

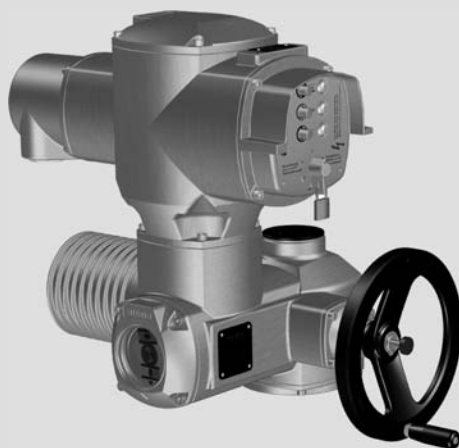


Multi-turn actuators

SA 07.2 – SA 16.2/SAR 07.2 – SAR 16.2

with actuator controls

AUMA MATIC BASIC AMB 01.1/AMB02.1



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	<p>AUMA products are designed and manufactured in compliance with recognised standards and directives. This is certified in a Declaration of Incorporation and an EC Declaration of Conformity.</p> <p>The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation.</p>
Safety instructions/warnings	<p>All personnel working with this device must be familiar with the safety and warning instructions in this manual and observe the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.</p>
Qualification of staff	<p>Assembly, electrical connection, commissioning, operation, and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or contractor of the plant only.</p> <p>Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety.</p>
Commissioning	<p>Prior to commissioning, it is important to check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.</p>
Operation	<p>Prerequisites for safe and smooth operation:</p> <ul style="list-style-type: none">• Correct transport, proper storage, mounting and installation, as well as careful commissioning.• Only operate the device if it is in perfect condition while observing these instructions.• Immediately report any faults and damage and allow for corrective measures.• Observe recognised rules for occupational health and safety.• Observe the national regulations.• During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend checking the surface temperature using an appropriate thermometer and wearing protective gloves, if required, prior to working on the device.
Protective measures	<p>The end user or the contractor are responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.</p>
Maintenance	<p>To ensure safe device operation, the maintenance instructions included in this manual must be observed.</p> <p>Any device modification requires prior consent of the manufacturer.</p>

1.2. Range of application

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

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

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

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

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

No liability can be assumed for inappropriate or unintended use.

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

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

1.3. Applications in Ex zone 22 (option)

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

The actuators are designed to meet enclosure protection IP68 and fulfil the requirements of EN 50281-1-1:1998 section 6 - Electrical apparatus for use in presence of combustible dust, requirements for category 3 electrical equipment - protected by enclosures.

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

- In compliance with the ATEX directive 94/9/EC, the actuators must be equipped with an additional identification – II3D IP6X T150 °C.
- The maximum surface temperature of the actuators, based on an ambient temperature of +40 °C in accordance with EN 50281-1-1 section 10.4, is +150 °C. In accordance with section 10.4, an increased dust deposit on the equipment was not considered for the determination of the maximum surface temperature.
- The correct connection of the thermostats or the PTC thermistors as well as fulfilling the requirements of the duty type and the technical data are prerequisites for compliance with the maximum surface temperature of devices.
- The connection plug may only be plugged in or pulled out when device is disconnected from the mains.
- The cable glands used also have to meet the requirements of category II3 D and must at least comply with enclosure protection IP67.
- The actuators must be connected by means of an external ground connection (accessory part) to the potential compensation or integrated into an earthed piping system.
- The threaded plug (part no. 511.0) or the stem protection tube with protective cap (part nos. 568.1 and 568.2) for sealing the hollow shaft must imperatively be mounted to guarantee tightness and therefore the combustible dust hazard protection.
- As a general rule, the requirements of EN 50281-1-1 must be respected in dust hazardous locations. During commissioning, service, and maintenance, special care as well as qualified and trained personnel are required for the safe operation of actuators.

1.4. Warnings and notes

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

 **DANGER**

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



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



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



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


Arrangement and typographic structure of the warnings



Type of hazard and respective source!

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

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

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


1.5. References and symbols

The following references and symbols are used in these instructions:

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

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

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

< > **Reference to other sections**

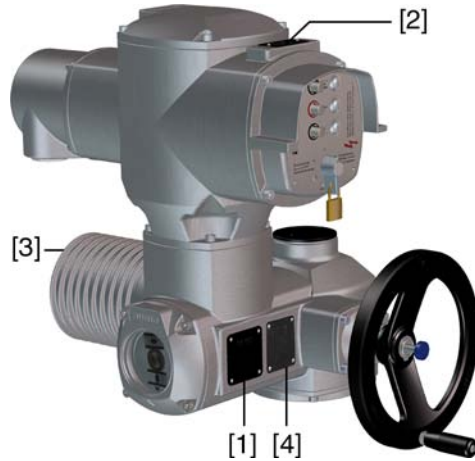
Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

2. Identification

2.1. Name plate

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

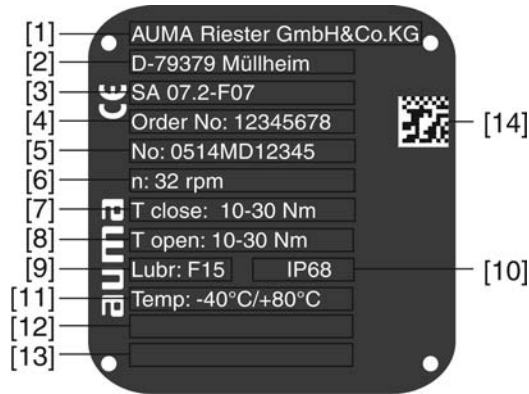
Figure 1: Arrangement of name plates



- [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

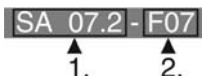
Figure 3: Actuator controls name plate



- [1] **Type designation**
- [2] **Order number**
- [3] **Serial number**
- [4] Actuator terminal plan
- [5] Actuator controls terminal plan
- [6] Mains voltage
- [7] **AUMA power class for 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
- SAR 07.2, 07.6, 10.2, 14.2, 14.6, 16.2 = multi-turn actuators for modulating duty
- AMB 01.1 = AUMA MATIC BASIC 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.

Control

Table 2: Control examples (indications on 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)
230 V AC	Control voltage 230 V AC OPEN-CLOSE control via digital inputs (OPEN, STOP, CLOSE)

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:



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 electro-mechanical version of the AUMA MATIC controls includes switchgear for control in OPEN - CLOSE duty and a logic for various indications via contacts

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.



Hovering load!

Risk of death or serious injury.

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

3.2. Storage



Danger of corrosion due to inappropriate storage!

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

Long-term storage

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

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

3.3. Packaging

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

4. Assembly

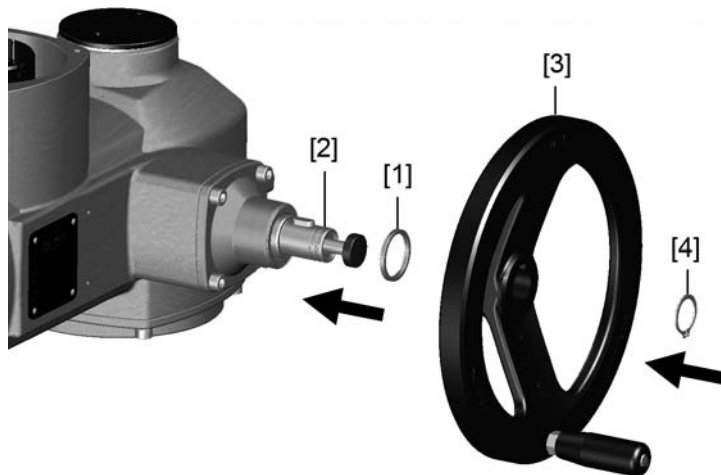
4.1. Mounting position

AUMA actuators 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

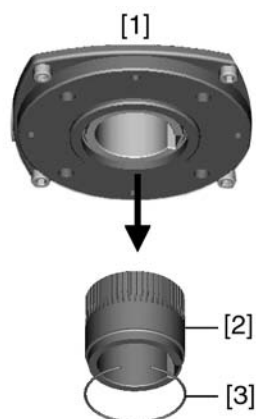
Danger of corrosion due to damage to paint finish and condensation!

- 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 sleeve with bore and keyway
- [3] Circlip

Information Spigot at flanges should be loose fit.

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

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

Information: Ensure that the spigot fits uniformly in the recess and that the mounting faces are in complete contact.
5. Fasten multi-turn actuator with screws according to table.

Information: We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.
6. Fasten screws crosswise to a torque according to table.

Table 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

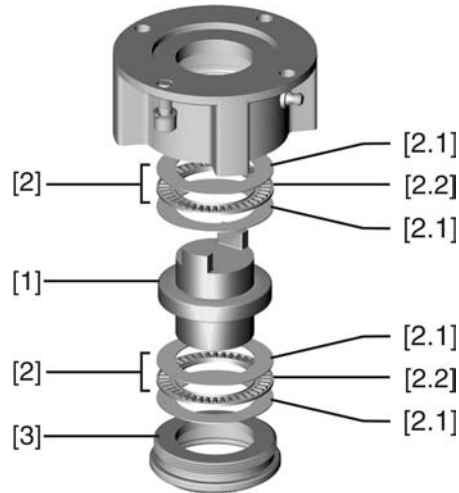
4.3.2. Output drive type A

- Application**
 - Output drive for rising, non-rotating valve stem
 - Capable of withstanding thrust
- Design** Torque is transmitted by means of a stem nut.
- Information** To adapt the actuators to available output drive types A 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

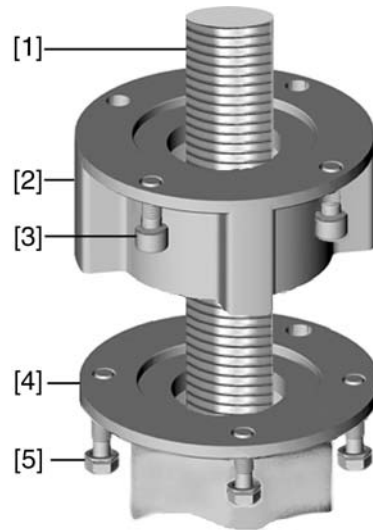


- [1] Stem nut
- [2] Bearing
- [2.1] Bearing race
- [2.2] Bearing rim
- [3] Spigot ring

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

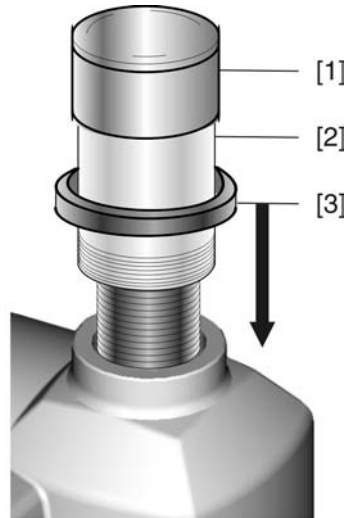
11. Turn multi-turn actuator with handwheel in direction OPEN until valve flange and output drive A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

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



5. Electrical connection

5.1. Basic information



Danger due to incorrect electrical connection

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

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

Wiring diagram/terminal plan

The pertaining wiring diagram/terminal plan (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	up to 1.5 kW	16 A (gL/gG)
Reversing contactor	up to 7.5 kW	32 A (gL/gG)
Reversing contactor	up to 11 kW	63 A (gL/gG)

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

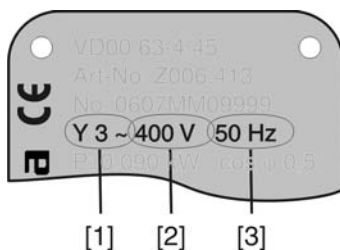
Power supply for the controls (electronics)

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.

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

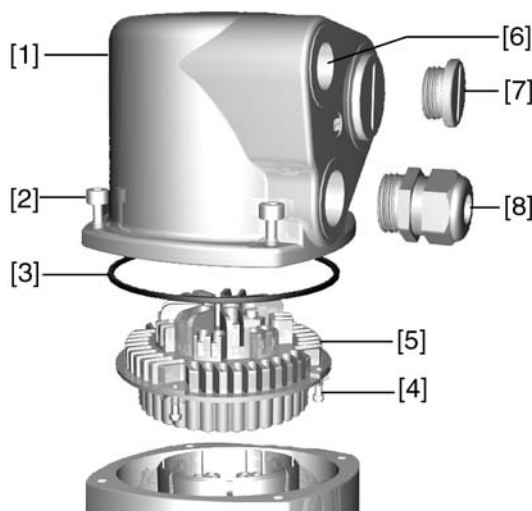
Cross sections AUMA plug/socket connector:

- 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

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

5.2.1. Terminal compartment: open

Figure 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 plugs
- [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 for enclosure protection IP68



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

5.2.2. Cable connection

✓ Observe permissible cross sections.

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

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

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



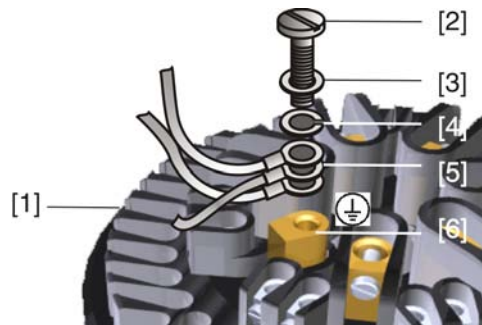
In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!

Risk of electric shock.

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

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

Figure 16: PE connection

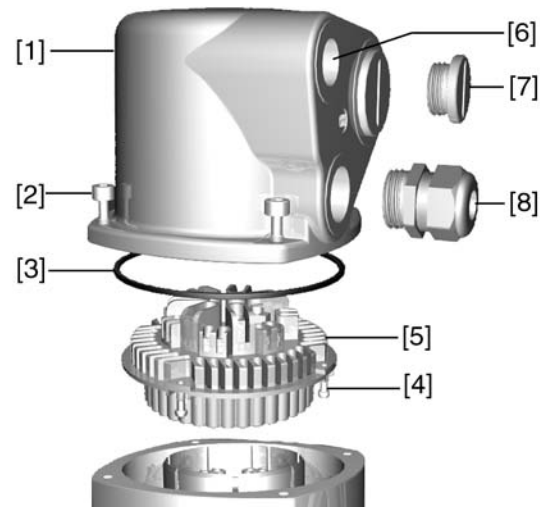


- [1] Socket carrier
- [2] Screw
- [3] Washer
- [4] Lock washer
- [5] Protective earth with ring lugs/loops
- [6] PE connection, symbol: ⊕

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 plugs
- [8] Cable gland (not included in delivery)

**Short-circuit due to pinching of cables!**

Risk of electric shock and functional failures.

→ Carefully fit socket carrier to avoid pinching the cables.

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

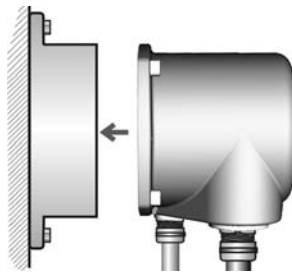
5.3. Accessories for electrical connection**5.3.1. Parking frame**

— Option —

Application Parking frame for safe storage of a disconnected plug.

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

Figure 18: Parking frame



5.3.2. Protection cover

— Option —

Application Protection cover for plug compartment when plug is removed.
The open terminal compartment can be closed using a protective cover (not illustrated).

5.3.3. Double sealed intermediate frame

— Option —

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

5.3.4. External earth connection

— Option —

Application External earth connection (terminal clamp) for connection to equipotential compensation.

Figure 19: Earth connection



Cross sections of earth connection:

- 2 x 2.5 mm² to 6 mm² (solid and stranded conductors) or
- 2 x 1.5 mm² to 4 mm² (fine stranded conductors)

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.

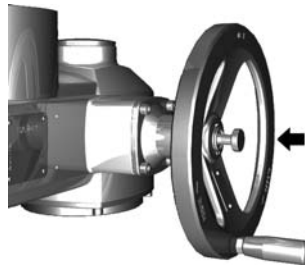
6.1.1. Manual operation: engage

NOTICE

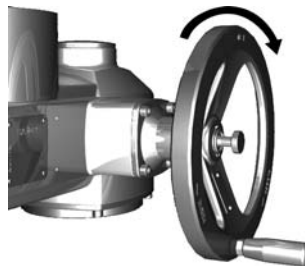
Damage at the motor coupling due to faulty operation!

→ 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.

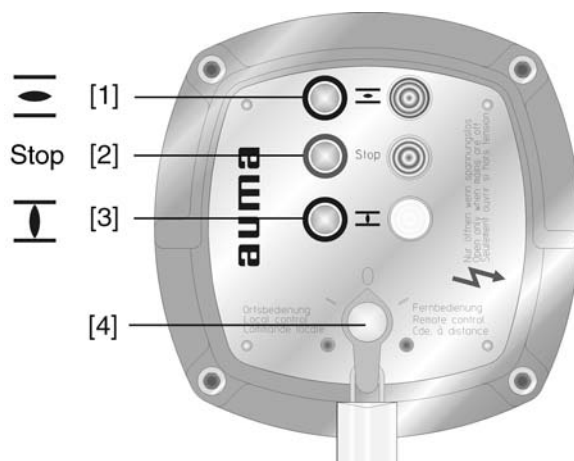
6.2. Motor operation

- ✓ 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 20: 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



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).

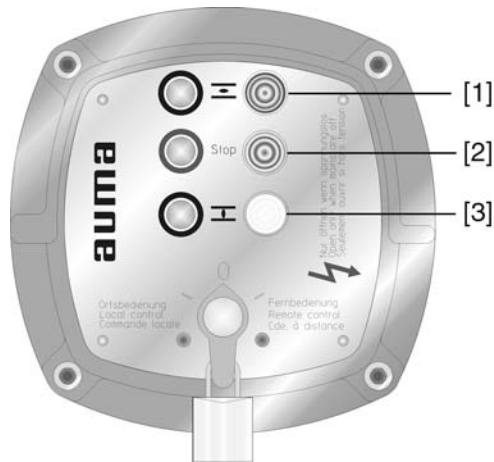


- ➔ Now, it is possible to operate the actuator via remote control, via operation commands (OPEN, STOP, CLOSE).

7. Indications

7.1. Indication lights

Figure 21: Local controls with indication lights



- [1] illuminated (green): End position OPEN reached
- [2] illuminated (red): Fault signal (option)
- [3] illuminated (yellow): End position CLOSED reached

Fault signal (option) The fault signal (red indication light) indicates the following events:

- Torque fault: The set torque was exceeded before reaching an end position.
- Thermal fault: Motor protection has tripped, i.e. the motor is overheated.

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 22: 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 (binary)

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

Feedback signal	Type and designation in wiring diagram
End position OPEN/CLOSED reached	Signalling via limit switches (NO), non potential-free Value of the output signal depends on control voltage (refer to wiring diagram)
	LSC Limit switch, closing, clockwise rotation
	LSO Limit switch, opening, counterclockwise rotation
	Option: Tandem switch with additional potential-free contacts LSC1 and LSO1
Intermediate position reached (option)	Potential-free signal via switches (NC/NO) Condition: DUO limit switching in the actuator
	LSA DUO limit switch, clockwise rotation
	LSB DUO limit switch, counterclockwise rotation
Torque o.k./ Torque fault	Potential-free signal via contacts, terminals XK 15 and XK 16 Condition: Relay board A5 within the controls Output contact XK 15 closed = no torque fault Output contact XK 16 = torque fault, i.e. the set torque was exceeded before reaching an end position.
Torque OPEN/CLOSED reached (option)	Potential-free signal via switches (NC/NO) Condition: Torque switch in tandem arrangement with TSC/TSO
	TSC1 Torque switch, closing, clockwise rotation
	TSO 1 Torque switch, opening, counterclockwise rotation
Motor protection tripped (option)	Potential-free signal via contacts, terminal XK 13 Condition: Relay board A5 within the controls Thermoswitch tripped (NO contact) = Output contact closed
	F1, Th Thermoswitches
	F7 Thermal overload relay
Selector switch position (option)	Potential-free signal via switches (2 x NC) Condition: Selector switch with 2 levels indicates selector switch position LOCAL/REMOTE
Running indication (option)	Potential-free signal via switch (NC) Contact opens and closes (blinks) during an actuator operation
	S5, BL Blinker transmitter

8.2. Feedback signals (analogue)

Feedback signal	Type and designation in wiring diagram
Valve position (option)	Depending on version either with potentiometer or electronic position transmitter EWG/RWG
	R2 Potentiometer
	R2/2 Potentiometer in tandem arrangement (option)
	B1/B2, EWG/RWG 3-wire or 4-wire system (0/4– 20 mA)
B3/B4, EWG/RWG 2-wire system (4 – 20 mA)	

9. Commissioning (basic settings)

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



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

2. Switch on the power supply.

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

3. Perform basic settings.

9.1. Switch compartment: open

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

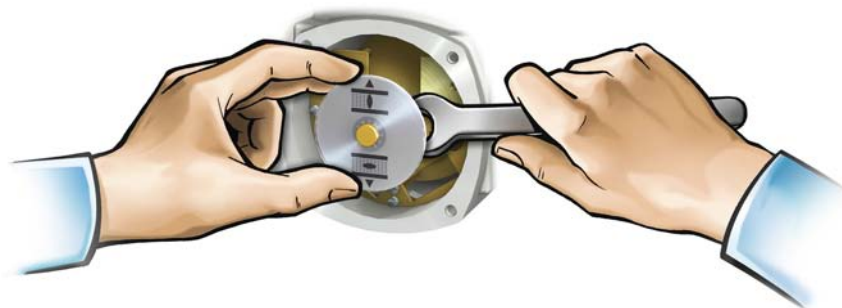
1. Loosen screws [2] and remove cover [1] from the switch compartment.



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.



9.2. Torque switching: set

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

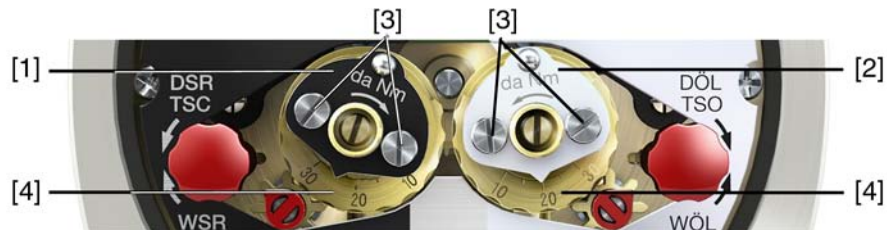
Information The torque switches may also trip during manual operation.

NOTICE

Valve damage due to excessive tripping torque limit setting!

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

Figure 23: Torque 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 $\hat{=}$ 250 Nm for direction CLOSE
 - White torque switching head set to approx. 20 da Nm $\hat{=}$ 200 Nm for direction OPEN
3. Fasten lock screws [3] again.

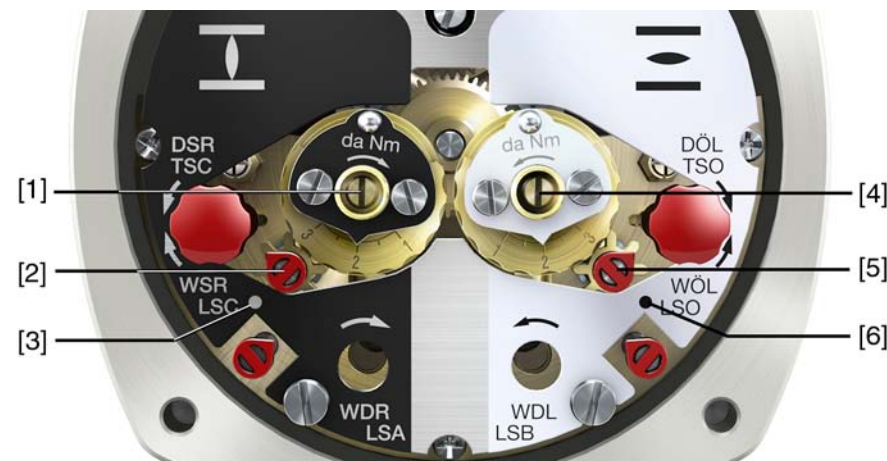
Information: Maximum tightening torque: 0.3 – 0.4 Nm

➔ The torque switch setting is complete.

9.3. Limit switching: set

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

Figure 24: Setting elements for limit switching



Black section:

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

White section:

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

9.3.1. End position CLOSED (black section): set

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

9.3.2. End position OPEN (white section): set

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

9.4. Intermediate positions: set

— Option —

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

Figure 25: Setting elements for limit switching



Black section:

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

White section:

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

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

9.4.1. Running direction CLOSE (black section): set

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

9.4.2. Running direction OPEN (white section): set

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

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

9.5. Test run

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

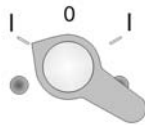
9.5.1. Direction of rotation: check

NOTICE

Valve damage due to incorrect direction of rotation!

- If the direction of rotation is wrong, switch off immediately (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).

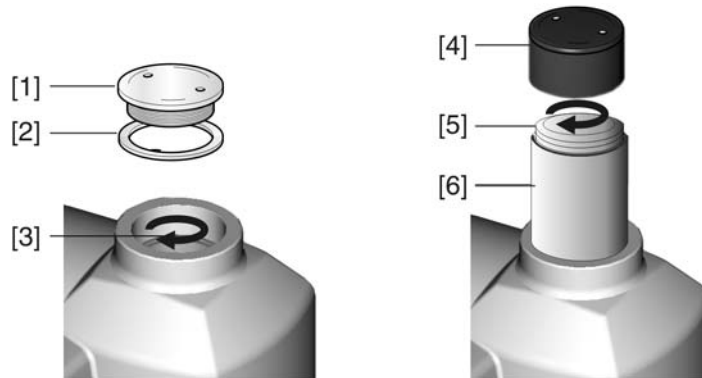


3. Switch on actuator in running direction CLOSE and observe the direction of rotation:
with indicator disc: step 4
without indicator disc: step 5 (hollow shaft)
→ Switch off before reaching the end position.
4. With indicator disc:
→ Observe direction of rotation.
➔ The direction of rotation is correct,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

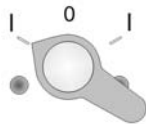
Figure 26: Hollow shaft/stem



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

9.5.2. Limit switching: check

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



2. Operate actuator using push buttons OPEN - STOP - CLOSE.
 - ➔ The limit switching is set correctly if (default indication):
 - the yellow indication light 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. 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	$(U_V - 12 V)/20 \text{ mA}$
Impact of power supply		0.1 %
Load influence		0.1 %
Temperature impact		< 0.1 ‰/K
Ambient temperature ²⁾		-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 27: 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

9.6.1. 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>.

9.6.2. 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 of 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)

9.6.3. 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

9.7. 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 28: View on control unit



[1] Potentiometer

9.7.1. 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).

9.8. 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 29: 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].

9.8.1. Measuring range: set

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



1. Move valve to end position CLOSED.

2. Connect measuring equipment for 0 – 20 mA to measuring points [4] and [5].
 If no value can be measured:
 - Check whether external load is connected to customer connection XK (for standard wiring: terminals 23/24). Consider maximum load R_B .
 - Or connect link across customer connection XK (for standard wiring: terminals 23/24).
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.

9.9. Mechanical position indicator: set



— Option —

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



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



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

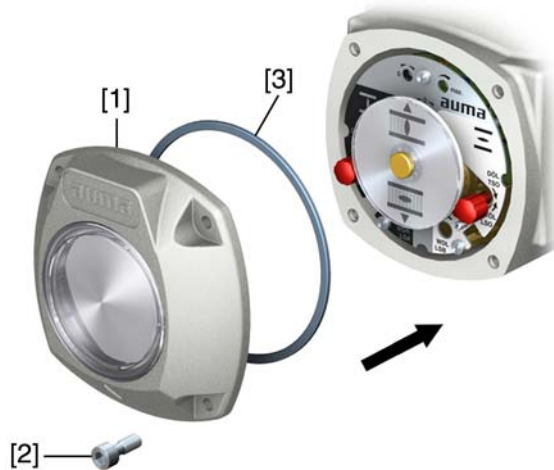
9.10. Switch compartment: close

NOTICE

Danger of corrosion due to damage to paint finish!

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

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



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

10. 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.

The following settings are described in these operation instructions:

- Setting the type of seating (limit or torque seating)
- Setting push-to-run operation or self-retaining
- Feedback signals setting via output contacts (option)

10.1. Local controls: remove



Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

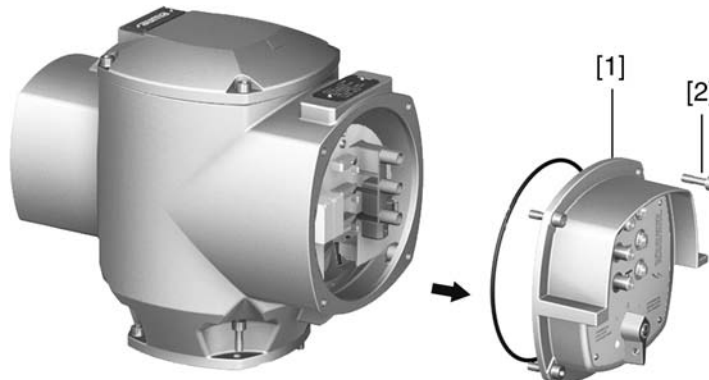
NOTICE

Electrostatic discharge ESD!

Risk of damage to electronic components.

→ Earth both operators and devices.

→ Loosen screws [2] and carefully remove local controls [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 a toggle switch on the signal and control 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.

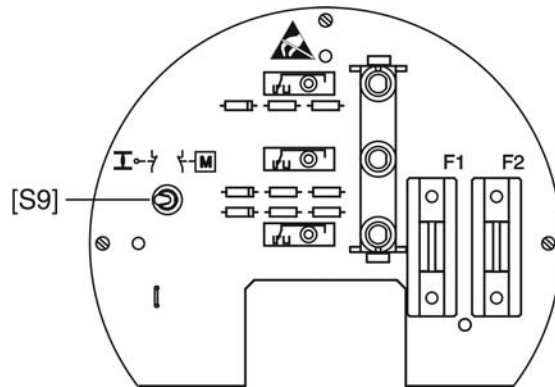
Torque seating

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

The limit switching is used for signalling and must be set to trip shortly **before** reaching the set tripping torque.

→ Set type of seating via toggle switch [S9].

Figure 30: Signal and control board



[S9] Toggle switch
 in position $\text{I} \rightarrow \text{M}$ = limit seating
 in position $\text{M} \rightarrow \text{I}$ = torque seating

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

The operation behaviour for operation commands (OPEN, STOP, CLOSE) can be set separately via the push buttons on the local controls or for operation commands from Remote.

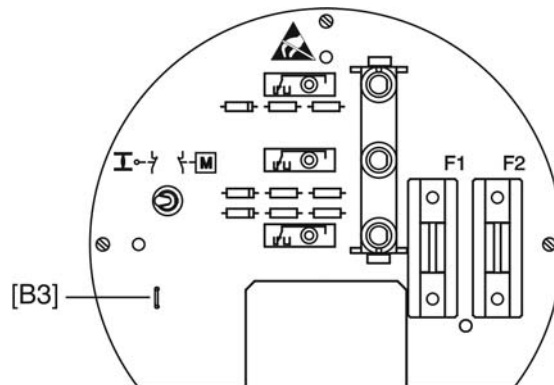
Push-to-run operation Actuator only runs in directions OPEN or CLOSE while an operation command is being received. The actuator stops if the operation command is cancelled.

Self-retaining After an operation command, the actuator continues to run in directions 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.

10.3.1. Push-to-run operation or self-retaining for operation commands via push buttons

Push-to-run operation or self-retaining for operation commands is set in the factory and usually remains unchanged. Subsequent modification is however possible but by interrupting or soldering a link on the signal and control board.

Figure 31: Signal and control board



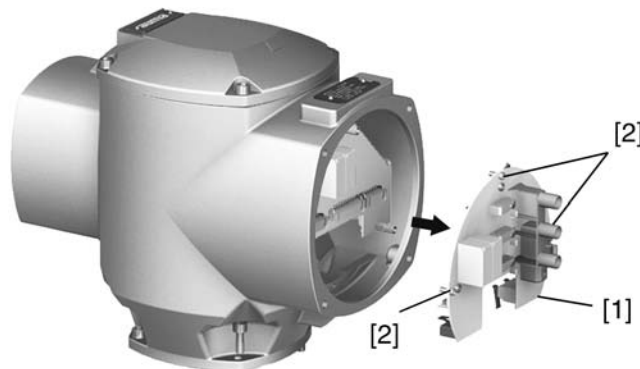
[B3] Soldering link closed = self-retaining LOCAL
 [B3] Soldering link interrupted = push-to-run operation LOCAL

10.3.2. Push-to-run operation or self-retaining for operation commands from Remote

The settings for push-to-run operation or self-retaining from Remote is made via a jumper on the wiring board.

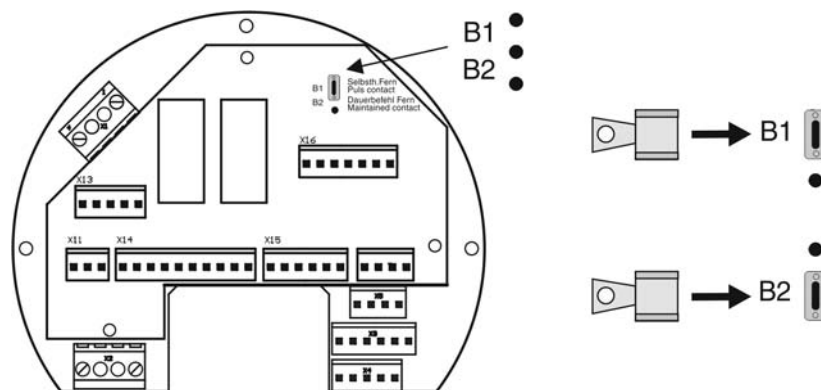
- Loosen all 3 screws [2] on the signal and control board [1] and remove board.
Information: Make sure not to disconnect the jumpers.

Figure 32: Remove signal and control board



- Set push-to-run operation or self-retaining via red jumper on wiring board.
 - Link via B1 = self-retaining REMOTE
 - Link via B2 = push-to-run operation REMOTE (continuous signal REMOTE)

Figure 33: Wiring board

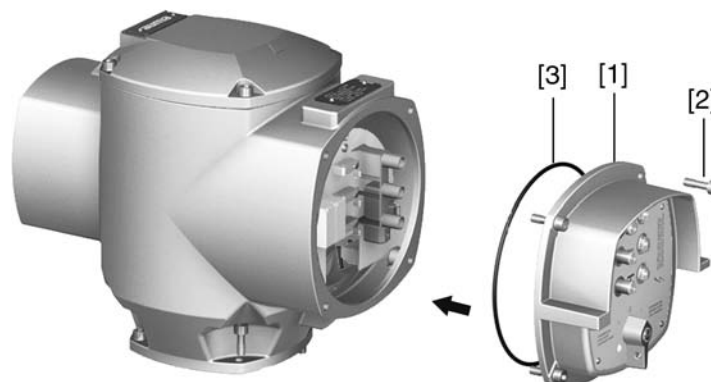


- Fasten signal and control board [2] again.

10.4. Local controls: mount

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

Figure 34:



- Fit local controls [1].

NOTICE

Cable damage due to twisting or pinching!

Risk of functional failures.

→ Carefully mount local controls.

5. Fasten screws evenly crosswise.

10.5. Controls: open

DANGER

Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

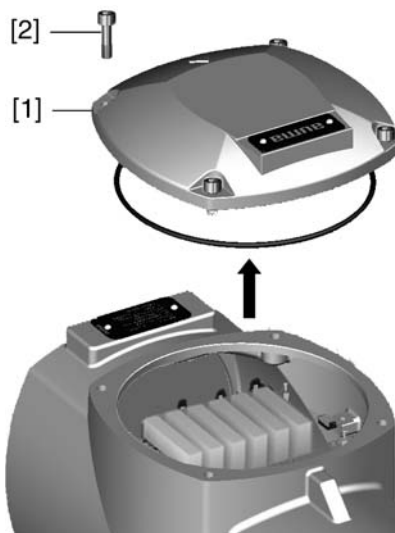
NOTICE

Electrostatic discharge ESD!

Risk of damage to electronic components.

→ Earth both operators and devices.

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



10.6. Feedback signals setting via output contacts

— (Option) —

Only valid for versions (B02 and B04) with output contacts K6, K7, K8 on relay board.

Setting

Feedback signals can be set via two jumpers on the relay board. Refer to the <Feedback signals setting> table for the set functions

Information

The jumpers for feedback signal setting are preset in the factory as specified in the order. The wiring diagram pertaining to the order has been coded accordingly and the connections for the signals (terminals XK) have been entered. In case of subsequent change of the setting (rewiring of the jumpers), the wiring diagram provided will no longer correspond to the changed settings. For this reason, setting changes may exclusively be performed by the AUMA service.

Figure 35: Relay board; left: version B02, right: version B04

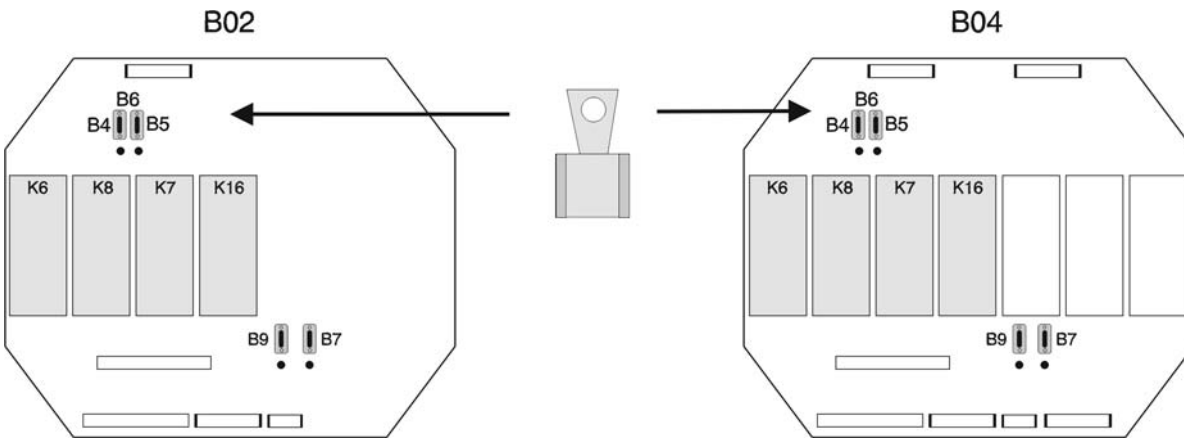







Table 11: Feedback signals setting

Function (Signal at terminal XK ... ¹⁾ active, if function matches)	Signal at terminal	Link
Torque switch tripped in mid-travel and/or Thermoswitch or thermal overload relay tripped	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
No thermoswitch or no thermal overload relay tripped	XK 13	
Torque switch tripped in mid-travel	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
No function	XK 13	
Torque switch tripped in mid-travel	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
No thermoswitch or no thermal overload relay tripped	XK 13	
Torque switch tripped in mid-travel	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
Thermoswitch or thermal overload relay tripped	XK 13	
Torque switch tripped in mid-travel	XK 16	B4  B5
No torque switch tripped in mid-travel	XK 15	
No function	XK 13	
Common connection	XK 14	

1) refer to order-related wiring diagram BSP ...

→

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

— (Option) —

EMERGENCY behaviour In case an EMERGENCY command is issued, the actuator will run to the defined end position:

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

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

Connection The EMERGENCY command is initiated by a signal at the ESD COMMAND input (refer to wiring diagram).

The ESD COMMAND input must be connected via an NC contact to the control voltage (quiescent current principle). If an EMERGENCY command is issued (signal is cancelled = NO contact activated), the actuator runs to the defined end position.



Risk of immediate actuator operation when switching on!

Risk of personal injuries or damage to the valve

- Ensure that the ESD COMMAND signal is present when switching on.
- If the actuator starts to run unexpectedly: Immediately press push button **Stop**.

Setting

Settings for the EMERGENCY command are performed via a jumper on the relay board. For the set EMERGENCY behaviour, refer to the <EMERGENCY command setting> table

Information

The jumper for EMERGENCY command setting is present in the factory as specified in the order. The wiring diagram pertaining to the order has been coded accordingly and the connection for the input (terminals XK) has been entered. In case of subsequent change of the setting (rewiring of the jumper), the wiring diagram will no longer correspond to the changed settings. For this reason, setting changes may exclusively be performed by the AUMA service.

Figure 36: Relay board

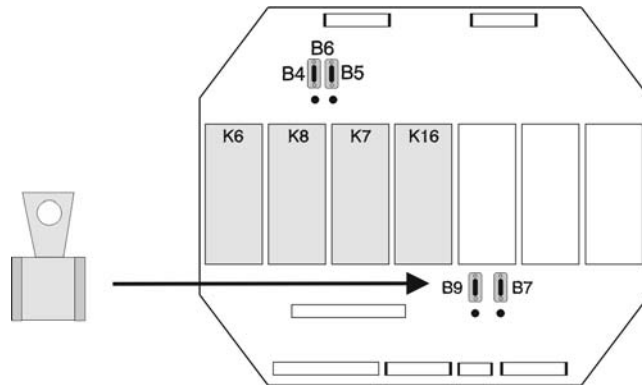


Table 12: EMERGENCY command setting

Link [B9]	EMERGENCY command (EMERGENCY behaviour)
	EMERGENCY - CLOSE (Actuator runs to end position CLOSED.)
	EMERGENCY - OPEN (Actuator runs to end position OPEN.)

10.8. Controls: close

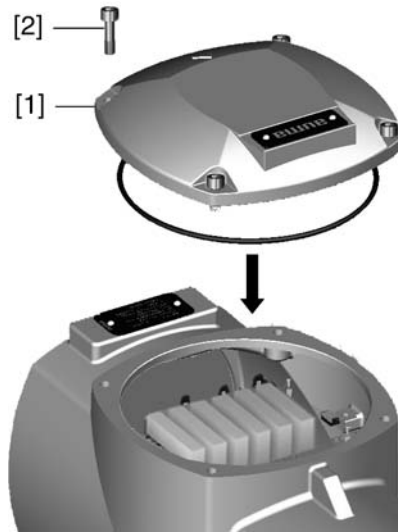


Danger of corrosion due to damage to paint finish!

→ 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 13: 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.	<ul style="list-style-type: none"> 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).
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:



- 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.
- Turn test button [2] in direction of the TSO arrow: Torque switch OPEN trips. The red indication light (fault) on the local controls is illuminated.

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.

- Turn test button [1] in direction of the LSC arrow: Limit switch CLOSED trips.
- 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.

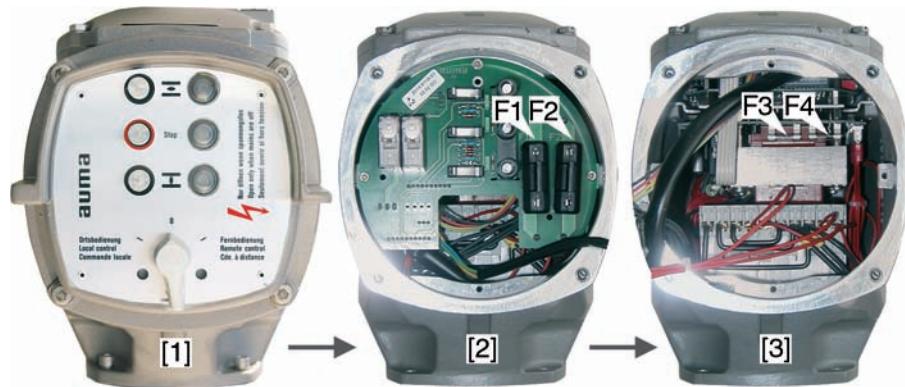


Hazardous voltage!

Risk of electric shock.

→ Disconnect device from the mains before opening.

Figure 37: Access to fuses



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

F1/F2 Primary fuses on power supply unit

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

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
- 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

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

Information Only use fuses of same type and value for replacement.

→ After replacing the fuses, fasten local controls 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, thermostiches are embedded in the motor winding. The thermostat is tripped as soon as the max. permissible winding temperature has been reached.

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

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

Version with thermostat (standard)

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

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

The operation may only be resumed once the fault signal (red 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.

12. Servicing and maintenance



Damage caused by inappropriate maintenance!

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

AUMA Service & Support

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

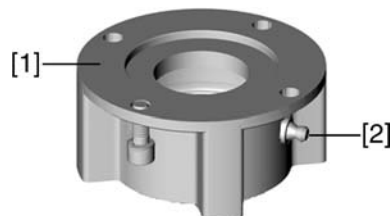
12.1. Preventive measures for servicing and safe operation

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 38: Output drive type A



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

Table 14: Grease quantities for bearing of output drive type A

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

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

For enclosure protection IP68

After continuous immersion:

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

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: $\pm 10\%$ Permissible variation of mains frequency: $\pm 5\%$ (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: Thermostitches (NC) DC motors: Without
	Option: Thermostitches (NC) in the actuator and in the thermal overload relay of controls
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, on request
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 open-close duty with 3-phase AC motors) For exact version, refer to actuator name plate.
Humidity	Up to 100 % relative humidity across the entire permissible temperature range
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: <ul style="list-style-type: none"> • Depth of water: Maximum 8 m head of water • Duration of continuous immersion in water: Maximum 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 use in areas with high salinity, almost permanent condensation, and high pollution. Option: KX: Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution. 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 controls and motor Permissible variation of the mains voltage: $\pm 10\%$ Permissible variation of the mains frequency: $\pm 5\%$ 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
Overvoltage category	Category III according to IEC 60364-4-443
Rated power	The controls are designed for the rated motor power, refer to motor name plate
Switchgear	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
Reversing contactors are designed for a lifetime of 2 million starts. For the assignment of AUMA power classes, please refer to Electrical data Multi-turn actuators/Part-turn actuators.	
Control	Standard: Control inputs OPEN - STOP - CLOSE, 230 V AC, internally supplied (non potential-free) EMERGENCY-STOP function from control room, independent of position of selector switch
	Option: Control inputs , OPEN - STOP - CLOSE, 24 V DC, externally supplied (with galvanic isolation via contact), current consumption: approx. 15 mA per input Control inputs OPEN - STOP - CLOSE, 24 V DC, internally supplied (non potential-free) Control inputs OPEN - STOP - CLOSE, 115 V AC, internally supplied (non potential-free)
Status signals	Standard: Output signals for end positions OPEN/CLOSED, 230 V AC, internally supplied (non potential-free) for external indication lights OPEN/CLOSE ($P_{max} = 2.5\text{ W}$)
	Options: <ul style="list-style-type: none"> • 5 potential-free output signals with one common, max. 250 V AC, 2 A (resistive load) <ul style="list-style-type: none"> - Motor protection tripped (thermal fault) - Torque fault - No torque fault • Selector switch position LOCAL/REMOTE
Voltage output	Standard: 230 V AC $\pm 10\%$, max. 2.5 W for supply of the control inputs., galvanically isolated from internal voltage supply
	Option: 24 V DC $\pm 5\%$, max. 10 mA for supply of the control inputs, galvanically isolated from internal voltage supply 115 V AC $\pm 10\%$, max. 30 mA for supply of the control inputs, galvanically isolated from internal voltage supply
Local controls	Standard: Selector switch LOCAL - OFF - REMOTE (lockable in all three positions) Push buttons OPEN, STOP, CLOSE 2 indication lights: End position CLOSED (yellow), end position OPEN (green)
	Options: 3 indication lights: End position CLOSED (yellow), collective fault signal (red), end position OPEN (green)
	Special colours for the indication lights
	Protection cover, lockable

Features and functions		
Functions	Standard:	Standard: <ul style="list-style-type: none"> Switch-off mode adjustable <ul style="list-style-type: none"> Limit or torque seating for end position OPEN and end position CLOSED Overload protection against excessive torques over the whole travel 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 Selectable type of seating, limit or torque seating for end position OPEN and end position CLOSED
Motor protection evaluation	Standard:	Monitoring the motor temperature in combination with thermostats within actuator motor
	Options:	Additional thermal overload relay in controls combined with thermostats within actuator Additional thermal overload relay in the controls
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	

Further options for version with EWG/RWG in actuator	
Position feedback signal (option)	Analogue output E2 = 0/4 – 20 mA (load max. 500 Ω)

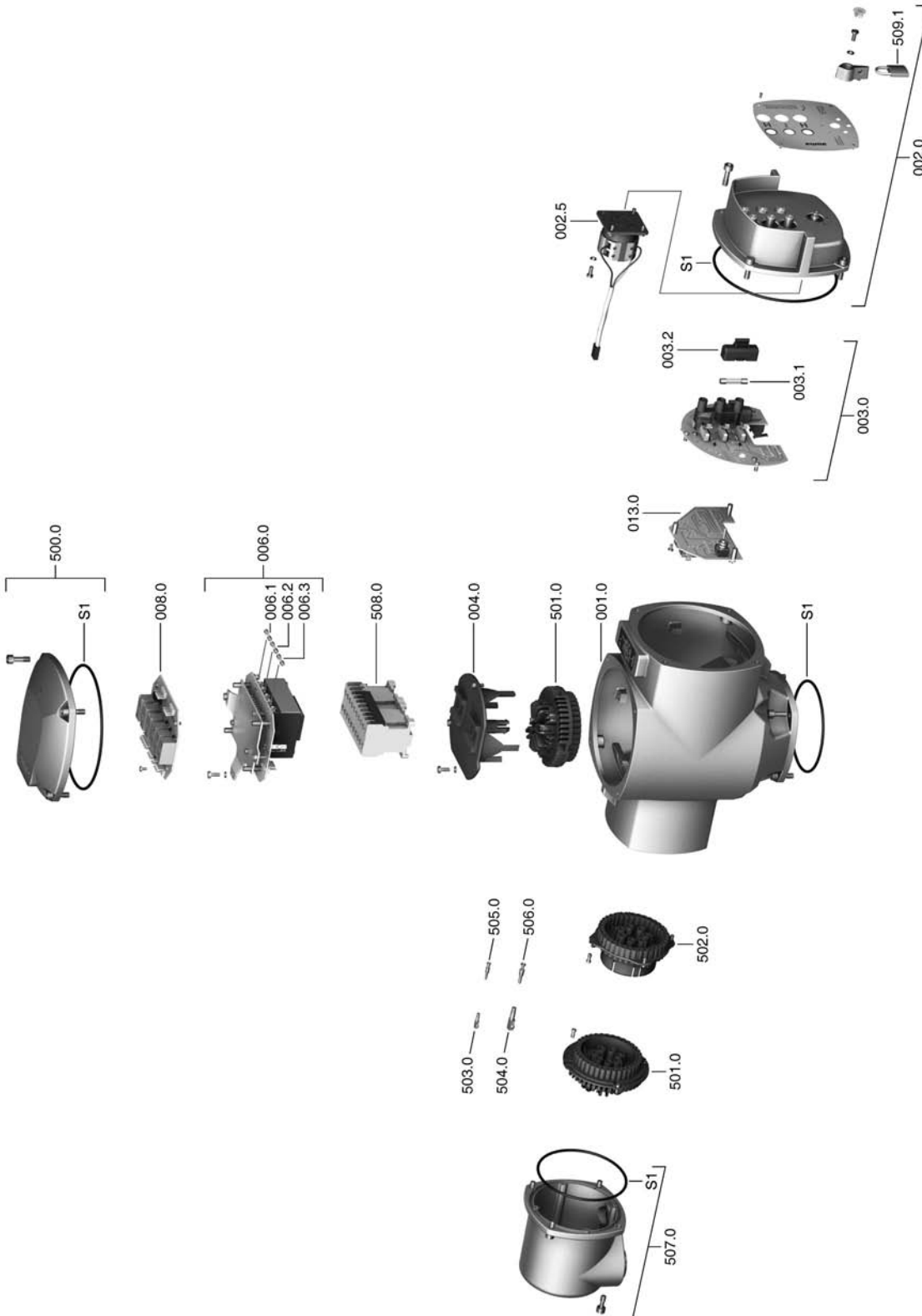
Service conditions		
Use	Indoor and outdoor use permissible	
Mounting position	Any position	
Installation altitude	≤ 2 000 m above seal level > 2,000 m above sea level on request	
Ambient temperature	Standard:	–40 °C to +70 °C
	Options:	–60 °C to +60 °C, extreme low temperature version incl. heating system Low temperature versions incl. heating system for connection to external power supply 230 V AC or 115 V AC.
For exact version, refer to actuator controls 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: <ul style="list-style-type: none"> Depth of water: maximum 8 m head of water Duration of continuous immersion in water: Max. 96 hours Up to 10 operations during continuous immersion Modulating duty is not possible during continuous immersion.		
For exact 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	1 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 use in areas with high salinity, almost permanent condensation, and high pollution.
	Option:	KX: Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.

Service conditions		
Finish coating	Powder coating Two-component iron-mica combination	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Other colours available on request
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)	

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	Sub-assembly
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	Manual gearing	Sub-assembly	556.0	Potentiometer as 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 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	575.1	Stem nut A (without thread)	
507.0	Cover for electrical connection	Sub-assembly	583.0	Motor coupling on motor shaft	Sub-assembly
511.0	Threaded plug	Sub-assembly	583.1	Pin for motor coupling	
514.0	Output drive form A (without stem nut)	Sub-assembly	584.0	Retaining spring for motor coupling	Sub-assembly
514.1	Axial needle roller bearing	Sub-assembly	614.0	Position transmitter EWG	Sub-assembly
516.0	Output drive D	Sub-assembly	S1	Seal kit, small	Set
535.1	Snap ring		S2	Seal kit, large	Set

14.2. Actuator controls AUMA Matic BASIC AMB 01.1/AMB 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	Cover for fuse	
004.0	Carrier for contactors	
006.0	Power supply unit	Sub-assembly
006.1	Secondary fuse F3	
006.2	Secondary fuse F4	
006.3	Secondary fuse F5	
008.0	Relay board	Sub-assembly
013.0	Wiring 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 control	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	
S1	Seal kit	Set

15. Certificates

15.1. Declaration of Incorporation and EC Declaration of Conformity

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www.auma.com



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

for electric AUMA 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 Müllheim

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

Müllheim, 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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