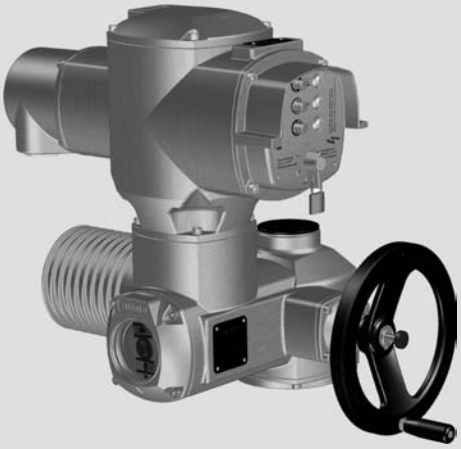
auma®
Solutions for a world in motion

Multi-turn actuators

SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2

with actuator controls

AUMA MATIC AM 01.1/AM 02.1



Operation instructions Assembly, operation, commissioning

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:

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

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1. Safety instructions

1.1. Basic information on safety

Standards/directives

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

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

Safety instructions/warnings

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

Qualification of staff

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

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

Commissioning

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

Operation

Prerequisites for safe and smooth operation:

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

Protective measures

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

Maintenance

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

Any device modification requires prior consent of the manufacturer.

1.2. Range of application

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

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

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

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

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

No liability can be assumed for inappropriate or unintended use.

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

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

1.3. Applications in Ex zone 22 (option)

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

The actuators are designed to meet enclosure protection 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 thermoswitches or the PTC thermistors as well as fulfilling the requirements of the duty type and the technical data are pre-requisites for compliance with the maximum surface temperature of devices.
- The connection plug may only be plugged in or pulled out when device is dis-connected 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).

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

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

Arrangement and typographic structure of the warnings

⚠ DANGER	**Type of hazard and respective source!** *Potential consequence(s) in case of non-observance (option)* → Measures to avoid the danger → Further measure(s)

Safety alert symbol ⚠ warns of a potential personal injury hazard.

The signal word (here: DANGER) indicates the level of hazard.

1.5. References and symbols

The following references and symbols are used in these instructions:

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

Symbol for CLOSED (valve closed)

Symbol for OPEN (valve open)

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

< > **Reference to other sections**

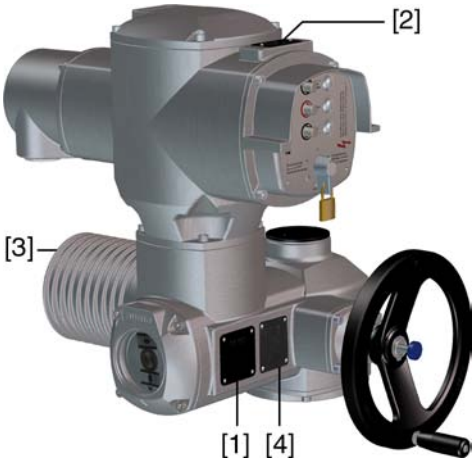
Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

2. Identification

2.1. Name plate

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

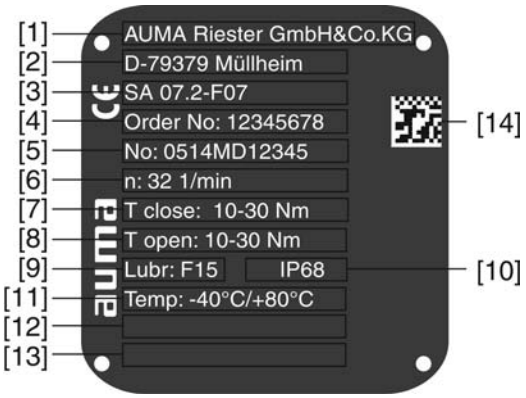
Figure 1: Arrangement of name plates



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

Description of actuator name plate

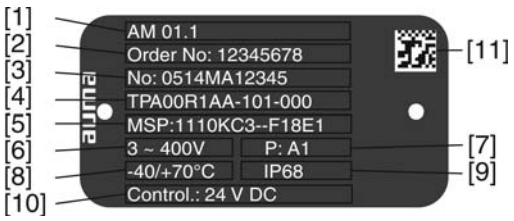
Figure 2: Actuator name plate (example)



[1] Name of manufacturer
[2] Address of manufacturer
[3] **Type designation**
[4] **Order number**
[5] **Serial number**
[6] Speed
[7] Torque range in direction CLOSE
[8] Torque range in direction OPEN
[9] Type of lubricant
[10] Enclosure protection
[11] Permissible ambient temperature
[12] Can be assigned as an option upon customer request
[13] Can be assigned as an option upon customer request
[14] **Data Matrix code**

Description of actuator controls name plate

Figure 3: Actuator controls name plate

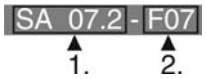


[1] **Type designation**
[2] Order number
[3] Serial number
[4] Terminal plan for actuator
[5] Wiring diagram for controls
[6] Mains voltage
[7] **AUMA power class switchgear**
[8] Permissible ambient temperature
[9] Enclosure protection
[10] **Control**
[11] Data Matrix code

Descriptions

Type designation

Figure 4: 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:

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

SA**R** 07.2, 07.6, 10.2, 14.2, 14.6, 16.2 = Multi-turn actuators for modulating duty

AM 01.1/02.1 = AUMA MATIC actuator controls

Order number

The product can be identified using this number and the technical data as well as order-related data pertaining to the device can be compiled.

Please always state this number for any product inquiries.

On the Internet at **http://www.auma.com**, we offer a service allowing authorised users to download order-related documents such as wiring diagrams and technical data (both in German and English), inspection certificates and the operation instructions when entering the order number.

Serial number

Table 1: Description of serial number (with example)

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

AUMA power class for switchgear

The switchgear used in the actuator controls (reversing contactors/thyristors) are classified according to AUMA power classes (e.g. A1, B1, ...). The power class defines the max. permissible rated power (of the motor) the switchgear has been designed for. The rated power (nominal power) of the actuator motor is indicated in kW on the motor name plate. For the assignment of the AUMA power classes to the nominal power of the motor types, refer to the separate electrical data sheets.

For switchgear without assignment to any power classes, the actuator controls name plate does not indicate the power class but the max. rated power in kW.

Data Matrix code

When registered as authorised user, you may use the **AUMA Support App** to scan the Data Matrix code and directly access the order-related product documents without having to enter order number of serial number.

Figure 5: Link to the App store:

Control

Table 2: Control example (data on actuator controls name plate)

Input signal	Description
24 V DC	Control voltage 24 V DC for OPEN-CLOSE control via digital inputs (OPEN, STOP, CLOSE)
115 V AC	Control voltage 115 V AC for OPEN-CLOSE control via digital inputs (OPEN, STOP, CLOSE)
0/4 – 20 mA	Input current for setpoint control via analog input

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 AUMA MATIC actuator controls are used to operate AUMA actuators and are supplied ready for use. The controls can be mounted directly to the actuator but also separately on a wall bracket. The functions of the AUMA MATIC controls include standard valve control in OPEN - CLOSE duty, position indications and different signals right through to position control.

Local controls

Operation (via push buttons), setting and indication can be performed directly at the controls (contents of these instructions).

3. Transport, storage and packaging

3.1. Transport

For transport to place of installation, use sturdy packaging.

DANGER

Hovering load!

Risk of death or serious injury.

→ Do NOT stand below hovering load.

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

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

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

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

3.2. Storage

NOTICE

Danger of corrosion due to inappropriate storage!

→ Store in a well-ventilated, dry room.

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

→ Cover to protect against dust and dirt.

→ Apply suitable corrosion protection agent to uncoated surfaces.

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

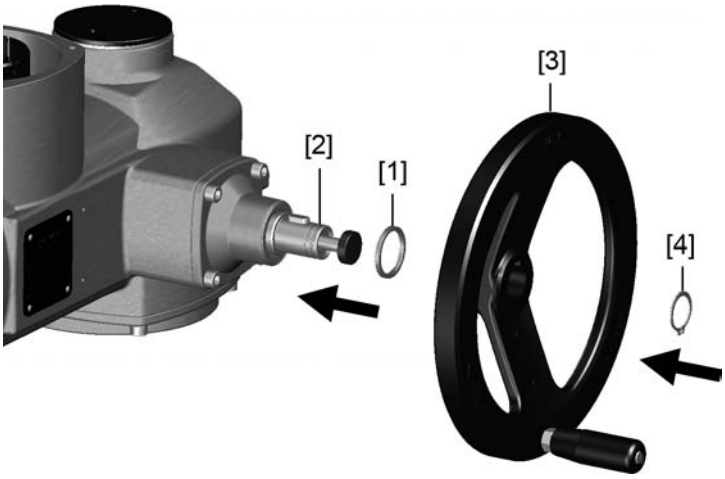
4.1. Mounting position

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 6: 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.

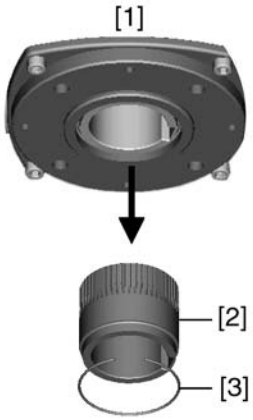
→ After mounting, connect the device immediately to electrical mains to ensure that heater minimises condensation.

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 7: Output drive



[1] Output drive types B, B1 – B4, E and C
[2] Output drive sleeve/output drive plug sleve 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 3: 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

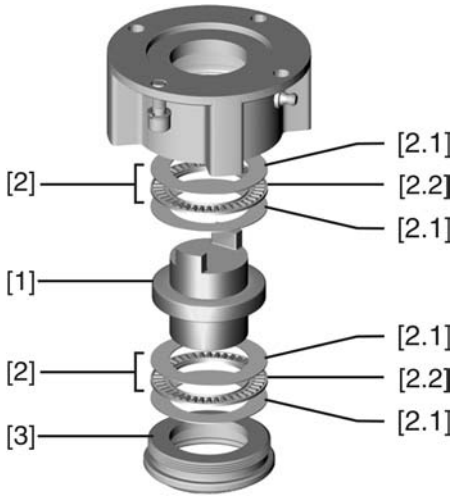
Application
- Output drive for rising, non-rotating valve stem
- Capable of withstanding thrust

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 8: Design of output drive type A

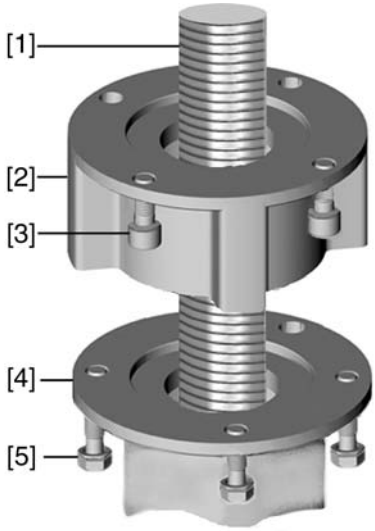


[1] Stem nut
[2] Bearing
[2.1] Bearing race
[2.2] Bearing rim
[3] Spigot ring

1. Remove spigot ring [3] from output drive.
2. Remove stem nut [1] together with bearings [2].
3. Remove bearing races [2.1] and bearing rims [2.2] from stem nut [1].
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 9: Assembly with output drive type A



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

1. If the output drive type A is already mounted to the multi-turn actuator: Loosen screws [3] and remove output drive type A [2].
2. Check if the flange of output drive type A matches the valve flange [4].
3. Apply a small quantity of grease to the valve stem [1].
4. Place output drive type A on valve stem and turn until it is flush on the valve flange.
5. Turn output drive type A until alignment of the fixing holes.
6. Screw in fastening screws [5], however do not completely tighten.
7. Fit multi-turn actuator on the valve stem so that the stem nut dogs engage into the output drive sleeve.

➥ The flanges are flush with each other if properly engaged.

8. Adjust multi-turn actuator until alignment of the fixing holes.
9. Fasten multi-turn actuator with screws [3].
10. Fasten screws [3] crosswise with a torque according to table.

Table 4: 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

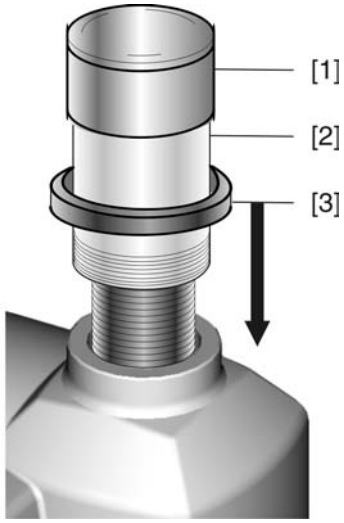
11. Turn multi-turn actuator with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

4.4. Accessories for assembly

4.4.1. Stem protection tube for rising valve stem

— Option —

Figure 10: Assembly of the stem protection tube



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

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

4.5. Mounting positions of local controls

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

Figure 11: Mounting positions A and B



Figure 12: Mounting positions C and D



4.5.1. Mounting positions: modify

DANGER

Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

1. Loosen screws and remove the local controls.
2. Loosen 3 screws of the board, turn board to the new position and fasten the screws.
3. Check whether O-ring is in good condition, correctly insert O-ring.
4. 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.

5. Fasten screws evenly crosswise.

5. Electrical connection

5.1. Basic information

⚠ WARNING

Danger due to incorrect electrical connection

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

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

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

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

Wiring diagram/terminal plan

The pertaining wiring diagram/terminal plan (both in German and English) is attached to the device in a weather-proof bag, together with these operation instructions. It can also be requested from AUMA (state order number, refer to name plate) or downloaded directly from the Internet (http://www.auma.com).

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 5: Current consumption controls

Mains voltage	Max. current consumption
100 to 120 V AC (±10 %)	575 mA
208 to 240 V AC (±10 %)	275 mA
380 to 500 V AC (±10 %)	160 mA
24 V DC (+20 %/–15 %) and AC motor	500 mA

Table 6: 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.

Power supply for the controls (electronics)

If the controls (electronics) are supplied externally with 24 V DC, the power supply is smoothed via an internal 1,000 µF capacitor). When selecting a power supply, care must be taken to consider the capacitor inrush current upon powering the unit up.

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.

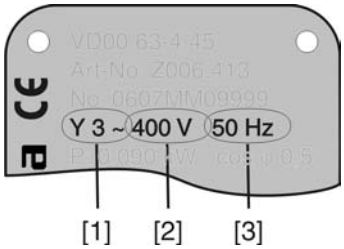
- Lay cables being susceptible to interference or sources of interference at the highest possible distance from each other.
- The interference immunity of signal and bus cables increases if the cables are laid close to the earth potential.
- If possible, avoid laying long cables and make sure that they 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 13: 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.

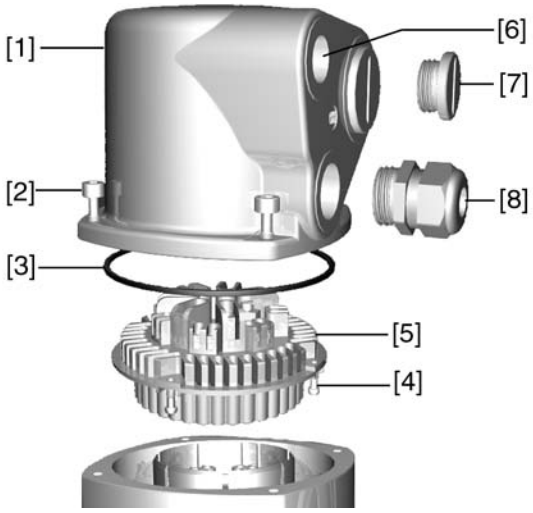
5.2. Connection with AUMA plug/socket connector

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 14: Connection AUMA plug/socket connector, version S



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

DANGER

Hazardous voltage!

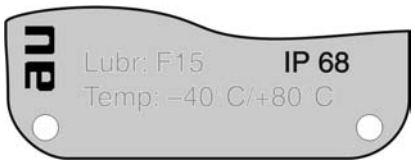
Risk of electric shock.

→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
2. Loosen screws [4] and remove socket carrier [5] from cover [1].
3. Insert cable glands [8] suitable for connecting cables.

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

Figure 15: 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.

⚠ WARNING

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

Risk of electric shock.

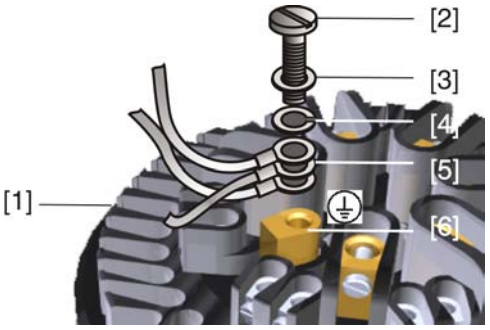
→ Connect all protective earth conductors.

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

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

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

Figure 16: PE connection

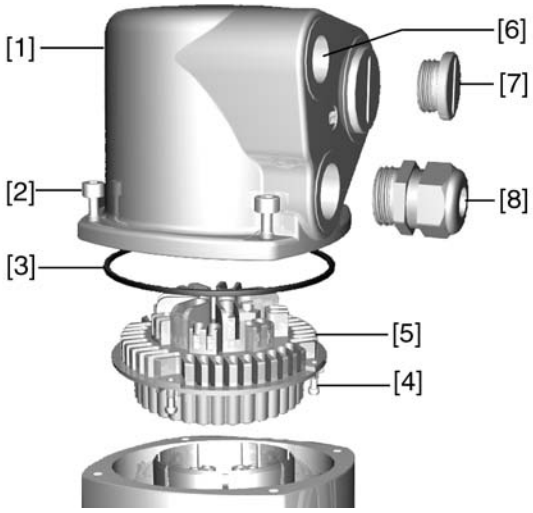


[1] Socket carrier
[2] Screw
[3] Washer
[4] Lock washer
[5] Protective earth with ring lugs/loops
[6] PE connection, symbol: ⏚

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

5.2.3. Terminal compartment: close

Figure 17: Example: Version S



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

⚠ WARNING

Short-circuit due to pinching of cables!

Risk of electric shock and functional failures.

→ Carefully fit socket carrier to avoid pinching the cables.

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

5.3. Accessories for electrical connection

— Option —

5.3.1. Controls mounted to wall bracket

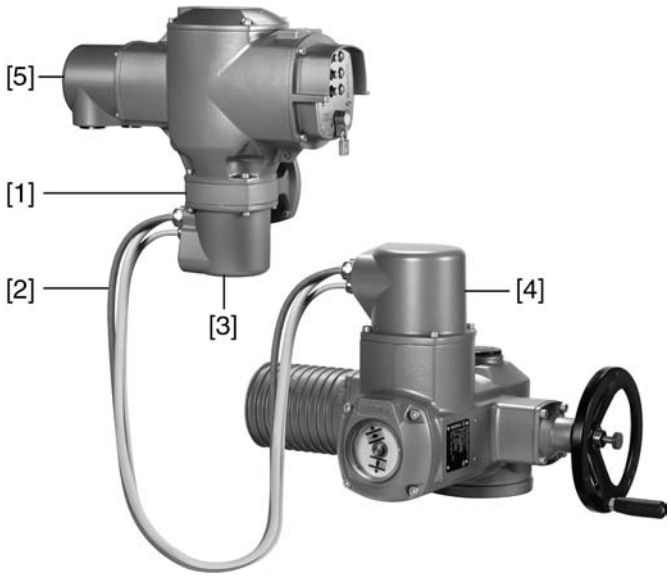
The wall bracket allows separate mounting of controls and actuator.

Application

- When mounted in confined spaces.
- If the actuator is subjected to high temperatures.
- In case of heavy vibration of the valve.

Design

Figure 18: Design principle with wall bracket



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

Observe prior to connection

- Permissible length of connecting cables: max. 100 m.
- If the actuator is equipped with a position transmitter (EWG/RWG): Connecting cables must be available as shielded version.
- Versions with potentiometer in the actuator are not suitable.
- We recommend using an AUMA cable set "LSW".
- 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 plug (XA-XM-XK, refer to wiring diagram), these connecting cables must be subject to an insulation test in compliance with EN 50178. Connecting cables of position transmitters (EWG, RWG, IWG, potentiometer) do not belong to this group. They may **not** be subject to an insulation test.

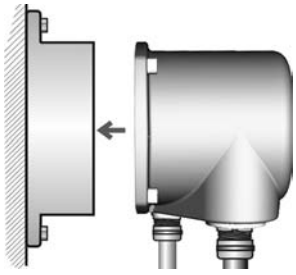
5.3.2. Parking frame

Application

Parking frame for safe storage of a disconnected plug.

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

Figure 19: Parking frame



5.3.3. Protection cover

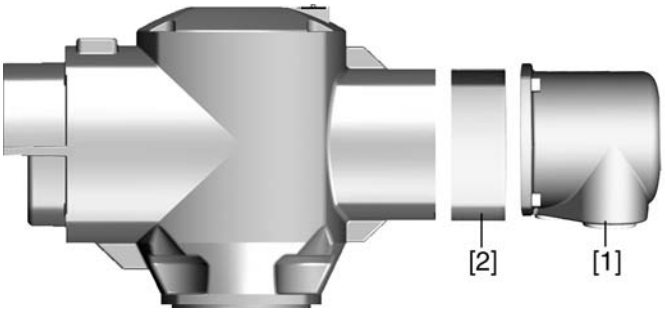
Protection cover for plug compartment when plug is removed.

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 20: 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 21: Earth connection



6. Operation

6.1. Manual operation

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

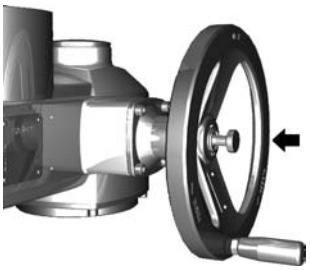
6.1.1. Manual operation: engage

NOTICE

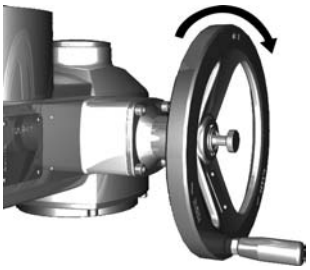
Damage at the motor coupling due to faulty operation!

→ Engage manual operation only during motor standstill.

1. Press push button.



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



6.1.2. Manual operation: disengage

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

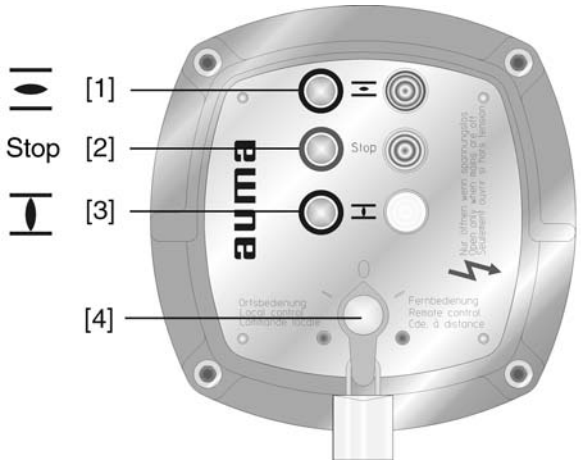
6.2. Motor operation

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

6.2.1. Local operation

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

Figure 22: 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] Selector switch

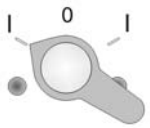
⚠ CAUTION

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

Danger of burns

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

→ Set selector switch [4] to position **Local control** (LOCAL).



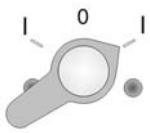
➥ The actuator can now be operated using the push buttons [1 – 3]:

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

Information The OPEN - CLOSE operation commands can be given either in push-to-run operation mode or in self-retaining mode. In self-retaining mode, the actuator runs to the defined end position after pressing the button, unless another command has been received beforehand.

6.2.2. Actuator operation from remote

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



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

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

Behaviour in modulating duty for version with positioner:

In case of signal loss of setpoint E1 or actual value E2, the actuator moves to a preset position. The following reactions are possible:

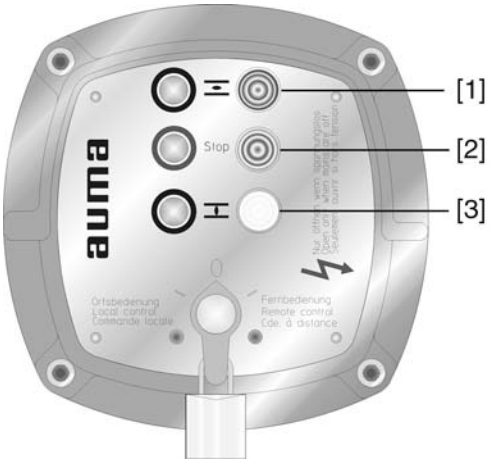
- **Fail as is:** Actuator stops immediately and remains in this position.
- **Fail close:** Actuator moves the valve to end position CLOSED.
- **Fail open:** Actuator moves the valve to end position OPEN.

The behaviour on loss of signal can be set via a switch in the controls.

7. Indications

7.1. Indication lights

Figure 23: Local controls with indication lights



[1] illuminated (default: green): End position OPEN reached
[2] illuminated (default: red): Collective fault signal
[3] illuminated (default: yellow): End position CLOSED reached

Information The three indication lights can be provided in different colours (deviating from the standard).

Collective fault signal The collective fault signal [2] appears if one of the following events occurs (default configuration):

- Torque fault: The set torque was exceeded before reaching an end position. (This signal can be activated/deactivated via a switch in the controls.)
- Thermal fault: Motor protection has tripped, i.e. the motor is overheated.
- Phase failure: One phase is missing (3-ph AC motors only).
- PTC tripping device: Test complete

Running indication If the actuator is equipped with a blinker transmitter (wiring diagram designation: S5), indication lights [1] and [3] can be used as running indication. The running indication can be activated/deactivated via a switch in the controls. If the running indication is active, the respective indication light blinks during operation.

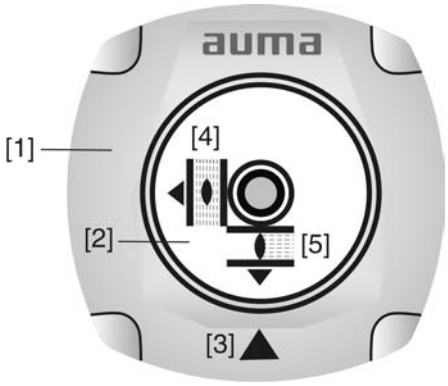
7.2. Mechanical position indicator/running indication

— 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 24: Mechanical position indicator



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

8. Signals

8.1. Feedback signals via output contacts (binary)

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

The signals are assigned according to the order. Example:

Output contact open = end position CLOSED not reached

Output contact closed = end position CLOSED reached

Collective fault signal

Switches: 1 NC and 1 NO (standard)

Designation in the wiring diagram: K9

The collective fault signal appears if one of the following events occurs (default configuration):

- Torque fault: The set torque was exceeded before reaching an end position. (This signal can be activated/deactivated via a switch in the controls.)
- Thermal fault: Motor protection has tripped, i.e. the motor is overheated.
- Phase failure: One phase is missing (3-ph AC motors only).
- PTC tripping device: Test complete

4 output contacts:

Switches: 1 NC (standard)

Designation in the wiring diagram: K5, K6, K7, K8

Default configuration:

- K5: Selector switch is in position **Remote control** (REMOTE).
- K6: Selector switch is in position **Local control** (LOCAL).
- K7: End position OPEN reached
- K8: End position CLOSED reached

8.2. Feedback signals (analogue)

— (Option) —

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

Valve position

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

Designation in the wiring diagram: E2 (actual value)

9. Commissioning (basic settings)

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



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

2. Switch on the power supply.

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

3. Perform basic settings.

9.1. Heat-up time for low temperature version

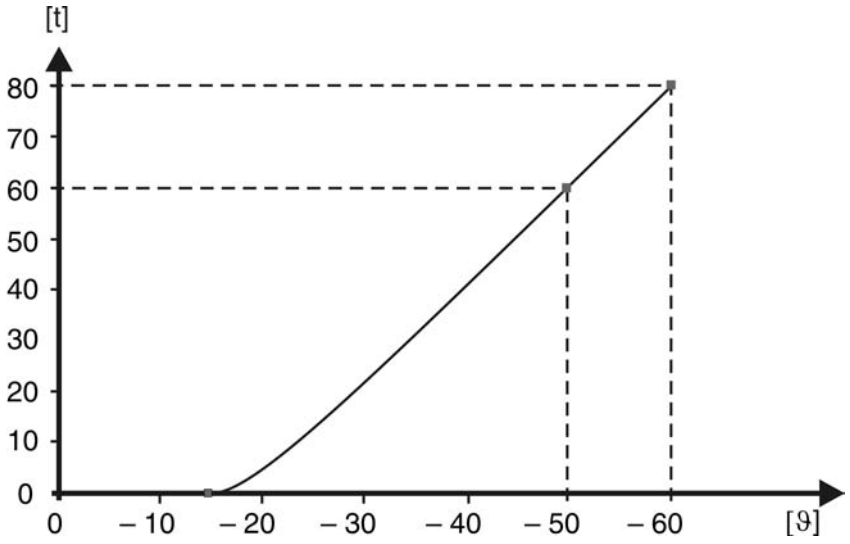
Please note that for low temperature versions, the controls require a heat-up time.

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

For –50 °C = 60 min.

For –60 °C = 80 min.

Figure 25: Sketch illustrating the heat-up time



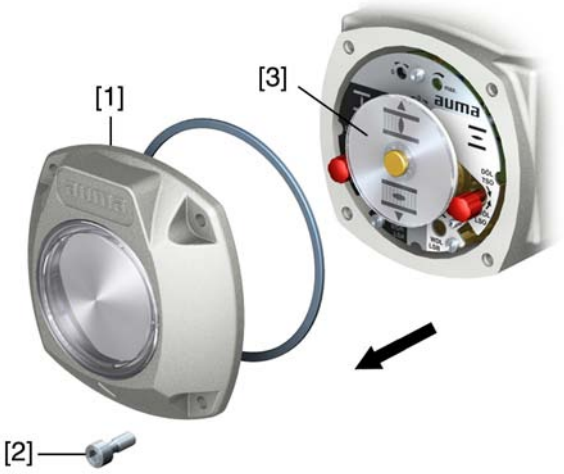
[t] Heat-up time in minutes

[ϑ] Ambient temperature in °C

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.

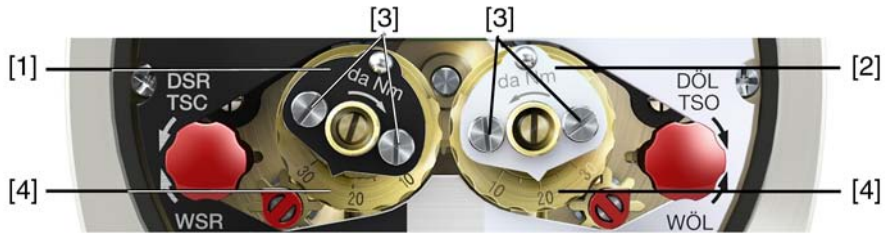
NOTICE

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 26: Torque measuring heads



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

1. Loosen both lock screws [3] at the indicator disc.

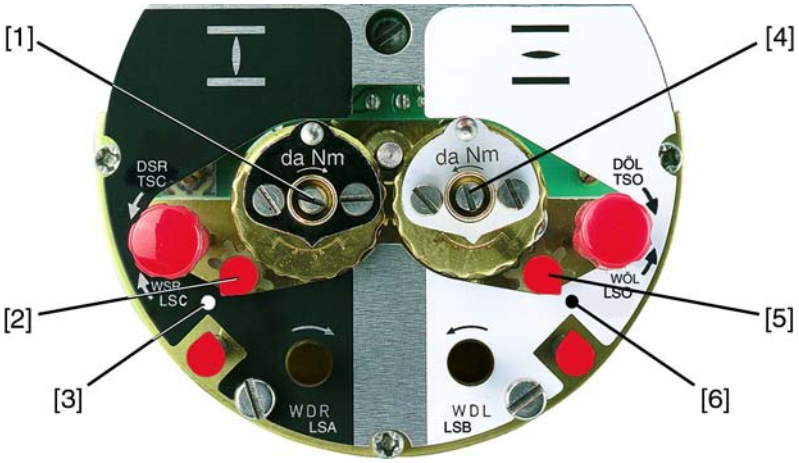
2. Turn torque dial [4] to set the required torque (1 da Nm = 10 Nm). Example:
- Black torque switching head set to approx. 25 da Nm ≙ 250 Nm for direction CLOSE
- White torque switching head set to approx. 20 da Nm ≙ 200 Nm for direction OPEN
3. Fasten lock screws [3] again.
   Information: Maximum tightening torque: 0.3 – 0.4 Nm

➥ The torque switch setting is complete.

9.4. Limit switching: set

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

Figure 27: 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 28: 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

NOTICE

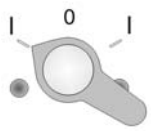
Valve damage due to incorrect direction of rotation!

→ If the direction of rotation is wrong, switch off immediately (press STOP).

→ Eliminate cause, i.e. correct phase sequence for cable set wall bracket.

→ Repeat test run.

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



3. Switch on actuator in running direction CLOSE and observe the direction of rotation:

   with indicator disc: step 4
   without indicator disc: step 5 (hollow shaft)

   → Switch off before reaching the end position.

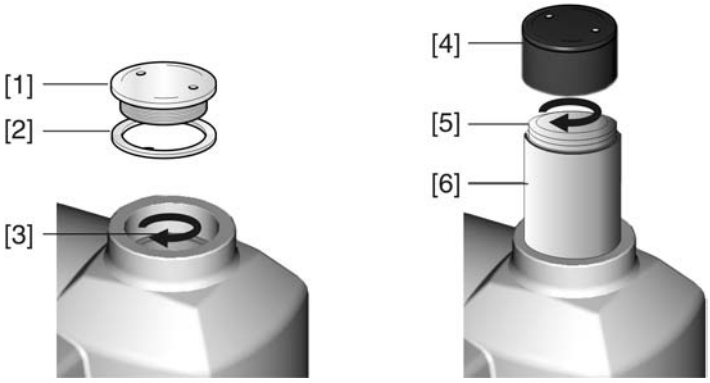
4. With indicator disc:
   → Observe direction of rotation.
   ➥ The direction of rotation is correct, if **actuator runs in direction CLOSE** and **indicator disc turns counterclockwise**.



5. Without the indicator disc:
   → Unscrew threaded plug [1] and seal [2] or cap for stem protection tube [4] and observe direction of rotation at hollow shaft [3] or the stem [5].

➥ The direction of rotation is correct, if **actuator runs in direction CLOSE** and hollow shaft or stem **turn clockwise**.

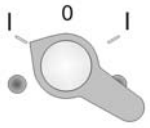
Figure 29: Hollow shaft/stem



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

➥ The limit switching is set incorrectly if:

- the actuator comes to a standstill before reaching the end position
- the red indication light is illuminated (torque 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.

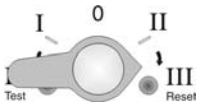
9.6.3. PTC tripping device (option): test

1. Turn selector switch to position **Test** (spring return).



➥ If the PTC tripping device is working properly, the tripping of the motor protection is signalled via the red indication light "collective fault signal" on the local controls.

2. Turn selector switch to position **Reset**.



➥ The fault signal is reset if the device is working properly.

3. If no fault signal is initiated: Request AUMA service to check both wiring and selector switch.

9.7. Electronic position transmitter EWG 01.1

— Option —

The electronic position transmitter EWG 01.1 signals the remote position or the valve position. On the basis of the actual valve position sensed by hall sensor, a current signal between 0 – 20 mA or 4 – 20 mA is generated.

Technical data

Table 7: EWG 01.1

Data	3-wire or 4-wire system	2-wire system
Output current I_a	0 – 20 mA, 4 – 20 mA	4 – 20 mA
Power supply U_V 1)	24 V DC (18 – 32 V)	24 V DC (18 – 32 V)
Max. current consumption	LED off = 26 mA, LED on = 27 mA	20 mA
Max. load R_B	600 Ω	(U_V – 12 V)/20 mA
Impact of power supply	0.1 %	
Load influence	0.1 %	
Temperature impact	< 0.1 ‰/K	
Ambient temperature2)	–60 °C to +80 °C	

1) Power supply possible via: AC, AM controls or external power supply
2) Depending on temperature range of the actuator: Refer to name plate

Setting elements

The EWG is housed in the actuator switch compartment. The switch compartment must be opened to perform any settings. ➔ Refer to <Switch compartment: open>.

All settings are made via the two push buttons [S1] and [S2].

Figure 30: View on control unit when switch compartment is open



[S1] Push button: Set 0/4 mA
[S2] Push button: Set 20 mA
LED Optical aid for setting
[1] Measuring point (+) 0/4 – 20 mA
[2] Measuring point (–) 0/4 – 20 mA

The output current (measuring range 0 – 20 mA) can be checked at measuring points [1] and [2].

Table 8: Short overview on push button functions

Push buttons	Function
[S1] + [S2]	→ press simultaneously for 5 s: Activate setting mode
[S1]	→ press in setting mode for 3 s: Set 4 mA → press in setting mode for 6 s: Set 0 mA → press in operation for 3 s: Switch on/off LED end position signalling. → touch in end position: Reduce current value by 0.02 mA
[S2]	→ press in setting mode for 3 s: Set 20 mA → press in operation for 3 s: Switch on/off LED end position signalling. → touch in end position: Increase current value by 0.02 mA

9.7.1. Measuring range: set

For measuring range setting, voltage must be applied at the position transmitter.

Information

- Both measuring ranges 0/4 – 20 mA and 20 – 0/4 mA (inverse operation) can be set.
  During setting process, the measuring range (normal or inverse operation) is assigned to the end positions by push button S1/S2 assignment.
- Setting mode activating clears the setting in both end positions and sets the output current to a value of 3.5 mA. After activation, both end values (0/4 mA and 20 mA) need to be reset.
- In case of inadvertent incorrect adjustment, the settings can always be reset by renewed activation of the setting mode (simultaneous pressing of [S1] and [S2]).

Activate setting mode

1. Press both push buttons [S1] and [S2] and hold down for 5 seconds:



➥ By pulsing double flashes, the LED indicates that the setting mode is correctly activated:



➥ For any other LED flash sequence (single/triple flashing): ➔ Refer to <Faults during commissioning>.

Set measuring range

2. Operate valve in one of the end positions (OPEN/CLOSED).
3. Set desired output current (0/4 mA or 20 mA):
   → for **4 mA**: Hold down push button [S1] for approx. 3 seconds, until **LED is slowly blinking** .
   → for **0 mA**: Hold down push button [S1] for approx. 6 seconds, until **LED is blinking fast** .
   → for **20 mA**: Hold down push button [S2] for approx. 3 seconds, until **LED is illuminated** .
4. Operate valve into opposite end position.

➥ The value set in end position (0/4 mA or 20 mA) does not change during travel in setting mode.

5. Perform setting in the second end position following the same steps.
6. Approach both end positions again to check the setting.
   → If the measuring range cannot be set:
   Refer to <Faults during commissioning>.
   → If the current values (0/4/20 mA) are incorrect:
   Refer to <Current values: adjust>.
   → If the current value fluctuates (e.g. between 4.0 – 4.2 mA):
   <LED end position signalling: switch on/off>.

9.7.2. Current values: adjust

The current values (0/4/20 mA) set in end positions can be adjusted at any time. Conventional values are e.g. 0.1 mA (instead of 0 mA) or 4.1 mA (instead 4 mA).

Information

If the current value fluctuates (e.g. between 4.0 – 4.2 mA), the <LED end position signalling> must be switched on for current adjustment.

→ Operate valve in desired end position (OPEN/CLOSED).
   → Reduce current value: Press push button [S1]
   (the current is reduced by 0.02 mA every time the push button is pressed)
   → Increase current value Press push button [S2]
   (the current is increased by 0.02 mA every time the push button is pressed)

9.7.3. LED end position signalling: switch on/off

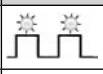
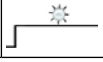
The LED behaviour for end position reached can be set as follows: blinking/continuous illumination or no illumination. During setting mode, end positions signalling is switched on.

Switching on and off

1. Operate valve in one of the end positions (OPEN/CLOSED).
2. Hold down push buttons [S1] or [S2] for approx. 3 seconds.

➥ End position signalling is switched on or off.

Table 9: LED behaviour when end position signalling is switched on

Set output current	LED behaviour in end position
4 mA	 LED is blinking slowly
0 mA	 LED is blinking fast
20 mA	 LED is illuminated

9.8. Potentiometer

— Option —

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

Information This setting is only required if the potentiometer is directly wired to the customer connection XK (refer to wiring diagram).

Setting elements The potentiometer is housed in the actuator switch compartment. The switch compartment must be opened to perform any settings. ➔ Refer to <Switch compartment: open>.

Setting is made via potentiometer [1].

Figure 31: View on control unit



[1] Potentiometer

9.8.1. Potentiometer setting

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

1. Move valve to end position CLOSED.
2. Turn potentiometer [1] clockwise to the stop.

➥ End position CLOSED corresponds to 0 %

➥ End position OPEN corresponds to 100 %

3. Turn potentiometer [1] slightly in opposite direction.
4. Perform fine-tuning of the zero point at external setting potentiometer (for remote indication).

9.9. Electronic position transmitter RWG

— Option —

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

Technical data

Table 10: RWG 4020

Data	3-wire or 4-wire system	2-wire system
Output current I_a	0 – 20 mA, 4 – 20 mA	4 – 20 mA
Power supply U_V [1)]	24 V DC (18 – 32 V)	14 V DC + (I x R_B), max. 30 V
Max. current consumption	24 mA at 20 mA output current	20 mA
Max. load R_B	600 Ω	(U_V – 14 V)/20 mA
Impact of power supply	0.1 %/V	0.1 %/V
Load influence	0.1 %/(0 – 600 Ω)	0.1 %/100 Ω
Temperature impact	< 0.3 ‰/K	
Ambient temperature[2)]	–60 °C to +80 °C	
Transmitter potentiometer	5 kΩ	

1) Power supply possible via: AC, AM controls or external power supply
2) Depending on temperature range of the actuator: Refer to name plate

Setting elements

The RWG is housed in the actuator switch compartment. The switch compartment must be opened to perform any settings. Refer to <Switch compartment: open>.

Setting is made via three potentiometers [1], [2] and [3].

Figure 32: View on control unit when switch compartment is open



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

The output current (measuring range 0 – 20 mA) can be checked at measuring points [4] and [5].

9.9.1. Measuring range: set

For measuring range setting, voltage must be applied at the position transmitter.

1. Move valve to end position CLOSED.
2. Connect ammeter for 0 – 20 mA to measuring points [4 and 5].
3. Turn potentiometer [1] clockwise to the stop.
4. Turn potentiometer [1] slightly in opposite direction.
5. Turn potentiometer [2] clockwise until output current starts to increase.
6. Turn potentiometer [2] in opposite direction until the following value is reached:

- for 0 – 20 mA approx. 0.1 mA
- for 4 – 20 mA approx. 4.1 mA

➥ This ensures that the signal remains above the dead and live zero point.

7. Move valve to end position OPEN.
8. Set potentiometer [3] to end value 20 mA.
9. Approach end position CLOSED again and check minimum value (0.1 mA or 4.1 mA). If necessary, correct the setting.

Information

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

9.10. Mechanical position indicator: set

— Option —

1. Place indicator disc on shaft.
2. Move valve to end position CLOSED.

3. Turn lower indicator disc until symbol (CLOSED) is in alignment with the mark ▲ on the cover.



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



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

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

   7.1 Repeat setting procedure.

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

9.11. Switch compartment: close

NOTICE

Danger of corrosion due to damage to paint finish!

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

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



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

10. Commissioning – controls settings

The controls are set in the factory according to the order. The settings only have to be changed if the device is used for applications other than those specified in the order. In case the device is equipped with a positioner (option), subsequent setting may be required.

The following settings are described in these operation instructions:

- Type of seating (limit or torque seating): set
- Push-to-run operation or self-retaining: set
- Running indication (blinker transmitter) (option): activate/deactivate
- Torque fault in collective fault signal: activate/deactivate
- Positioner setting (option)

10.1. Controls: open

DANGER

Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

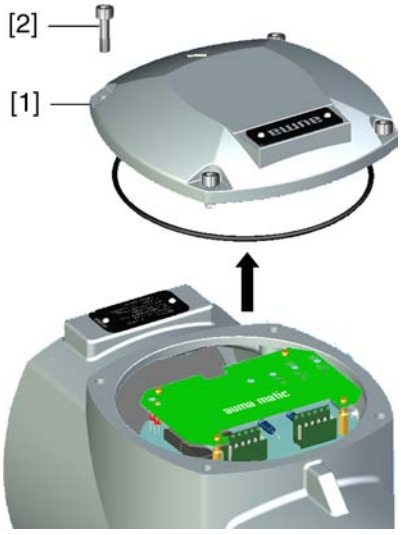
NOTICE

Electrostatic discharge ESD!

Risk of damage to electronic components.

→ Earth both operators and devices.

→ Loosen screws [2] and remove cover [1].



10.2. 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.

The type of seating can be set via two DIP switches on the logic board.

Limit seating

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

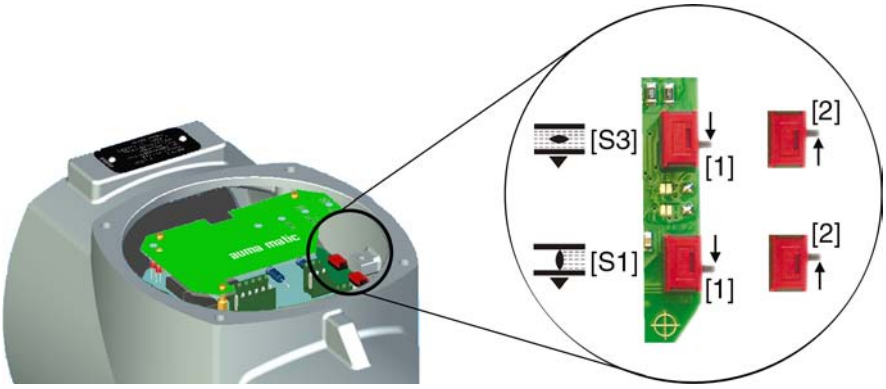
Torque seating

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

The limit seating is used to signal that the limit switching will trip shortly **before** reaching the set tripping torque. If this is not the case, either the indication light on the local controls or the alarm contact K9 (collective fault signal) will signal a fault.

→ Set type of seating for end positions via DIP switches [S1] and [S3].

Figure 33: DIP switches on logic board



[S1] DIP switch for end position CLOSED
[S3] DIP switch for end position OPEN
[1] Position [1] = limit seating
[2] Position [2] = torque seating

10.3. Push-to-run operation or self-retaining: set

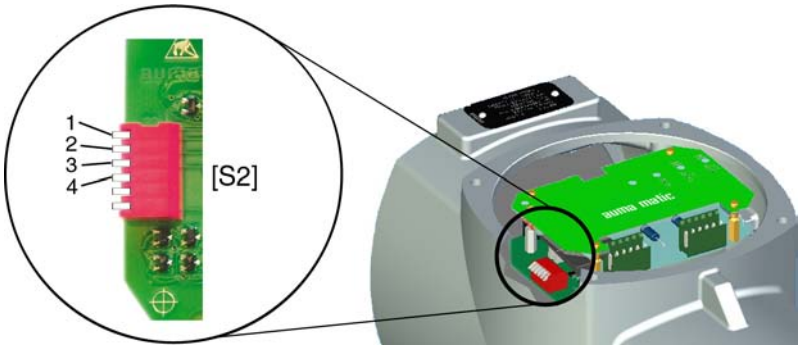
Push-to-run operation or self-retaining is set via a DIP switch on the logic board.

Push-to-run operation Actuator only runs in direction OPEN or CLOSE while an operation command is being received. The actuator stops if the operation command is cancelled.

Self-retaining After receiving an operation command, the actuator continues to run in direction OPEN or CLOSE, even if the operation command is cancelled (self-retaining). The actuator is either stopped by the STOP command or if an end position or intermediate position has been reached.

→ Set push-to-run operation or self-retaining via DIP switch [S2].

Figure 34: DIP switch on logic board



[S2] 6-way DIP, switches [1 – 4]:
1 for operation commands CLOSE from remote
2 for operation commands OPEN from remote
3 for operation commands CLOSE via push button at local controls
4 for operation commands OPEN via push button at local controls

➥ Switch in lower position (position ON): Self-retaining

➥ Switch in upper position (position OFF): Push-to-run operation

Information If the controls are equipped with a positioner, switches 1 and 2 (operation commands from remote) must be in position OFF (push-to-run operation).

10.4. Running indication (blinker transmitter): activate/deactivate

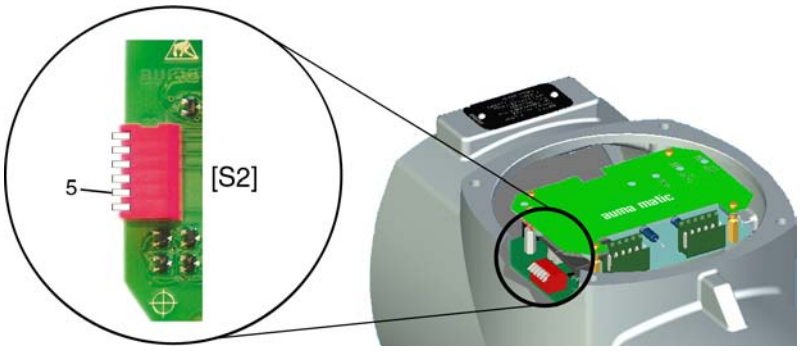
— (Option) —

If the actuator is equipped with a blinker transmitter (wiring diagram designation: S5), indication lights (OPEN/CLOSE) on the local controls can be used as running indication. If the running indication is active, the respective indication light blinks during actuator operation.

The running indication is activated/deactivated via a DIP switch on the logic board.

→ Set running indication (blinker) via DIP switch [S2].

Figure 35: DIP switch on logic board



[S2] 6-way DIP, switch 5

➥ Switch 5 in lower position (position ON): Running indication is deactivated.

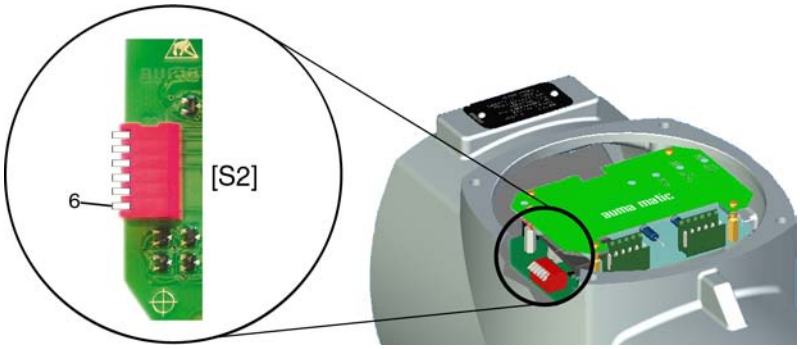
➥ Switch 5 in upper position (position OFF): Running indication is activated.

10.5. Torque fault in collective fault signal: activate/deactivate

The torque fault signal is activated/deactivated via a DIP switch on the logic board.

→ Activate/deactivate signal via DIP switch [S2].

Figure 36: DIP switch on logic board



[S2] 6-way DIP, switch 6

➥ Switch 6 in lower position (position ON): The signal "Torque fault in collective fault signal" is activated.

➥ Switch 6 in upper position (position OFF): The signal "Torque fault in collective fault signal" is deactivated.

10.6. Positioner

— (Option) —

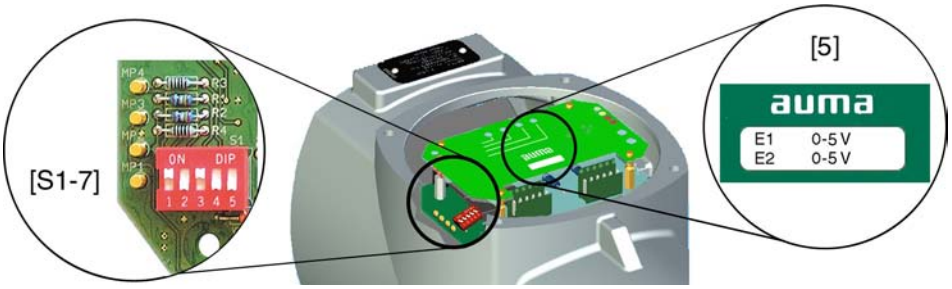
→ Prior to positioner setting, set limit and torque switching as well as potentiometer or electronic position transmitter.

10.6.1. Input ranges (signal type) for setpoint and actual value

The input range (signal type) for setpoint E1 and actual value E2 is set in the factory and marked with a label on the cover plate of the positioner.

The type of signal can be modified at a later date exclusively for versions with setpoint E1 ≠ 0/4 – 20 mA and split-range version. For these versions, the positioner board is equipped with an additional contact.

Figure 37: Version with additional switch on the positioner board



[5] Label indicating the set input ranges
[S1-7] 5-contact DIP switch for setting
DIP1 Actual value E2 (current or voltage signal)
DIP3 Setpoint E1 (current or voltage signal)
DIP5 Setpoint E1 (double signal range e.g. for split range)

Table 11: Input range setting for setpoint E1

Setpoint E1	**[S1–7]**
	DIP 3 and 5
0/4 – 20 mA	ON 1 2 3 4 5
0 – 5 V	ON 1 2 3 4 5
0 – 10 V	ON 1 2 3 4 5

Table 12: Input range setting for actual value E2

Actual value E2	**[S1–7]**
	DIP 1
0/4 – 20 mA[1)]	ON 1 2 3 4 5
0 – 5 V[2)]	ON 1 2 3 4 5

1) for internal feedback of electronic position transmitter RWG
2) for internal feedback of precision potentiometer 5 kΩ

Information When changing the setting, a new label [5] indicating the set signal type must be provided. Furthermore, the wiring diagram indicated on the name plate of the actuator controls also changes.

10.6.2. Behaviour on loss of signal (actuator reaction)

In case of a loss of signal of setpoint E1 or actual value E2, the reaction of the actuator can be programmed via switch [S2-7]. The complete selection range, however, is only available for signals 4 – 20 mA.

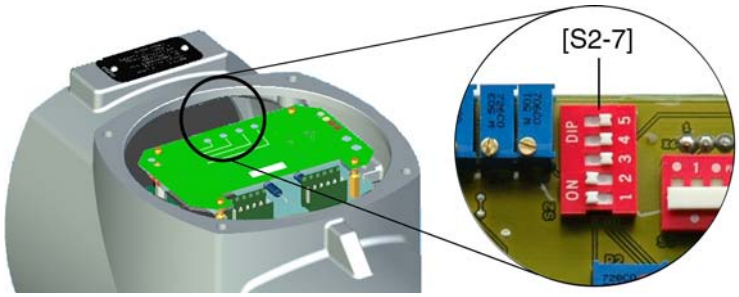
The following reactions are possible:

Fail as is: Actuator stops immediately and remains in this position.

Fail close: Actuator moves the valve to end position CLOSED.

Fail open: Actuator moves the valve to end position OPEN.

Figure 38: DIP switch [S2-7] on positioner board



DIP1 = ON, actual value E2 is monitored
DIP2 = ON, setpoint E1 is monitored

Table 13: Recommended settings

Behaviour on loss of signal of	**Signal type**		**[S2–7]**
E1 and/or E2	**Setpoint E1**	**Actual value E2**	**DIP 1 2 3 4**
Fail as is	4 – 20 mA	4 – 20 mA	ON 1 2 3 4 5
Fail close			ON 1 2 3 4 5
Fail open			ON 1 2 3 4 5

Table 14: Further possible settings

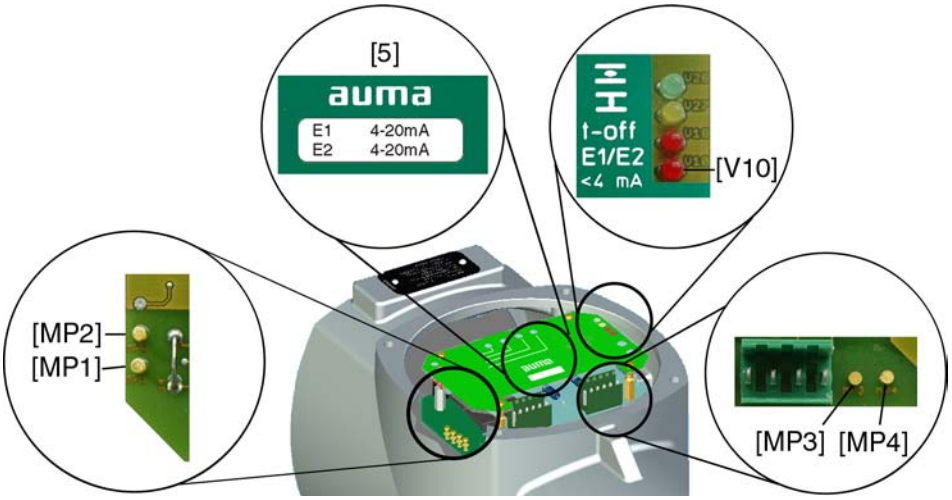
Behaviour on loss of signal of		**Signal type[1)]**		**[S2–7]**
E1	**E2**	**Setpoint E1**	**Actual value E2**	**DIP 1 2 3 4**
Fail as is	Fail open	4 – 20 mA	0 – 5 V	ON 1 2 3 4 5
Fail close	Fail open	4 – 20 mA	0 – 5 V	ON 1 2 3 4 5
		0 – 20 mA	4 – 20 mA	ON 1 2 3 4 5
		0 – 20 mA 0 – 5 V 0 – 10 V	0 – 20 mA 0 – 5 V	ON 1 2 3 4 5
	Fail close	0 – 20 mA 0 – 5 V	4 – 20 mA	ON 1 2 3 4 5
	Fail as is	0 – 20 mA 0 – 10 V	4 – 20 mA	ON 1 2 3 4 5
Fail open		4 – 20 mA	0 – 20 mA 0 – 5 V	ON 1 2 3 4 5

1) in case of a signal loss, a misinterpretation might be made for **0** – 20 mA, **0** – 5 V or **0** – 10 V, due to the fact that E1 or E2 could take the value 0 mA even without loss of signal (end position CLOSED = 0 mA or 0 V).

10.6.3. Adjustment in end positions

The setting described below applies to the standard positioner version, i.e. maximum setpoint E1 (20 mA) triggers a travel to end position OPEN, minimum setpoint (0/4 mA) triggers a travel to end position CLOSED.

Figure 39: Electronic positioner board



[MP1] Measuring point (–) for actual value E2
[MP2] Measuring point (+) for actual value E2
[MP3] Measuring point (+) for setpoint E1
[MP4] Measuring point (–) for setpoint E1
[5] Label with signal indication
[V10] Red LED: E1/E2 <4 mA

End position CLOSED

1. Set selector switch to position **Local control** (LOCAL).
2. Move valve to end position CLOSED.
3. Connect lower setpoint to customer connection XK (terminals 2/3). The lower setpoint (0 V, 0 mA or 4 mA) is indicated on the label [5].
4. If the red LED [V10] **E1/E2 <4 mA** is illuminated:
   - 4.1 Verify polarity of setpoint E1.
   - 4.2 Check whether external load is connected to customer connection XK (terminals 23/24) (observe max. load R_B), or
   - 4.3 Connect terminals 23/24 across customer connection XK (terminals 23/24).
5. Measure setpoint E1: Connect measuring device for 0 – 5 V to measuring points **[MP3/MP4]**.

➥ For a setpoint E1 of 0 V or 0 mA, the voltmeter shows 0 V.

➥ For a setpoint E1 of 4 mA, the voltmeter shows 1 V.

6. If measured value is not correct: Correct setpoint E1.
7. Measure actual value E2: Connect measuring device for 0 – 5 V to measuring points **[MP1/MP2]**.

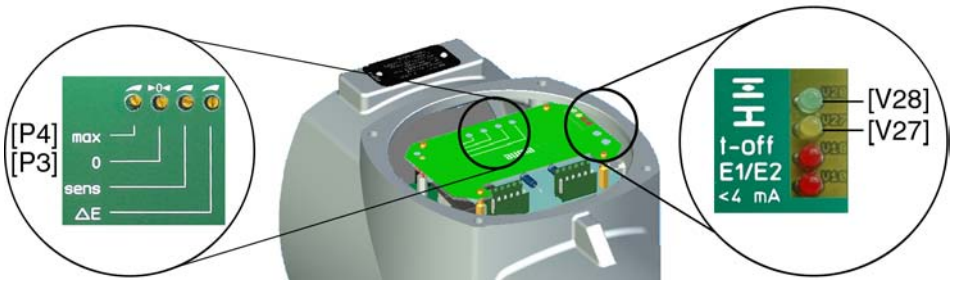
➥ For an actual value E2 of 0 mA, the voltmeter shows 0 V.

➥ For an actual value E2 of 4 mA, the voltmeter shows 1 V.

8. If measured value is not correct: Re-set potentiometer or electronic position transmitter and perform adjustment once again, starting from step 1.

9. Adjust positioner using potentiometer **0** [P3].
   9.1 If both LEDs are OFF or the green LED [V28] is illuminated: Turn potentiometer **0** [P3] slightly clockwise until the yellow LED [V27] is illuminated.
   9.2 If the yellow LED [V27] is illuminated: Turn potentiometer **0** [P3] counterclockwise until the yellow LED [V27] goes out. Then turn potentiometer **0** [P3] slightly clockwise until the yellow LED [V27] is illuminated again.

Figure 40: Electronic positioner board



[P3] Potentiometer 0
[P4] Potentiometer max
[V27] Yellow LED: End position CLOSED reached
[V28] Green LED: End position OPEN reached

➥ The setting is correct if the yellow LED [V27] is switched on when reaching end position CLOSED.

End position OPEN

10. Move valve to end position OPEN.
11. Measure actual value E2 (measuring points **[MP1/MP2]**):

➥ For an actual value E2 of 20 mA, the voltmeter shows 5 V.

12. If measured value is not correct: Re-set potentiometer or electronic position transmitter and perform adjustment once again, starting from step 1.
13. Set maximum setpoint E1 (5 V or 20 mA, refer to label [5]).
14. Measure setpoint E1 (measuring points **[MP3/MP4]**):

➥ For a setpoint E1 of 5 V or 20 mA, the voltmeter shows 5 V.

15. If measured value is not correct: Verify setpoint E1.
16. Adjust positioner using potentiometer **max** [P4].
    16.1 If both LEDs are OFF or the yellow LED [V27] is illuminated: Turn potentiometer **max** [P4] slightly counterclockwise until the green LED [V28] is illuminated.
    16.2 If the green LED [V28] is illuminated: Turn potentiometer **max** [P4] clockwise until the green LED [V28] goes out. Then turn potentiometer **0** [P3] slightly counterclockwise until the green LED [V28] is illuminated again.

➥ The setting is correct if the green LED [V28] is switched on when reaching end position OPEN.

10.6.4. Sensitivity setting

NOTICE

Unnecessary wear at valve and actuator caused by an excessive number of starts (sensitivity)!

→ Set maximum dead band acceptable for the process.
→ Observe maximum number of actuator starts (refer to technical data sheet for modulating actuators).

Dead band

The dead band determines the sensitivity between switch-on point and switch-off point. The smaller the dead band, the higher the sensitivity of the positioner.

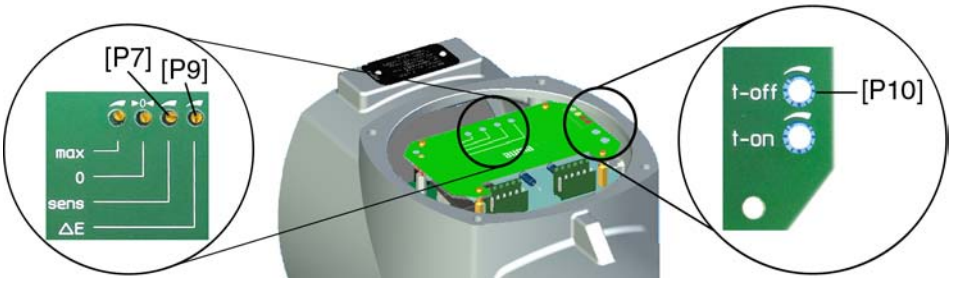
Default value: 2.5 %

Setting range: 0.5 % to 2.5 % (of the maximum setpoint E1)

Dead time

The dead time prevents the operation to a new setpoint within a pre-determined time (0.5 to 10 seconds). The number of starts can be reduced by setting the dead time to a sufficiently high value.

Figure 41: Sensitivity setting



[P7] Potentiometer **sens** (fine tuning)

[P9] Potentiometer Δ **E** (dead band)

[P10] Potentiometer **t-off** (dead time)

Dead band setting

1. Set selector switch to position **Remote control** (REMOTE).
2. Connect setpoint E1 to customer connection XK (terminals 2/3).
3. Set dead band using potentiometer Δ **E** [P9]:
   - → Reduce dead band (increase sensitivity): Turn potentiometer counterclockwise.
   - → Increase dead band (reduce sensitivity): Turn potentiometer clockwise.

Fine tuning

Information: Fine tuning is only useful for output speeds <16 rpm. For 1-phase AC motors, fine tuning is not possible.

4. Reduce dead band further by up to 0.25 % (increase sensitivity): Turn potentiometer **sens** [P7] counterclockwise.

Dead time setting

5. Set dead time using potentiometer **t-off** [P10]:
   - → Reduce dead time: Turn potentiometer **t-off** [P10] counterclockwise.
   - → Increase dead time: Turn potentiometer **t-off** [P10] clockwise.

10.7. EMERGENCY command (EMERGENCY - OPEN/EMERGENCY - CLOSE)

— (Option) —

The EMERGENCY input (refer to wiring diagram) has to be connected to the control voltage using an NC contact (closed circuit principle). In the event of an EMERGENCY command (removal of the signal = NC contact is operated), the actuator runs to the preset end position:

- EMERGENCY - CLOSE input: Actuator runs to end position CLOSED.
- EMERGENCY - OPEN input: Actuator runs to end position OPEN.

The EMERGENCY command is effective in all three selector switch positions (LOCAL, OFF, REMOTE).

⚠ CAUTION

The actuator can immediately start when switched on!

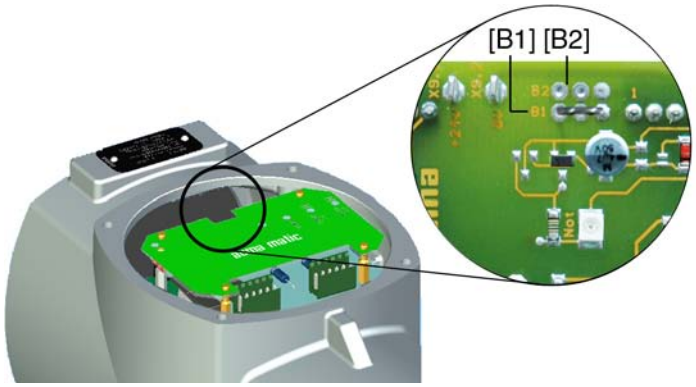
Risk of personal injuries or damage to the valve.

→ Ensure that EMERGENCY signal is present when switching on.

→ If the actuator starts to run unexpectedly: Immediately press push button **Stop**.

Disable EMERGENCY command

Figure 42: Interface board for available option EMERGENCY - OPEN/EMERGENCY - CLOSE



[B1] Link available: EMERGENCY - CLOSE
[B2] Link available: EMERGENCY - OPEN

1. Remove face plate.
2. Disconnect links [B1] or [B2].

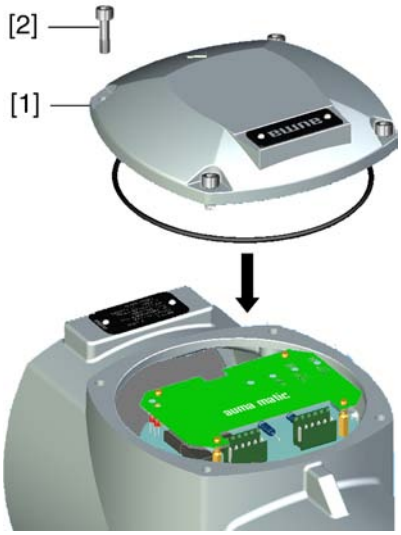
10.8. Controls: close

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.

11. Corrective action

11.1. Faults during commissioning

Table 15: Faults during commissioning

Fault	Description/cause	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
In spite of correct setting of limit switching, actuator operated into the valve end position.	The overrun was not considered when setting the limit switching. The overrun is generated by the inertia of both the actuator and the valve and the delay time of the controls.	• 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).
No value can be measured at measuring points of the RWG.	Current loop across RWG is open. (Position feedback 0/4 – 20 mA is only possible if the current loop is closed across the RWG.)	• Connect link across RWG to XK (terminals 23/24) • Connect external load to XK, e.g. remote indication. • Observe maximum load R_B.
Measuring range 0/4 – 20 mA or maximum value 20 mA at position transmitter cannot be set or supplies an incorrect value.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
The measuring range 0/4 – 20 mA at EWG position transmitter cannot be set.	The LED on the EWG either flashes in setting mode a) single flash or b) triple flash:  a) EWG is not calibrated. b) Magnet positions of EWG are not aligned.	Call AUMA service.
Limit and/or torque switches do not trip.	Switch is defective or switch setting is incorrect.	• Check setting, if required, reset end positions. • Refer to <Check switches> and replace the switches 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. The red indication light (fault) on the local controls is illuminated.
2. Press push button OPEN to reset the fault (indication light) by operating the device in the opposite direction.
3. Turn test button [2] in direction of the TSO arrow: Torque switch OPEN trips.
4. Press push button CLOSE to reset the fault (indication light) by operating the device in the opposite direction.

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.

11.2. Fuses

11.2.1. Fuses within the actuator controls

After removal of local controls, the fuses can be accessed.

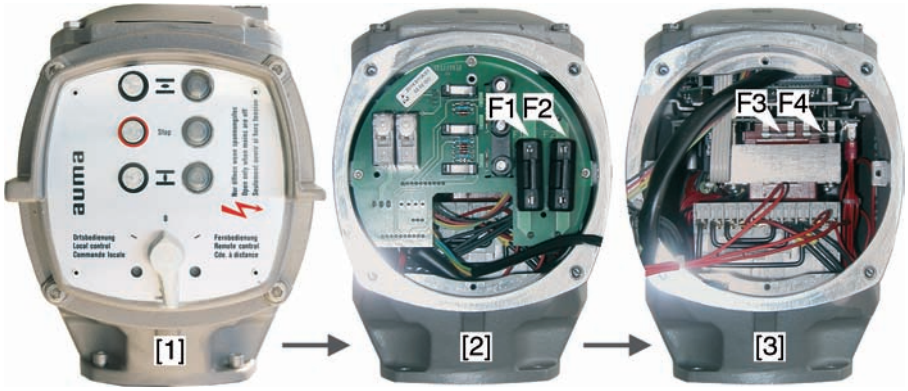
DANGER

Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

Figure 43: Access to fuses



[1] Local controls
[2] Signal and control board
[3] Power supply unit

F1/F2 Primary fuses on power supply unit

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

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	500 mA T; 250 V	K001.183
Voltage output (power supply unit) = 115 V	500 mA T; 250 V	K001.183

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

- Heater, switch compartment, reversing contactors control
- PTC tripping device (24 V AC only)
- 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	1.0 A T; 250 V 1.6 A T; 250 V	K004.831 K003.131
Voltage output (power supply unit) = 115 V	0.4 A T; 250 V	K003.021

Information Only replace fuses with fuses of the same type and value.

→ After replacing the fuses, screw local controls back on again.

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.

11.2.2. Motor protection (thermal monitoring)

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

The actuator is stopped and the "collective fault" indication light (option) on the local controls is illuminated.

The motor has to cool down before the operation can be resumed.

Version with thermoswitch (standard)

The actuator can be controlled again once the motor has cooled down ("collective fault" indication light goes out).

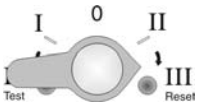
Version with thermoswitch and additional thermal overload relay within the controls (option)

The operation may only be resumed once the fault signal ("collective fault" indication light) has been reset. The fault signal is reset via the overload relay integrated in the actuator controls. Therefore the controls have to be opened at the cover and the relay held down. The relay is located on the contactors.

Version with PTC thermistor (option)

The operation may only be resumed once the fault signal ("collective fault" indication light) has been reset. The fault signal is reset via selector switch position **Reset** of the local controls.

Figure 44: Selector switch on local controls



12. Servicing and maintenance

⚠ CAUTION

Damage caused by inappropriate maintenance!

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

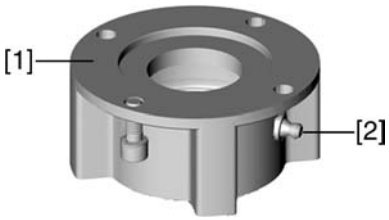
12.1. Preventive measures for servicing and safe operation

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 45: Output drive type A



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

Table 16: 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 r = 0.9 kg/dm³

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.

12.2. 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.

12.3. 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.

13. Technical data

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

13.1. Technical data Multi-turn actuators

Features and functions		
Type of duty	Standard:	Short-time duty S2 - 15 min (multi-turn actuators for open-close duty) Intermittent duty S4 - 25 % (multi-turn actuators for modulating duty)
	Option:	Short-time duty S2 - 30 min (multi-turn actuators for open-close duty) Intermittent duty S4 - 50 % (multi-turn actuators for modulating duty) Intermittent duty S5 - 25 % (multi-turn actuators for modulating duty) S5 - 25 % only in combination with insulation class H
	For nominal voltage and 40 °C ambient temperature and at average load with 35 % of the max. torque	
Motors	Standard:	3-ph AC asynchronous motor, type IM B9 according to IEC 60034
	Option:	1-phase AC motor, type IM B9 according to IEC 60034 DC shunt motor, type IM B14 according to IEC 60034 DC compound motor, type IM B14 according to IEC 60034
Mains voltage, mains frequency	Refer to motor name plate Permissible variation of mains voltage: ±10 % Permissible variation of mains frequency: ±5 % (for 3-phase AC and 1-phase AC current)	
Overvoltage category	Category III according to IEC 60364-4-443	
Insulation class	Standard:	F, tropicalized
	Option:	H, tropicalized
Motor protection	Standard:	3-phase and 1-phase AC motors: Thermoswitches (NC) DC motors: Without
	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.	
Motor heater (option)	Voltages:	110 – 120 V AC, 220 – 240 V AC or 400 V AC (externally supplied)
	Power depending on the size 12.5 – 25 W	
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation.	
	Option:	Handwheel lockable Handwheel stem extension Power tool for emergency operation with square 30 mm or 50 mm
Indication for manual operation (option)	Indication whether manual operation is active/not active via single switch (1 change-over contact)	
Valve attachment	Standard:	B1 according to EN ISO 5210
	Option:	A, B2, B3, B4 according to EN ISO 5210 A, B, D, E according to DIN 3210 C according to DIN 3338
	Special output drive types: AF, AK, AG, B3D, ED, DD, IB1, IB3 A prepared for permanent lubrication of stem	

Electromechanical control unit		
Limit switching	Counter gear mechanism for end positions OPEN and CLOSED Turns per stroke: 2 to 500 (standard) or 2 to 5,000 (option)	
	Standard:	Single switches (1 NC and 1 NO) for each end position, not galvanically isolated
	Options:	Tandem switches (2 NC and 2 NO) for each end position, switches galvanically isolated Triple switches (3 NC and 3 NO) for each end position, switches galvanically isolated Intermediate position switch (DUO limit switching), adjustable for any position
Torque switching	Torque switching adjustable for directions OPEN and CLOSE	
	Standard:	Single switches (1 NC and 1 NO) for each direction, not galvanically isolated
	Options:	Tandem switches (2 NC and 2 NO) for each direction, switches galvanically isolated
Position feedback signal, analogue (option)	Potentiometer or 0/4 – 20 mA (EWG/RWG)	
Mechanical position indicator (option)	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED	
Running indication	Blinker transmitter (option for modulating actuators)	
Heater in switch compartment	Standard:	Self-regulating PTC heater, 5 – 20 W, 110 – 250 V AC/DC
	Options:	24 – 48 V AC/DC or 380 – 400 V AC
	A resistance type heater of 5 W, 24 V AC is installed in the actuator in combination with AM or AC actuator controls.	

Technical data for limit and torque switches	
Mechanical lifetime	2 x 10^6 starts
Silver plated contacts:	
U min.	24 V AC/DC
U max.	250 V AC/DC
I min.	20 mA
I max. AC current	5 A at 250 V (resistive load) 3 A at 250 V (inductive load, cos phi = 0.6)
I max. DC current	0.4 A at 250 V (resistive load) 0.03 A at 250 V (inductive load, L/R = 3 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)

Service conditions		
Use	Indoor and outdoor use permissible	
Mounting position	Any position	
Installation altitude	≤ 2 000 m above sea level > 2,000 m above sea level, please contact AUMA	
Ambient temperature	Standard:	–40 °C to +80 °C –40 °C to +60 °C (multi-turn actuators for modulating duty with DC motors)
	Options:	–50 °C to +60 °C (1-phase AC motors) –60 °C to +60 °C (3-phase AC motors) 0 °C to +120 °C (multi-turn actuators for modulating duty with 3-phase AC motors)
	For exact version, refer to actuator name plate.	
Enclosure protection according to EN 60529	Standard:	IP68 For special motors differing enclosure protection: refer to name plate.
	Option:	DS Terminal compartment additionally sealed against interior (double sealed)
	According to AUMA definition, enclosure protection IP68 meets the following requirements: • 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.	
	For actual version, refer to actuator name plate.	
Pollution degree	Pollution degree 4 (when closed) according to EN 50178	
Vibration resistance according to IEC 60068-2-6	2 g, from 10 to 200 Hz Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this. Valid for multi-turn actuators in version AUMA NORM (with AUMA plug/socket connector, without actuator controls). Not valid in combination with gearboxes.	
Corrosion protection	Standard:	KS: Suitable for installation in industrial units, in water or power plants with a low pollutant concentration as well as for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. wastewater treatments plants, chemical industry)
	Option:	KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration
		KX-G : same as KX, however aluminium-free version (outer parts)
Finish coating	Powder coating Two-component iron-mica combination	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Other colours are possible on request.
Lifetime	AUMA multi-turn actuators meet or exceed the lifetime requirements of EN 15714-2. For further details, please contact AUMA	

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

13.2. Technical data Actuator controls

Features and functions		
Mains voltage, mains frequency	Refer to name plates at the controls and the motor Permissible variation of the mains voltage: ±10 % Further permissible fluctuations of mains voltage and frequency (option): (–20 %/+15 %), (–20 %/+10 %), (–30 %/+30 %), , (–30 %/+10 %) Permissible variation of the mains frequency: ±5 % Current consumption of controls depending on mains voltage: 100 to 120 V AC = max. 575 mA 208 to 240 V AC = max. 275 mA 380 to 690 V AC = max. 160 mA	
External supply of the electronics (option)	24 V DC +20 % / –15 % Current consumption: Basic version approx. 200 mA, with options up to 500 mA	
Overvoltage category	Category III according to IEC 60364-4-443	
Rated power	The controls are conceived for the rated motor power, refer to motor name plate	
Switchgear	Standard:	Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2
	Options:	Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2 with additional contacts, 1 NC + 1 NO each
		Reversing contactors (mechanically and electrically interlocked) for AUMA power class A3
		Thyristor unit for mains voltage up to 600 V AC (recommended for modulating actuators) for AUMA power classes B1, B2 and B3
	Reversing contactors are designed for a lifetime of 2 million starts. For applications requiring a high number of starts, we recommend using thyristor units. For the assignment of AUMA power classes, refer to the Electric data pertaining to the actuator.	
Control	Standard:	Control inputs 24 V DC, OPEN - STOP - CLOSE (via opto-isolator, one common), current consumption: approx. 10 mA per input Respect min. pulse duration for modulating actuators
	Option:	Control inputs 115 V AC, OPEN - STOP - CLOSE - EMERGENCY (via opto-isolator, one common), current consumption: approx. 15 mA per input
Status signals	Standard:	5 output contacts with gold-plated contacts: • 4 potential-free NO contacts with one common, max. 250 V AC, 0.5 A (resistive load) - Default configuration: End position CLOSED, end position OPEN, selector switch REMOTE, selector switch LOCAL • 1 potential-free change-over contact, max. 250 V AC, 0.5 A (resistive load) - Default configuration: Collective fault signal (torque fault, phase failure, motor protection tripped)
	Options:	• Signals in combination with positioner: - End position OPEN, end position CLOSED (requires tandem switch within actuator), selector switch REMOTE, selector switch REMOTE, selector switch LOCAL via 2nd level selector switch • 1 potential-free change-over contact, max. 250 V AC, 0.5 A (resistive load) - Default configuration: Collective fault signal (torque fault, phase failure, motor protection tripped)
Voltage output	Standard:	Auxiliary voltage 24 V DC ±5 %, max. 50 mA for supply of control inputs, galvanically isolated from internal voltage supply
	Option:	115 V AC ±10 %, max. 30 mA for supply of the control inputs.[1)], galvanically isolated from internal voltage supply
Local controls	Standard:	Selector switch LOCAL - OFF - REMOTE (lockable in all three positions)
		Push buttons OPEN, STOP, CLOSE
		3 indication lights: End position CLOSED (yellow), collective fault signal (red), end position OPEN (green)
	Options:	Special colours for the 3 indication lights
		Protection cover, lockable

Features and functions		
Functions	Standard:	Selectable type of seating, limit or torque seating for end position OPEN and end position CLOSED
		Overload protection against excessive torques over the whole travel
		Excessive torque (torque fault) can be excluded from collective fault signal.
		Phase failure monitoring with automatic phase correction
		Push-to-run operation or self-retaining in REMOTE
		Push-to-run operation or self-retaining in LOCAL
		Blinker signal from actuator (option) for running indication via indication lights of local controls can be activated/deactivated.
	Options:	Positioner (requires position transmitter in actuator) • Position setpoint via analogue input E1 = 0/4 – 20 mA • Galvanic isolation for position setpoint (0/4 – 20 mA) and position feedback (0/4 – 20 mA) • Adjustable behaviour on loss of signal • Adjustable sensitivity (dead zone and dead time)
		Positioner for Split Range operation (requires position transmitter in actuator)
Motor protection evaluation	Standard:	Monitoring the motor temperature in combination with thermoswitches within actuator motor
	Options:	Additional thermal overload relay in the controls in combination with thermoswitches within the actuator
		PTC tripping device in combination with PTC thermistors within actuator motor
Electrical connection	Standard:	AUMA plug/socket connector with screw-type connection
	Options:	Terminals or crimp connection
		Gold-plated control plug (sockets and plugs)
Threads for cable entries	Standard:	Metric threads
	Options:	Pg-threads, NPT-threads, G-threads
Wiring diagram	Refer to name plate	

1) Not possible in combination with PTC tripping device

Service conditions		
Use	Indoor and outdoor use permissible	
Mounting position	Any position	
Installation altitude	≤ 2 000 m above sea level > 2,000 m above sea level, please contact AUMA	
Ambient temperature	Standard:	–40 °C to +70 °C
	Options:	-60 °C to +60 °C, extreme low temperature version incl. heating system
		Low temperature versions incl. heating system for connection to external power supply 230 V AC or 115 V AC.
	For actual version, refer to actuator controls name plate.	
Enclosure protection according to EN 60529	Standard:	IP68 with AUMA 3-phase AC motor/1-phase AC motor For special motors differing enclosure protection: refer to name plate.
	Option:	DS Terminal compartment additionally sealed against interior (double sealed)
	According to AUMA definition, enclosure protection IP68 meets the following requirements: • Depth of water: maximum 8 m head of water • Duration of continuous immersion in water: Max. 96 hours • Up to 10 operations during continuous immersion Modulating duty is not possible during continuous immersion.	
	For actual version, refer to actuator controls name plate.	
Pollution degree	Pollution degree 4 (when closed) according to EN 50178	
Vibration resistance according to IEC 60068-2-6	2 g, from 10 to 200 Hz Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this. Valid for multi-turn actuators in version AUMA NORM (with AUMA plug/socket connector, without actuator controls). Not valid in combination with gearboxes.	

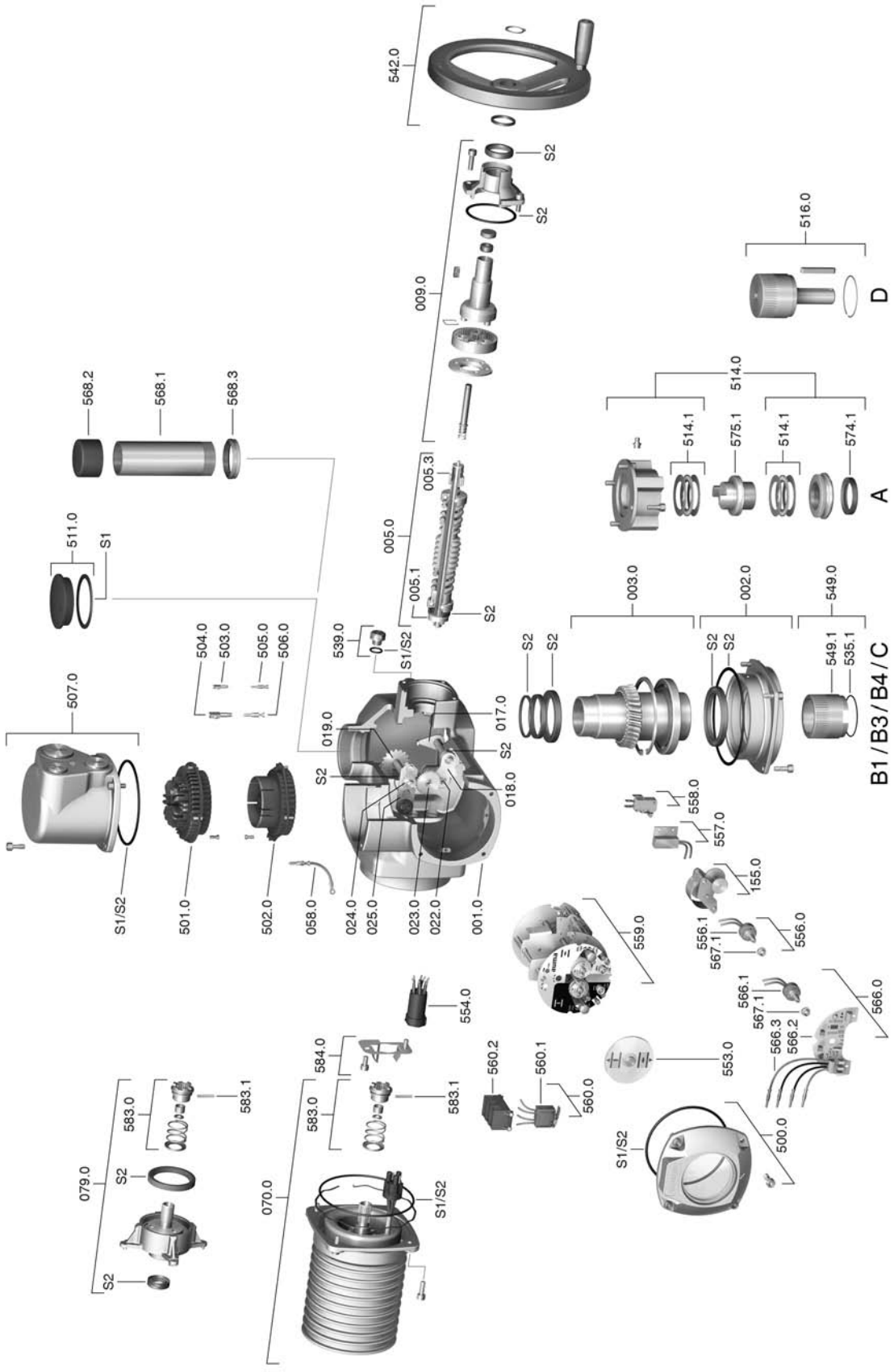
Service conditions		
Corrosion protection	Standard:	KS: Suitable for installation in industrial units, in water or power plants with a low pollutant concentration as well as for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. wastewater treatments plants, chemical industry)
	Option:	KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration
Finish coating	Powder coating Two-component iron-mica combination	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Other colours are possible on request.

Wall bracket	AM mounted separately from the actuator, including plug/socket connector. Connecting cable on request. Recommended for high ambient temperatures, difficult access, or in case of heavy vibration during service. Cable length between actuator and AM max. 100 m. Not suitable for version with potentiometer in the actuator. Instead of the potentiometer, the actuator has to be provided with EWG.

Further information	
Weight	Approx. 7 kg (with AUMA plug/socket connector)
EU Directives	Electromagnetic Compatibility (EMC): (2004/108/EC) Low Voltage Directive: (2006/95/EC) Machinery Directive: (2006/42/EC)

14. Spare parts

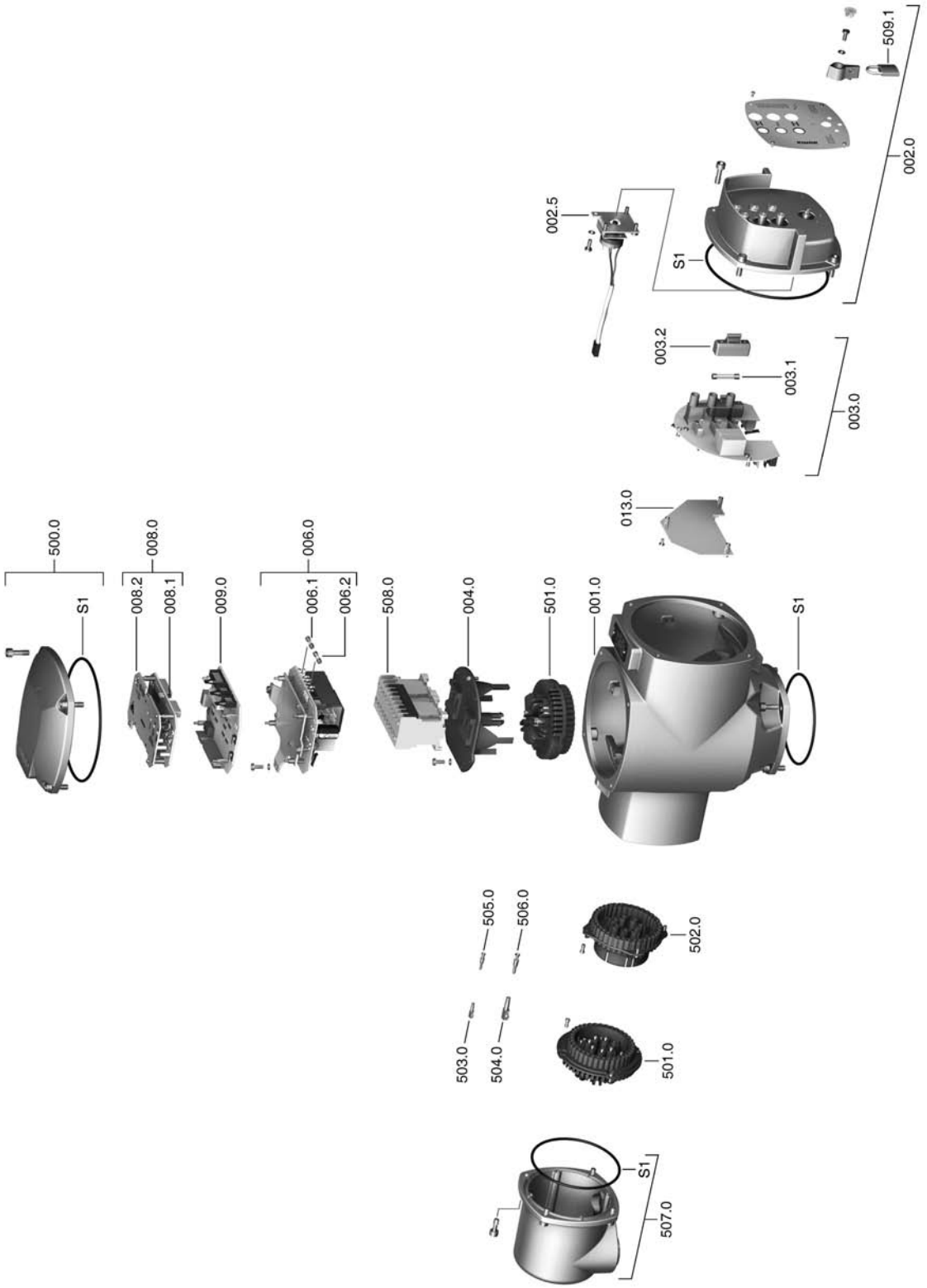
14.1. Multi-turn actuators SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2



Information: Please state device type and our order number (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Delivered spare parts may slightly vary from the representation in these instructions.

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

14.2. Actuator controls AUMA MATIC AM 01.1/AM 02.1



Information: Please state device type and our order number (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Delivered spare parts may slightly vary from the representation in these instructions.

Ref. no.	Designation	Type
001.0	Housing	
002.0	Local controls	Sub-assembly
002.5	Selector switch	Sub-assembly
003.0	Signal and control board	Sub-assembly
003.1	Primary fuse F1/F2	
003.2	Fuse cover	
004.0	Carrier for contactors	
006.0	Power supply unit	Sub-assembly
006.1	Secondary fuse F3	
006.2	Secondary fuse F4	
008.0	Interface board	Sub-assembly
008.1	Interface board	
008.2	Cover plate for interface board	
009.0	Logic board	Sub-assembly
013.0	Adapter 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	Cover for electrical connection	Sub-assembly
508.0	Switchgear	Sub-assembly
509.1	Padlock	
S	Seal kit	Set

15. Certificates

15.1. Declaration of Incorporation and EC Declaration of Conformity

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

Tel +49 7631 809-0
Fax +49 7631 809-1250
Riester@auma.com

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 EN ISO 5211: 2001
EN ISO 5210: 1996

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

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

Authorised person for documentation: Peter Malus, Aumastrasse 1, D-79379 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, 2014-01-01

H. Newerla, General Management

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

Y006.332/003/en

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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-Armaturenantriebe 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

AUMA Finland Oy
FI 02230 Espoo
Tel +358 9 5840 22
auma@auma.fi
www.auma.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

AUMA-LUSA Representative Office, Lda.
PT 2730-033 Barcarena
Tel +351 211 307 100
geral@aumalusa.pt

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
aumarussia@auma.ru
www.auma.ru

OOO PRIWODY AUMA
RU 125362 Moscow
Tel +7 495 787 78 21
aumarussia@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.ctltech.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 China Co., Ltd
CN 215499 Taicang
Tel +86 512 3302 6900
mailbox@auma-china.com
www.auma-china.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@pldtdsl.net

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

Certificate Registration No.
12 100/104 4269

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