



Multi-turn actuators

SA 25.1 – SA 40.1/SAR 25.1 – SAR 30.1

Control unit: electronic (MWG)

with actuator controls

AUMATIC AC 01.1 Non-Intrusive

Control

→ Parallel

Profibus DP

Modbus

DeviceNet

Foundation Fieldbus



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 01.1/ACExC 01.1 Parallel

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.

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

- Escalators
- Continuous duty
- Buried service
- Permanent submersion (observe enclosure protection)
- Potentially explosive areas, with the exception of zone 22
- Radiation exposed areas in nuclear power plants

No liability can be assumed for inappropriate or unintended use.

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

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

1.3 Applications in Ex zone 22 (option)

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

The actuators are designed to meet enclosure protection IP 67 or IP 68 and fulfil the requirements of EN 50281-1-1:1998 section 6 - Electrical apparatus for use in presence of combustible dust, requirements for category 3 electrical equipment - protected by enclosures.

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

- In compliance with the ATEX directive 94/9/EC, the actuators must be equipped with an additional identification – II3D IP6X T150 °C.
- The maximum surface temperature of the actuators, based on an ambient temperature of +40 °C in accordance with EN 50281-1-1 section 10.4, is +150 °C. In accordance with section 10.4, an increased dust deposit on the equipment was not considered for the determination of the maximum surface temperature.
- The correct connection of the thermostats 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 threaded plug (part no. 1.27) or the stem protection tube with protective cap (part nos. 160.1 and 160.2) for sealing the hollow shaft must imperatively be mounted to guarantee tightness and therefore the combustible dust hazard protection.
- As a general rule, the requirements of EN 50281-1-1 must be respected in dust hazardous locations. During commissioning, service, and maintenance, special care as well as qualified and trained personnel are required for the safe operation of actuators.

1.4 Warnings and notes

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



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



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



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



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

Arrangement and typographic structure of the warnings



Type of hazard and respective source!

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

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

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

1.5 References and symbols

The following references and symbols are used in these instructions:

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

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

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

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.

Step by step

Provides a detailed description of each step for setting/viewing the parameter.



Description of the parameter settings/indications

Describes the setting/viewing possibilities of a parameter.

Reference to other sections

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

2. Identification

2.1 Name plate

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

Figure 1: Arrangement of name plates



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

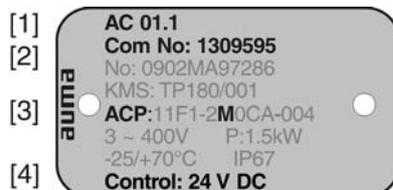
Data for identification

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 25.1, 30.1, 35.1, 40.1, 48.1

	Multi-turn actuators for modulating duty: SAR 25.1, 30.1 AC 01.1 = Stellantriebs-Steuerung 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 7 th position in the ACP wiring diagram indicates the type of feedback signals from the actuator: M = MWG, <Non-Intrusive version>. P = Potentiometer R = RWG (electronic position transmitter)
Control	24 V DC = Control via parallel interface at 24 V DC control voltage. 115 V AC = Control via parallel interface at 115 V AC control voltage. 0/4 – 20 mA = Control via parallel interface via analogue input 0/4 – 20 mA.

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 right through to diagnostic functions.
Local controls/COM-AC	Operation, setting, and display can be performed on site directly at the controls On site it is possible to <ul style="list-style-type: none"> • 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 COM-AC software (option), using a computer (laptop or PC). Depending on the version, the connection between computer and AUMATIC can be made with cable (infra-red interface) or without cable (Bluetooth interface) (not included in these instructions).
Intrusive - Non-Intrusive	<ul style="list-style-type: none"> • 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.

Figure 4: Lifting the actuator using an eyebolt



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 $-30\text{ }^{\circ}\text{C}$.

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

4. Assembly

4.1 Mounting position

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

4.2 Handwheel fitting

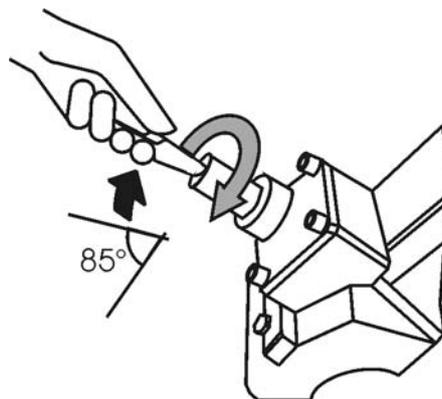
Information For transport purposes, handwheels from a diameter of 400 mm are supplied separately.

NOTICE

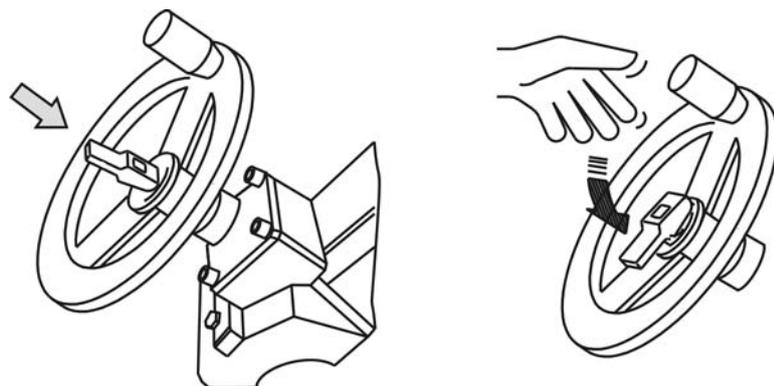
Damage at the change-over mechanism due to incorrect assembly!

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

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



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



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

4.3 Multi-turn actuator: mount to valve/gearbox

NOTICE

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

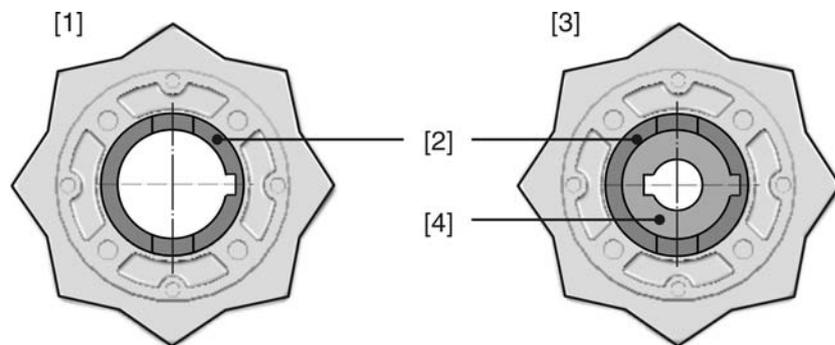
- Touch up damage to paint finish after work on the device.
- After mounting, connect the device immediately to electrical mains to ensure that heater minimises condensation.

4.3.1 Output drive types B, B1 – B4 and E

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

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

Figure 7: Output drives



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

Information Spigot at flanges should be loose fit.

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

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

Table 1: Tightening torques for screws

Screws	Tightening torque T_A [Nm]
Threads	Strength class 8.8
M16	214
M20	431
M30	1,489
M36	2,594

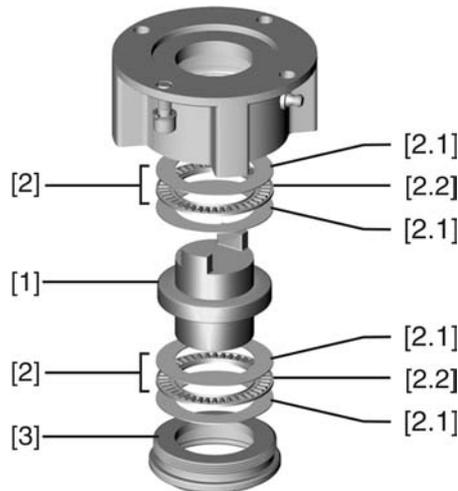
4.3.2 Output drive type A

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

4.3.2.1 Stem nut: finish machining

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

Figure 8: Design of output drive type A

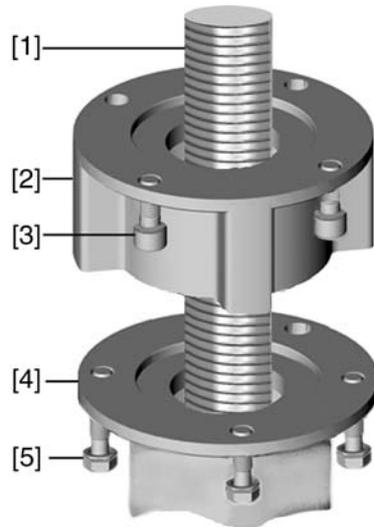


- [1] Stem nut
- [2] Bearing
- [2.1] Bearing race
- [2.2] Bearing rim
- [3] Spigot ring

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].
Information: From sizes A 35.2 – 48.2: Record the order of the bearing races [2.1].
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].
Information: From sizes A 35.2 – 48.2: Respect correct order of bearing races [2.1].
8. Re-insert stem nut [1] with bearings [2] into output drive.
Information: Ensure that dogs or splines are placed correctly in the keyway of the hollow shaft.
9. Screw in spigot ring [3] until it is firm against the shoulder.

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

Figure 9: Assembly with output drive type A



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

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

Table 2: Tightening torques for screws

Screws	Tightening torque T_A [Nm]
Threads	Strength class 8.8
M16	214
M20	431
M30	1,489
M36	2,594

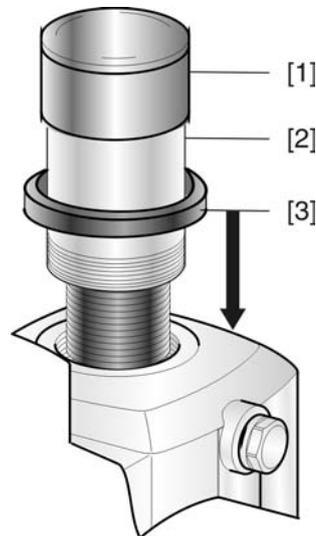
11. Turn multi-turn actuator with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

4.4 Accessories for assembly

4.4.1 Stem protection tube for rising valve stem

— Option —

Figure 10: 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 selected according to the order. If, after mounting the actuator to the valve or the gearbox on site, the local controls are in an unfavourable position, the mounting position can be changed at a later date. Four mounting positions are possible.

Figure 11: Mounting positions A and B



Figure 12: 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



Danger due to incorrect electrical connection

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

- The electrical connection must be carried out exclusively by suitably qualified personnel.
- Prior to connection, observe basic information contained in this chapter.
- After connection but prior to applying the voltage, observe the <Commissioning> and <Test run> chapters.

Wiring diagram/terminal plan

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

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
100 to 120 V AC (±10 %)	650 mA
208 to 240 V AC (±10 %)	325 mA
380 to 500 V AC (±10 %)	190 mA
24 V DC (+10 %/-15 %) and AC motor	500 mA, filter capacitor 2,200 µF
24 V DC (+10 %/-10 %) and DC motor	750 mA, filter capacitor 2,200 µF

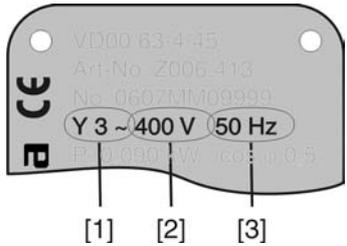
Table 4: Maximum permissible protection

Switchgear	Rated power	max. protection
Reversing contactor A1	up to 1.5 kW	16 A (gL/gG)
Reversing contactor A2	up to 7.5 kW	32 A (gL/gG)
Reversing contactor A3	up to 11 kW	63 A (gL/gG)
Reversing contactor A4 (in the control box)	up to 30 kW	125A (gL/gG)
Reversing contactor A5 (in the control box)	up to 55 kW	200A (gL/gG)
Thyristor	up to 1.5 kW	16 A (g/R) I ² t<1,500A ² s
Thyristor	up to 3 kW	32 A (g/R) I ² t<1,500A ² s
Thyristor	up to 5.5 kW	63 A (g/R) I ² t<5,000A ² s

If controls are mounted separately from actuator (controls on wall bracket): Consider length and cross section of connecting cable when defining the protection required.

Power supply for the controls (electronics)

If the controls (electronics) are supplied externally with 24 V DC and DC motors (24 V DC, 48 V DC, 60 V DC, 110 V DC, 220 V DC) are used simultaneously, the 24 V DC voltage supply for the controls should be ensured via the XK25/26 terminals, separately from the power supply (U1, V1). In case of common supply using a single cable (links from U1, V1 with XK25/26, for 24 V DC only !!!), short-term excess or falling below the permissible voltage limits can be the consequence during switching (24 V DC +10 %/-10 %). Any possibly incoming operation commands are not executed outside the admissible limit values. The controls briefly signal a fault condition.

Potential of customer connections	<p>All input signals (control) must be supplied with the same potential.</p> <p>All output signals (status signals) must be supplied with the same potential.</p>
Safety standards	<p>All externally connected devices shall comply with the relevant safety standards.</p>
Cable installation in accordance with EMC	<p>Signal and bus cables are susceptible to interference.</p> <p>Motor cables are interference sources.</p> <ul style="list-style-type: none"> • 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 earth 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	<p>Type of current, mains voltage and mains frequency must match the data on the motor name plate.</p> <p>Figure 13: Motor name plate (example)</p>  <p>[1] Type of current [2] Mains voltage [3] Mains frequency (for 3-ph and 1-ph AC motors)</p>
Connecting cables	<ul style="list-style-type: none"> • For device insulation, appropriate (voltage-proof) cables must be used. Specify cables for the highest occurring rated voltage. • Use connecting cable with appropriate minimum rated temperature. • For connecting cables exposed to UV radiation (outdoor installation), use UV resistant cables.

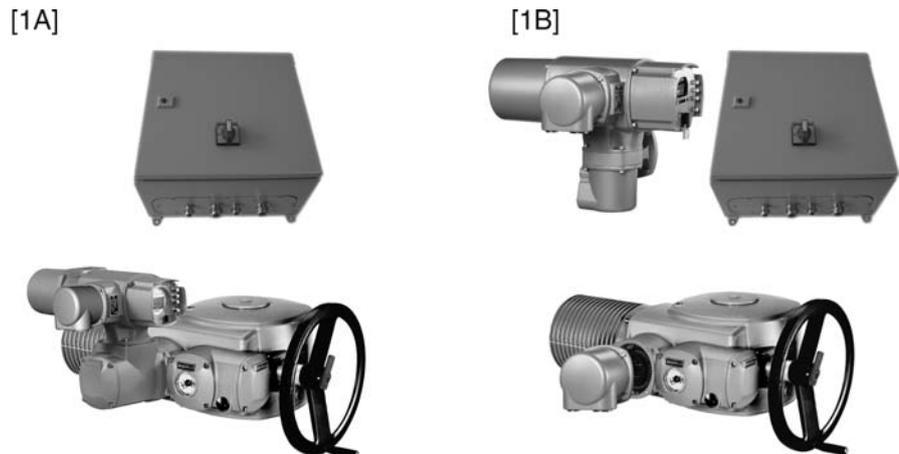
5.2 Connection with control box

For actuators with a high motor current, the electrical connection is made via control box.

The control box is mounted separately on a wall.

The AUMATIC actuator controls are generally mounted directly to the actuator [1A] but can be mounted separately on a wall bracket [1B].

Figure 14: Assembly of controls



[1A] AUMATIC directly mounted to actuator

[1B] AUMATIC on wall bracket

Observe prior to connection

- Cables and required number of wires are indicated in the wiring diagram.
- The cable for motor connection has to be shielded.
- For the power supply cable, fuses have to be provided for short-circuit protection by the customer. The fuses have to be adapted to the cross section of the cable, the thermal overload relay in the control box, the switch contacts and the motor data (refer to motor name plate).

Information

For wall-mounted controls [1B], additionally observe <Controls on wall bracket> chapter.

5.3 Motor connection



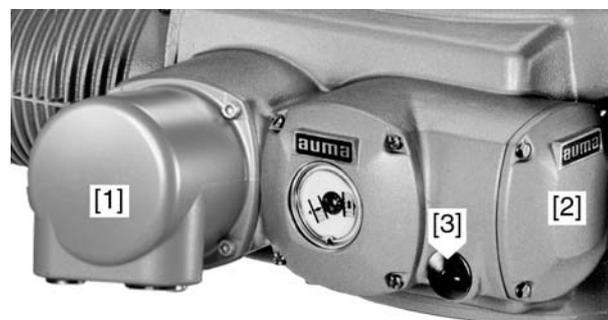
Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

Motor connection is performed at motor connection compartment [2] for motors with nominal currents exceeding 25 A. Motor connection can also be made via plug/socket connector [1] in case of lower nominal currents.

Figure 15: Connection arrangement for sizes 25.1 – 40.1



[1] AUMA plug/socket connector for control connections and motor connections up to 25 A

[2] Motor connection compartment for motor connections exceeding 25 A

[3] Cable entry for motor connection

Table 5: Cross sections and tightening torques for motor terminals

Type	Output speed	Cross sections	Tightening torques
SA 25.1 SAR 25.1	4 – 22	0.5 – 16 mm ²	2.0 Nm
	32 – 90	2.5 – 35 mm ²	3.5 Nm
SA 30.1 SAR 30.1	4 – 22	4 – 16 mm ²	1.2 – 2.4 Nm
	32 – 45	10 – 35 mm ²	4.0 – 5.0 Nm
	63 – 90	16 – 70 mm ²	6.0 – 12 Nm
SA 35.1	4 – 5.6	4 – 16 mm ²	1.2 – 2.4 Nm
	8 – 22	10 – 35 mm ²	4.0 – 5.0 Nm
	32 – 45	16 – 70 mm ²	6.0 – 12 Nm
SA 40.1	4 – 11	10 – 35 mm ²	4.0 – 5.0 Nm
	16 – 32	16 – 70 mm ²	6.0 – 12 Nm

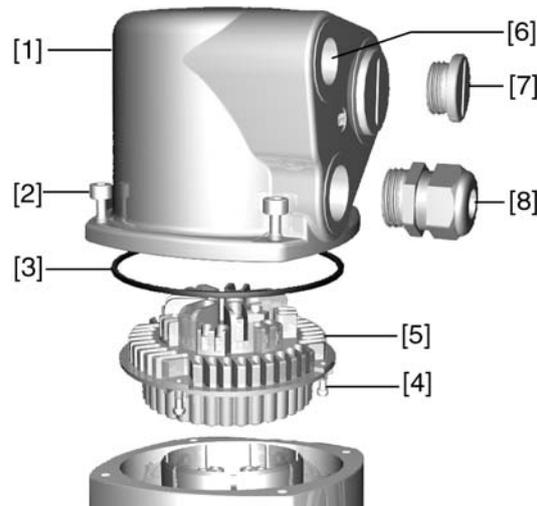
5.4 Connection with AUMA plug/socket connector

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

5.4.1 Terminal compartment: open

Figure 16: Connection AUMA plug/socket connector, version S



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



Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
2. Loosen screws [4] and remove socket carrier [5] from cover [1].

3. Insert cable glands [8] suitable for connecting cables.
- ➔ The enclosure protection IP... stated on the name plate is only ensured if suitable cable glands are used. Example: Name plate shows enclosure protection IP 68.



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

5.4.2 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

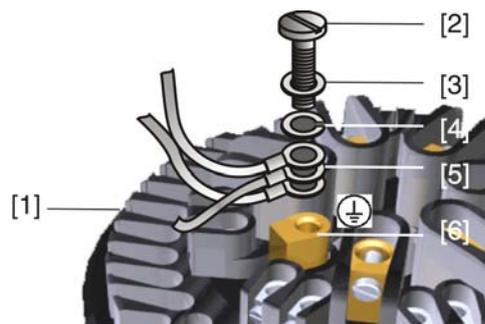
In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!

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 18: PE connection



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

NOTICE

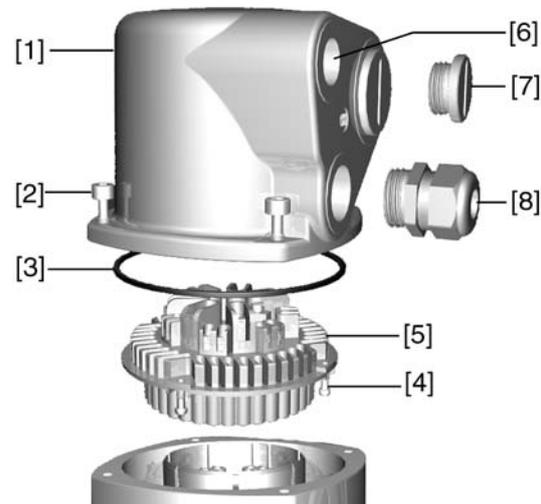
Danger of corrosion: Damage due to condensation!

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

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

5.4.3 Terminal compartment: close

Figure 19: Example: Version S



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



Short-circuit due to pinching of cables!

Risk of electric shock and functional failures.

→ Carefully fit socket carrier to avoid pinching the cables.

1. Insert the socket carrier [5] into the cover [1] and fasten with screws [4].
2. Clean sealing faces of cover [1] and housing.
3. Check whether O-ring [3] is in good condition, replace if damaged.
4. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.
5. Fit cover [1] and fasten screws [2] evenly crosswise.
6. Fasten cable glands [8] applying the specified torque to ensure the required enclosure protection.

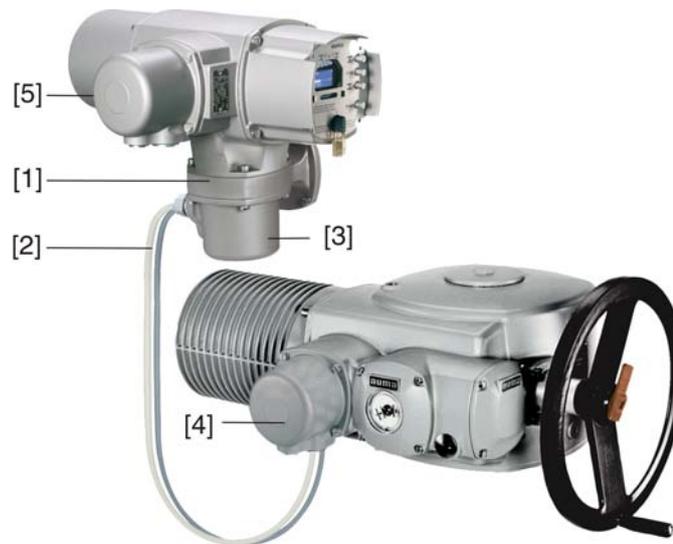
5.5 Accessories for electrical connection

5.5.1 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 subject 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 of controls (XK) - customer plug

Observe prior to connection

- Permissible length of connecting cables: max. 100 m.
- Permissible length of connecting cables for later separation of actuator and controls: max. 10 m.
- We recommend: AUMA cable set LSW20.
- If the AUMA cable set is not used:
 - Use suitable flexible and screened connecting cables.
 - Use separate, CAN bus cable for MWG of 120 Ohm character impedance (e.g. UNITRONIC BUS-FD P CAN UL/CSA - 2 x 2 x 0.5 mm², manufacturer: Lapp).
 - Data cable connection: XM2-XA2 = CAN L, XM3-XA3 = CAN H.
 - MWG voltage supply if the AUMATIC has been ordered and delivered with wall bracket: XM6-XA6 = GND, XM7-XA7 = + 24 V DC (refer to wiring diagram).
 - MWG voltage supply if AUMATIC has been subsequently separated from the actuator: XM6-XA6 = GND, XM11-XA117 = + 5 V DC (refer to wiring diagram).
 - For the electrical connection at wall bracket [3], the terminals are made as crimp connections.
 - Use a suitable four indent crimp tool for crimping.
 - Cross sections for flexible wires:
 - Control cables: max. 0.75 to 1.5 mm²
 - Mains connection: max. 2.5 to 4 mm²
- When using connecting cables, e.g. of the heater, requiring direct wiring from the actuator to the XK customer plug (XA-XM-XK, refer to wiring diagram), these connecting cables must be subject to an insulation test in compliance with EN 50178. Connecting cables for MWG do not belong to this group. They may **not** be subject to an insulation test.

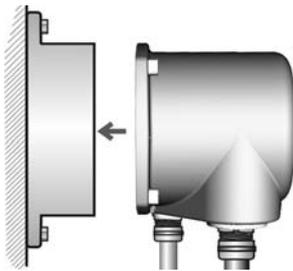
5.5.2 Parking frame

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



5.5.3 Protection cover

Protection cover for plug compartment when plug is removed.

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

5.5.4 Double sealed intermediate frame

When removing the electrical connection or due to leaky cable glands, ingress of dust and water into the housing may occur. This is prevented effectively by inserting the double sealed intermediate frame [2] between the plug/socket connector [1] and the housing of the device. The enclosure protection of the device (IP 68) will not be affected, even if the electrical connection [1] is removed.

Figure 22: Electrical connection with double sealed intermediate frame



[1] Electrical connection

[2] Double sealed intermediate frame

5.5.5 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

6.1 Manual operation

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

6.1.1 Manual operation: engage

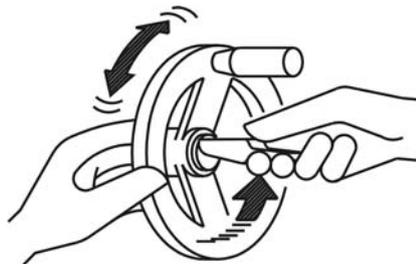
Information When using brake motors, note that the motor is disengaged during manual operation. For this reason, the brake motor cannot sustain any load during manual operation. The load must be sustained via the handwheel.

NOTICE

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

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

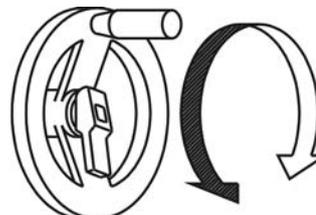
1. Pivot change-over lever manually to approx. 85° while slightly turning the handwheel back and forth until manual operation engages.



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



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



6.1.2 Manual operation: disengage

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

6.2 Motor operation

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

6.2.1 Local operation

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

Figure 27: Local controls



- [1] Push button OPEN
- [2] Push button STOP
- [3] Push button CLOSE
- [4] Push button Reset
- [5] Selector switch
- [6] Indication lights/LEDs

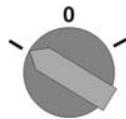


Hot surfaces, e.g. possibly caused by high ambient temperatures or strong direct sunlight!

Danger of burns

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

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



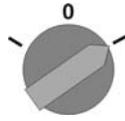
- The actuator can now be operated using the push buttons [1 – 3].
- Run actuator in direction OPEN: Press push button OPEN [1].
- Stop actuator: Press push button STOP [2].
- Run actuator in direction CLOSE: Press push button CLOSE [3].

Information

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

6.2.2 Operation from REMOTE

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



➔ Now, it is possible to operate the actuator via remote control, via operation commands (OPEN, STOP, CLOSE) or via analogue setpoints (e.g. 0 – 20 mA).

Information For actuators equipped with a positioner, it is possible to select between **open-close control** (Remote OPEN-CLOSE) and **setpoint control** (remote SETPOINT). Selection is made via MODE input, e.g. based on a 24 V DC signal (refer to wiring diagram).

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

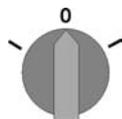
The push buttons of the local controls are used to view, edit, and show various indications on the display.

Figure 30: Local controls



- [1] Push button ▲
- [2] Push button ▼
- [3] Push button ←
- [4] Push button C
- [5] Selector switch
- [6] Display

→ Set selector switch [5] to position **0** (OFF).



➔ Now, settings and indications can be performed via the push buttons [1 – 4].

6.3.1 Short overview: Functions of the push buttons

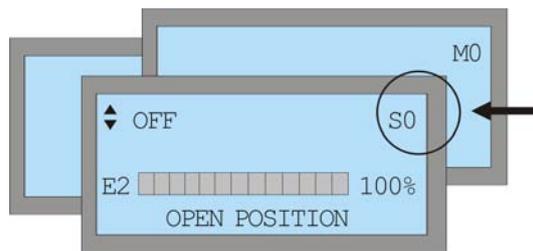
Push buttons	Functions
▼▲	Scrolling within a group (The triangles ▼▲ in the display show which direction of scrolling is possible) Change values Enter figures from 0 to 9
↵	Confirm the selection to go to a new menu/subgroup
C	Cancel process Return to previous display: press briefly Change to another group (S, M, D): <ul style="list-style-type: none"> • hold down for approx. 3 seconds until group M0 is displayed. • hold down for longer than 3 seconds until group D0 is displayed (thereby, group M is skipped).

6.3.2 Structural design and navigation

The indications on the display are divided into 3 groups:

- Group S = Status indications
- Group M = Menu (settings)
- Group D = Diagnostic indications

The active group is displayed in the top right corner of the display.



Change from group S to group M:

1. Press push button C and hold it down for approx. 3 seconds until group M0 appears.

Change from group S to group D:

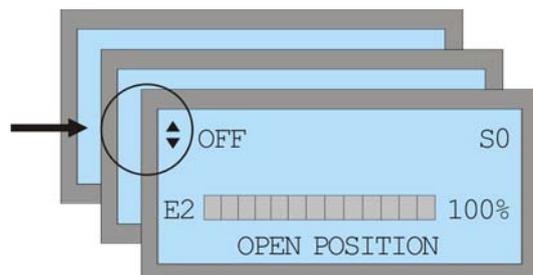
2. Press push button C and hold it down until group D0 is displayed.
- ➔ (Thereby, group M is skipped.)

Return from group M or group D to group S:

3. Briefly press C.

Scrolling within a group:

4. Press ▼ or ▲.
- ➔ The triangles ▼▲ in the top left corner of the display indicate which direction of scrolling (within one group) is possible.



6.4 Password entry

In the menu (group M), the settings are password protected. To change the parameters, a password must be entered first. The following default password is set in the factory: 0000.

After selecting EDIT, the following is displayed:



▼ Step by step:

1. Select figures 0 to 9: Press ▼▲.
2. Move to the next position: Press ←.
3. Repeat steps 1 and 2 for all four digits.
4. To cancel a process: Press C.

Information If no input is received over a longer period of time (approx. 10 min.), the controls automatically return to status indication S0.

6.5 Language change in the display

M ▶ Via the menu to parameter:

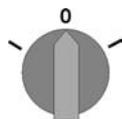
```
MAIN MENU (M0)
  LANGUAGE/CONTRAS (M00)
    VIEW (M00)
    EDIT (M01)
      LANGUAGE (M010)
```

Default value: ENGLISH

Setting range: ENGLISH, GERMAN, MAGYAR, POLSKI, TUERKCE, PORTUGUESE, ITALIAN, SPANISH, FRENCH

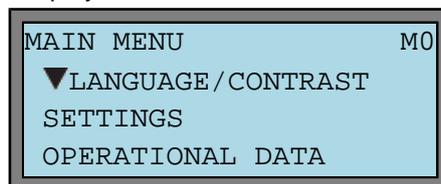
▼ Step by step:

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



2. Press C and hold it down for approx. 3 seconds.

➔ Display indicates:



3. Press ←.

➔ Display indicates:



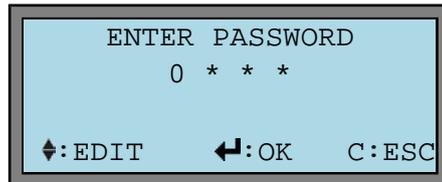
4. Press ▼.

➔ Display indicates:



5. Press ←.

➔ Display indicates:



6. Enter password:

→ Press ← 4 x = 0000 (default factory password).

➔ Display indicates:



7. Press ←.

➔ Display shows the set value:



8. Press ← again to enter the edit mode.

➔ Display indicates:



9. Set new value:

→ Press ▼▲.

10. Accept value or cancel?

→ Accept value: Press ←.

→ Cancel process without accepting the value: Press C .

7. Indications

7.1 Status indications in the display

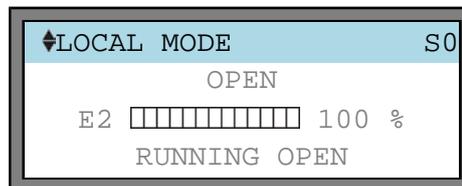
The status indications in the display locally indicate the current operation states as well as faults and warnings.

This section describes the indications for the operation states. Faults and warnings are described in the <Fault indications and warning indications> chapter.

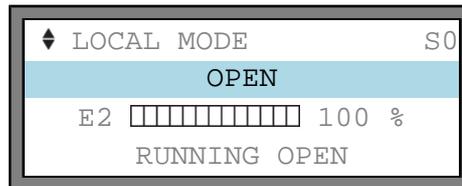
7.1.1 Status indication S0/S6 - operation

Information For actuators equipped with process controllers, status indication S6 is displayed instead of status indication S0 in selector switch position REMOTE. The description below applies to both indications (S0 and S6).

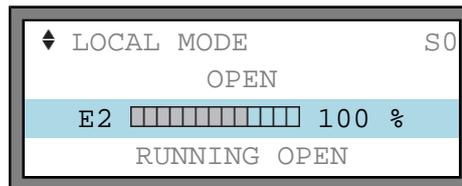
Operation mode display Line 1 indicates the current operation mode (LOCAL MODE, OFF, REMOTE MODE, ...).



Operation command/set-point display Line 2 indicates currently incoming operation commands (OPEN, STOP, CLOSE) or the setpoints E1 or E7 (for actuators equipped with positioner/process controller) in % of the total travel.

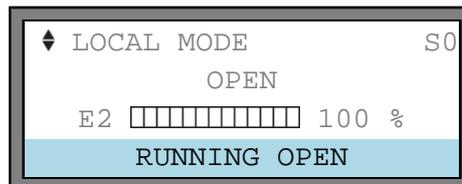


Valve position display Line 3 indicates the valve position in % of the travel. This indication is only available if the actuator is equipped with a position transmitter.



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

End position/running indication Line 4 indicates the current actuator status.



Description of indications in line 4:

RUNNING OPEN
 Actuator runs logically OPEN (remains set during operation pauses).

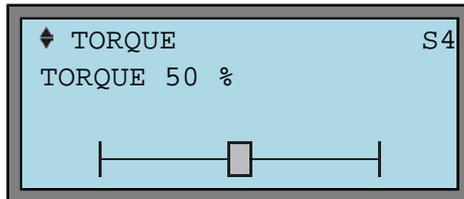
RUNNING CLOSE
 Actuator runs logically CLOSE (remains set during operation pauses).

OPEN POSITION

End position OPEN reached.
CLOSED POSITION
End position CLOSED reached.
SETPOINT POSITION
Setpoint (modulating actuators only).

7.1.2 Status indication S4 - torque

A deflection to the left side indicates torque in direction CLOSE.
A deflection to the right side indicates torque in direction OPEN.



Example: SA 07.5 with 20 – 60 Nm.
100 % corresponds to 60 Nm of nominal torque.
50 % corresponds to 30 Nm of nominal torque.

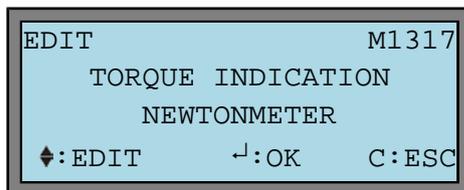
Information It is possible to change the unit displayed (% , Nm or Lbs/ft.). For further information, please refer to the Manual (Operation and setting).

7.1.3 Torque indication: edit

The torque value can be displayed in percent, Newtonmeter (Nm) or in Lbs/ft.

M ▷ Via the menu to parameter:

MAIN MENU (M0)
SETTINGS (M1)
LOCAL CONTROLS (M13)
TORQUE INDICATION (M1317)



Description of the parameter settings:

PERCENT
Indication of the nominal torque in percent

NEWTONMETER
Indication in Nm

LBS . FT.
Indication in Lbs/ft.

7.2 Indication lights/LEDs

The indication lights/LEDs locally display the different operation states as optical signals. The signals can be freely assigned.

Figure 35: Indication lights/LEDs on local controls



- [1] Marking with symbols (standard)
- [2] Marking with figures (option)

Table 6: Meaning of signals

Indication light	Behaviour (default)	Meaning of signal
LED 1 (̄)	illuminated	Actuator is in end position CLOSED
	blinking	Running indication: Actuator runs in direction CLOSE
LED 2 (T)	illuminated	Torque fault CLOSE
LED 3 (Th)	illuminated	Motor protection tripped
LED 4 (T)	illuminated	Torque fault OPEN
LED 5 (⊖)	illuminated	Actuator is in end position OPEN
	blinking	Running indication: Actuator runs in direction OPEN
LED 6 (BT) (option)	illuminated	Bluetooth connection available

Information The behaviour (blinking/illuminated) can be changed via the `BLINKER (M1311)` parameter.

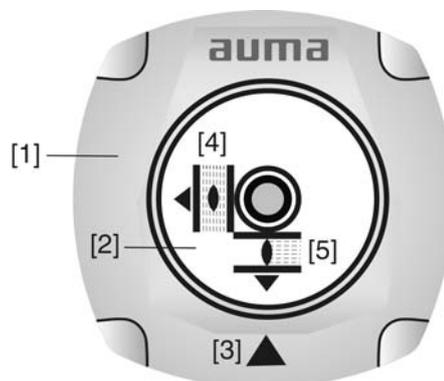
7.3 Mechanical position indicator/running indication

— Option —

Mechanical position indicator:

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

Figure 36: Mechanical position indicator



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

8. Signals

8.1 Feedback signals via output contacts (binary)

The output contacts can be used to indicate operation modes of the actuator or the controls as binary signals. The signals can be freely assigned. Example:

Output contact open = no thermal fault

Output contact closed = thermal fault in actuator

The output contacts are denominated in the wiring diagram as follows:

- Output contacts 1 to 5: DOUT1 to DOUT5
- Alarm contacts: NC fault/NO ready

Signal assignment is made via the parameters: OUTPUT CONTACT 1 to OUTPUT CONTACT 5 and ALARM CONTACT.

Alarm contact default value:

FAULT GROUP 3 = fault signal (includes: torque fault, thermal fault, phase failure and internal faults)

Default values OUTPUT CONTACT 1 to OUTPUT CONTACT 5:

OUTPUT CONTACT 1 = CLOSED POSITION

OUTPUT CONTACT 2 = OPEN POSITION

OUTPUT CONTACT 3 = REMOTE SW. POSITION

OUTPUT CONTACT 4 = TORQUE FAULT (CLOSE)

OUTPUT CONTACT 5 = TORQUE FAULT (OPEN)

8.2 Feedback signals (analogue)

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

Designation in the wiring diagram:

ANOUT1 (position)

Torque feedback Signal: E6 = 0/4 – 20 mA (galvanically isolated)

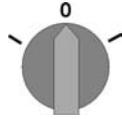
Designation in the wiring diagram:

ANOUT2 (torque)

For further information to this topic, please refer to the 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 Heat-up time for low temperature version

Please note that for low temperature versions, the controls require a heat-up time.

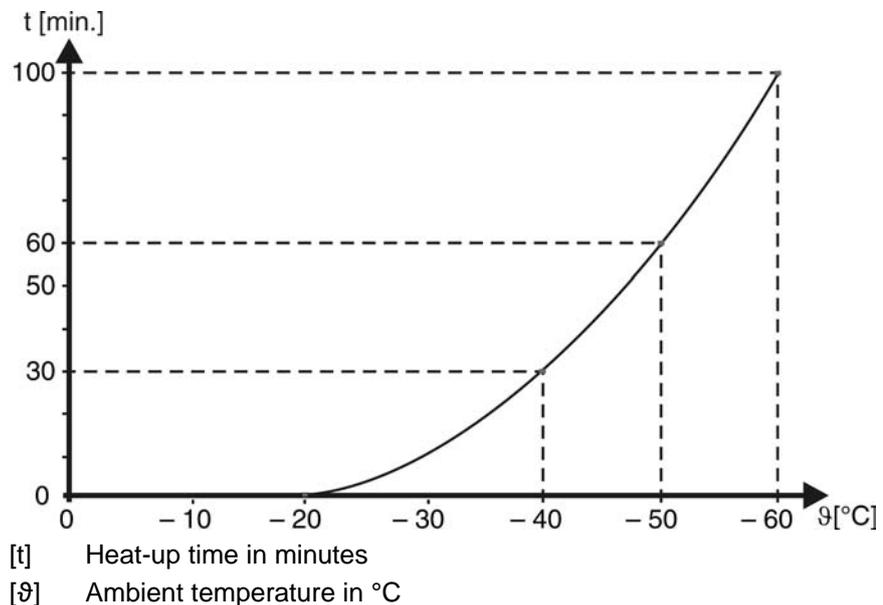
This heat-up time is applicable in case the actuator and the controls are not live and have cooled down to ambient temperature. Under these conditions and after connection to the voltage supply, the following heat-up times must be complied with prior to commissioning:

For -40 °C = 30 min.

For -50 °C = 60 min.

For -60 °C = 100 min.

Figure 38: Sketch illustrating the heat-up time



9.2 Type of seating: check/edit for end positions

NOTICE

Valve damage due to incorrect setting!

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

Limit seating

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

Torque seating

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

The limit seating is used to signal that the limit switching will trip shortly before reaching the set tripping torque. If this is not the case, one of the following fault signals is displayed: TSO FAULTS or TSC FAULTS (menu S1).

M ▷ Via the menu to parameter:

```

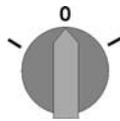
MAIN MENU (M0)
  SETTINGS (M1)
    SEATING MODE (M11)
      VIEW (M110)
      EDIT (M111)
        OPEN POSITION (M11_0)
        CLOSED POSITION (M11_1)
    
```

Default value: LIMIT



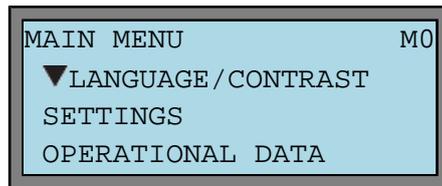
Step by step:

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



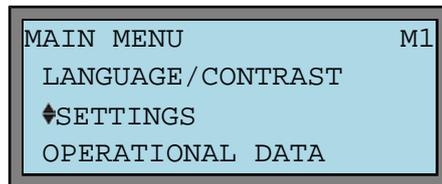
2. Press **C** and hold it down for approx. 3 seconds.

➔ Display indicates:



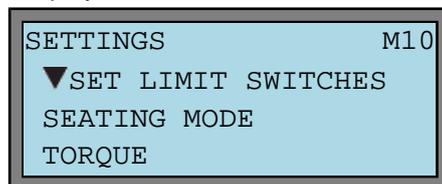
3. Press **▼**.

➔ Display indicates:



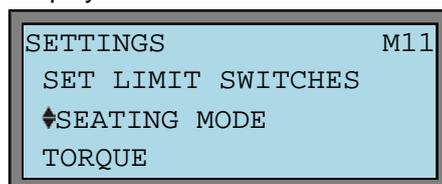
4. Press **←**.

➔ Display indicates:



5. Press **▼**.

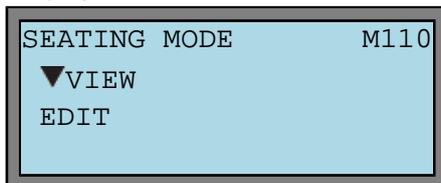
➔ Display indicates:



Display type of seating:

6. Press **↵**.

→ Display indicates:



Use **▲** and **▼** to select between **VIEW** and **EDIT**.

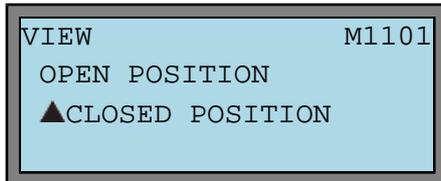
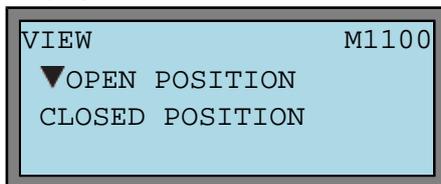
7. View or edit?

Display seating mode: continue with 8.

Change seating mode: continue with 11.

8. Press **↵**.

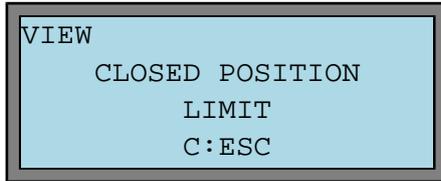
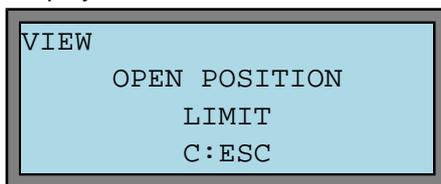
→ Display indicates:



Use **▲** and **▼** to select between **OPEN POSITION** and **CLOSED POSITION**.

9. Press **↵**.

→ Display indicates:



Use **▲** and **▼** to also select here between **OPEN POSITION** and **CLOSED POSITION**.

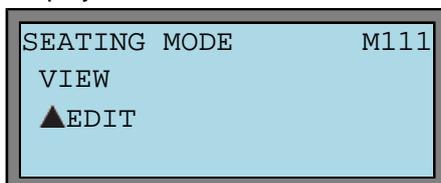
10. Return to the **VIEW/EDIT** menu:

→ Press **C** twice.

Change seating mode:

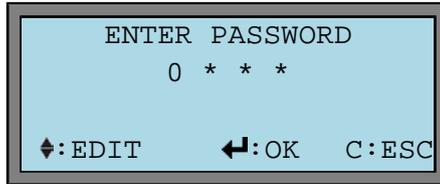
11. Press **▼**.

→ Display indicates:



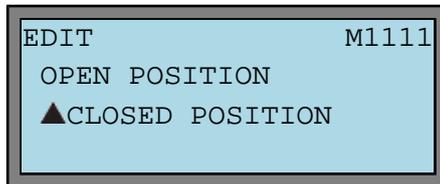
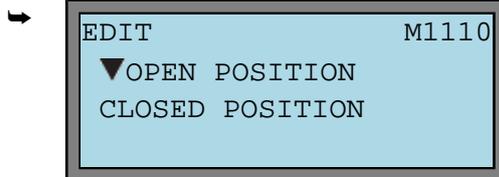
12. Press **←**.

→ Display indicates:



13. Enter password:

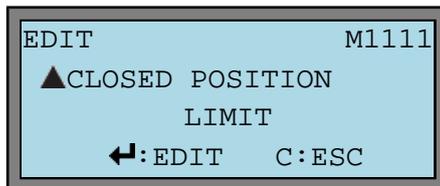
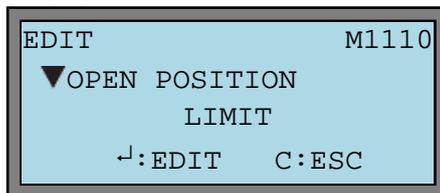
→ Press **←** 4 x = 0000 (default factory password).



Use **▲** and **▼** to select between OPEN POSITION and CLOSED POSITION.

14. Press **←**.

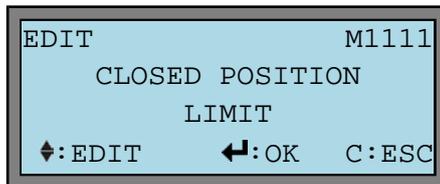
→ Display shows the set value:



Use **▲** and **▼** to select between OPEN POSITION and CLOSED POSITION.

15. Press **←** again to enter the edit mode.

→ Display indicates:

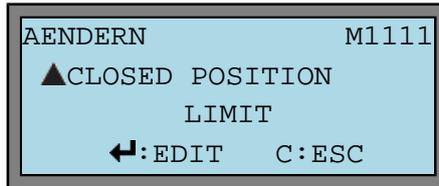
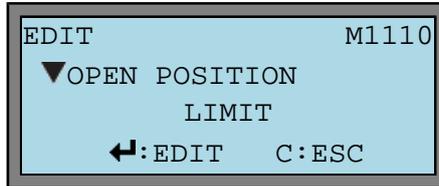


16. Set new value:

→ Press **▲▼**.

17. Accept value or cancel?
 → Accept value: Press **↵**.
 → Cancel process without accepting the value: Press **C**.

→ Display indicates:



Use **▲** and **▼** to select between OPEN POSITION and CLOSED POSITION.

18. Return to status display:
 → Press **C** several times until S0 is displayed.

9.3 Torque switching: check/set

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

Information The torque switches may also trip during manual operation.

NOTICE

Valve damage due to excessive tripping torque limit setting!

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

M ▶ Via the menu to parameter:

- MAIN MENU (M0)
- SETTINGS (M1)
- TORQUE (M12)
- VIEW (M120)
- EDIT (M121)
- OPENING (M12_0)
- CLOSING (M12_1)

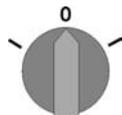
Default value: according to order data

Setting range: according to torque setting range, refer to actuator name plate



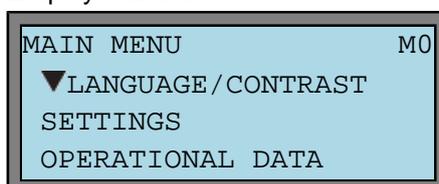
Step by step:

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



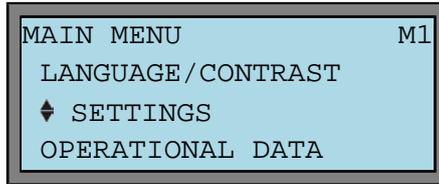
2. Press **C** and hold it down for approx. 3 seconds.

→ Display indicates:



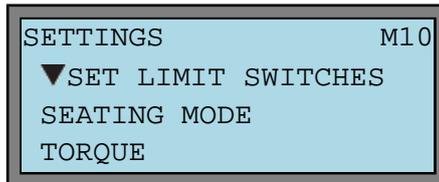
3. Press ▼.

➔ Display indicates:



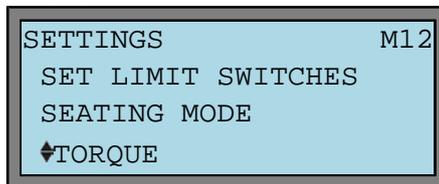
4. Press ←.

➔ Display indicates:



5. Press ▼ twice.

➔ Display indicates:



6. Press ←.

➔ Display indicates:



Use ▲ and ▼ to select between VIEW and EDIT.

7. View or edit?

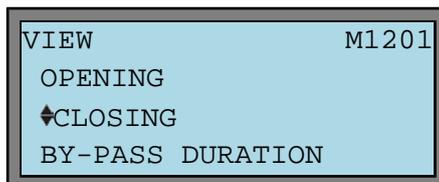
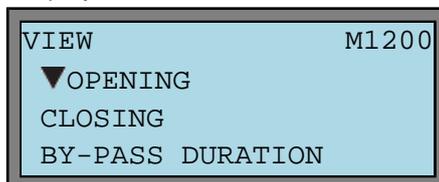
→ Display torque setting: continue with 8.

→ Edit torque setting: continue with 11.

Display torque setting:

8. Press ←.

➔ Display indicates:



Use ▲ and ▼ to select between OPENING and CLOSING.

9. Press **↵**.

➔ Display indicates:

```
VIEW
      OPENING
      65%
      C:ESC
```

```
VIEW
      CLOSING
      65%
      C:ESC
```

Use **▲** and **▼** to also select here between OPENING and CLOSING.

10. Return to the VIEW/EDIT menu:

→ Press **C** twice.

Edit torque setting:

11. Press **▼**.

➔ Display indicates:

```
TORQUE M121
VIEW
▲EDIT
```

12. Press **↵**.

➔ Display indicates:

```
ENTER PASSWORD
0 * * *
⬇:EDIT ⬅:OK C:ESC
```

13. Enter password:

→ Press **↵** 4 x = 0000 (default factory password).

➔

```
EDIT M1210
▼OPENING
CLOSING
BY-PASS DURATION
```

```
EDIT M2111
OPENING
⬇CLOSING
BY-PASS DURATION
```

Use **▲** and **▼** to select between OPENING and CLOSING.

14. Press **←**.

→ Display shows the set value:

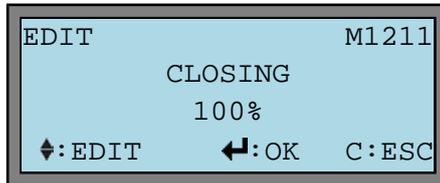
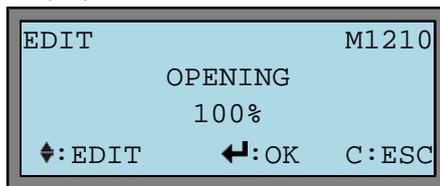


Use **▲** and **▼** to select between OPENING and CLOSING.

Information: The value can be displayed in percent, Newtonmeter (Nm), or in Lbs/ft. To display in percent: 100 % equals the max. torque indicated on the name plate of the actuator. Example: SA 07.5 with 20 – 60 Nm: 100 % = 60 Nm (33 % = 20 Nm).

15. Press **←** again to enter the edit mode.

→ Display indicates:



16. Set new value:

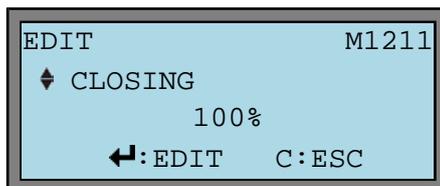
→ Press **▲▼**.

17. Accept value or cancel?

→ Accept value: Press **←**.

→ Cancel process without accepting the value: Press **C**.

→ Display indicates:



Use **▲** and **▼** to select between OPENING and CLOSING.

18. Return to status display:

→ Press **C** several times until S0 is displayed.

Information The following fault signals are sent if the torque setting performed has been reached **in mid-travel**:

- Status indication S0: Operation mode OFF/LOCAL = FAULT IND.
- Status indication S0/S6: Operation mode REMOTE = FAULT IND.
- Status indication S1: TORQUE FAULT (OPEN) or TORQUE FAULT (CLOSE) (torque fault)

The fault has to be acknowledged before the operation can be resumed. The acknowledgement is made:

- either by an operation command in the opposite direction.
 - For TORQUE FAULT (CLOSE): Operation command in direction OPEN
 - For TORQUE FAULT (OPEN): Operation command in direction CLOSE
- or, in case the torque applied is lower than the preset tripping torque:
 - via the push button **Reset** in selector switch position LOCAL.

9.4 Limit switching: set

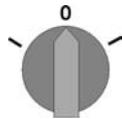
M ▷ Via the menu to parameter:

MAIN MENU (M0)
SETTINGS (M1)
SET LIMIT SWITCHES (M10)
CLOSED POSITION (M100)
OPEN POSITION (M101)



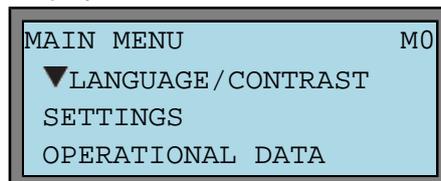
Step by step:

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



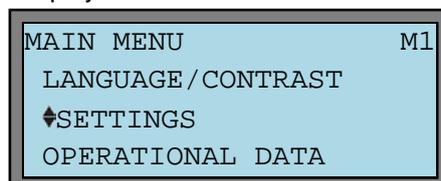
2. Press **C** and hold it down for approx. 3 seconds.

➔ Display indicates:



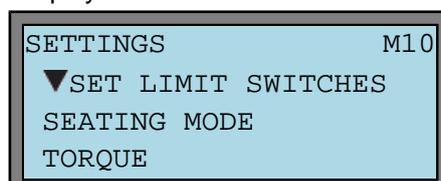
3. Press **▼**.

➔ Display indicates:



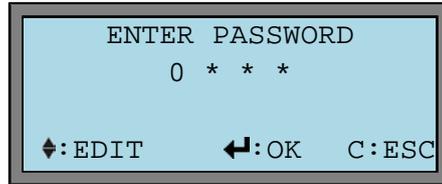
4. Press **↵**.

➔ Display indicates:



5. Press **←**.

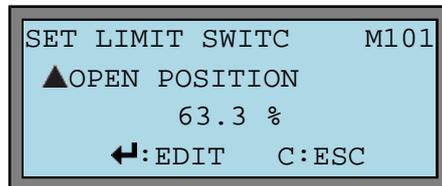
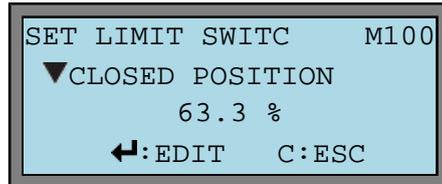
➔ Display indicates:



6. Enter password:

→ Press **←** 4 x = 0000 (default factory password).

➔ The current actuator position is displayed:



Use **▲** and **▼** to select between OPEN POSITION and CLOSED POSITION.

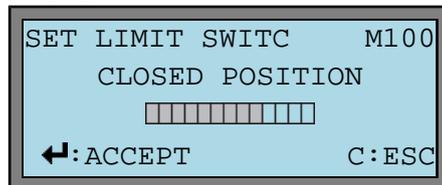
7. Set end position CLOSED or end position OPEN?

Set end position CLOSED: continue with 8.
Set end position OPEN: continue with 13.

Set end position CLOSED

8. Press **←** to enter the edit mode.

➔ Display indicates:



9. Engage manual operation.

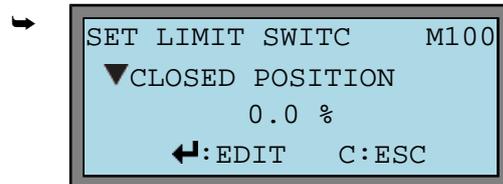
10. Turn handwheel until valve is closed.

11. Turn handwheel by approximately half a turn (overrun) in the opposite direction.

12. Press **←** to accept new end position setting.

➔ LEDs and display indicate that the new end position has been accepted:

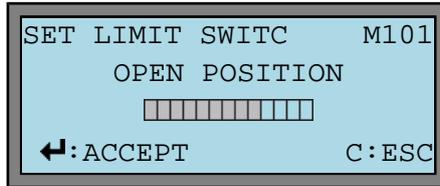
- The left LED is illuminated (default setting).
- Display indicates: 0.0 %



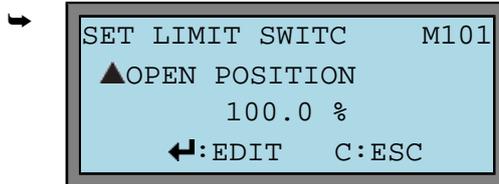
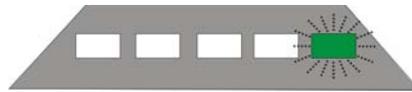
Use **▼** to select OPEN POSITION.

Setting end position 13. Press **↵** to enter the edit mode.

OPEN: → Display indicates:



14. Engage manual operation.
 15. Turn handwheel until valve is open.
 16. Turn handwheel by approximately half a turn (overrun) in the opposite direction.
 17. Press **↵** to accept new end position setting.
- LEDs and display indicate that the new end position has been accepted:
- The right LED is illuminated (default setting).
 - Display indicates: 100.0 %.



Use **▲** to select CLOSED POSITION.

18. Return to status display:
 → Press **C** several times until S0 is displayed.

Information: If an end position cannot be set: Check the type of control unit in actuator.

Information The end positions can be approached (via push buttons and selector switch in position LOCAL) even during motor operation. Position the selector switch to 0 (OFF) for setting. Direct approaching of the mechanical end stops during motor operation may cause valve damage. Consequently, during motor operation, the travel to the mechanical end stop of valve/gearbox must be interrupted prior to reaching the preset position (press push button STOP).

9.5 Test run

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

9.5.1 Direction of rotation: check

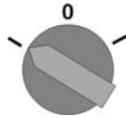
NOTICE

Valve damage due to incorrect direction of rotation!

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

1. Move actuator manually to intermediate position or to sufficient distance from end position.

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



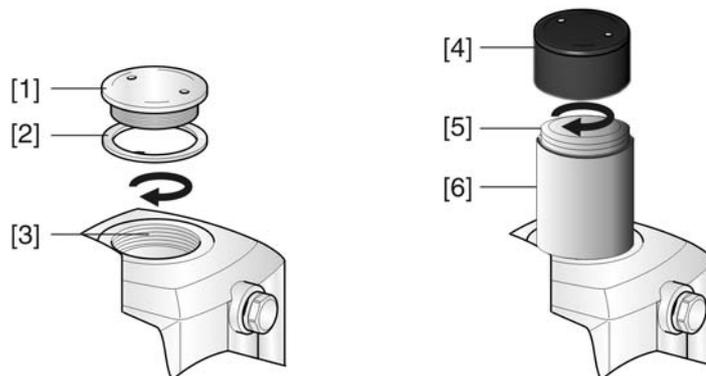
3. Switch on actuator in running direction **CLOSE** and observe the direction of rotation:
with indicator disc: step 4
without indicator disc: step 5 (hollow shaft)
→ Switch off before reaching the end position.

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 threaded plug [1] and seal [2] or cap for stem protection tube [4] and observe direction of rotation at hollow shaft [3] or the stem [5].
➔ The direction of rotation is correct, if **actuator runs in direction CLOSE** and hollow shaft or stem **turn clockwise**.

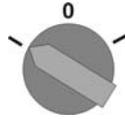
Figure 46: Hollow shaft/stem



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

9.5.2 Limit switching: check

1. 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:

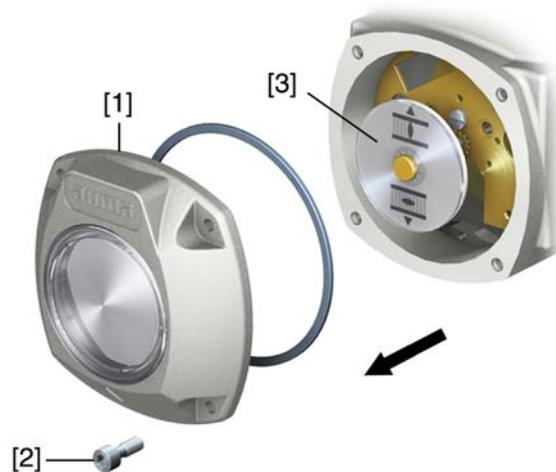
- The actuator comes to a standstill before reaching the end position
- One of the red indication lights/LEDs is illuminated (torque fault), or the following fault signals are displayed:
 - Status indication S0: FAULT IND.
 - Status indication S1: TORQUE FAULT (OPEN) or TORQUE FAULT (CLOSE)

3. If the end position setting is incorrect: Reset limit switching.

9.6 Switch compartment: open

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

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



9.7 Mechanical position indicator: set

— Option —

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



3. Move actuator to end position OPEN.

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



5. Move valve to end position CLOSED again.
6. Check settings:
If the symbol  (CLOSED) is no longer in alignment with mark  on the cover:
 - 6.1 Repeat setting procedure.
 - 6.2 Gear stage of the reduction gearing: test/set

9.8 Gear stage of the reduction gearing: test/set

This test/setting is only required if the turns/stroke of the actuator have been modified after the initial setting.

The control unit may possibly have to be exchanged:

Control unit MS5.2: 1 to 500 turns per stroke

Control unit MS50.2: 10 to 5,000 turns per stroke

1. Pull off indicator disc. Open end spanner may be used as lever.



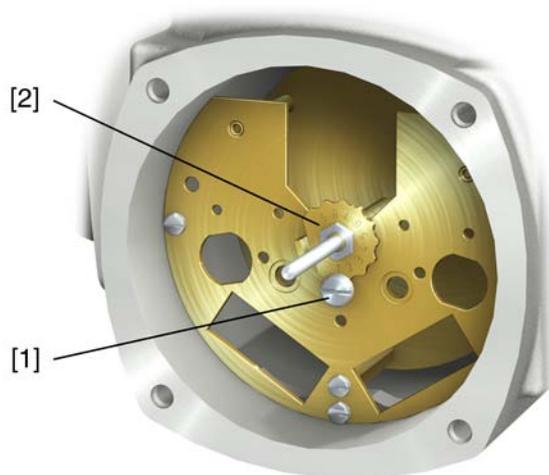
2. Refer to table and check if turns/stroke of the actuator correspond to the setting of the primary reduction gearing (stages 1– 9).
 If the setting is **not** correct: continue with 3.
 If the setting is correct: continue with 6.

Control unit MS5.2 (1 to 500 turns per stroke)	
Turns/stroke above – to	Gear stage
1.0 – 1.9	1
1.9 – 3.9	2
3.9 – 7.8	3
7.8 – 15.6	4
15.6 – 31.5	5
31.5 – 62.5	6
62.5 – 125	7
125 – 250	8
250 – 500	9

Control unit MS50.2 (10 to 5,000 turns per stroke)	
Turns/stroke above – to	Gear stage
10.0 – 19.5	1
19.5 – 39.0	2
39.0 – 78.0	3
78 – 156	4
156 – 315	5
315 – 625	6
625 – 1,250	7
1,250 – 2,500	8
2,500 – 5,000	9

3. Loosen screw [1].
4. Set crown wheel [2] to desired level according to table.
5. Fasten screw [1].
6. Place indicator disc on shaft.
7. Set mechanical position indicator.

Figure 52: Control unit with reduction gearing



- [1] Screw
- [2] Crown wheel

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

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

1. Clean sealing faces of housing and cover.
2. Check whether O-ring [3] is in good condition, replace if damaged.
3. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.



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

10. Corrective action

10.1 Faults during commissioning

Table 7: 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.	Set gear stage of the reduction gearing. The control unit might have to be exchanged.
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).
Push buttons do not react The controls may not be operated via the local controls. Display indicates: RESTRICTED or EMERGENCY STOP.	RESTRICTED signifies that the local controls of the AUMATIC have not been released yet. EMERGENCY STOP signifies that the EMERGENCY STOP mode has been activated via the EMERGENCY STOP button (option),	For RESTRICTED: A release must be initiated externally via bus or input signal. Refer to parameter Enable LOCAL MODE. For EMERGENCY STOP: Release EMERGENCY STOP button.

10.2 Fault indications and warning indications

Faults interrupt or prevent the electrical actuator operation.

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

Fault and warning indications are shown in the display.

10.2.1 Status indication S0 - faults and warnings

Line 4 of status indication S0 displays faults and warnings.

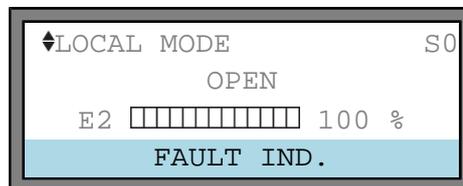


Table 8: Description of the fault indications

Signal	Description	Remedy
FAULT IND.	A fault has occurred.	For further information, press ▼▲ and go to status indication S1.
WARNING IND.	A warning has occurred.	For further information, press ▼▲ and go to status indication S2.
FAULT + WARNING	Faults as well as warnings have occurred.	For further information, press ▼▲ and go to status indication S1 (faults) or S2 (warnings).
NOT READY IND.	The actuator cannot be operated from REMOTE. The actuator can only be operated via the local controls.	For further information, press ▼▲ and go to status indication S3 (cause for fault indications).
FLT + NR	Faults and the NOT READY IND. signal have occurred.	For further information, press ▼▲ and go to status indication S1 or S3.
WRN + NR	Warnings and the NOT READY IND. signal have occurred.	For further information, press ▼▲ and go to status indication S2 or S3.
FLT + WRN + NR	Faults, warnings, and the NOT READY IND. signal have occurred.	For further information, press ▼▲ and go to status indications S1 to S3.

10.2.2 Status indication S1 - faults

Faults are indicated within the status indication S1:

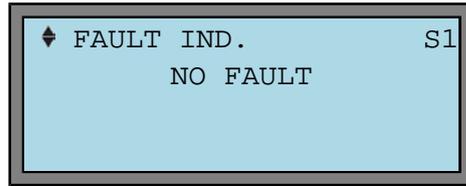


Table 9: Description of the fault indications

Signal	Description	Remedy
NO FAULT	No fault has occurred.	
INTERNAL FAULT	Internal fault has occurred.	For further information: 1. Go to group D0: Press C and hold it down until diagnostic indication D0 is displayed. 2. Go to diagnostic indication D2: Press ▼ twice.
TORQUE FAULT (CLOSE)	Torque fault in direction CLOSE.	Operation command in direction OPEN. Set selector switch to position Local control (LOCAL) and reset fault indication via push button Reset .
TORQUE FAULT (OPEN)	Torque fault in direction OPEN.	Operation command in direction CLOSE. Set selector switch to position Local control (LOCAL) and reset fault indication via push button Reset .
LOSS OF PHASE	One phase is missing.	Test/connect phases.
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) or reset fault indication via push button Reset . Check fuse F4.
CONFIGURATION FAULT	The controls configuration is incorrect.	For further information: 1. Go to group D0: Press C and hold it down until diagnostic indication D0 is displayed. 2. Go to diagnostic indication D4: Press ▼ 4 x.

10.2.3 Status indication S2 - warnings

Faults are indicated within the status indication S2:

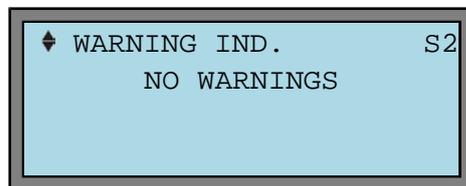


Table 10: Description of the warnings

Signal	Description	Remedy
NO WARNINGS	No warnings have occurred.	
WARNING OPER. TIME	Preset running time for a travel between end position OPEN and end position CLOSED has been exceeded.	Set the operating time (MONITOR TRIGGERS parameter) in accordance with the actual operating time. Check tripping behaviour of end position switches. Verify actuator mechanics.

Signal	Description	Remedy
WARNING STARTS/RUN	Preset values for max. starts/h or max. running time/h have been exceeded.	Check modulating behaviour. Increase dead time. Reduce number of setpoint changes.
INTERNAL FEEDBACK	Position transmitter (potentiometer or RWG) is not standardised.	Operate actuator into both end positions (OPEN and CLOSED).
INTERNAL WARNING	Internal warnings have occurred.	For further information: 1. Go to group D0: Press C and hold it down until diagnostic indication D0 is displayed. 2. Go to diagnostic indication D3: Press ▼ 3 times.
FEEDBACK E2 LOSS	Signal loss of position transmitter	Check position transmitter signal. 1. Go to group D0: Press C and hold it down until diagnostic indication D0 is displayed. 2. Go to diagnostic indication D7, D8 or D9: Press ▼ either 7, 8 or 9 times. Check position transmitter wiring. Check POSITION E2 parameter. The setting must correspond to the wiring diagram.
SETPOINT E1 LOSS	Signal loss of setpoint	Check wiring.
TORQUE E6 LOSS	Signal loss of torque source	Check wiring.

10.2.4 Status indication S3 - causes for not ready remote

The causes for the NOT READY IND. fault signals (from status indication S0) are displayed within status indication S3.

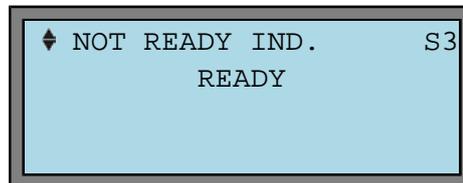


Table 11: Description of the fault indications

Signal	Description
READY	Actuator can be operated from REMOTE.
NOT REMOTE	Actuator cannot be operated from REMOTE as the selector switch is in position LOCAL or OFF.

10.3 Fuses

10.3.1 Fuses within the actuator controls

Fuses F1 and F2 can be accessed after removing the cover [1] on the rear side.

Fuses F3, F4, and F5 are located on the power supply unit and can be accessed after removing the electrical connection [2].



Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

Figure 54: Access to fuses



- [1] Rear cover
- [2] Electrical connection

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; 660 V	K002.665
Thyristor units for motor power up to 1.5 kW	16 A FF; 500 V	K001.185
Thyristor units for motor power up to 3.0 kW	30 A FF; 500 V	K006.965
Thyristor units for motor power up to 5.5 kW	1 A T; 500 V	K002.277

F3 Internal 24 V DC supply

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	F3	F4
Size	5 x 20 mm	5 x 20 mm
Voltage output (power supply unit) = 24 V	1.0 A T; 250 V	1.25 A T; 250 V
Voltage output (power supply unit) = 115 V	1.0 A T; 250 V	0.315 A T; 250 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 surface temperatures at the actuator, PTC thermistors or thermostats are embedded in the motor winding. The thermostat 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 S0: Operation mode OFF/LOCAL = FLT + NR
- Status indication S0/S6: Operation mode REMOTE = FAULT IND.
- Status indication S1: THERMAL FAULT

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 reset using the **Reset** push button in selector switch position LOCAL.

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

11. Servicing and maintenance



Damage caused by inappropriate maintenance!

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

AUMA Service & Support

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

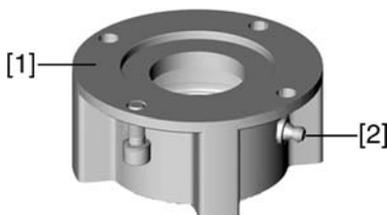
11.1 Preventive measures for servicing and safe operation

The following measures are required to ensure safe device operation:

6 months after commissioning and then every year

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

Figure 55: Output drive type A



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

Table 12: Grease quantities for bearing of output drive type A

Output drive	A 25.2	A 30.2	A 35.2	A 40.2	A 48.2
Quantity [g] ¹⁾	10	14	20	25	150

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

For enclosure protection IP 68

After continuous immersion:

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

11.2 Maintenance

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

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

11.3 Disposal and recycling

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

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

The following generally applies:

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

12. Technical data

Information The following technical data includes standard and optional features. For detailed information on the customer-specific version, refer to the order-relevant data sheet. This data sheet can be downloaded from the Internet at <http://www.auma.com> in German and English (indication of commission number required).

12.1 Features and functions of actuator

Type of duty ¹⁾	Standard: <ul style="list-style-type: none"> SA: Short-time duty S2 - 15 min SAR: Intermittent duty S4 - 25 % Options: <ul style="list-style-type: none"> SA: Short-time duty S2 - 30 min SAR: Intermittent duty S4 - 50 % SAR: Intermittent duty S5 – 25 %
Torque range	Refer to actuator name plate
Output speed	Refer to actuator name plate
Motor	Standard: 3-ph AC asynchronous motor, type IM B9 according to IEC 60034
Insulation class	Standard: F, tropicalized Option: H, tropicalized
Motor protection	Standard: Thermostats (NC) Option: PTC thermistors (according to DIN 44082)
Self-locking	<ul style="list-style-type: none"> Self-locking: <ul style="list-style-type: none"> SA/SAR 25.1 – 30.1: Output speeds up to 90 rpm (50 Hz), 108 rpm (60 Hz) SA 35.1 – SA 48.1: Output speeds up to 22 rpm (50 Hz), 26 rpm (60 Hz) NOT self-locking: <ul style="list-style-type: none"> SA 35.1 – SA 48.1: Output speeds from 32 rpm (50 Hz), 38 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	Magnetic limit and torque transmitter MWG for 1 to 500 turns per stroke or 10 to 5,000 turns per stroke
Torque switching	Via MWG (like limit switching)
Position feedback signal, analogue (option)	Via MWG
Torque feedback signal, analogue (option)	Via MWG
Mechanical position indicator (option)	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)	110 – 120 V AC/DC: 50 W 220 – 240 V AC/DC: 50 W 380 – 400 V AC/DC: 22 W
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation. Option: Handwheel lockable
Connection 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 or IB3 only size 25.1) A with stem lubrication

1) For nominal voltage and 40 °C ambient temperature and an average load with running torque or modulating torque according to separate technical data. The type of duty must not be exceeded.

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 nominal voltage: $\pm 10\%$ Permissible variation of the mains frequency: $\pm 5\%$
Current consumption	Motor current consumption: Refer to motor name plate Current consumption of the controls depending on the mains voltage: 100 to 120 V AC = max. 650 mA 208 to 240 V AC = max. 325 mA 380 to 500 V AC = max. 190 mA
External supply of the electronics (option)	24 V DC $+20\%$ / -15% Current consumption: Basic version approx. 200 mA, with options up to 500 mA
Rated power	The controls are designed for the rated power of the motor, refer to motor name plate
Overvoltage category	Category III according to IEC 60364-4-443
Switchgear ^{1) 2)}	Standard: Reversing contactors (mechanically and electrically interlocked) for motor power up to power class A1 Options: <ul style="list-style-type: none"> • Reversing contactors (mechanically and electrically interlocked) for motor power up to power class A2 • Thyristor unit for mains voltage up to 500 V AC (recommended for modulating actuators) for AUMA power classes B1, B2 and B3
Control	Standard: Control inputs 24 V DC, OPEN - STOP - CLOSE - EMERGENCY (via opto-isolator, one common), current consumption: Approx. 10 mA per input, observe minimum pulse duration for modulating actuators Option: Control inputs 115 V AC, OPEN – STOP - CLOSE - EMERGENCY (via opto-isolator, one common), current consumption: Approx. 15 mA per input
Output signals	Standard: 6 output contacts with gold-plated contacts: <ul style="list-style-type: none"> • 5 NO contacts with one common, max. 250 V AC, 1 A (resistive load) <ul style="list-style-type: none"> - Default configuration: End position OPEN, end position CLOSED, selector switch in REMOTE, torque fault CLOSE, torque fault OPEN • 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load) for collective fault signal <ul style="list-style-type: none"> - Default configuration: Torque fault, phase failure, motor protection tripped Option: 5 potential-free NO/NC contacts without one common, per contact max. 250 V AC, 5 A (resistive load)
Voltage output	Standard: Auxiliary voltage 24 V DC, max. 100 mA for supply of the control inputs, galvanically isolated from internal voltage supply Option: Auxiliary voltage 115 V AC, max. 30 mA to supply the control inputs ³⁾ , galvanically isolated from internal voltage supply

Local controls	<p>Standard:</p> <ul style="list-style-type: none"> • Selector switch LOCAL - OFF - REMOTE (lockable in all three positions) • Push buttons OPEN - STOP - CLOSE - RESET • 5 indication lights: <ul style="list-style-type: none"> - End position CLOSED and running indication CLOSE (yellow), torque fault CLOSE (red), motor protection tripped (red), torque fault OPEN (red), end position and running indication OPEN (green) • LC display, illuminated • Programming interface (infra-red) <p>Options:</p> <ul style="list-style-type: none"> • Bluetooth programming interface is equipped with a class II Bluetooth chip with a range of up to 10 m. The interface supports the Bluetooth protocol SPP (Serial Port Profile). • Enabling the local controls via the digital input RELEASE. Thus, the actuator operation can be enabled or disabled via push buttons on the local controls. • Special colours for the 5 indication lights: <ul style="list-style-type: none"> - End position CLOSED (green), torque fault CLOSE (blue), torque fault OPEN (yellow), motor protection tripped (white), end position OPEN • Protection cover, lockable • Protection cover with indicator glass, lockable
Functions	<p>Standard:</p> <ul style="list-style-type: none"> • Switch-off mode adjustable <ul style="list-style-type: none"> - Limit or torque seating for end position OPEN and end position CLOSED • Torque monitoring over the whole travel • Torque by-pass, adjustable up to 5 seconds (no torque monitoring during this time) • Phase failure monitoring⁴⁾ with automatic phase correction • Running indication via indication lights/LEDs • EMERGENCY behaviour programmable <ul style="list-style-type: none"> - 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). <p>Options:</p> <ul style="list-style-type: none"> • Positioner⁵⁾ <ul style="list-style-type: none"> - Position setpoint via analogue input E1 = 0/4 – 20 mA - Programmable behaviour on loss of signal - Automatic adaptation of the dead band (adaptive behaviour can be selected) - Split Range operation - Change-over between open-close duty and modulating duty via digital MODE input • Process controller, PID⁶⁾ <ul style="list-style-type: none"> - Process setpoint via analogue input E1 = 0/4 – 20 mA - Actual process value via analogue input E4 = 0/4 – 20 mA - Programmable behaviour on loss of signal - Limitation of the control range - Change-over between open-close duty and modulating duty via digital MODE input
Monitoring functions	<ul style="list-style-type: none"> • Programmable monitoring of the max. number of starts, generates warning signal • Reaction monitoring for operation command (programmable from 1 to 15 seconds), generates fault signal and results in switching off • Operating time monitoring (programmable from 4 to 1,800 seconds), generates warning signal

Electronic name plate	<ul style="list-style-type: none"> • Ordering data: <ul style="list-style-type: none"> - AUMATIC commission number, actuator commission number, KKS number (definition system for power plants), valve number, plant number • Product data: <ul style="list-style-type: none"> - Product name, actuator works number, AUMATIC works number, logic software version, logic hardware version, date of final test, wiring diagram, terminal plan • Project data: <ul style="list-style-type: none"> - Project name, 2 freely definable customer fields with a max. of 19 characters each • Service data: <ul style="list-style-type: none"> - Service telephone, Internet address, service text 1, service text 2
Operating data logging	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
Motor protection evaluation	Standard: Monitoring of the motor temperature in combination with thermostiches in the motor Options: <ul style="list-style-type: none"> • Additional thermal overload relay in the controls in combination with thermostiches within the motor • PTC tripping device in combination with PTC thermistors in the motor
Electrical connection	Standard: AUMA plug/socket connector (S) with screw-type connection and M-threads Options: <ul style="list-style-type: none"> • 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)
Wiring diagram	Refer to name plate

- 1) The reversing contactors are designed for a lifetime of 2 million starts.
- 2) For the assignment of AUMA power classes, please refer to electrical data on actuator.
- 3) Not possible in combination with PTC tripping device
- 4) During an adjustable period (factory setting 10 seconds), faults in the supply voltage (e.g. voltage drops) will not lead to a fault signal.
- 5) Requires position transmitter in actuator
- 6) Requires position transmitter in actuator

Further options for Non-intrusive version with MWG in the actuator	
Setting limit and torque switching via the controls' local controls	
Position feedback	Galvanically isolated analogue output E2 = 0/4 – 20 mA (load max. 500 Ω)
Torque feedback	Galvanically isolated analogue output E6 = 0/4 – 20 mA (load max. 500 Ω)
Timer	Start and end of stepping mode as well as ON and OFF time (1 up to 300 seconds) can be programmed individually for the directions OPEN and CLOSE.
Intermediate positions	Any 8 intermediate positions between 0 and 100 %, reaction and signal behaviour programmable

12.3 Service conditions

Mounting position	Any position
Use	Indoor and outdoor use permissible
Enclosure protection according to EN 60529	Standard: • IP 67 with AUMA 3-ph AC motor For actual version, refer to actuator/controls name plate.
Corrosion protection	Standard: • KN: Suitable for installation in industrial units, in water or power plants with a low pollutant concentration Options: • KS: Suitable for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. in wastewater treatment plants, chemical industry) • KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration • KX-G : same as KX, however aluminium-free version (outer parts)
Installation altitude	Standard: ≤ 2,000 m above sea level Option: > 2,000 m above sea level, please contact AUMA
Humidity	Up to 100 % relative humidity over the entire permissible temperature range
Pollution degree	Within controls: Pollution degree 2 Outside controls (when closed): Pollution degree 4
Finish coating	Standard: Paint based on polyurethane (powder coating)
Colour	Standard: AUMA silver-grey (similar to RAL 7037)
Ambient temperature	Standard: • -25 °C to +70 °C For actual version, refer to actuator/controls name plate.
Lifetime	Open-close duty (operating cycles (OPEN - CLOSE - OPEN): SA 25.1 – SA 30.1: 10,000 SA 35.1: 5,000 SA 40.1 – SA 48.1: 3,000 Modulating duty: ¹⁾ SAR 25.1 – SAR 30.1: 2.5 million modulating steps
Weight	Refer to separate technical data

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

12.4 Accessories

Wall bracket ¹⁾	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
EMERGENCY STOP button ²⁾	The control voltage of the reversing contactors is interrupted by operating the EMERGENCY STOP button.
Programming software for PC	COM-AC. An interface cable is required for the standard infra-red programming interface.

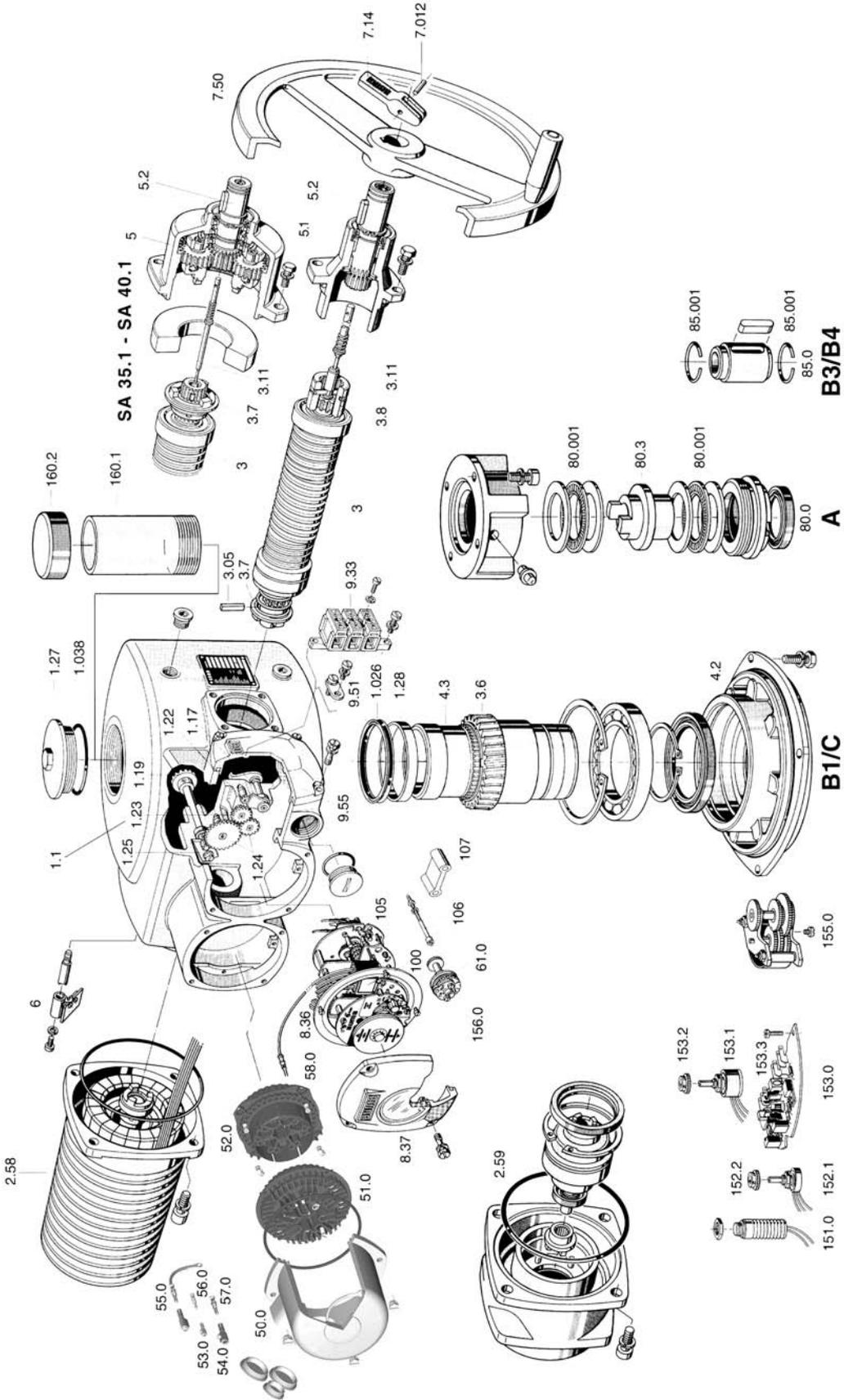
- 1) Cable distance between actuator and AUMATIC max. 100 m. Requires separate data cable for MWG. If actuator and AUMATIC are separated at a later date, the max. cable length is 10 m.
2) Only in combination with reversing contactors and AUMATIC AC 01.1 in enclosure protection IP 67 or IP 68

12.5 Further information

EU Directives	<ul style="list-style-type: none"> • Electromagnetic Compatibility (EMC): (2004/108/EC) • Low Voltage Directive: (2006/95/EC) • Machinery Directive: (2006/42/EC)
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13. Spare parts

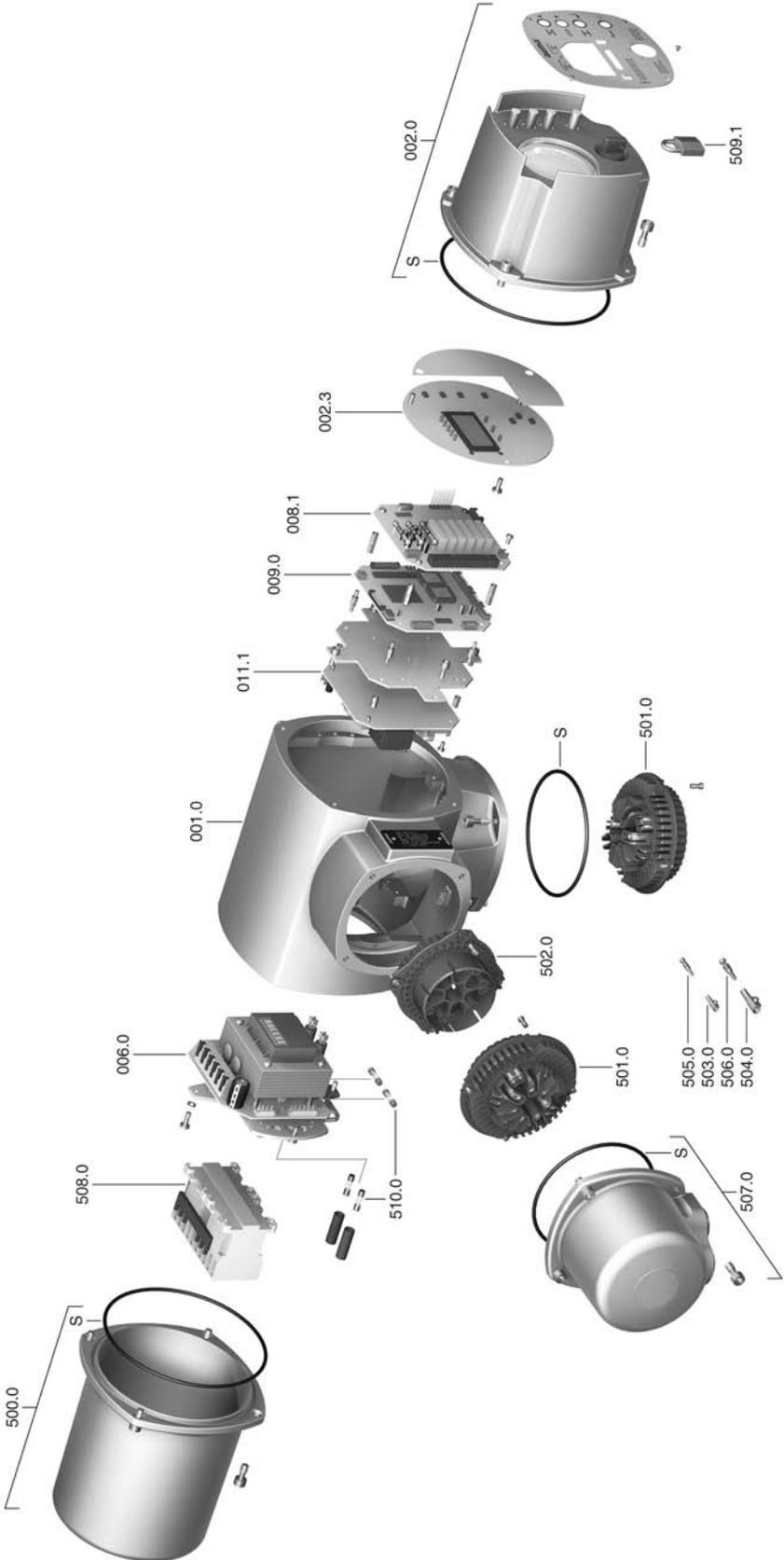
13.1 Multi-turn actuators SA 25.1 – SA 48.1/SAR 25.1 – SAR 30.1



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

No.	Designation	Type	No.	Designation	Type
1.026	V-Seal		54.0	Socket for motor	Sub-assembly
1.038	O-ring		55.0	Socket for protective earth	Sub-assembly
1.1	Housing	Sub-assembly	56.0	Pin for controls	Sub-assembly
1.17	Torque lever	Sub-assembly	57.0	Pin for motor	Sub-assembly
1.19	Crown wheel	Sub-assembly	58.0	Wire for protective earth	Sub-assembly
1.22	Drive pinion II for torque switching	Sub-assembly	61.0	Torque switching head	Sub-assembly
1.23	Output drive wheel for limit switching	Sub-assembly	80.0	Output drive form A (without stem nut)	Sub-assembly
1.24	Intermediate wheel for limit switching	Sub-assembly	80.001	Thrust bearing set	Set
1.25	Locking plate		80.3	Stem nut (without thread)	
1.27	Threaded plug		85.0	Output drive B3/ B4	Sub-assembly
1.28	Bearing bush		85.001	Snap ring	
2.58	Motor	Sub-assembly	100	Switch for limit/ torque switching (including pins at wires)	Sub-assembly
2.59	Planetary gear for motor drive	Sub-assembly	105	Blinker transmitter including pins at wires (without impulse disc and insulation plate)	Sub-assembly
3	Drive shaft kpl.	Sub-assembly	106.0	Stud bolt for switches	Sub-assembly
3.05	Parallel pin		107	Spacer	
3.11	Pull rope	Sub-assembly	151.0	Heater	Sub-assembly
3.6	Worm wheel	Sub-assembly	152.1	Potentiometer without slip clutch	Sub-assembly
3.7	Motor coupling		152.2	Slip clutch for potentiometer	Sub-assembly
3.8	Manual drive coupling	Sub-assembly	153.0	RWG	Sub-assembly
4.2	Bearing flange	Sub-assembly	153.1	Potentiometer for RWG without slip clutch	Sub-assembly
4.3	Hollow shaft	Sub-assembly	153.2	Slip clutch for potentiometer/RWG	Sub-assembly
5	Planetary gear for manual drive	Sub-assembly	153.3	Electronic board RWG	Sub-assembly
5.1	Retaining flange		155.0	Reduction gearing	Sub-assembly
5.2	Handwheel shaft	Sub-assembly	156.0	Mechanical position indicator	Sub-assembly
6	Swing lever	Sub-assembly	160.1	Stem protection tube (without cap)	
7.012	Notched pin		160.2	Cap for stem protection tube	
7.14	Change-over lever assy		S1	Seal kit (small)	Set
7.50	Handwheel with ball handle	Sub-assembly	S2	Seal kit (large)	Set
8.36	Control unit without torque switching heads and switches	Sub-assembly			
8.37	Cover for switch compartment	Sub-assembly			
9.33	Terminals for motor connection	Sub-assembly			
9.51	Protective earth connection	Sub-assembly			
9.55	Cover for motor connection compartment assly	Sub-assembly			
50.0	Plug cover assly	Sub-assembly			
51.0	Socket carrier (complete with sockets)	Sub-assembly			
52	Pin carrier (without pins)	Sub-assembly			
53.0	Socket for controls	Sub-assembly			

13.2 Actuator controls AUMATIC AC 01.1



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

No.	Designation	Type
001.0	Housing	Sub-assembly
002.0	Local controls	Sub-assembly
002.3	Local controls board	
006.0	Power supply	Sub-assembly
008.1	Interface board	
009.0	Logic board	Sub-assembly
011.1	Relay 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	Plug cover	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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Original Declaration of Incorporation of Partly Completed Machinery (EC Directive 2006/42/EC) and EC Declaration of Conformity in compliance with the Directives on EMC and Low Voltage

for electric AUMA multi-turn actuators of the type ranges **SA 07.1 – SA 48.1** and **SAR 07.1 – SAR 30.1**
in versions **AUMA NORM, AUMA SEMIPACT, AUMA MATIC** or **AUMATIC**.

AUMA Riester GmbH & Co. KG as manufacturer declares herewith, that the above mentioned multi-turn actuators meet the following basic requirements of the EC Machinery Directive 2006/42/EC: Annex I, articles 1.1.2, 1.1.3, 1.1.5, 1.2.1; 1.2.6, 1.3.1, 1.3.7, 1.5.1, 1.6.3, 1.7.1, 1.7.3, 1.7.4

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

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

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

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

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

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

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

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

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

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

Year of affixing of the CE marking: 2010

Müllheim, 2009-12-29

H. Newerla, General Management

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

Y004.922/002/en

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