STOP	Push button STOP of the local controls is operated.	

Indication on display	Description/cause	Remedy
Configuration error	Collective signal 11: The failure behaviour is active since all required setpoints and actual values are incorrect.	Verify signals: • Setpoint E1 • Actual value E2 • Actual process value E4 For bus: • Check connection to master. • Check (clear) status of master.
Internal fault	Collective signal 14: Internal fault	AUMA service
Torque fault OPEN	Torque fault in direction OPEN	Perform one of the following measures: • Issue operation command in direction CLOSE. • Set selector switch to position **Local control** (LOCAL) and reset fault indication via push button **RESET**. • Execute reset command via fieldbus.
Torque fault CLOSE	Torque fault in direction CLOSE	Perform one of the following measures: • Issue operation command in direction OPEN. • Set selector switch to position **Local control** (LOCAL) and reset fault indication via push button **RESET**. • Execute reset command via fieldbus.
Thermal fault	Motor protection tripped	• Cool down, wait. • If the fault indication display persists after cooling down: - Set selector switch to position **Local control** (LOCAL) and reset fault indication via push button **RESET**. - Execute reset command via fieldbus. • Check fuses.
Phase fault	• When connecting to a 3-ph AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. • When connecting to a 3-ph or 1-ph AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing.	Test/connect phases.
IE version	LCB internal error: Error when comparing versions	AUMA service
IE EEPROM	LCB internal error: Error in EEPROM	AUMA service
IE parameter	LCB internal error: Error during parameter initialisation	AUMA service
IE file access	LCB internal error: Error when accessing a file on SD or NAND	AUMA service
Mains quality	Due to insufficient mains quality, the controls cannot detect the phase sequence (sequence of phase conductors L1, L2 and L3) within the pre-set time frame provided for monitoring.	• Check mains voltage. • Check Tripping time M0172 parameter, extend time frame if required.
Incorrect phase seq	The phase conductors L1, L2 and L3 are connected in the wrong sequence. Only applicable if connected to a 3-ph AC system	Correct the sequence of the phase conductors L1, L2 and L3 by exchanging two phases.

Indication on display	Description/cause	Remedy
IE 24 V AC internal	Internal error logic: The internal 24 V AC voltage supply of the controls has exceeded the power supply limits. The 24 V AC voltage supply is used to control the reversing contactors, to assess the thermoswitches, to supply the internal actuator heater and, as an option, to generate the 115 V AC supply for the customer.	• Check power supply (level and wiring). • Check power supply unit.
IE registration	System: Internal error registration: Error when ordering a data object (PRM, PZD or CH)	AUMA service
IE startup FB	System: Internal error startup function block Error during startup of a function block	AUMA service
IE startup sub-assy	System: Internal error startup sub-assembly Error during startup of sub-assemblies	AUMA service
IE mot. prot. monitor	Motor protection monitoring is defective	
IE LC	Internal fault: Local controls board	AUMA service
IE logic	Internal fault: Logic board	AUMA service
IE MWG	Internal fault: MWG	AUMA service
IE fieldbus	Internal fault: Fieldbus	AUMA service
IE I/O interface	Internal fault: I/O board	AUMA service • Check I/O interface M0139 parameter. The setting must correspond to the wiring diagram. • Check wiring. • Check I/O interface.
IE MCM	Internal fault: MCM (Motor Control and Monitoring)	AUMA service
IE PSO	Internal fault: PSO (Power Supply Options)	AUMA service
IE parameter config.	Internal fault: Parameter configuration	AUMA service
IE output defective	Internal fault: Output defective (switchgear control)	AUMA service
IE config. pos. transm.	Internal fault: Configuration of the position transmitter (for recording the actual position) incorrect	AUMA service
IE position transmitter	Internal fault: Position transmitter (for recording the actual position)	AUMA service
IE selector switch	Internal fault: IE selector switch	Replace selector switch.

10.3 Fuses

⚠ DANGER

Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

10.3.1 Fuses within the actuator controls

Fuses can be accessed after removing the electrical connection [2]. Fuses F1 and F2 are in the fuse holder. Fuses F3, F4, and F5 are located below, on the power supply.

Figure 79: Access to fuses

[1] Rear cover
[2] Electrical connection

Figure 80: Fuse holders for F1 and F2

F1/F2 Primary fuses on power supply unit

G fuses	F1/F2	AUMA Art. No.:
Size	6.3 x 32 mm	
Reversing contactors Power supply ≤ 500 V	1 A T; 500 V	K002.277
Reversing contactors Power supply > 500 V	2 A FF; 690 V	K002.665
Thyristor units for motor power up to 1.5 kW	1 A T; 500 V	K002.277
Thyristor units for motor power up to 3.0 kW		
Thyristor units for motor power up to 5.5 kW		

F3 Internal 24 V DC supply

G-fuse according to IEC 60127-2/III	F3	AUMA Art. No.:
Size	5 x 20 mm	
Voltage output (power supply unit) = 24 V	2.0 A T; 250 V	K006.106
Voltage output (power supply unit) = 115 V	2.0 A T; 250 V	K006.106

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

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

G-fuse according to IEC 60127-2/III	F4	AUMA Art. No.:
Size	5 x 20 mm	
Voltage output (power supply unit) = 24 V	1.25 A T; 250 V	K001.184
Voltage output (power supply unit) = 115 V	—	—

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

Information After fuse replacement, replace and fasten cover.

10.3.2 Motor protection (thermal monitoring)

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

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

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

The motor has to cool down before the operation can be resumed. Depending on the parameter setting, the fault signal is either automatically reset or the fault signal has to be acknowledged.

The acknowledgement is made:

- via the push button **Reset** in selector switch position LOCAL.
- or with the reset command via fieldbus.

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

11. Servicing and maintenance

CAUTION

Damage caused by inappropriate maintenance!

→ Servicing and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or the contractor of the plant.

→ 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).

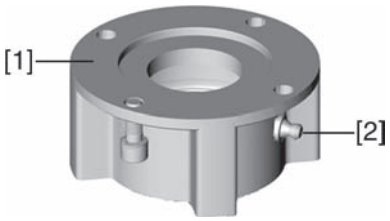
11.1 Preventive measures for servicing and safe operation

The following measures are required to ensure safe device operation:

Every 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.
  Consider torques according to manufacturer's details.
- Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the fastening 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 81: Output drive A



[1] Output drive A
[2] Grease nipple

Table 13: Grease quantities for bearing of output drive A

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

For enclosure protection IP 68

After submersion:

- 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.

1) For grease at density r = 0.9 kg/dm³

- 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

AUMA 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[2)]	Standard: • SA: Short-time duty S2 - 15 min • SAR: Intermittent duty S4 - 25 % Options: • 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 Options: • 1-ph AC motor, type IM B14 according to IEC 60034 • DC shunt motor, type IM B14 according to IEC 60034 • DC compound motor, type IM B14 according to IEC 60034 • Special motors
Motor voltage and frequency	Refer to motor name plate
Insulation class	Standard: F, tropicalized Option: H, tropicalized
Motor protection	Standard: Thermoswitches (NC) Option: PTC thermistors (according to DIN 44082)
Self-locking	Self-locking: Output speeds up to 90 rpm (50 Hz), 108 rpm (60 Hz) NOT self-locking: Output speeds from 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: 2 to 500 (standard) or 2 to 5,000 (option) Standard: • Single switch (1 NC and 1 NO) for each end position, switches 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 switch (1 NC and 1 NO) for each direction, switches not galvanically isolated Option: Tandem switches (2 NC and 2 NO) for each direction, switches galvanically isolated
Position feedback signal, analogue (option)	Potentiometer or 0/4 – 20 mA (RWG)
Mechanical position indicator	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED
Running indication	Blinker transmitter (standard for SA, option for SAR)
Heater in switch compartment	Standard: Resistance type heater, 5 W, 24 V DC, (internal supply)
Motor heater (option)	Voltages: 110 – 220 V AC, 220 – 240 V AC or 400 V AC (externally supplied) Power depending on the size 12.5 – 25 W

2) For nominal voltage and 40 °C ambient temperature and at average load with 35 % of the max. torque. The type of duty must not be exceeded.

Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation. Option: Handwheel lockable
onnection to controls	AUMA plug/socket connector with screw-type connection
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
Sensor system	
Indication for manual operation (option)	Indication whether manual operation is active/not active via switch (1 change-over contact)

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.	30 V AC/DC
U max.	250 V AC/DC
I max. AC current	4 A at 250 V (resistive load) 4 A at 250 V (inductive load, cos phi = 0.8)
I max. DC current	0.4 A at 250 V (resistive load) 2 A at 30 V (resistive load)

Technical data for handwheel activation switches	
Mechanical lifetime	10^7 starts
Silver plated contacts:	
U min.	12 V DC
U max.	250 V AC
I max. AC current	3 A at 250 V (inductive load, cos phi = 0.8)
I max. DC current	3 A at 12 V (resistive load)

12.2 Features and functions of actuator controls

Power supply, mains frequency	For mains voltage and mains frequency, refer to name plates at the controls and the motor Permissible variation of the mains voltage: ±10 % Permissible variation of the mains frequency: ±5 % Option: Permissible variation of the mains voltage: –30 %
Current consumption	Current consumption of the controls depending on the mains voltage: at permissible variation of the mains voltage of ±10 %: • 100 to 120 V AC = max. 750 mA • 208 to 240 V AC = max. 400 mA • 380 to 500 V AC = max. 250 mA • 515 to 690 V AC = max. 200 mA at permissible variation of the mains voltage of ±30 %: • 100 to 120 V AC = max. 1,200 mA • 208 to 240 V AC = max. 750 mA • 380 to 500 V AC = max. 400 mA • 515 to 690 V AC = max. 400 mA Motor current consumption: Refer to motor name plate
External supply of the electronics (option)	24 V DC +20 %/–15 % Current consumption: Basic version approx. 250 mA, with options up to 500 mA The external power supply must have a reinforced insulation against the mains voltage in accordance with IEC 61010-1 and may only be supplied by a circuit limited to 150 VA in accordance with IEC 61010-1.
Rated power	The controls are designed for the rated motor power, refer to motor name plate
Overvoltage category	Category III according to IEC 60364-4–443
Switchgear[3)]	Standard: Reversing contactors (mechanically and electrically interlocked) for motor power up to 1.5 kW, nominal motor current up to 9 A (OPEN-CLOSE duty) or 5.2 A (modulating duty) Options: • Reversing contactors (mechanically and electrically interlocked) for motor power up to 7.5 kW, nominal motor current up to 20 A (OPEN-CLOSE duty) or 18 A (modulating duty) • Thyristor unit (recommended for modulating actuators) - for motor power up to 1.5 kW, 500 V AC - for motor power up to 3.0 kW, 500 V AC - for motor power up to 5.5 kW, 500 V AC
Control	Via fieldbus interface
Status signals	Via fieldbus interface
Fieldbus interface	Standard: Profibus DP interface without additional inputs Options: • Additional inputs for version 1: - 4 binary inputs 24 V DC inputs (current consumption: approx. 10 mA/input), assign as desired - 2 analogue inputs 0/4 – 20 mA, assign as desired - Signal transmission is made via fieldbus interface • Additional inputs for version 2: - 6 binary inputs 24 V DC inputs (current consumption: approx. 10 mA/input), optional 115 V AC, assign as desired: - OPEN, STOP,CLOSE, EMERGENCY - BUS/EXTERNAL for selecting the type of control - MODE for selecting between open-close and modulating duty - Analogue input 0/4 – 20 mA for position setpoint (positioner) - Analogue input 0/4 – 20 mA for position feedback - Status signals via 6 programmable output contacts Additional inputs for version 3: • like version 2, however additionally status signals via 6 programmable output contacts
Profibus DP-V1 (option)	Access to parameters, the electronic name plate and the operating and diagnostic data with acyclic write/read services

3) The reversing contactors are designed for a lifetime of 2 million starts.

Profibus DP-V2 (option)	• Redundancy: AUMATIC is equipped with an additional redundant Profibus DP interface. • Time-stamp: Synchronisation of time between AUMATIC and Profibus master with subsequent time-stamp of the most important events such as malfunctions, end position and torque signals from the AUMATIC
Redundancy (option)	Additional redundant Profibus DP interface
Local controls	Standard: • Selector switch LOCAL - OFF - REMOTE (lockable in all three positions) • Push buttons OPEN, STOP, CLOSE, RESET • 6 indication lights: - End position CLOSED (yellow), torque fault CLOSE (red), motor protection tripped (red), torque fault OPEN (red), end position and running indication OPEN (green), Bluetooth (blue) • Graphic LC display, illuminated • Bluetooth programming interface with Bluetooth class II chip, version 2.0 with a range up to 10 m in industrial environments. Supports the SPP Bluetooth profile (Serial Port Profile). Options: • Special colours for the 5 indication lights: - End position CLOSED (green), torque fault CLOSE (blue), torque fault OPEN (yellow), motor protection tripped (white), end position OPEN (red)
Application functions	Standard: • Switch-off mode adjustable - Limit or torque seating for end position OPEN and end position CLOSED • Torque by-pass, adjustable up to 5 seconds (no torque monitoring during this time) • Start and end of stepping mode as well as ON and OFF time (1 up to 1,800 seconds) can be programmed individually for the directions OPEN and CLOSE. • Any 8 intermediate positions between 0 and 100 %, reaction and signal behaviour programmable • Positioner - Position setpoint via fieldbus interface - Programmable behaviour on loss of signal - Automatic adaptation of the dead band (adaptive behaviour can be selected) - Split Range operation - Selection between open-close duty and modulating duty via fieldbus interface Options:
Failure functions	Options: • EMERGENCY behaviour programmable - Digital input low active, reaction can be selected: Stop, move to end position CLOSED, move to end position OPEN, move to intermediate position - Torque monitoring can be by-passed during EMERGENCY operation. - Thermal protection can be by-passed during EMERGENCY operation (only in combination with thermoswitch in the actuator, not with PTC thermistor). • EMERGENCY STOP function
Monitoring functions	• Monitoring the actuator sensor system • Torque monitoring: Valve overload protection (adjustable), results in switching off and generates fault indication • Monitoring of permissible on-time and number of starts (adjustable), generates warning indication • Operating time monitoring (adjustable), results in switching off and generates fault indication • Phase failure monitoring (adjustable), results in switching off and generates fault indication • Automatic correction of the direction of rotation upon wrong phase sequence

Diagnostic functions	• Electronic device ID with order and product data • Logging of operating data: A resettable counter and a lifetime counter each for: - Motor running time, number of starts, torque switch trippings in end position CLOSED, limit switch trippings in end position CLOSED, torque switch trippings in end position OPEN, limit switch trippings in end position OPEN, torque faults CLOSE, torque faults OPEN, motor protection trippings • Time-stamped event report with setting, operation and fault history: - Status signals in compliance with NAMUR recommendation NE 107: "Failure", Function check", "Out of specification", "Maintenance required"
Electrical connection	Standard: AUMA plug/socket connector (S) with screw-type connection and M-threads Options: • Pg-threads, NPT-threads, G-threads, special threads • Gold-plated control contacts (pins and sockets) • Parking frame for wall mounting of the disconnected plug • Protection cover for plug compartment (when plug is removed)
Overvoltage protection (option)	Protection of the actuator and control electronics against overvoltages on the fieldbus cables of up to 4 kV
Wiring diagram	Refer to name plate

12.3 Profibus DP interface

Settings/programming the Profibus DP interface	
Baud rate setting	Automatic baud rate recognition
Setting the Profibus DP interface	The setting of the Profibus DP address is made via the display of the AUMATIC
Configurable process representation via GSD file	For an optimum adaptation to the process control system, the process representation may be freely configured.

Commands and signals of the fieldbus interface	
Process representation output (command signals)	OPEN, STOP, CLOSE, position setpoint, RESET, EMERGENCY, Interlock OPEN/CLOSE, Enable LOCAL
Process representation input (feedback signals)	• End position OPEN, CLOSED • Actual position value • Actual torque value[4)] • Selector switch in position LOCAL/REMOTE • Running indication (directional) • Torque switch OPEN, CLOSED • Limit switch OPEN, CLOSED • Manual operation by handwheel or via local controls • 2 analogue and 4 digital customer inputs
Process representation input (fault signals)	• Motor protection tripped • Torque switch tripped in mid-travel • One phase missing • Loss of the analogue customer inputs
Behaviour on loss of communication	The behaviour of the actuator is programmable: • Stop in current position • Travel to end position OPEN or CLOSED • Travel to any intermediate position

4) Requires magnetic limit and torque transmitter (MWG) in actuator

General Profibus DP interface data	
Communication protocol	Profibus DP according to IEC 61158 and IEC 61784-1
Network topology	• Line (bus) structure • When using repeaters, tree structures can also be implemented. • Coupling and uncoupling of devices during operation without affecting other devices is possible
Transmission medium	Twisted, screened copper cable according to IEC 61158
Fieldbus interface	EIA-485 (RS485)
Transmission speed/cable length	• Baud rate and maximum cable length (segment length) without repeater: - between 9.6 and 93.75 kbit/s: 1,200 m - for 187.5 kbit/s: 1,000 m - for 500 kbit/s: 400 m - for 1,500 kbit/s: 200 m • Baud rate and possible cable length with repeater (total network cable length): - between 9.6 and 93.75 kbit/s: approx. 10 km - for 187.5 kbit/s: approx. 10 km - for 500 kbit/s: approx. 4 km - for 1,500 kbit/s: approx. 2 km
Device types	• DP master class 1, e.g. central controllers such as PLC, PC, ... • DP master class 2, e.g. programming/configuration tools • DP slave, e.g. devices with digital and/or analogue inputs/outputs such as actuators, sensors
Number of devices	32 devices without repeater, with repeater expandable to 126
Bus access	• Token-passing between masters and polling for slaves • Mono-master or multi-master systems are possible.
Supported fieldbus functions	Cyclic data exchange, sync mode, freeze mode, fail-safe mode

12.4 Service conditions

Mounting position	Any position
Use	Approved for indoor and outdoor installation
Enclosure protection according to EN 60529	Standard: • IP 68 with AUMA 3-ph AC motor/1-ph AC motor • For special motors variant enclosure protection: refer to name plate Option: • IP 68–DS According to AUMA definition, enclosure protection IP 68 meets the following requirements: • Water depth: maximum 8 m head of water • Duration of submersion in water: maximum of 96 hours • Up to 10 operations during submersion • Modulating duty is not possible during submersion (DS = Double Sealed = terminal compartment additional sealed against interior)
Corrosion protection	Standard: • KS: Suitable for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. in wastewater treatment plants, chemical industry) Options: • KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration
Installation altitude	Standard: ≤ 2 000 m above sea level Option: > 2 000 m above sea level, please contact AUMA
Humidity	Up to100 % relative humidity across the total permissible temperature range
Pollution degree	Within actuator controls: pollution degree 2 Outside actuator controls (in closed conditions): pollution degree 4
Finish coating	Standard: Coating based on polyurethane (powder coating)
Colour	Standard: AUMA silver-grey (similar to RAL 7037)

Ambient temperature	Refer to name plate Standard: • Open-close duty: –40 °C to +70 °C • Modulating duty: –40 °C to +60 °C Options: • Open-close and modulating duty: –50 °C to +60 °C • Open-close and modulating duty: –60 °C to +60 °C Low temperature versions inc. heating system for connection to external power supply 230 V AC or 115 V AC.
Vibration resistance according to IEC 60068–2–6	1 g, for 10 to 200 Hz Resistant to vibrations 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 (operation cycles OPEN - CLOSE - OPEN): SA 07.2/07.6 – SA 10.2: 25,000 SA 14.2/14.6 – SA 16.2: 20,000 Modulating duty:[5)] SAR 07.2/07.6 – SAR 10.2: 7.5 million modulating steps SAR 14.2/14.6 – SAR 16.2: 5.0 million modulating steps
Weight	Refer to separate technical data

12.5 Accessories

Wall bracket[6)]	AUMATIC mounted separately from the actuator, including plug/socket connector. Connecting cables on request. Recommended for high ambient temperatures, difficult access, or in case of heavy vibration during service
Programming software for PC	PC ToolSuite

12.6 Further information

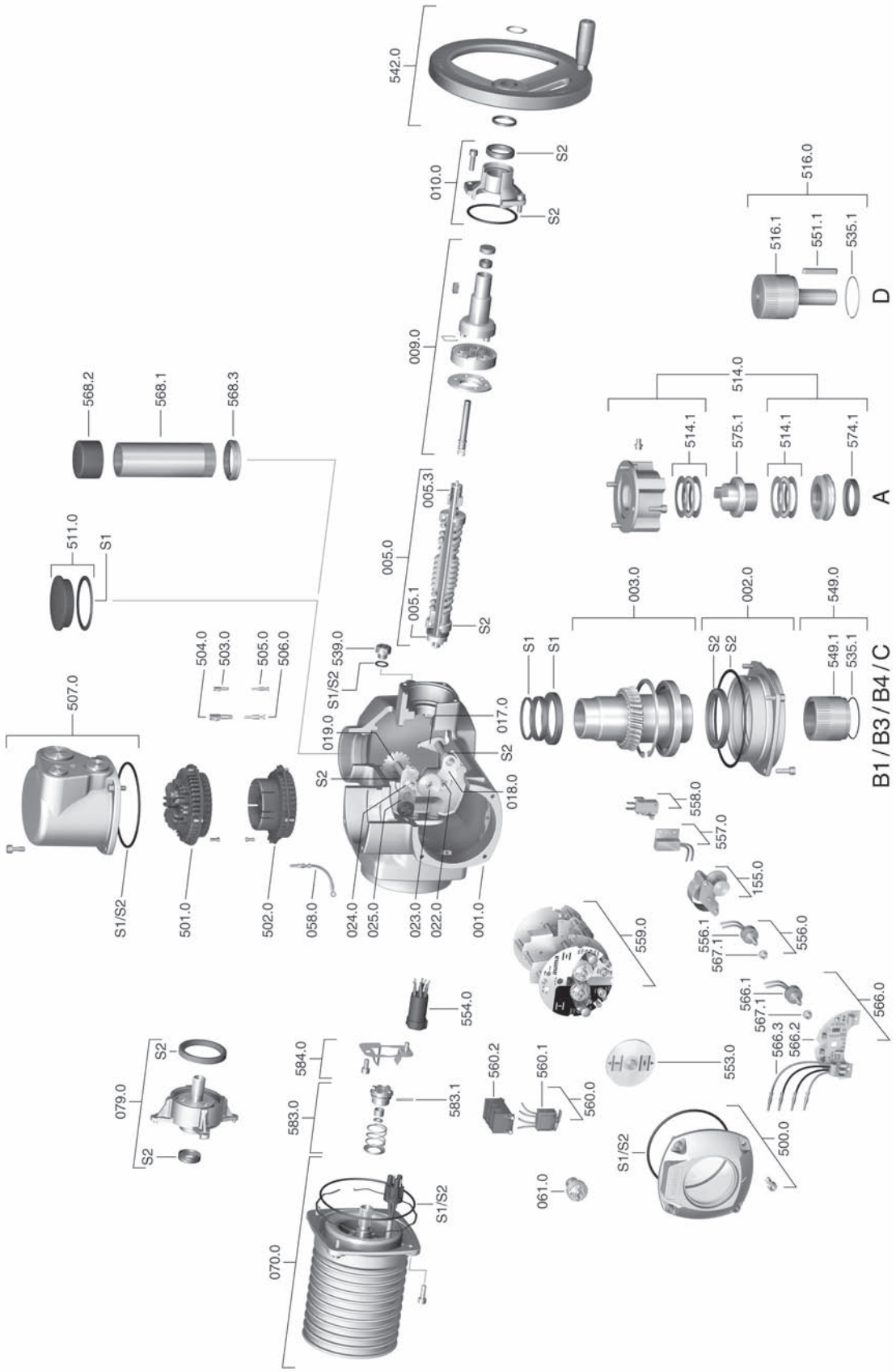
EU Directives	• Electromagnetic Compatibility (EMC): (2004/108/EC) • Low Voltage Directive: (2006/95/EC) • Machinery Directive: (2006/42/EC)

5) 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.

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

13. Spare parts

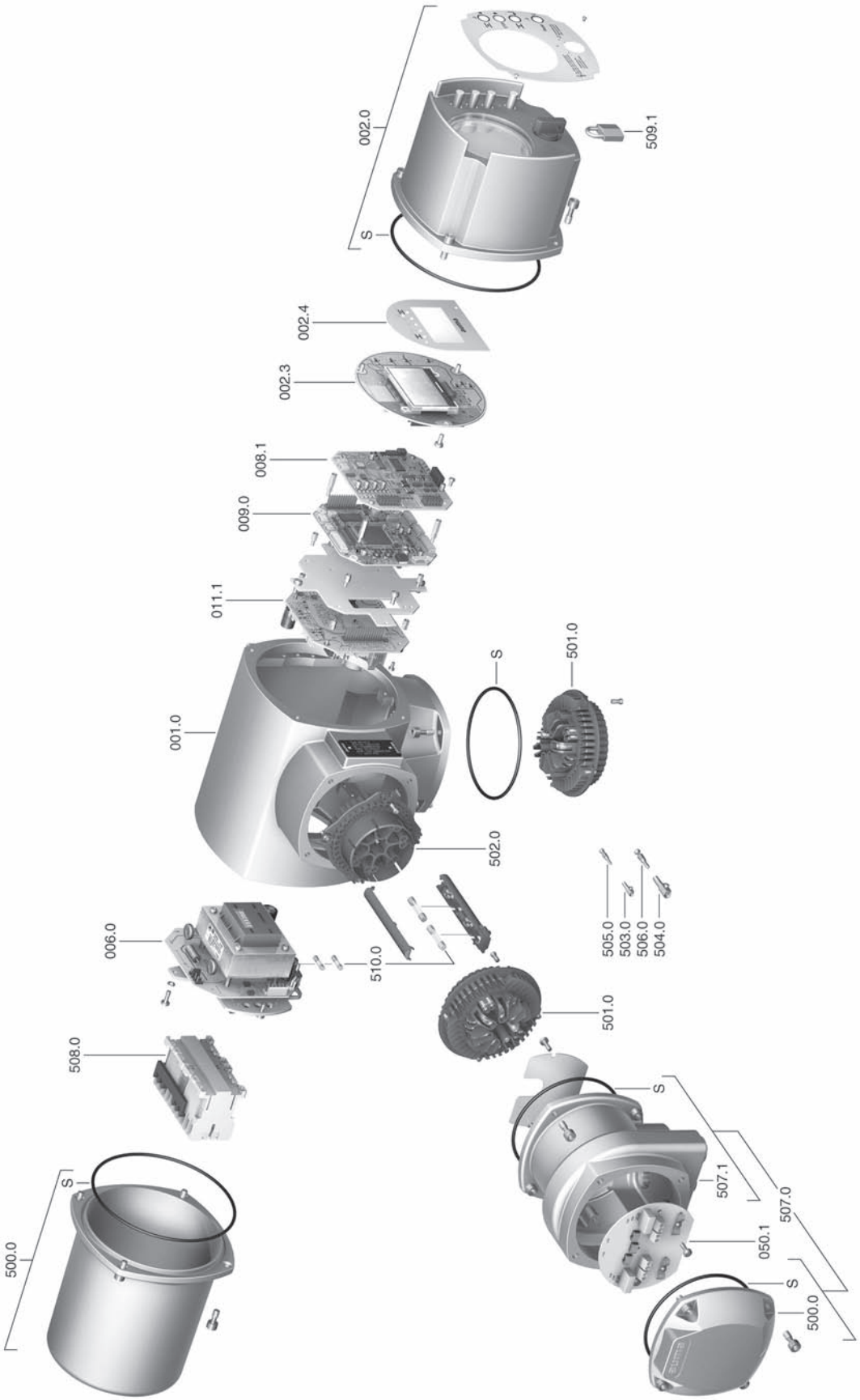
13.1 Multi-turn actuators SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2



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	553.0	Mechanical position indicator	Sub-assembly
002.0	Bearing flange	Sub-assembly	554.0	Socket carrier with motor cable harness	Sub-assembly
003.0	Hollow shaft with worm wheel	Sub-assembly	556.0	Potentiometer for position transmitter	Sub-assembly
005.0	Drive shaft	Sub-assembly	556.1	Potentiometer without slip clutch	Sub-assembly
005.1	Motor coupling on output drive shaft		557.0	Heater	Sub-assembly
005.3	Manual drive coupling		558.0	Blinker transmitter including pins at wires (without impulse disc and insulation plate)	Sub-assembly
009.0	Planetary gear for manual drive	Sub-assembly	559.0–1	Control unit without torque switching heads and switches	Sub-assembly
010.0	Retaining flange	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
017.0	Torque lever	Sub-assembly	560.0–1	Switch stack for direction OPEN	Sub-assembly
018.0	Gear segment		560.0–2	Switch stack for direction CLOSE	Sub-assembly
019.0	Crown wheel		560.1	Switch for limit/torque switching	Sub-assembly
022.0	Drive pinion II for torque switching	Sub-assembly	560.2	Switch case	
023.0	Output drive wheel for limit switching	Sub-assembly	566.0	Position transmitter RWG	Sub-assembly
024.0	Intermediate wheel for limit switching	Sub-assembly	566.1	Potentiometer for RWG without slip clutch	Sub-assembly
025.0	Locking plate	Sub-assembly	566.2	Electronic board RWG	Sub-assembly
058.0	Wire for protective earth (pin)	Sub-assembly	566.3	Wire harness for RWG	Sub-assembly
061.0	Torque switching head	Sub-assembly	567.1	Slip clutch for potentiometer/RWG	Sub-assembly
070.0	Motor (VD motor incl. no. 079.0)	Sub-assembly	568.1	Stem protection tube (without cap)	
079.0	Planetary gear for motor drive (SA/SAR 07.2 — 16.2 for VD motor)	Sub-assembly	568.2	Cap for stem protection tube	
155.0	Reduction gearing	Sub-assembly	568.3	V-seal	
500.0	Cover for switch compartment	Sub-assembly	574.1	Radial seal output drive A for ISO flange	
501.0	Socket carrier (complete with sockets)	Sub-assembly	575.1	Stem nut type A	
502.0	Pin carrier without pins	Sub-assembly	583.0	Motor coupling on motor shaft	Sub-assembly
503.0	Socket for controls	Sub-assembly	583.1	Pin for motor coupling	
504.0	Socket for motor	Sub-assembly	584.0	Retaining spring for motor coupling	Sub-assembly
505.0	Pin for controls	Sub-assembly	S1	Seal kit, small	Set
506.0	Pin for motor	Sub-assembly	S2	Seal kit, large	Set
507.0	Plug cover	Sub-assembly			
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			
516.0	Output drive D	Sub-assembly			
516.1	Output drive shaft D				
535.1	Snap ring				
539.0	Screw plug	Sub-assembly			
542.0	Handwheel with ball handle	Sub-assembly			
549.0	Output drive B1/B3/B4/C	Sub-assembly			
549.1	Output socket B1/B3/B4/C				
551.1	Parallel key				

13.2 Actuator controls AUMATIC AC 01.2 with AUMA plug/socket connector (SD bus)



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

No.	Designation	Type
001.0	Housing	Sub-assembly
002.0	Local controls	Sub-assembly
002.3	Local controls board	Sub-assembly
002.4	Display face-plate	Sub-assembly
006.0	Power supply	Sub-assembly
008.1–2	Fieldbus board	Sub-assembly
009.0	Logic board	Sub-assembly
011.1	Relay board	Sub-assembly
050.1	Bus connection board	
500.0	Cover	Sub-assembly
501.0	Socket carrier complete with sockets	Sub-assembly
502.0	Pin carrier without pins	Sub-assembly
503.0	Socket for controls	Sub-assembly
504.0	Socket for motor	Sub-assembly
505.0	Pin for controls	Sub-assembly
506.0	Pin for motor	Sub-assembly
507.0	Electrical connection for bus without connection board (050.1)	Sub-assembly
507.1	Frame	Sub-assembly
508.0	Switchgear	Sub-assembly
509.1	Padlock	
510.0	Fuse kit	Set
S	Seal kit	Set

14. Certificates

14.1 Declaration of Incorporation and EC Declaration of Conformity

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auma®
Solutions for a world in motion

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

for electric AUMA multi-turn actuators of the type ranges **SA 07.2 – SA 16.2** and **SAR 07.2 – SAR 16.2** in versions **AUMA NORM**, **AUMA SEMIPACT**, **AUMA MATIC** or **AUMATIC**.

AUMA Riester GmbH & Co. KG as manufacturer declares herewith, that the above mentioned multi-turn 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 Muellheim

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

Muellheim, 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.

Y004.924/002/en

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