



Multi-turn actuators

SA 07.2 – SA 16.2

SAR 07.2 – SAR 16.2

Control unit: electromechanic
with actuator controls

AUMATIC AC 01.2 Intrusive

Control

→ Parallel

Profibus DP

Modbus

Foundation Fieldbus



Read operation instructions first.

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

Purpose of the document:

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

Reference documents:

- Manual (Operation and setting) AUMATIC AC 01.2 Parallel

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

Table of contents	Page
1. Safety instructions.....	5
1.1. Basic information on safety	5
1.2. Range of application	5
1.3. Applications in Ex zone 22 (option)	6
1.4. Warnings and notes	6
1.5. References and symbols	7
2. Identification.....	8
2.1. Name plate	8
2.2. Short description	9
3. Transport, storage and packaging.....	11
3.1. Transport	11
3.2. Storage	11
3.3. Packaging	11
4. Assembly.....	12
4.1. Mounting position	12
4.2. Handwheel fitting	12
4.3. Multi-turn actuator: mount to valve/gearbox	12
4.3.1. Output drive types B, B1 – B4 and E	12
4.3.1.1. Multi-turn actuator (with output drive types B1 – B4 or E): mount to valve/gearbox	13
4.3.2. Output drive type A	13
4.3.2.1. Stem nut: finish machining	14
4.3.2.2. Multi-turn actuator (with output drive type A): mount to valve	15
4.4. Accessories for assembly	16
4.4.1. Stem protection tube for rising valve stem	16
4.5. Mounting positions of local controls	16
4.5.1. Mounting positions: modify	17
5. Electrical connection.....	18
5.1. Basic information	18
5.2. Connection with AUMA plug/socket connector	19
5.2.1. Terminal compartment: open	20
5.2.2. Cable connection	20

5.2.3.	Terminal compartment: close	22
5.3.	Accessories for electrical connection	22
5.3.1.	Controls mounted to wall bracket	22
5.3.2.	Parking frame	23
5.3.3.	Protection cover	23
5.3.4.	Double sealed intermediate frame	24
5.3.5.	Earth connection, external	24
6.	Operation.....	25
6.1.	Manual operation	25
6.1.1.	Manual operation: engage	25
6.1.2.	Manual operation: disengage	25
6.2.	Motor operation	25
6.2.1.	Local actuator operation	25
6.2.2.	Actuator operation from remote	26
6.3.	Menu navigation via push buttons (for settings and indications)	27
6.3.1.	Menu layout and navigation	28
6.4.	User level, password	29
6.4.1.	Password entry	29
6.4.2.	Password change	29
6.5.	Language in the display	30
6.5.1.	Language change	30
7.	Indications.....	32
7.1.	Indications during commissioning	32
7.2.	Indications in the display	32
7.2.1.	Feedback indications from actuator and valve	33
7.2.2.	Status indications according to AUMA classification	36
7.2.3.	Status indications according to NAMUR recommendation	37
7.3.	Mechanical position indicator/running indication	38
7.4.	Indication lights	39
8.	Signals.....	40
8.1.	Status signals via output contacts (digital outputs)	40
8.1.1.	Assignment of outputs	40
8.1.2.	Encoding of outputs	40
8.2.	Analogue signals	40
9.	Commissioning (basic settings).....	41
9.1.	Type of seating: set	41
9.2.	Switch compartment: open	42
9.3.	Torque switching: set	43
9.4.	Limit switching: set	43
9.4.1.	End position CLOSED (black section): set	44
9.4.2.	End position OPEN (white section): set	44
9.5.	Intermediate positions: set	45
9.5.1.	Running direction CLOSE (black section): set	45
9.5.2.	Running direction OPEN (white section): set	45
9.6.	Test run	46
9.6.1.	Direction of rotation: check	46
9.6.2.	Limit switching: check	47
9.6.3.	Reference operation position feedback: perform	47
9.7.	Potentiometer setting	48

9.8.	Electronic position transmitter RWG: set	48
9.9.	Mechanical position indicator: set	49
9.10.	Switch compartment: close	50
10.	Corrective action.....	51
10.1.	Faults during commissioning	51
10.2.	Fault indications and warning indications	51
10.3.	Fuses	54
10.3.1.	Fuses within the actuator controls	54
10.3.2.	Motor protection (thermal monitoring)	56
11.	Servicing and maintenance.....	57
11.1.	Preventive measures for servicing and safe operation	57
11.2.	Maintenance	57
11.3.	Disposal and recycling	58
12.	Technical data.....	59
12.1.	Features and functions of actuator	59
12.2.	Features and functions of actuator controls	61
12.3.	Service conditions	64
12.4.	Accessories	65
12.5.	Further information	65
13.	Spare parts.....	66
13.1.	Multi-turn actuators SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2	66
13.2.	Actuator controls AUMATIC AC 01.2	68
14.	Certificates.....	70
14.1.	Declaration of Incorporation and EC Declaration of Conformity	70
	Index.....	71
	Addresses.....	73

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 IP68 and fulfil the requirements of EN 50281-1-1:1998 section 6 - Electrical apparatus for use in presence of combustible dust, requirements for category 3 electrical equipment - protected by enclosures.

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

- In compliance with the ATEX directive 94/9/EC, the actuators must be equipped with an additional identification – II3D IP6X T150 °C.
- The maximum surface temperature of the actuators, based on an ambient temperature of +40 °C in accordance with EN 50281-1-1 section 10.4, is +150 °C. In accordance with section 10.4, an increased dust deposit on the equipment was not considered for the determination of the maximum surface temperature.
- The correct connection of the 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 IP67.
- The actuators must be connected by means of an external ground connection (accessory part) to the potential compensation or integrated into an earthed piping system.
- The threaded plug (part no. 511.0) or the stem protection tube with protective cap (part nos. 568.1 and 568.2) for sealing the hollow shaft must imperatively be mounted to guarantee tightness and therefore the combustible dust hazard protection.
- As a general rule, the requirements of EN 50281-1-1 must be respected in dust hazardous locations. During commissioning, service, and maintenance, special care as well as qualified and trained personnel are required for the safe operation of actuators.

1.4. Warnings and notes

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



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



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



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



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


Arrangement and typographic structure of the warnings



Type of hazard and respective source!

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

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

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


1.5. References and symbols

The following references and symbols are used in these instructions:

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

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

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

M ▶ Via the menu to parameter

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

< > Reference to other sections

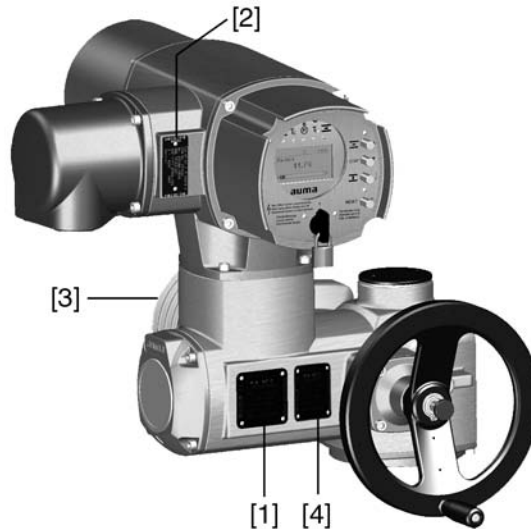
Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

2. Identification

2.1. Name plate

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

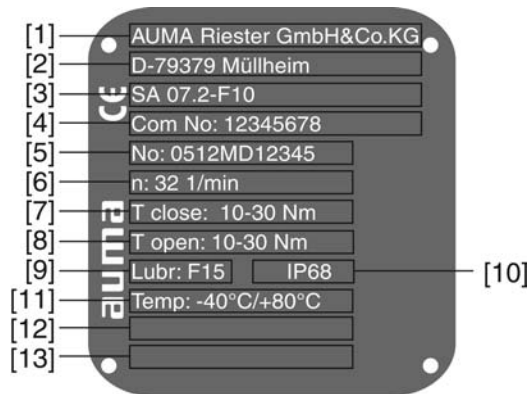
Figure 1: Arrangement of name plates



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

Description of actuator name plate

Figure 2: Actuator name plate (example)



- [1] Name of manufacturer
- [2] Address of manufacturer
- [3] **Type designation** (see explanation below)
- [4] **Commission number** (see explanation below)
- [5] **Actuator serial number** (see explanation below)
- [6] Output speed
- [7] Torque range in direction CLOSE
- [8] Torque range in direction OPEN
- [9] Lubricant type – [10] enclosure protection
- [11] Permissible ambient temperature
- [12] Can be assigned as an option upon customer request
- [13] Can be assigned as an option upon customer request

Type designation Figure 3: Type designation (example)



1. Type and size of actuator
2. Flange size

Type and size

These instructions apply to the following devices types and sizes:

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

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

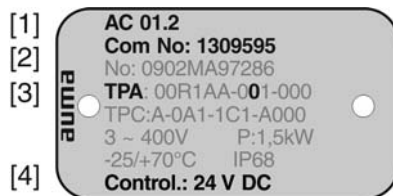
Commission number An order-relevant commission number (order number) is assigned to each device. This commission number can be used to directly download the wiring diagram (in German and English language), inspection records and further information regarding the device from the Internet: <http://www.auma.com>. For some details, the customer number might be required.

Actuator serial number Table 1: Description of serial number (with example)

05	12	M D 12345
1st + 2nd position: Assembly in week		
05	In our example: Week 05	
3rd + 4th position: Year of production		
12	In our example: Year of production: 2012	
All other positions		
	M D 12345	Internal works number for unambiguous product identification

Description of controls name plate

Figure 4: Controls name plate



- [1] **Type designation**
- [2] Commission number
- [3] **Wiring diagram**
- [4] **Control**

Type designation AC 01.2 = Actuator controls AUMATIC

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

Control unit: electromechanical:

0 = without position transmitter

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

C, D, E, G, H, M, P, S, U = 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/AUMA CDT

Operation, setting, and display can be performed on site directly at the controls.

When set to local control, it is possible to

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

Intrusive - Non-Intrusive

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

3. Transport, storage and packaging

3.1. Transport

For transport to place of installation, use sturdy packaging.



Hovering load!

Risk of death or serious injury.

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

3.2. Storage

NOTICE

Danger of corrosion due to inappropriate storage!

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

NOTICE

Damage on display caused by temperatures below permissible level!

- The AUMATIC actuator controls must NOT be stored below $-30\text{ }^{\circ}\text{C}$.

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

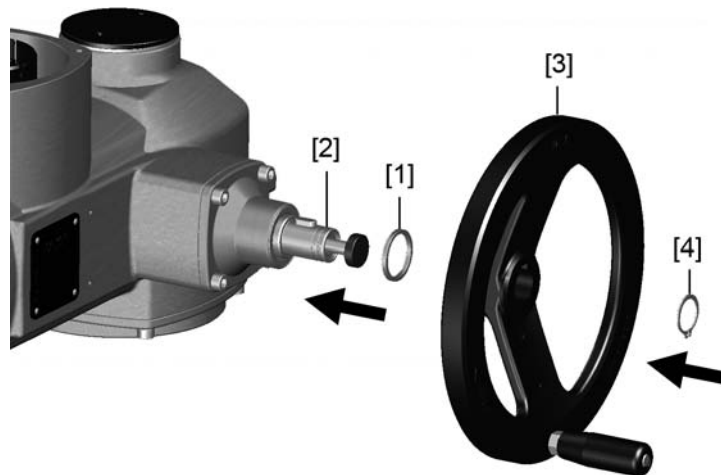
4.1. Mounting position

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.

Figure 5: Handwheel



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

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

4.3. Multi-turn actuator: mount to valve/gearbox

NOTICE

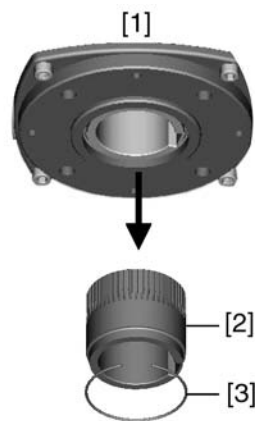
Danger of corrosion due to damage to paint finish and condensation!

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

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

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

Figure 6: Output drive



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

Information Spigot at flanges should be loose fit.

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

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

Table 2: Tightening torques for screws

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

4.3.2. Output drive type A

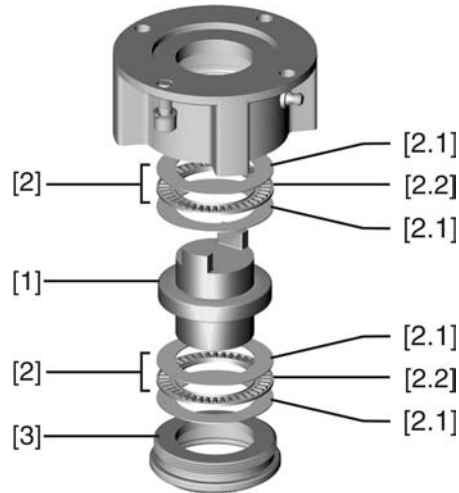
- Application**
- Output drive for rising, non-rotating valve stem
 - Capable of withstanding thrust

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

4.3.2.1. Stem nut: finish machining

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

Figure 7: Design of output drive type A

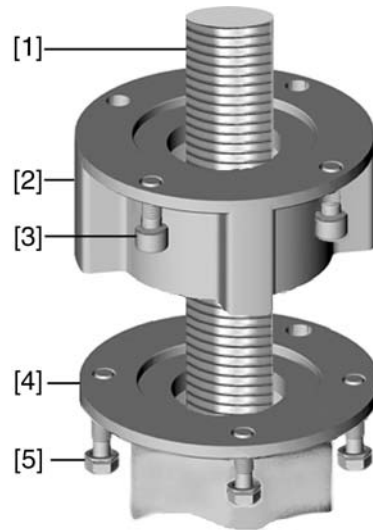


- [1] Stem nut
- [2] Bearing
- [2.1] Bearing race
- [2.2] Bearing rim
- [3] Spigot ring

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

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

Figure 8: Assembly with output drive type A



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

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

Table 3: Tightening torques for screws

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

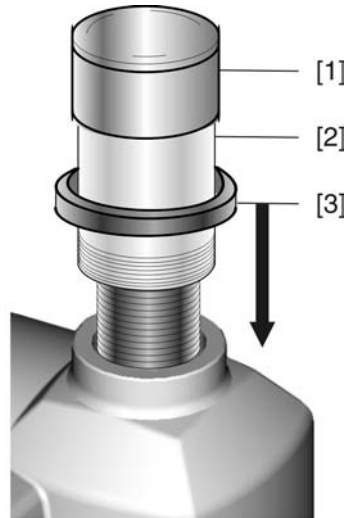
11. Turn multi-turn actuator with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

4.4. Accessories for assembly

4.4.1. Stem protection tube for rising valve stem

— Option —

Figure 9: Assembly of the stem protection tube



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

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

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 10: Mounting positions A and B

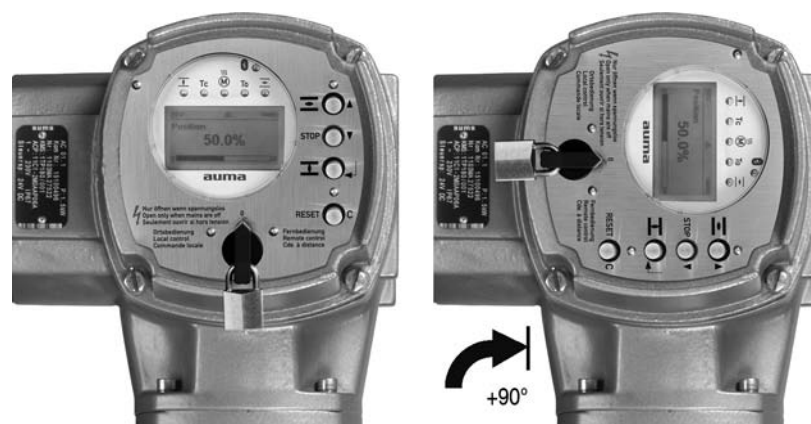
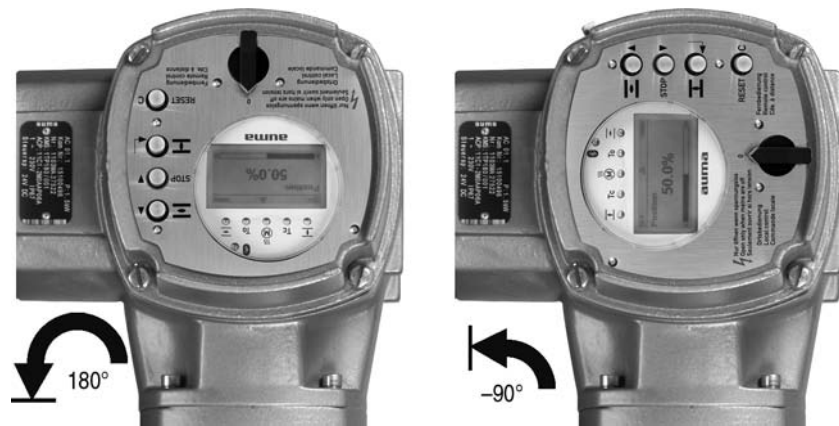


Figure 11: Mounting positions C and D



4.5.1. Mounting positions: modify



DANGER

Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

NOTICE

Electrostatic discharge ESD!

Risk of damage to electronic components.

→ Earth both operators and devices.

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).

Permissible networks (supply networks)

The controls (actuators) are suitable for use in TN and TT networks with directly earthed star point and a maximum voltage of 690 V AC. Use in IT networks is permitted while observing the respective <Protection on site> for maximum supply voltages of 600 V AC.

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 4: Current consumption controls

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

Table 5: 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)
Thyristor B1	up to 1.5 kW	16 A (g/R) $I^2t < 1,500A^2s$
Thyristor B2	up to 3 kW	32 A (g/R) $I^2t < 1,500A^2s$
Thyristor B3	up to 5.5 kW	63 A (g/R) $I^2t < 5,000A^2s$

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

Use appropriate insulation monitors when working in power installations, for example an insulation monitor measuring the pulse code.

Power supply for the controls (electronics)

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

Potential of customer connections

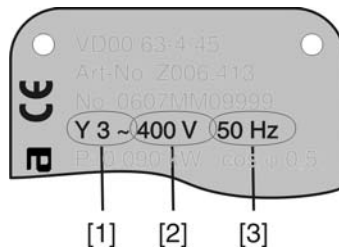
All input signals (control) must be supplied with the same potential.

All output signals (status signals) must be supplied with the same potential.

- Safety standards** All externally connected devices shall comply with the relevant safety standards.
- Cable installation in accordance with EMC** Signal and bus cables are susceptible to interference.
 Motor cables are interference sources.
- Lay cables being susceptible to interference or sources of interference at the highest possible distance from each other.
 - The interference immunity of signal and bus cables increases if the cables are laid close to the 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 Type of current, mains voltage and mains frequency must match the data on the motor name plate.

Figure 12: Motor name plate (example)



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

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

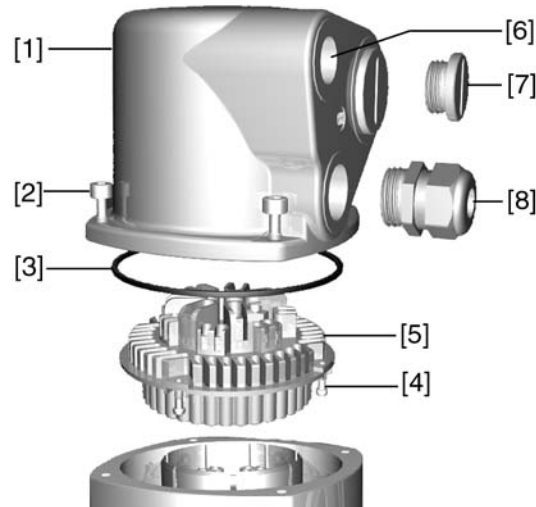
5.2. Connection with AUMA plug/socket connector

Cross sections AUMA plug/socket connector:

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

5.2.1. Terminal compartment: open

Figure 13: 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)

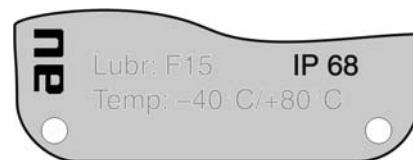
**Hazardous voltage!**

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.

Figure 14: Example: Name plate shows enclosure protection IP68



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

5.2.2. Cable connection

- ✓ Observe permissible cross sections.

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

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

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



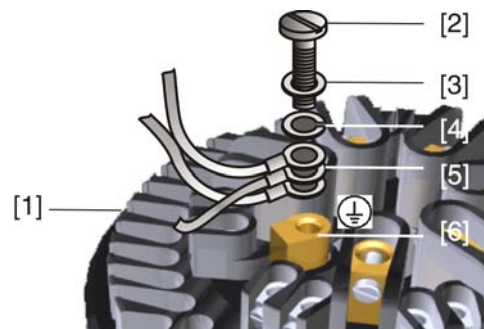
In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!

Risk of electric shock.

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

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

Figure 15: PE connection

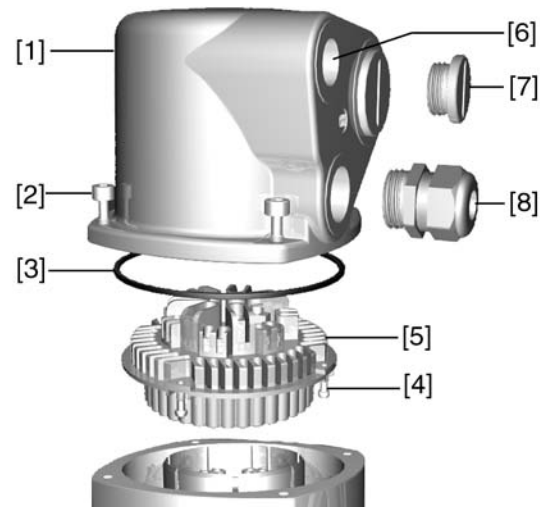


- [1] Socket carrier
- [2] Screw
- [3] Washer
- [4] Lock washer
- [5] Protective earth with ring lugs/loops
- [6] PE connection, symbol: ⊕

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

5.2.3. Terminal compartment: close

Figure 16: 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.

5.3. Accessories for electrical connection

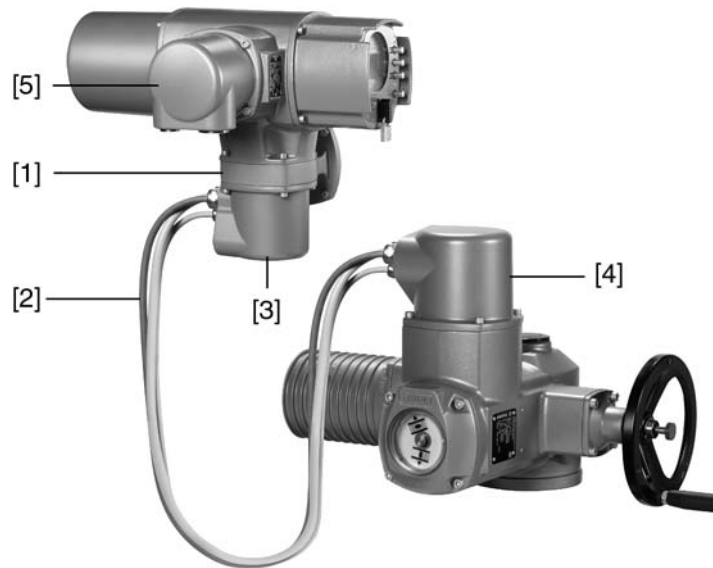
— Option —

5.3.1. Controls mounted to wall bracket

The wall bracket allows separate mounting of controls and actuator.

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

Design Figure 17: 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 connector

Observe prior to connection

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

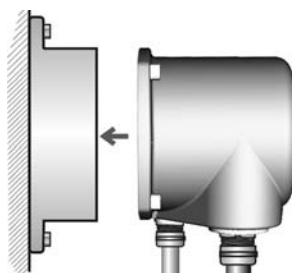
5.3.2. Parking frame

Application

Parking frame for safe storage of a disconnected plug.

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

Figure 18: Parking frame



5.3.3. Protection cover

Protection cover for plug compartment when plug is removed.

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

5.3.4. Double sealed intermediate frame

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

Figure 19: Electrical connection with double sealed intermediate frame



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

5.3.5. Earth connection, external

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

Figure 20: Earth connection



6. Operation

NOTICE

Valve damage due to incorrect basic setting!

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

6.1. Manual operation

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

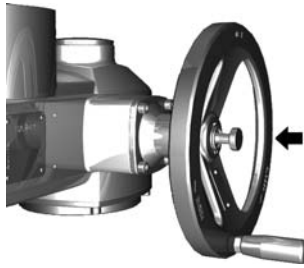
6.1.1. Manual operation: engage

NOTICE

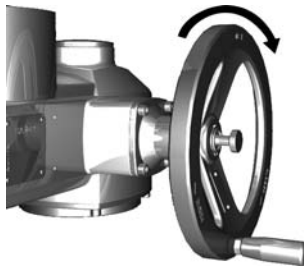
Damage at the motor coupling due to faulty operation!

→ Engage manual operation only during motor standstill.

1. Press push button.



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



6.1.2. Manual operation: disengage

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

6.2. Motor operation

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

6.2.1. Local actuator operation

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

Figure 21: Local controls



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

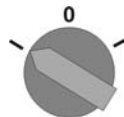


Hot surfaces, e.g. possibly caused by high ambient temperatures or strong direct sunlight!

Danger of burns

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

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



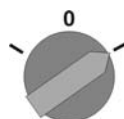
➔ The actuator can now be operated using the push buttons [1 – 3].

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

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

6.2.2. Actuator operation from remote

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



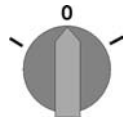
➔ Now, it is possible to operate the actuator via remote control, via operation commands (OPEN, STOP, CLOSE) or analogue setpoints (e.g. 0 – 20 mA).

Information For actuators equipped with a positioner, it is possible to change over between **OPEN - CLOSE control** (Remote OPEN-CLOSE) and **setpoint control** (Remote SET-POINT). 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)

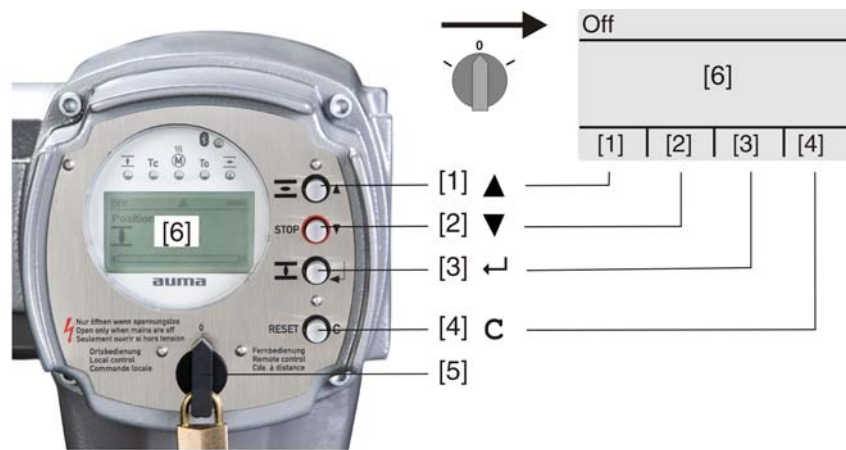
Menu navigation for display and setting is made via the push buttons [1 – 4] of the local controls.

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



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

Figure 22:



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

Table 6: Important push button functions for menu navigation

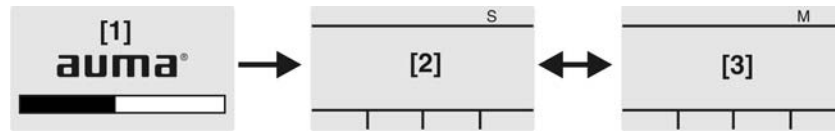
Push buttons	Navigation support on display	Functions
[1] ▲	Up ▲	Change screen/selection Change values Enter figures from 0 to 9
[2] ▼	Down ▼	Change screen/selection Change values Enter figures from 0 to 9
[3] ←	Ok Save Edit Details	Confirm selection Save Enter <Edit> menu Display more details
[4] C	Setup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

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

6.3.1. Menu layout and navigation

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

Figure 23: Groups



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

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

Figure 24: Marking with ID

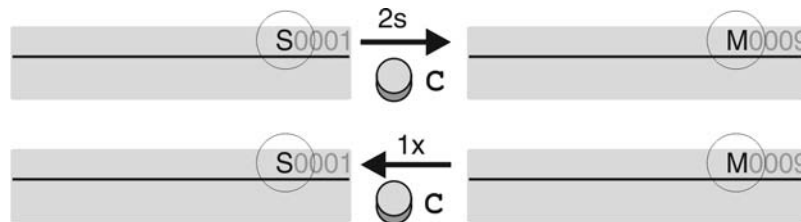


- S ID starts with S = status menu
- M ID starts with M = main menu

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

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

Figure 25: Select menu groups

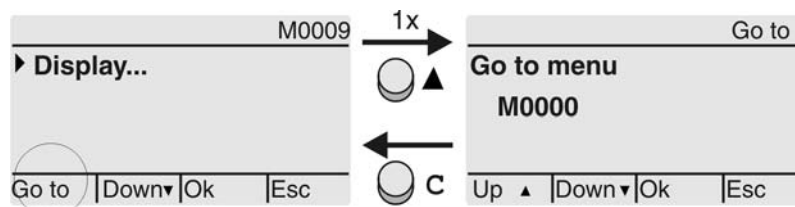


You return to the status menu if:

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

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

Figure 26: Direct display (example)



Display indicates in the bottom row: **Go to**

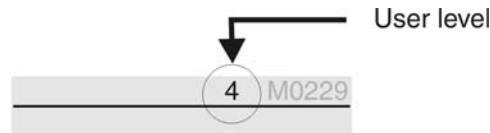
1. Press push button **▲ Go to**.
Display indicates: **Go to menu M0000**
2. Use push buttons **▲▼ Up ▲ Down ▼** to select figures 0 to 9.
3. Press push button **← Ok** to confirm first digit.
4. Repeat steps 2 and 3 for all further digits.
5. To cancel the process: Press **C Esc**.

6.4. User level, password

User level The user level defines which menu items or parameters can be displayed or modified by the active user.

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

Figure 27: User level display (example)



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

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

Table 7: User levels and authorisations

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

6.4.1. Password entry

1. Select desired menu and hold down push button **↵** for approx. 3 seconds.
 ➔ Display indicates the set user level, e.g **Observer (1)**
2. Press **▲ Up ▲** to select a higher user level and press **↵ Ok** to confirm.
 ➔ Display shows: **Password 0*****
3. Use push buttons **▲ ▼ Up ▲ Down ▼** to select figures 0 to 9.
4. Confirm first digit of password via push button **↵ Ok**.
5. Repeat steps 1 and 2 for all further digits.
 ➔ Having confirmed the last digit with **↵ Ok**, access to all parameters within one user level is possible if the password entry is correct.

6.4.2. Password change

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

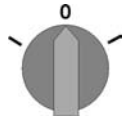
Example: The user is signed in as **Specialist (4)**. This authorises him or her to modify the passwords between user levels (1) to (4).

- M ▷ **Device configuration M0053**
- Service functions M0222**
- Change passwords M0229**

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

Select main menu

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



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

Change passwords

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



- For user level 1 (view only), passwords cannot be changed. To change passwords, you must change to a higher user level. For this, enter a password via a parameter.
4. For a user level between 2 and 6: Press push button **↵ Ok**.
➔ The display indicates the highest user level, e.g.: **For user 4**
5. Select user level via push buttons **▲ ▼ Up ▲ Down ▼** and confirm with **↵ Ok**.
➔ Display indicates: ▶ **Change passwords Password 0*****
6. Enter current password (→ enter password).
➔ Display indicates: ▶ **Change passwords Password (new) 0*****
7. Enter new password (→ enter password).
➔ Display indicates: ▶ **Change passwords For user 4** (example)
8. Select next user level via push buttons **▲ ▼ Up ▲ Down ▼** or cancel the process via **Esc**.

6.5. Language in the display

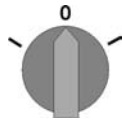
The AUMATIC display is multilingual.

6.5.1. Language change

M ▶ **Display...** **M0009**
Language **M0049**

Select main menu

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



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

Change language

3. Press **↵ Ok**.
➔ Display indicates: ▶ **Language**
4. Press **↵ Ok**.
➔ Display indicates the selected language, e.g.: ▶ **Deutsch**

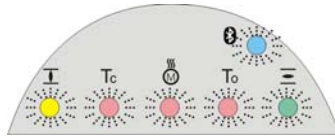
5. The bottom row of the display indicates:
 - **Save** → continue with step 10
 - **Edit** → continue with step 6
6. Press **↵ Edit**.
 - ➔ Display indicates: **▶ Observer (1)**
7. Select user level via **▲ ▼ Up ▲ Down ▼** resulting in the following significations:
 - black triangle: **▶** = current setting
 - white triangle: **▷** = selection (not saved yet)
8. Press **↵ Ok**.
 - ➔ Display indicates: **Password 0*****
9. Enter password (→ enter password).
 - ➔ Display indicates: **▶ Language and Save** (bottom row)
- Language selection** 10. Select new language via **▲ ▼ Up ▲ Down ▼** resulting in the following significations:
 - black triangle: **▶** = current setting
 - white triangle: **▷** = selection (not saved yet)
11. Confirm selection via **↵ Save**.
 - ➔ The display changes to the new language. The new language selection is saved.

7. Indications

7.1. Indications during commissioning

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

Figure 28: LED test

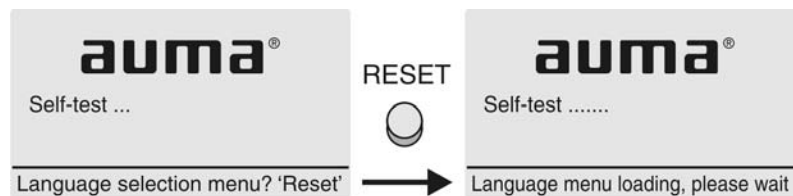


Language selection During the self-test, the language selection can be activated so that the selected language is immediately indicated in the display. For this, set selector switch [5] to position 0 (OFF).

Activate language selection:

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

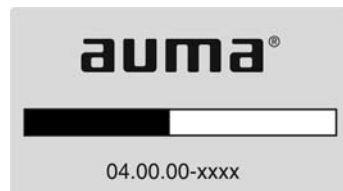
Figure 29: Self-test



The language selection menu follows the startup menu.

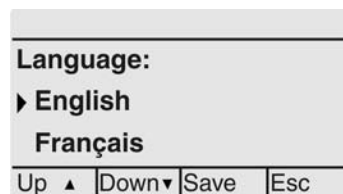
Startup menu The current firmware version is displayed during the startup procedure:

Figure 30: Startup menu with firmware version: 04.00.00–xxxx



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

Figure 31: Language selection

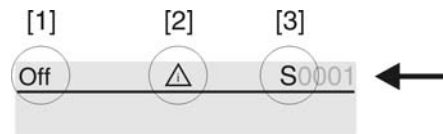


If no entry is made over a longer period of time (approx. 1 minute), the display automatically returns to the first status indication.

7.2. Indications in the display

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

Figure 32: Information in the status bar (top)

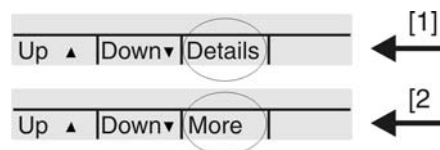


- [1] Operation mode
- [2] Error symbol (only for faults and warnings)
- [3] ID number: S = Status page

Navigation support

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

Figure 33: Navigation support (bottom)



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

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

7.2.1. Feedback indications from actuator and valve

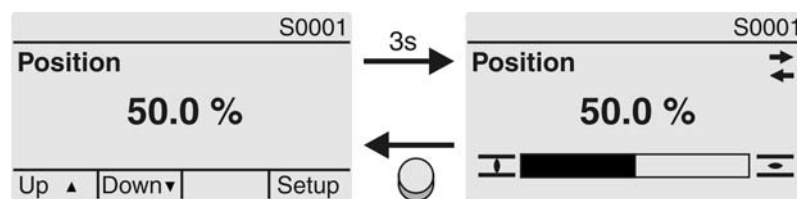
Display indications depend on the actuator version.

Valve position (S0001)

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

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

Figure 34: Valve position and direction of operation





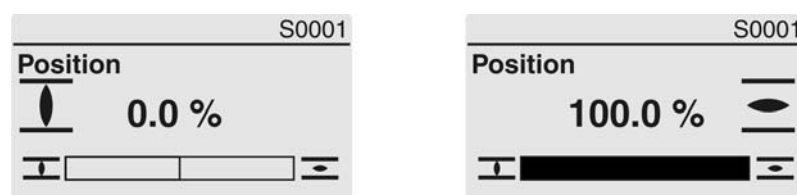
Reaching the preset end positions is additionally indicated via symbols  (CLOSED) and  (OPEN).

Figure 35: End position CLOSED/OPEN reached



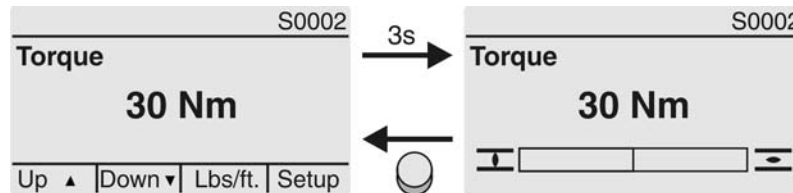
- 0% Actuator is in end position CLOSED
- 100% Actuator is in end position OPEN

Torque (S0002)

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

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

Figure 36: Torque



Select unit


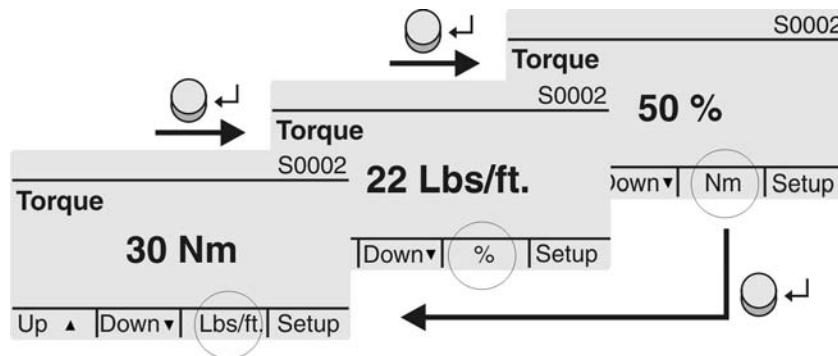
The push button  allows to select the unit displayed (percent %, Newton metre Nm or pounds per foot Lbs/ft).

Figure 37: Units of torque



Display in percent

100 % indication equals the max. torque indicated on the name plate of the actuator.
Example: SA 07.5 with 20 – 60 Nm.

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

Operation commands (S0003)

The display S0003 indicates:

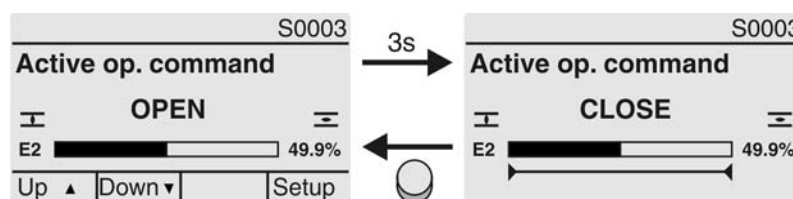
- active operation commands, like e.g.: Operation in direction CLOSE or in direction OPEN
- the actual value E2 as bargraph indication and as value between 0 and 100 %.
- for setpoint control (positioner): setpoint E1
- for stepping mode or for intermediate positions with operation profile: pivot points and operation behaviour of pivot points

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

OPEN - CLOSE control

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

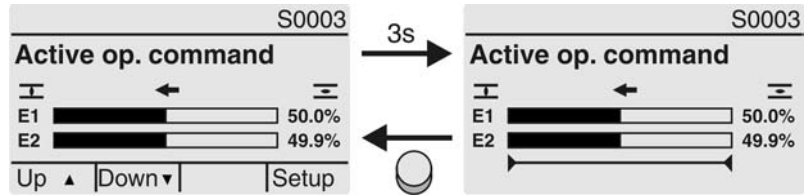
Figure 38: Display for OPEN - CLOSE control



E2 Actual position value

Setpoint control If the positioner is enabled and activated, the bargraph indication for E1 (position setpoint) is displayed.
 The direction of the operation command is displayed by an arrow above the bargraph indication. The figure below shows the operation command in direction CLOSE.

Figure 39: Display for setpoint control (positioner)



E1 Position setpoint
 E2 Actual position value

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

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

Operation profile M0294

Timer CLOSE M0156

Timer OPEN M0206

Figure 40: Examples: on the left pivot points (intermediate positions); on the right stepping mode

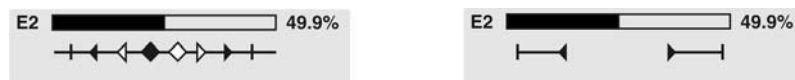


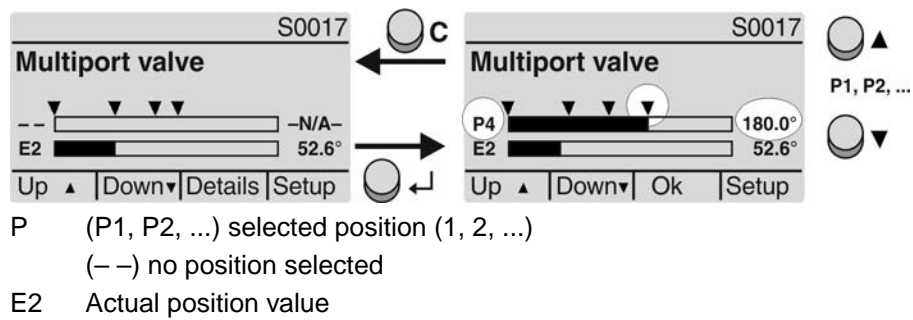
Table 8: Symbols along the pivot point axis

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

Multiport valve positions (S0017)

In case of active multiport valve function, the display S0017 indicates a second bargraph display with set positions (valve connections) above the actual position value E2. Positions (P1, P2, ...) are displayed with a black triangle ▼. Push buttons ▲▼ are used to select positions. Both positions and the actual position value E2 are displayed in degrees.

Figure 41: Status indication for multiport valve (example P4 = 180°)



7.2.2. Status indications according to AUMA classification

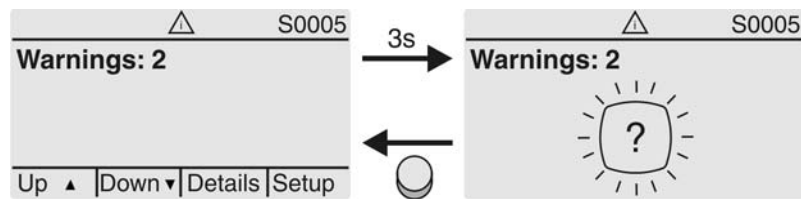
These indications are available, if the parameter **Diagnostic classific. M0539** is set to **AUMA**.

Warnings (S0005)

If a warning has occurred, the display shows **S0005**:

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

Figure 42: Warnings



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

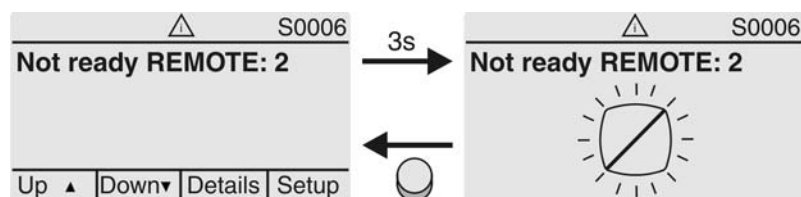
Not ready REMOTE (S0006)

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

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

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

Figure 43: Not ready REMOTE indications



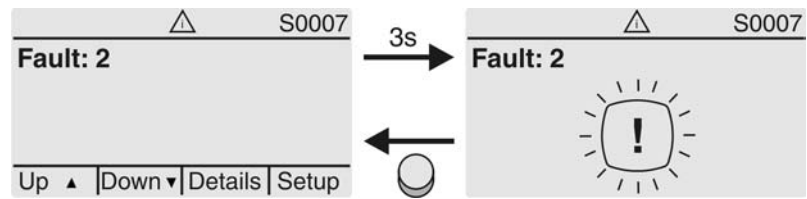
For further information, please also refer to <Corrective action>.

Fault (S0007)

If a fault has occurred, the display shows **S0007**:

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

Figure 44: Fault



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

7.2.3. Status indications according to NAMUR recommendation

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

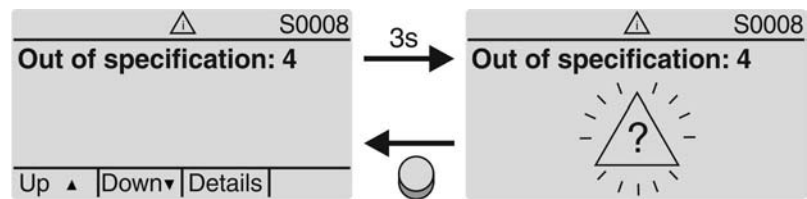
Out of Specification (S0008)

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

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

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

Figure 45: Out of specification



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

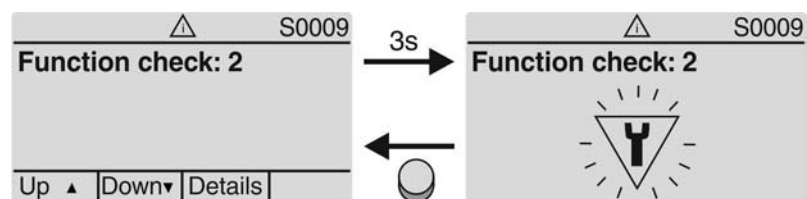
Function check (S0009)

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

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

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

Figure 46: Function check



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

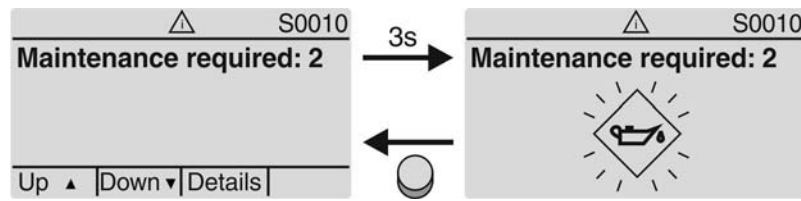
Maintenance required (S0010)

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

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

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

Figure 47: Maintenance required



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

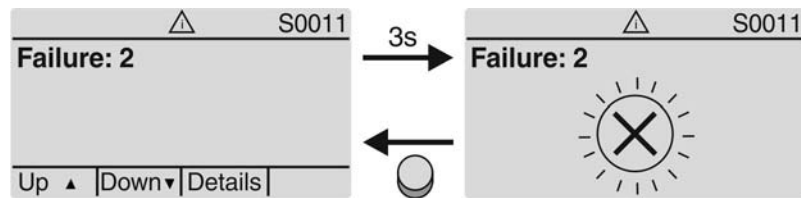
Failure (S0011)

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

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

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

Figure 48: Failure



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

7.3. Mechanical position indicator/running indication

— Option —

Mechanical position indicator:

- Continuously indicates the valve position (For complete travel from OPEN to CLOSED or vice versa, the indicator disc [2] rotates 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 49: Mechanical position indicator



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

7.4. Indication lights

Figure 50: Arrangement and signification of indication lights



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

Modify indication light assignment (indications)

Different indications can be assigned to LEDs 1 – 5.

- M ▷ **Device configuration** M0053
 - Local controls M0159
 - Indication light 1 (left) M0093
 - Indication light 2 M0094
 - Indication light 3 M0095
 - Indication light 4 M0096
 - Indicat. light 5 (right) M0097
 - Signal interm. pos. M0167

Default values (Europe):

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

Further setting values:

Refer to Manual (Operation and setting).

8. Signals

8.1. Status signals via output contacts (digital outputs)

Characteristics Output contacts are used to send status signals (e.g. reaching the end positions, selector switch position, faults...) as binary signals to the control room.

Status signals only have two states: active or inactive. Active means that the conditions for the signal are fulfilled.

8.1.1. Assignment of outputs

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

Required user level: **Specialist (4)** or higher.

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

Default values:

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

8.1.2. Encoding of outputs

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

- High active = output contact closed = signal active
- Low active = output contact open = signal active

Required user level: **Specialist (4)** or higher.

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

Default values for DOUT 1 – 12: High active

8.2. Analogue signals

— (Option) —

If the actuator is equipped with a position transmitter (potentiometer or MWG), an analogue feedback signal is available.

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

Designation in the wiring diagram:

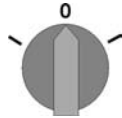
ANOUT1 (position)

ANOUT2 (position)

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

9. Commissioning (basic settings)

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



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

2. Switch on the power supply.

Information: Please consider the heat-up time for ambient temperatures below $-20\text{ }^{\circ}\text{C}$.

3. Perform basic settings.

9.1. Type of seating: set

NOTICE

Valve damage due to incorrect setting!

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

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

Default value: Limit

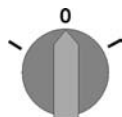
Setting values:

Limit Seating in end positions via limit switching.

Torque Seating in end positions via torque switching.

Select main menu

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



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

➔ Display goes to main menu and indicates: ▶ Display...

Select parameter

3. Select parameter either:
 - click via the menu M ▶ to parameter, or
 - via direct display: press ▲ and enter ID M0086 or M0087

➔ Display indicates: End position CLOSED

CLOSE or OPEN

4. Use ▲ ▼ Up ▲ Down ▼ to select:

→ ▶ End position CLOSED

→ ▶ End position OPEN

➔ The black triangle ▶ indicates the current selection.

5. Press ← Ok.

➔ Display indicates the current setting: Limit or Torque

➔ The bottom row of the display indicates either:

- Edit → continue with step 6

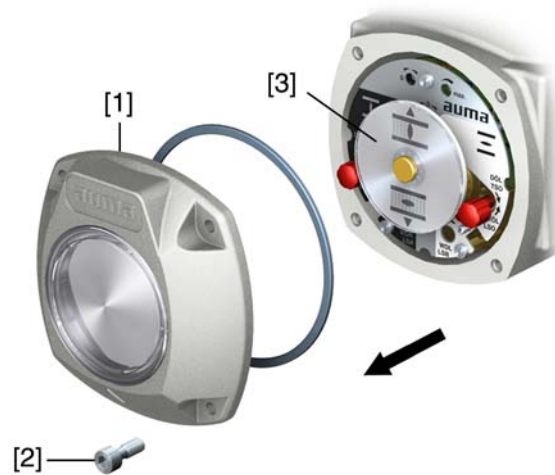
- Save → continue with step 10

6. Press **← Edit**.
- ➔ Display indicates: **▶ Specialist (4)**
- Log on user** 7. Use **▲▼ Up ▲ Down ▼** to select user:
Information: Required user level: **Specialist (4)** or higher
- ➔ The symbols have the following meaning:
- black triangle: ▶ = current setting
 - white triangle: ▷ = selection (not saved yet)
8. Press **← Ok**.
- ➔ Display indicates: **Password 0*****
9. Enter password (→ enter password).
- ➔ The screen indicates the pre-set type of seating (**▶ Limit** or **▶ Torque**) by means of a black triangle ▶.
- Change settings** 10. Select new setting **▲▼ Up ▲ Down ▼** resulting in the following significations:
- ➔ The symbols have the following meaning:
- black triangle: ▶ = current setting
 - white triangle: ▷ = selection (not saved yet)
11. Confirm selection via **← Save**.
- ➔ The setting for the type of seating is complete.
12. Back to step 4 (CLOSED or OPEN): Press **← Esc**.

9.2. Switch compartment: open

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

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



2. If indicator disc [3] is available:
 Remove indicator disc [3] using a spanner (as lever).
Information: To avoid damage to paint finish, use spanner in combination with soft object, e.g. fabric.



9.3. Torque switching: set

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

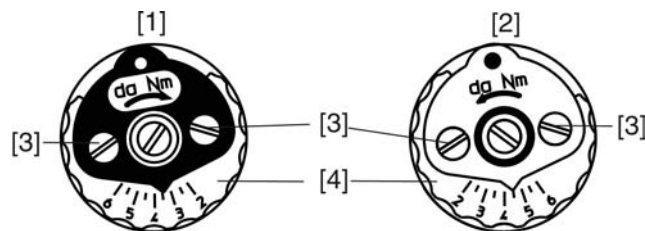
Information The torque switches may also trip during manual operation.

NOTICE

Valve damage due to excessive tripping torque limit setting!

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

Figure 51: Torque switching heads



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

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

Information: Maximum tightening torque: 0.3 – 0.4 Nm

➔ The torque switch setting is complete.

Example: The figure above shows the following settings:

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

9.4. Limit switching: set

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

Figure 52: Setting elements for limit switching

**Black section:**

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

White section:

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

9.4.1. End position CLOSED (black section): set

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

9.4.2. End position OPEN (white section): set

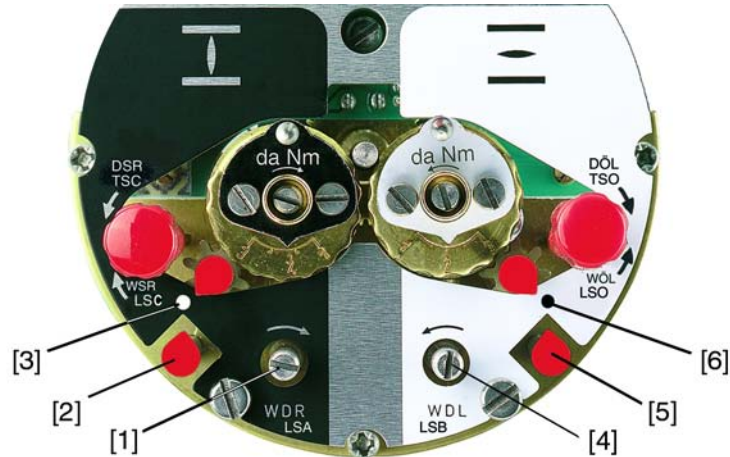
1. Engage manual operation.
2. Turn handwheel counterclockwise until valve is open.
3. Turn handwheel by approximately half a turn (overrun) in the opposite direction.
4. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet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

9.5. Intermediate positions: set

— Option —

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

Figure 53: Setting elements for limit switching



Black section:

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

White section:

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

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

9.5.1. Running direction CLOSE (black section): set

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

9.5.2. Running direction OPEN (white section): set

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

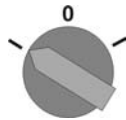
3. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet click is felt and heard, the pointer [5] moves 90° every time.
4. If the pointer [5] is 90° from mark [6]: Continue turning slowly.
5. If the pointer [5] moves to mark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

9.6. Test run

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

9.6.1. Direction of rotation: check

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

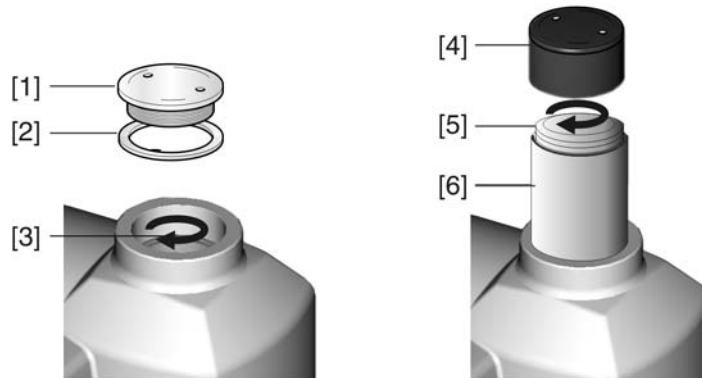


3. Switch on actuator in running direction CLOSE and observe the direction of rotation:
with indicator disc: step 4
without indicator disc: step 5 (hollow shaft)
→ Switch off before reaching the end position.
4. With indicator disc:
→ Observe direction of rotation.
➔ The direction of rotation is correct,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

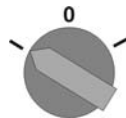
Figure 54: Hollow shaft/stem



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

9.6.2. Limit switching: check

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



2. Operate actuator using push buttons OPEN, STOP, CLOSE.
 - ➔ The limit switching is set correctly if (default indication):
 - the yellow indication light/LED1 is illuminated in end position CLOSED
 - the green indication light/LED5 is illuminated in end position OPEN
 - the indication lights go out after travelling into opposite direction.
 - ➔ The limit switching is set incorrectly if:
 - the actuator comes to a standstill before reaching the end position
 - one of the red indication lights/LEDs is illuminated (torque fault)
 - the status indication **S0007** in the display signals a fault.
3. If the end position setting is incorrect: Reset limit switching.
4. If the end position setting is correct and no options (e.g. potentiometer, position transmitter) are available: Close switch compartment.

9.6.3. Reference operation position feedback: perform

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

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

9.7. Potentiometer setting

— Option —

The potentiometer as travel sensor records the valve position.

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

Figure 55: View of control unit



[1] Potentiometer

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

9.8. Electronic position transmitter RWG: set

— Option —

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

Table 9: Technical data RWG 4020

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

Figure 56: View of control unit





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

1. Connect voltage to electronic position transmitter.
2. Move valve to end position CLOSED.
3. Connect ammeter for 0 – 20 mA to measuring points [4 and 5].
4. Turn potentiometer [1] clockwise to the stop.
5. Turn potentiometer [1] slightly in opposite direction.
6. Turn potentiometer [2] clockwise until output current starts to increase.
7. Turn potentiometer [2] in opposite direction until the following value is reached:
 - for 0 – 20 mA approx. 0.1 mA
 - for 4 – 20 mA approx. 4.1 mA
- ➔ This ensures that the signal remains above the dead and live zero point.
8. Move valve to end position OPEN.
9. Set potentiometer [3] to end value 20 mA.
10. Approach end position CLOSED again and check minimum value (0.1 mA or 4.1 mA). If necessary, correct the setting.

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


9.9. Mechanical position indicator: set

— Option —


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



4. Move actuator to end position OPEN.

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



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

9.10. Switch compartment: close

NOTICE

Danger of corrosion due to damage to paint finish!

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

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



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

10. Corrective action

10.1. Faults during commissioning

Table 10: Faults during commissioning

Fault description	Possible causes	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
Fault in end position Actuator runs to end stop although the limit switches work properly.	The overrun was not considered when setting the limit switching. The overrun is generated by the inertia of both the actuator and the valve and the delay time of the controls.	Determine overrun: Overrun = travel covered from switching off until complete standstill. Set limit switching again considering the overrun (turn handwheel back by the amount of the overrun).
Position transmitter RWG Measurement range 4 – 20 mA or maximum value 20 mA cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
Limit and/or torque switches do not trip.	Switch is defective or switch setting is incorrect.	Check setting, if required, reset end positions. → Check switches and replace them, if required.

Switch check

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



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

10.2. Fault indications and warning indications

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

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

Collective signals include further indications which can be displayed via the **Details** push button.

Table 11: Faults and warnings via status indications in the display

Indication on display	Description/cause	For indicated value > 0:
Warnings S0005	Collective signal 02: Indicates the number of active warnings.	Press push button Details . For details, refer to <Warnings and Out of specification> table.
Not ready REMOTE S0006	Collective signal 04: Indicates the number of active signals.	Press push button Details . For details, refer to <Not ready REMOTE and Function check> table.
Fault S0007	Collective signal 03: Indicates the number of active faults. The actuator cannot be operated.	Press push button Details to display a list of detailed indications. For details, refer to <Faults and Failure> table.

Indication on display	Description/cause	For indicated value > 0:
Out of specification S0008	Collective signal 07: Indication according to NAMUR recommendation NE 107 Actuator is operated outside the normal operation conditions.	Press push button ← Details . For details refer to <Warnings and Out of specification> table.
Function check S0009	Collective signal 08: Indication according to NAMUR recommendation NE 107 The actuator is being worked on; output signals are temporarily invalid.	Press push button ← Details . For details, refer to <Not ready REMOTE and Function check> table.
Maintenance required S0010	Collective signal 09: Indication according to NAMUR recommendation NE 107 Recommendation to perform maintenance.	Press push button ← Details to display a list of detailed indications.
Failure S0011	Collective signal 10: Indication according to NAMUR recommendation NE 107 Actuator function failure, output signals are invalid	Press push button ← Details to display a list of detailed indications. For details, refer to <Faults and Failure> table.

Table 12: Warnings and Out of specification

Indication on display	Description/cause	Remedy
Config. warning	Collective signal 06: Possible cause: Configuration setting is incorrect. The device can still be operated with restrictions.	Press push button ← Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Internal warning	Collective signal 15: Device warnings The device can still be operated with restrictions.	Press push button ← Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
24 V DC external	The external 24 V DC voltage supply of the controls has exceeded the power supply limits.	Check 24 V DC voltage supply.
Wrn on time running	Warning on time max. running time/h exceeded	<ul style="list-style-type: none"> • Check modulating behaviour of actuator. • Check parameter Perm. running time/h M0356, re-set if required.
Wrn on time starts	Warning on time max. number of motor starts (starts) exceeded	<ul style="list-style-type: none"> • Check modulating behaviour of actuator. • Check parameter Permissible starts/h M0357, re-set if required.
Failure behav. active	The failure behaviour is active since all required setpoints and actual values are incorrect.	Verify signals: <ul style="list-style-type: none"> • Setpoint E1 • Actual value E2 • Actual process value E4
Wrn input AIN 1	Warning: Loss of signal analogue input 1	Check wiring.
Wrn input AIN 2	Warning: Loss of signal analogue input 2	Check wiring.
Wrn setpoint position	Warning: Loss of signal of actuator setpoint position Possible causes: Input signal for setpoint = 0 (signal loss)	Check setpoint signal.
Op. time warning	The set time (parameter Perm.op. time, manual M0570) has been exceeded. The preset operating time is exceeded for a complete travel from end position OPEN to end position CLOSED.	The warning indications are automatically cleared once a new operation command is executed. <ul style="list-style-type: none"> • Check valve. • Check parameter Perm.op. time, manual M0570.
Wrn controls temp.	Temperature within controls housing too high	Measure/reduce ambient temperature.
Wrn motor temp.	Temperature within motor winding too high	Check actuator sizing, correct accordingly.
Wrn gearbox temp.	Temperature within actuator gear housing too high	Check actuator sizing, correct accordingly.

Indication on display	Description/cause	Remedy
RTC not set	Real time clock has not yet been set.	Set time.
RTC button cell	Voltage of the RTC button cell is too low.	Replace button cell.
PVST fault	Partial Valve Stroke Test (PVST) could not be successfully completed.	Check actuator (PVST settings).
PVST abort	Partial Valve Stroke Test (PVST) was aborted or could not be started.	Perform RESET or restart PVST.
Wrn no reaction	No actuator reaction to operation commands within the set reaction time.	<ul style="list-style-type: none"> Check movement at actuator. Check parameter Reaction time M0634.
Wrn FOC	Optical receiving signal (channel 1) incorrect (no or insufficient Rx receive level) or RS-485 format error (incorrect bit(s))	Check/repair FO cables.
Wrn FO cable budget	Warning: FO cable system reserve reached (critical or permissible Rx receive level)	Check/repair FO cables.
Wrn FOC connection	Warning FO cable connection is not available.	Fit FO cable connection.
Torque wrn OPEN	Limit value for torque warning in direction OPEN exceeded.	Check parameter Wrn torque OPEN M0768 , re-set if required.
Torque wrn CLOSE	Limit value for torque warning in direction CLOSE exceeded.	Check parameter Wrn torque CLOSE M0769 , re-set if required.

Table 13: Faults and Failure

Indication on display	Description/cause	Remedy
Configuration error	Collective signal 11: Configuration error has occurred.	Press push button ⏪ Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Config. error REMOTE	Collective signal 22: Configuration error has occurred.	Press push button ⏪ Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Internal error	Collective signal 14: Internal error has occurred.	AUMA service Press push button ⏪ Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Torque fault CLOSE	Torque fault in direction CLOSE	Perform one of the following measures: <ul style="list-style-type: none"> Issue 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	Perform one of the following measures: <ul style="list-style-type: none"> Issue operation command in direction CLOSE. Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET.
Phase fault	<ul style="list-style-type: none"> When connecting to a 3-ph AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. When connecting to a 3-ph or 1-ph AC system and with external 24 V DC supply of the electronics: One of the phases L1, L2 or L3 is missing. 	Test/connect phases.
Incorrect phase seq	The phase conductors L1, L2 and L3 are connected in the wrong sequence. Only applicable if connected to a 3-ph AC system.	Correct the sequence of the phase conductors L1, L2 and L3 by exchanging two phases.

Indication on display	Description/cause	Remedy
Mains quality	Due to insufficient mains quality, the controls cannot detect the phase sequence (sequence of phase conductors L1, L2 and L3) within the pre-set time frame provided for monitoring.	<ul style="list-style-type: none"> Check mains voltage. Check parameter Tripping time M0172, extend time frame if required.
Thermal fault	Motor protection tripped	<ul style="list-style-type: none"> Cool down, wait. If the fault indication display persists after cooling down: <ul style="list-style-type: none"> Set selector switch to position Local control (LOCAL) and reset fault indication via push button RESET. Check fuses.
Fault no reaction	No actuator reaction to operation commands within the set reaction time.	Check movement at actuator.

Table 14: Not ready REMOTE and Function check (collective signal 04)

Indication on display	Description/cause	Remedy
Wrong oper. cmd	Collective signal 13: Possible causes: <ul style="list-style-type: none"> Several operation commands (e.g. OPEN and CLOSE simultaneously, or OPEN and SETPOINT operation simultaneously) A setpoint is present and the positioner is not active For fieldbus: Setpoint exceeds 100.0 % 	<ul style="list-style-type: none"> Check operation commands (send one operation command only). Set parameter Positioner to Function active. Check setpoint. <p>Press push button Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).</p>
Sel. sw. not REMOTE	Selector switch is not in position REMOTE.	Set selector switch to position REMOTE.
Service active	Operation via service interface (Bluetooth) and service software AUMA CDT.	Exit service software.
Disabled	Actuator is in operation mode Disabled.	Check setting and status of function <Local controls enable>.
EMCY stop active	The EMERGENCY stop switch has been operated. The motor control power supply (contactors or thyristors) is disconnected.	<ul style="list-style-type: none"> Enable EMERGENCY stop switch. Reset EMERGENCY stop state by means of Reset command.
EMCY behav. active	Operation mode EMERGENCY is active (EMERGENCY signal was sent). 0 V are applied at the EMERGENCY input.	<ul style="list-style-type: none"> Detect cause for EMERGENCY signal. Verify failure source. Apply +24 V DC at EMERGENCY input.
I/O interface	The actuator is controlled via the I/O interface (parallel).	Check I/O interface.
Handwheel active	Manual operation is activated.	Start motor operation.
Interlock	An interlock is active.	Check interlock signal.
Interlock by-pass	By-pass function is interlocked.	Check states of main and by-pass valve.
PVST active	Partial Valve Stroke Test (PVST) is active.	Wait until PVST function is complete.

10.3. Fuses

10.3.1. Fuses within the actuator controls

Fuses used

F1/F2 Primary fuses on power supply unit

G fuse	F1/F2	AUMA art. no.
Size	6.3 x 32 mm	
Reversing contactors Power supply ≤ 500 V	1 A T; 500 V	K002.277
Reversing contactors Power supply > 500 V	2 A FF; 690 V	K002.665

G fuse	F1/F2	AUMA art. no.
Thyristor units for motor power up to 1.5 kW	1 A T; 500 V	K002.277
Thyristor units for motor power up to 3.0 kW		
Thyristor units for motor power up to 5.5 kW		

F3 Internal 24 V DC supply

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

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

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

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

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

Replace fuses F1/F2

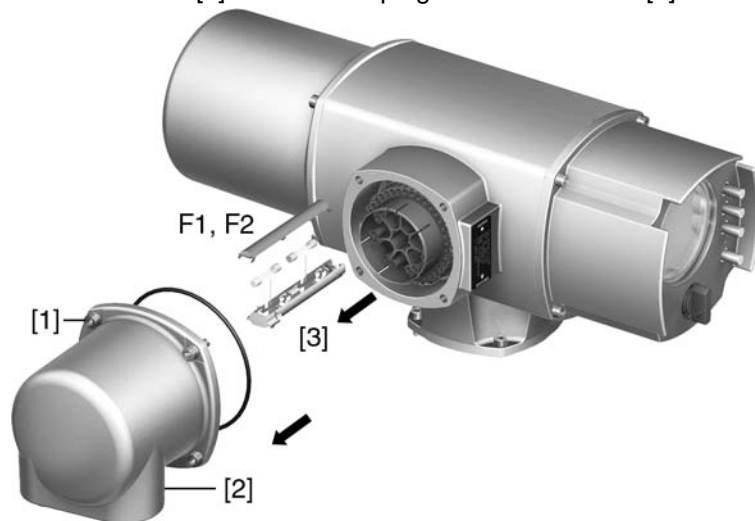


Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

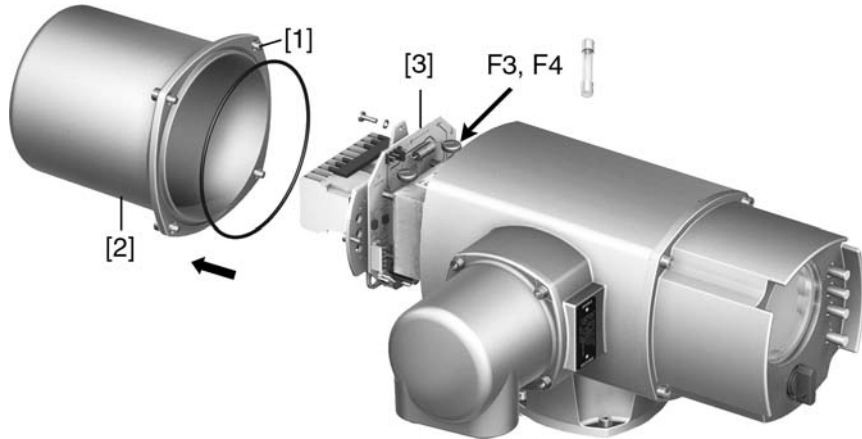
1. Loosen screws [1] and remove plug/socket connector [2].



2. Pull fuse holder [3] out of pin carrier, open fuse cover and replace old fuses by new ones.

Fuses F3/F4: test/replace

1. Loosen screws [1] and remove cover [2] on the rear of the actuator controls.



The power supply unit has measurement points (solder pins) allowing to perform a resistance (continuity) measurement:

Verifying	Measuring points
F3	MTP5 – MTP6
F4	MTP7 – MTP8

2. To replace defective fuses: Carefully loosen power supply unit [3] and pull out. (The fuses are on the equipped part of the power supply board).

NOTICE

Cable damage due to pinching!

Risk of functional failures.

→ Carefully assemble power supply unit to avoid pinching the cables.

10.3.2. Motor protection (thermal monitoring)

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

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

- LED 3 (thermal fault) on the local controls is illuminated.
- Status indication **S0007** displays a fault. The fault **Thermostich** is displayed when selecting **Details**.

The motor has to cool down before the operation can be resumed. Depending on the parameter setting, the fault signal is either automatically reset or the fault signal has to be reset using the push button **Reset** in selector switch position LOCAL.

For further information to this topic, please refer to 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).

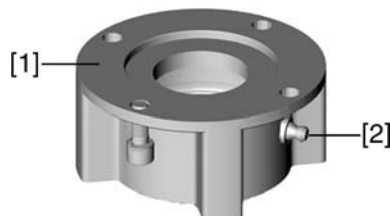
11.1. Preventive measures for servicing and safe operation

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 57: Output drive type A



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

Table 15: Grease quantities for bearing of output drive type A

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

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

For enclosure protection IP68

After continuous immersion:

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

11.2. Maintenance

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

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

11.3. Disposal and recycling

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

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

The following generally applies:

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

12. Technical data

Information The following technical data includes standard and optional features. For detailed information on the customer-specific version, refer to the order-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
Motor voltage and frequency	Refer to motor name plate
Insulation class	Standard: F, tropicalized Option: H, tropicalized
Motor protection	Standard: Thermoswitches (NC) Option: PTC thermistors (according to DIN 44082)
Self-locking	Self-locking: Output speeds up to 90 rpm (50 Hz), 108 rpm (60 Hz) NOT self-locking: Output speeds up to 125 rpm (50 Hz), 150 rpm (60 Hz) Multi-turn actuators are self-locking, if the valve position cannot be changed from standstill while torque acts upon the output drive.
Limit switching	Counter gear mechanism for end positions CLOSED and OPEN Turns per stroke: 2 to 500 (standard) or 2 to 5,000 (option) Standard: <ul style="list-style-type: none"> • Single switches (1 NC and 1 NO, not galvanically isolated) for each end position Options: <ul style="list-style-type: none"> • Tandem switches (2 NC and 2 NO) for each end position, switches galvanically isolated • Triple switches (3 NC and 3 NO) for each end position, switches galvanically isolated • Intermediate position switch (DUO limit switching), adjustable for any position
Torque switching	Torque switching adjustable for directions OPEN and CLOSE Standard: Single switch (1 NC and 1 NO; not galvanically isolated) for each direction Option: Tandem switches (2 NC and 2 NO) for each direction, switches galvanically isolated
Position feedback signal, analogue (option)	Potentiometer or 0/4 – 20 mA (RWG)
Mechanical position indicator (option)	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED
Heater in switch compartment	Standard: Resistance type heater, 5 W, 24 V AC, (internal supply)
Motor heater (option)	Voltages: 110 – 120 V AC, 220 – 240 V AC or 400 V AC (externally supplied) Power depending on the size 12.5 – 25 W
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation. Option: Handwheel lockable
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, IB3 A prepared for stem lubrication
Sensor system	

Indication for manual operation (option)	Indication whether manual operation is active/not active via switch (1 change-over contact)
--	---

- 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.

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

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

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

12.2. Features and functions of actuator controls

Power supply Mains frequency	For mains voltage and mains frequency, refer to name plates at the controls and the motor Permissible variation of the mains voltage: $\pm 10\%$ Permissible variation of the mains frequency: $\pm 5\%$ Option: Permissible variation of the mains voltage: $\pm 30\%$
External supply of the electronics (option)	24 V DC $+20\%$ / -15% Current consumption: Basic version approx. 250 mA, with options up to 500 mA The external power supply must have a reinforced insulation against the mains voltage in accordance with IEC 61010-1 and may only be supplied by a circuit limited to 150 VA in accordance with IEC 61010-1.
Current consumption	Current consumption of the controls depending on the mains voltage: For permissible variation of mains voltage by $\pm 10\%$: <ul style="list-style-type: none"> • 100 to 120 V AC = max. 740 mA • 208 to 240 V AC = max. 400 mA • 380 to 500 V AC = max. 250 mA • 515 to 690 V AC = max. 200 mA For permissible variation of mains voltage by $\pm 30\%$: <ul style="list-style-type: none"> • 100 to 120 V AC = max. 1,200 mA • 208 to 240 V AC = max. 750 mA • 380 to 500 V AC = max. 400 mA • 515 to 690 V AC = max. 400 mA Motor current consumption: Refer to motor name plate
Overvoltage category	Category III according to IEC 60364-4-443
Rated power	The controls are designed for the rated motor power, refer to motor name plate
Switchgear ^{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: Via digital inputs OPEN, STOP, CLOSE, EMERGENCY (via opto-isolator, OPEN, STOP, CLOSE with one common), respect minimum pulse duration for modulating actuators Option: Additional enable inputs for directions OPEN and CLOSE
Voltage and current values for control inputs ³⁾	Standard: 24 V DC, current consumption: approx. 10 mA per input Options: 48 V DC, current consumption: approx. 7 mA per input 60 V DC, current consumption: approx. 9 mA per input 110 V DC, current consumption: approx. 8 mA per input 115 V DC, current consumption: approx. 15 mA per input 115 V AC, current consumption: approx. 15 mA per input

Status signals	<p>Standard: 6 programmable output contacts:</p> <ul style="list-style-type: none"> • 5 potential-free NO contacts with one common, max. 250 V AC, 1 A (resistive load) <ul style="list-style-type: none"> - Default configuration: End position CLOSED, end position OPEN, selector switch in REMOTE, torque fault CLOSE, torque fault OPEN • 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load) <ul style="list-style-type: none"> - Default configuration: Collective fault signal (torque fault, phase failure, motor protection tripped) <p>Options: 6 programmable output contacts:</p> <ul style="list-style-type: none"> • 5 change-over contacts with one common, max. 250 V AC, 5 A (resistive load) • 1 potential-free change-over contact, max. 250 V AC, 5 A (resistive load) <p>12 programmable output contacts:⁴⁾</p> <ul style="list-style-type: none"> • 10 potential-free NO contacts, one common for respectively 5 contacts, max. 250 V AC, 1 A (resistive load) • 2 potential-free change-over contacts, max. 250 V AC, 5 A (resistive load) <p>6 programmable output contacts:</p> <ul style="list-style-type: none"> • 6 potential-free change-over contacts without one common, per contact max. 250 V AC, 5 A (resistive load) <p>10 programmable output contacts:⁴⁾</p> <ul style="list-style-type: none"> • 10 potential-free change-over contacts without one common, per contact max. 250 V AC, 5 A (resistive load) <p>All output signals must be supplied with the same potential.</p>
Position feedback signal	Galvanically isolated analogue output E2 = 0/4 – 20 mA (load max. 500 Ω)
Voltage output	<p>Standard: Auxiliary voltage 24 V DC, max. 100 mA for supply of the control inputs, galvanically isolated from internal voltage supply</p> <p>Option: Auxiliary voltage 115 V AC, max. 30 mA to supply the control inputs⁵⁾, galvanically isolated from internal voltage supply</p>
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 • 6 indication lights: <ul style="list-style-type: none"> - End position CLOSED (yellow), torque fault CLOSE (red), motor protection tripped (red), torque fault OPEN (red), end position and running indication OPEN (green), Bluetooth (blue) • Graphic LC display, illuminated <p>Options:</p> <ul style="list-style-type: none"> • 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 (red)
Bluetooth Communication interface	<p>Bluetooth class II chip, version 2.0 with a range up to 10 m in industrial environments. Supports the SPP Bluetooth profile (Serial Port Profile).</p> <p>Programming software: AUMA CDT, commissioning and diagnostic tool for windows based PCs, PDAs and smart phones</p>

<p>Application functions</p>	<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 by-pass, adjustable up to 5 seconds (no torque monitoring during this time) • Start and end of stepping mode as well as ON and OFF time (1 up to 1,800 seconds) can be programmed individually for directions OPEN and CLOSE. • Any 8 intermediate positions between 0 and 100 %, reaction and signal behaviour programmable <p>Options:</p> <ul style="list-style-type: none"> • Positioner <ul style="list-style-type: none"> - Position setpoint via analogue input E1 = 0/4 – 20 mA - Automatic adaptation of the dead band (adaptive behaviour can be selected) - Split Range operation - MODE input for selecting between OPEN - CLOSE duty and modulating duty
<p>Failure functions</p>	<p>Standard:</p> <ul style="list-style-type: none"> • EMERGENCY operation, 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"> • Enabling local controls via digital input Enable LOCAL. Thus, the actuator operation can be enabled or disabled via push buttons on the local controls. • Local Stop <ul style="list-style-type: none"> - The actuator can be stopped via push button Stop of local controls if the selector switch is in position REMOTE. Not activated when leaving the factory. • EMERGENCY stop button (latching) interrupts electrical operation irrespective of the selector switch position. • Interlock, enabling the operation commands OPEN or CLOSE via digital inputs Interlock OPEN or Interlock CLOSE
<p>Monitoring functions</p>	<p>Standard:</p> <ul style="list-style-type: none"> • Valve overload protection (adjustable), results in switching off and generates fault indication • Motor temperature monitoring (thermal monitoring), results in switching off and generates fault indication • Monitoring the heater within the actuator, generates warning signal • Monitoring of permissible on-time and number of starts (adjustable), generates warning signal • Operation time monitoring (adjustable), generates warning signal • Phase failure monitoring, results in switching off and generates fault indication • Automatic correction of the direction of rotation upon wrong phase sequence (3-phase AC current)

Diagnostic functions	<ul style="list-style-type: none"> • Electronic device ID with order and product data • Logging of operating data: A resettable counter and a lifetime counter each for: <ul style="list-style-type: none"> - Motor running time, number of starts, torque switch trippings in end positions CLOSED, limit switch trippings in end position CLOSED, torque switch trippings in end position OPEN, limit switch trippings in end position OPEN, torque faults CLOSE, torque faults OPEN, motor protection trippings • Time-stamped event report with setting, operation and fault history: <ul style="list-style-type: none"> - Status signals in compliance with NAMUR recommendation NE 107: "Failure", "Function check", "Out of specification", "Maintenance required" • Torque characteristics <ul style="list-style-type: none"> - 3 torque characteristics (torque-travel characteristic) for opening and closing directions, can be saved separately. Torque characteristics stored can be shown on the display.
Electrical connection	<p>Standard: AUMA plug/socket connector (S) with screw-type connection and M-threads</p> <p>Options:</p> <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) All input signals must be supplied with the same potential.
- 4) Not possible for low temperature versions with heating system
- 5) Not possible in combination with PTC tripping device

12.3. Service conditions

Use	Indoor and outdoor use permissible
Mounting position	Any position
Enclosure protection according to EN 60529	<p>Standard: IP68 with AUMA 3-ph AC motor/1-ph AC motor</p> <p>According to AUMA definition, enclosure protection IP68 meets the following requirements:</p> <ul style="list-style-type: none"> • Depth of water: maximum 8 m head of water • Duration of continuous immersion in water: max. 96 hours • Up to 10 operations during flooding. • Modulating duty is not possible during continuous immersion. <p>For actual version, refer to actuator/controls name plate.</p>
Corrosion protection	<p>Standard:</p> <ul style="list-style-type: none"> • KS: Suitable for installation in industrial units, in water or power plants with a low pollutant concentration as well as for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. in wastewater treatment plants, chemical industry) <p>Options:</p> <ul style="list-style-type: none"> • KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration
Installation altitude	<p>Standard: ≤ 2,000 m above sea level</p> <p>Option: > 2,000 m above sea level, please contact AUMA</p>
Humidity	Up to 100 % relative humidity over the entire permissible temperature range
Pollution degree	Pollution degree 4 (when closed) according to EN 50178
Finish coating	Standard: Paint based on polyurethane (powder coating)
Colour	Standard: AUMA silver-grey (similar to RAL 7037)
Ambient temperature	<p>Standard:</p> <ul style="list-style-type: none"> • Open-close duty: –25 °C to +70 °C • Modulating duty: –25 °C to +60 °C <p>For actual version, refer to actuator/controls name plate.</p>
Vibration resistance according to IEC 60068-2-6	<p>1 g, from 10 to 200 Hz</p> <p>Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this. Not valid in combination with gearboxes.</p>

Lifetime	AUMA multi-turn actuators meet or exceed the lifetime requirements of EN 15714-2. For further details, please contact AUMA
Weight	Refer to separate technical data

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
Programming software for PC	AUMA CDT

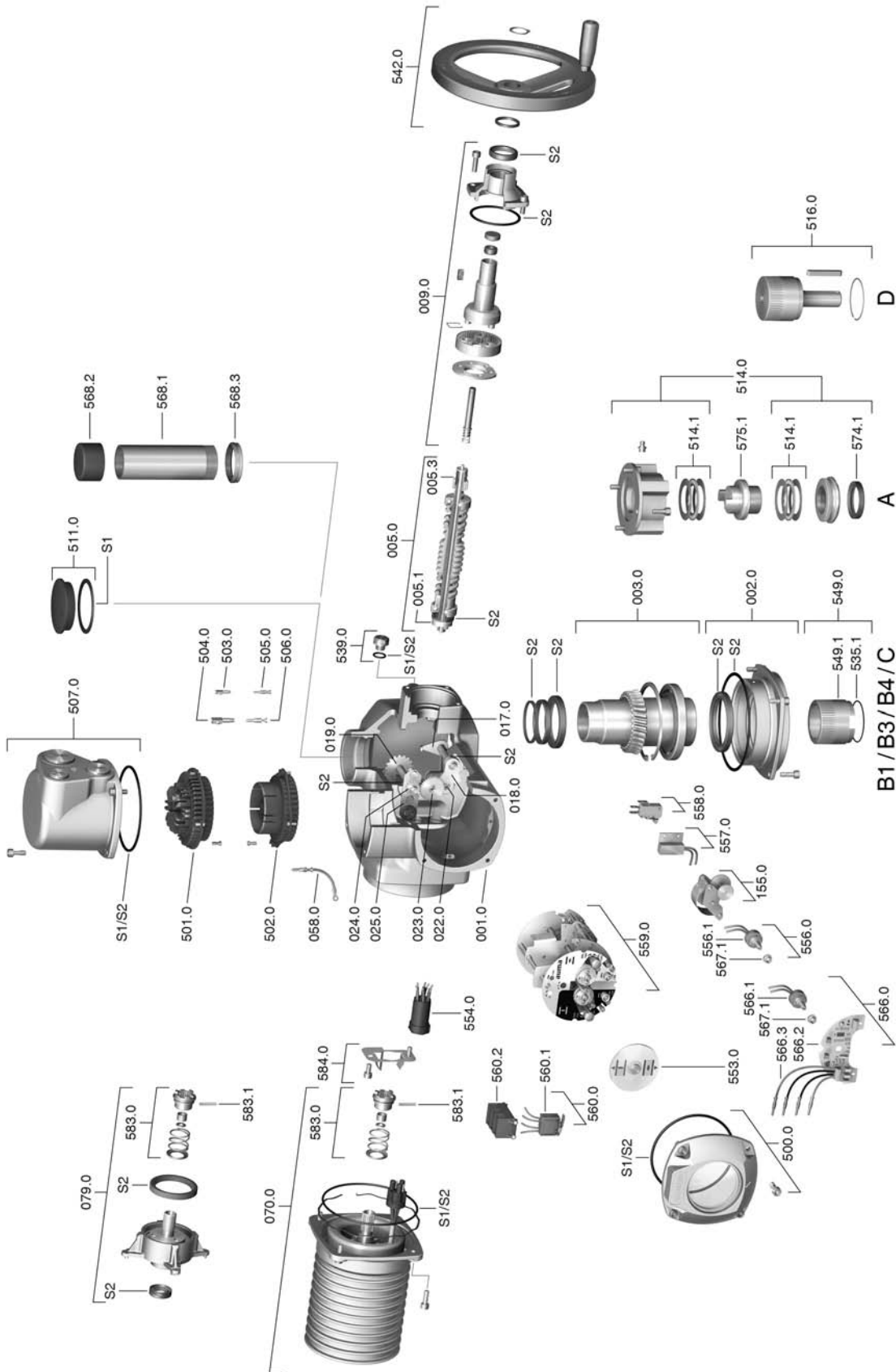
1) Cable length between actuator and AUMATIC max. 100 m. Not suitable for version with potentiometer in the actuator. Instead of the potentiometer, an RWG has to be used.

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)
---------------	--

13. Spare parts

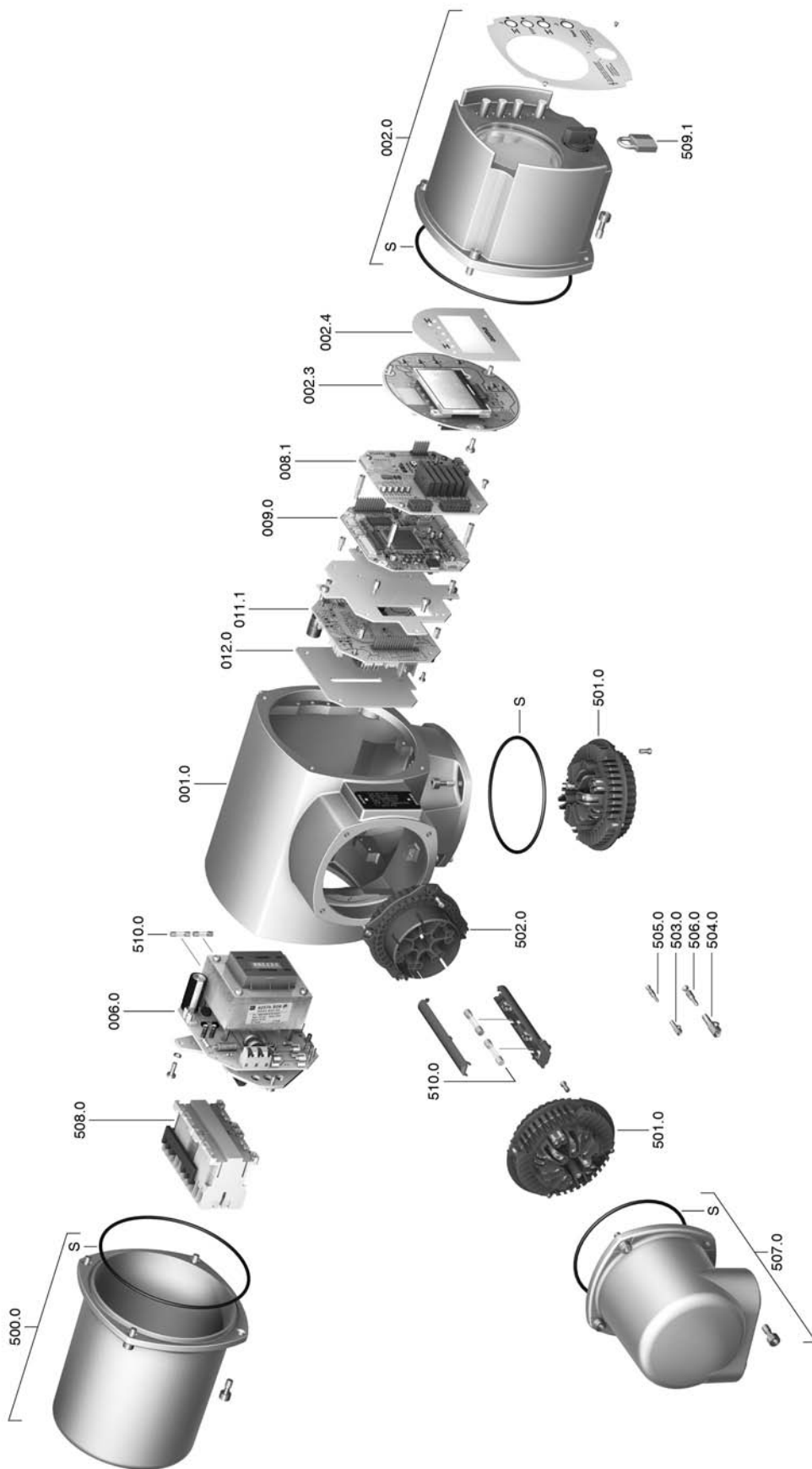
13.1. Multi-turn actuators SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2



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

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

13.2. Actuator controls AUMATIC AC 01.2



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

No.	Designation	Type
001.0	Housing	Sub-assembly
002.0	Local controls	Sub-assembly
002.3	Local controls board	Sub-assembly
002.4	Display faceplate	Sub-assembly
006.0	Power supply	Sub-assembly
008.1-1	I/O board	Sub-assembly
009.0	Logic board	Sub-assembly
011.1	Relay board	Sub-assembly
012.0	Option board	Sub-assembly
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	Sub-assembly
S	Seal kit	Set

14. Certificates**14.1. Declaration of Incorporation and EC Declaration of Conformity**

AUMA Riester GmbH & Co. KG Tel +49 7631 809-0
 Aumastr. 1 Fax +49 7631 809-1250
 79379 Müllheim, Germany Riester@auma.com
 www.auma.com

auma[®]
 Solutions for a world in motion

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

for electric AUMA Actuators of the type ranges

Multi-turn actuators	SA 07.2 – SA 16.2 and SAR 07.2 – SAR 16.2
Part-turn actuators	SQ 05.2 – SQ 14.2 and SQR 05.2 – SQR 14.2

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

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

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

EN ISO 12100: 2010 ISO 5211: 2001
 EN 5210: 1996

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

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

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

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

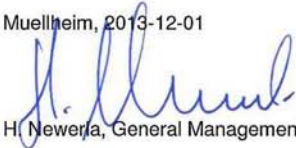
(1) Directive relating to Electromagnetic Compatibility (EMC) (2004/108/EC)

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

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

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

Muellheim, 2013-12-01


 H. Newerfa, General Management

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

Y006.332/003/en

Index

A

Accessories (electrical connection)	22
Accessories for assembly	16
Actual value - indication on display	34
Actuator operation at the local controls	25
Actuator operation from remote	26
Ambient temperature	8 , 64
Analogue signals	40
Applications	5
Assembly	12

C

Cable set	22
Certificates	70
Commission number	8 , 9
Commissioning	5
Commissioning (indications on display)	32
Connecting cable	22
Control	9 , 9
Corrective action	51
Corrosion protection	11 , 64
Cross sections	19
Current consumption	18

D

DUO limit switching	45
Declaration of Incorporation	70
Device type	9 , 9
Digital outputs	40
Direct display via ID	28
Direction of rotation	46
Directives	5
Display (indications)	32
Disposal	58
Double sealed	24

E

EC Declaration of Conformity	70
EMC	19
Earth connection	24
Electrical connection	18
Electronic position transmitter	48
Enclosure protection	8 , 64
Error - indication on display	32

F

Failure - indication on display	38
Fault - indication on display	36
Flange size	9
Function check - indication on display	37
Fuses	54

H

Handwheel	12
-----------	----

I

Identification	8
Indication lights	39
Indications	32
Indications on display	32
Indicator disc	38 , 49
Inspection record	9
Intermediate frame	24
Intermediate position indication via LEDs	39
Intermediate positions	45
Intrusive	10

L

LEDs (indication lights)	39
Language in the display	30
Limit switching	43 , 47
Local actuator operation	25
Local control	25
Local controls	25
Local setting	27
Lubrication	57

M

Main menu	28
Mains frequency	19
Mains voltage	19
Maintenance	5 , 57 , 57
Maintenance required - indication on display	37
Manual operation	25
Mechanical position indicator	38 , 49
Menu navigation	27
Motor heater	21
Motor operation	25
Multiport valve - Indications on display	35

N

Name plate	8 , 19
Network types	18
Non-Intrusive	10
Not ready REMOTE - indication on display	36

O

Operation	5 , 25
Operation commands - indications on display	34
Order number	8 , 9
Out of specification - indication on display	37
Output contacts	40
Output drive type A	13
Output drive types B, B1, B2, B3, B4, and E	12
Output speed	8

P		T	
Packaging	11	Technical data	59
Parking frame	23	Technical data for switches	60
Password	29	Terminal plan	18
Password change	29	Test run	46
Password entry	29	Torque - indication on display	34
Position indicator	49	Torque range	8
Position transmitter RWG	48	Torque switching	43
Positioner - indication on display	35	Transport	11
Potentiometer	48	Type (device type)	9 , 9
Power supply	18 , 19	Type designation	8
Production, year	9	Type of current	19
Protection cover	23	Type of lubricant	8
Protection on site	18	U	
Protective measures	5	User level	29
Q		V	
Qualification of staff	5	Valve position - indication on display	33
R		Valve stem	16
RWG	48	W	
Range of application	5	Wall bracket	22
Recycling	58	Warnings - indication on display	36
Reference operation	47	Wiring diagram	9 , 9 , 18
Remote actuator operation	26	Works number	9
Running indication	38	Y	
S		Year of production	9
Safety instructions	5		
Safety instructions/warnings	5		
Serial number	8 , 9		
Service	57		
Service conditions	64		
Servicing	57		
Setpoint - indication on display	35		
Short-circuit protection	18		
Signals	40		
Signals (analogue)	40		
Size	9 , 9		
Spare parts	66		
Standards	5		
Status menu	28		
Status signals	40		
Stem nut	14		
Stem protection tube	16		
Storage	11		
Supply networks	18		
Support	57		
Switch check	51		

Europe

AUMA Riester GmbH & Co. KG

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

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

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

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

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

AUMA-Armaturentriebe Ges.m.b.H.
AT 2512 Tribuswinkel
 Tel +43 2252 82540
 office@auma.at
 www.auma.at

AUMA BENELUX B.V. B. A.
BE 8800 Roeselare
 Tel +32 51 24 24 80
 office@auma.be
 www.auma.nl

ProStream Group Ltd.
BG 1632 Sofia
 Tel +359 2 9179-337
 valtchev@prostream.bg
 www.prostream.bg

OOO "Dunkan-Privod"
BY 220004 Minsk
 Tel +375 29 6945574
 belarus@auma.ru
 www.zatvor.by

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

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

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

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

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

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

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

D. G. Bellos & Co. O.E.
GR 13673 Acharnai, Athens
 Tel +30 210 2409485
 info@dgbellos.gr

APIS CENTAR d. o. o.
HR 10437 Bestovje
 Tel +385 1 6531 485
 auma@apis-centar.com
 www.apis-centar.com

Fabo Kereskedelmi és Szolgáltató Kft.
HU 8800 Nagykanizsa
 Tel +36 93/324-666
 auma@fabo.hu
 www.fabo.hu

Falkinn HF
IS 108 Reykjavik
 Tel +00354 540 7000
 os@falkinn.is
 www.falkinn.is

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

AUMA BENELUX B.V.
LU Leiden (NL)
 Tel +31 71 581 40 40
 office@auma.nl

NB Engineering Services
MT ZBR 08 Zabbar
 Tel + 356 2169 2647
 nikibel@onvol.net

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

SIGUM A. S.
NO 1338 Sandvika
 Tel +47 67572600
 post@sigum.no

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

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

SAUTECH
RO 011783 Bucuresti
 Tel +40 372 303982
 office@sautech.ro

OOO PRIWODY AUMA
RU 141402 Khimki, Moscow region
 Tel +7 495 221 64 28
 amarusia@auma.ru
 www.auma.ru

OOO PRIWODY AUMA
RU 125362 Moscow
 Tel +7 495 787 78 21
 amarusia@auma.ru
 www.auma.ru

ERICHS ARMATUR AB
SE 20039 Malmö
 Tel +46 40 311550
 info@erichsarmatur.se
 www.erichsarmatur.se

ELSO-b, s.r.o.
SK 94901 Nitra
 Tel +421 905/336-926
 elsob@stonline.sk
 www.elsob.sk

Auma Endüstri Kontrol Sistemleri Limited
 Sirketi
TR 06810 Ankara
 Tel +90 312 217 32 88
 info@auma.com.tr

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

Africa

Solution Technique Contrôle Commande
DZ Bir Mourad Rais, Algiers
 Tel +213 21 56 42 09/18
 stcco@wissal.dz

A.T.E.C.
EG Cairo
 Tel +20 2 23599680 - 23590861
 contactus@atec-eg.com

SAMIREG
MA 203000 Casablanca
 Tel +212 5 22 40 09 65
 samireg@menara.ma

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

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

America

AUMA Argentina Rep.Office
AR Buenos Aires
 Tel +54 11 4737 9026
 contacto@aumaargentina.com.ar

AUMA Automação do Brazil Ltda.
BR Sao Paulo
 Tel +55 11 4612-3477
 contato@auma-br.com

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

AUMA Chile Representative Office
CL 9500414 Buin
 Tel +56 2 821 4108
 aumachile@auma-chile.cl

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

Transcontinental Trading Overseas SA.
CU Ciudad Habana
 Tel +53 7 208 9603 / 208 7729
 tto@ttoweb.com

AUMA Región Andina & Centroamérica
EC Quito
 Tel +593 2 245 4614
 auma@auma-ac.com
 www.auma.com

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

Control Technologies Limited
TT Marabella, Trinidad, W.I.
 Tel + 1 868 658 1744/5011
 www.cntltech.com

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

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

Asia

AUMA Actuators UAE Support Office
AE 287 Abu Dhabi
 Tel +971 26338688
 Nagaraj.Shetty@auma.com

AUMA Actuators Middle East
BH 152 68 Salmabad
 Tel +97 3 17896585
 salesme@auma.com

Mikuni (B) Sdn. Bhd.
BN KA1189 Kuala Belait
 Tel + 673 3331269 / 3331272
 mikuni@brunet.bn

AUMA Actuators (Tianjin) Co., Ltd. Beijing Branch
CN 100020 Beijing
 Tel +86 10 8225 3933
 mailbox@auma-china.com
 cn.auma.com

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

PT. Carakamas Inti Alam
ID 11460 Jakarta
 Tel +62 215607952-55
 auma-jkt@indo.net.id

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

ITG - Iranians Torque Generator
IR 13998-34411 Teheran
 +982144545654
 info@itg-co.ir

Trans-Jordan Electro Mechanical Supplies
JO 11133 Amman
 Tel +962 - 6 - 5332020
 Info@transjordan.net

AUMA JAPAN Co., Ltd.
JP 211-0016 Kawasaki-shi, Kanagawa
 Tel +81-(0)44-863-8371
 mailbox@auma.co.jp
 www.auma.co.jp

DW Controls Co., Ltd.
KR 153-702 Gasan-dong, GeumChun-Gu,, Seoul
 Tel +82 2 2624 3400
 import@actuatorbank.com
 www.actuatorbank.com

Al-Arfaj Engineering Co WLL
KW 22004 Salmiyah
 Tel +965-24817448
 info@arfajengg.com
 www.arfajengg.com

TOO "Armaturny Center"
KZ 060005 Atyrau
 Tel +7 7122 454 602
 armacentre@bk.ru

Network Engineering
LB 4501 7401 JBEIL, Beirut
 Tel +961 9 944080
 nabil.ibrahim@networkenglb.com
 www.networkenglb.com

AUMA Malaysia Office
MY 70300 Seremban, Negeri Sembilan
 Tel +606 633 1988
 sales@auma.com.my

Mustafa Sultan Science & Industry Co LLC
OM Ruwi
 Tel +968 24 636036
 r-negi@mustafasultan.com

FLOWTORK TECHNOLOGIES CORPORATION
PH 1550 Mandaluyong City
 Tel +63 2 532 4058
 flowtork@pltdtssl.net

M & C Group of Companies
PK 54000 Cavalry Ground, Lahore Cantt
 Tel +92 42 3665 0542, +92 42 3668 0118
 sales@mcscs.com.pk
 www.mcscs.com.pk

Petrogulf W.L.L
QA Doha
 Tel +974 44350151
 pgulf@qatar.net.qa

AUMA Saudi Arabia Support Office
SA 31952 Al Khobar
 Tel + 966 5 5359 6025
 Vinod.Fernandes@auma.com

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

NETWORK ENGINEERING
SY Homs
 +963 31 231 571
 eyad3@scs-net.org

Sunny Valves and Intertrade Corp. Ltd.
TH 10120 Yannawa, Bangkok
 Tel +66 2 2400656
 mainbox@sunnyvalves.co.th
 www.sunnyvalves.co.th

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

AUMA Vietnam Hanoi RO
VN Hanoi
 +84 4 37822115
 chiennguyen@auma.com.vn

Australia

BARRON GJM Pty. Ltd.
AU NSW 1570 Artarmon
 Tel +61 2 8437 4300
 info@barron.com.au
 www.barron.com.au

auma[®]

Solutions for a world in motion

AUMA Riester GmbH & Co. KG

P.O.Box 1362

DE 79373 Muellheim

Tel +49 7631 809 - 0

Fax +49 7631 809 - 1250

riester@auma.com

www.auma.com



Y004.751/003/en/3.13