SIEMENS

A-Series Electric Actuator Auma (21,300 and 40,680 lb-in)

Installation, Operation and Maintenance Manual

SA 07.6/GS 125.3 = A226.21K
SA 10.2/GS 100.3 = A226.41K

SAR 07.6/GS 125.3 = A266.21K
SAR 10.2/GS 100.3 = A266.41K

A6V12052002

Smart Infrastructure

2020-07-14

Table of Contents

Introduction

The A-series AUMA quarter-turn industrial electric actuator mounts directly to Siemens resilient seat butterfly valves without the need for brackets and linkages. Available in torque outputs of 21,300 lb-in (2406 Nm) and 40,680 lb-in (4596 Nm) in 120 Vac, Two-Position (On/Off) and Modulating units. All AUMA actuators are NEMA 6P and IP-68 rated

Safety instructions

Basic information on safety

Standards/directives

Our products are designed and manufactured in compliance with recognized standards and directives. This is certified in a Declaration of Incorporation and an EU Declaration of Conformity.

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

Safety

This device left the factory in proper condition to be safely installed and operated in a hazard-free manner. The notes and warnings in this document must be observed by the user to ensure hazard-free operation of this device.

All necessary precautions must be taken to prevent damage due to rough handling, impact, or improper storage. Do not use abrasive compounds to clean the device, or scrape its surfaces with any objects.

Configuration and setup procedures for this device are described in this manual. Proper configuration and setup are required for the safe operation of this device.

The control system in which this device is installed must have proper safeguards to prevent injury to personnel, or damage to equipment, should a failure of system components occur.

⚠ WARNING

Installation, commissioning, operation and maintenance of the unit must be performed under strict observation of all applicable codes, standards, and safety regulations.

The actuator must be installed, commissioned, operated and repaired only by qualified personnel. A qualified person is one who is trained in:

- The operation and maintenance of electrical equipment and systems in accordance with established safety practices.
- Procedures to energize, de-energize, ground, tag and lockout electrical circuits and equipment in accordance with established safety practices.
- The proper use and care of personal protective equipment (PPE) in accordance with established safety practices.
- First aid.

This document does not cover every detail about every version of the product described. It does not consider every potential occurrence concerning the installation, operation, maintenance and use of this device.

If situations transpire that are not documented in sufficient detail, please request the required information from the Siemens Distributor or Representative responsible for your area.

Commissioning

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

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, for example, cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.

Operation

Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the device if it is in perfect condition while observing these instructions.
- Immediately report any faults and damage and allow for corrective measures.
- Observe recognized rules for occupational health and safety.
- Observe national regulations.
- During operation, the housing warms up and surface temperatures >140°F (60°C) may occur. To prevent possible burns, we recommend checking the surface temperature using an appropriate thermometer and wearing protective gloves, if required, prior to working on the device.

Protective measures

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

Maintenance

To ensure safe device operation, follow the maintenance instructions included in this manual.

Any device modification requires prior written consent of the manufacturer.

Range of application

AUMA multi-turn actuators are designed for the operation of Siemens resilient seat butterfly valves.

Do not use for the following applications:

- 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
- Radiation exposed areas in nuclear power plants

No liability can be assumed for inappropriate or unintended use.

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

Information

These operating instructions are only valid for the "clockwise closing" standard version, (the driven shaft turns clockwise to close the valve).

Warnings and notes

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

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

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

	**⚠ CAUTION**
	Indicates a potentially hazardous situation with a low level of risk. Failure to observe this warning may result in minor or moderate injury. May also result in equipment damage.

	***NOTICE***
	Potentially hazardous situation. Failure to observe this warning may result in property damage. It is not used for personal injury.

Arrangement and typographic structure of the warnings

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

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

References and symbols

The following references and symbols are used in these instructions:

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

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

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

M ▷ **Via the menu to parameter**

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

< > **Reference to other sections**

Terms in brackets shown above refer to other sections of the document that provide further information on this topic. These terms are either an index listing, a heading or appear in the table of contents and may easily be located.

Identification

Name plate

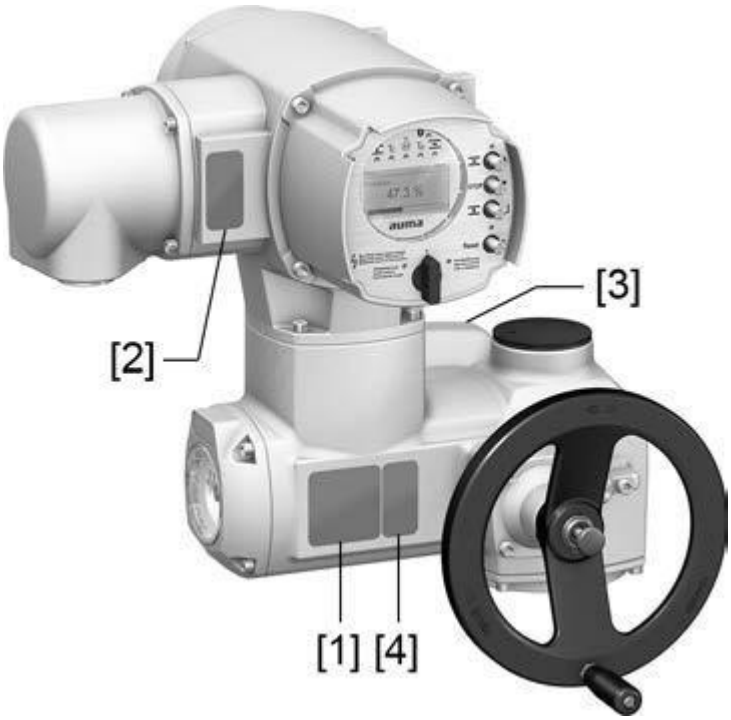


Figure 1: Arrangement of name plates.

[1]	Actuator name plate
[2]	Actuator controls name plate
[3]	Motor name plate
[4]	Additional plate

Actuator name plate

Figure 2: Actuator name plate (example).

auma (= manufacturer logo)

CE (= CE mark)

[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]	Permissible ambient temperature
[11]	Can be assigned as an option upon customer request
[12]	Enclosure protection
[13]	Data Matrix code

Name plate for actuator controls (example)

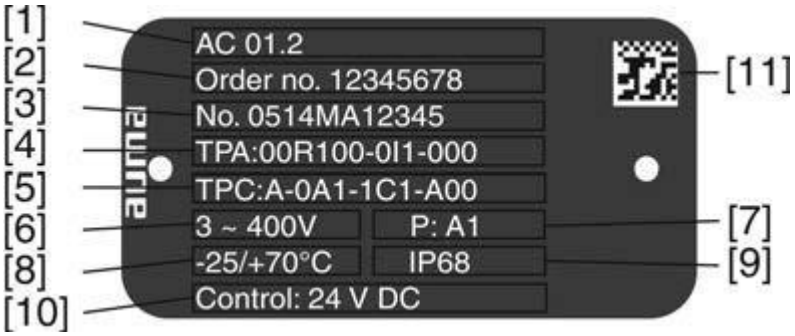


Figure 3: Name plate for actuator controls (example).

[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

Motor name plate

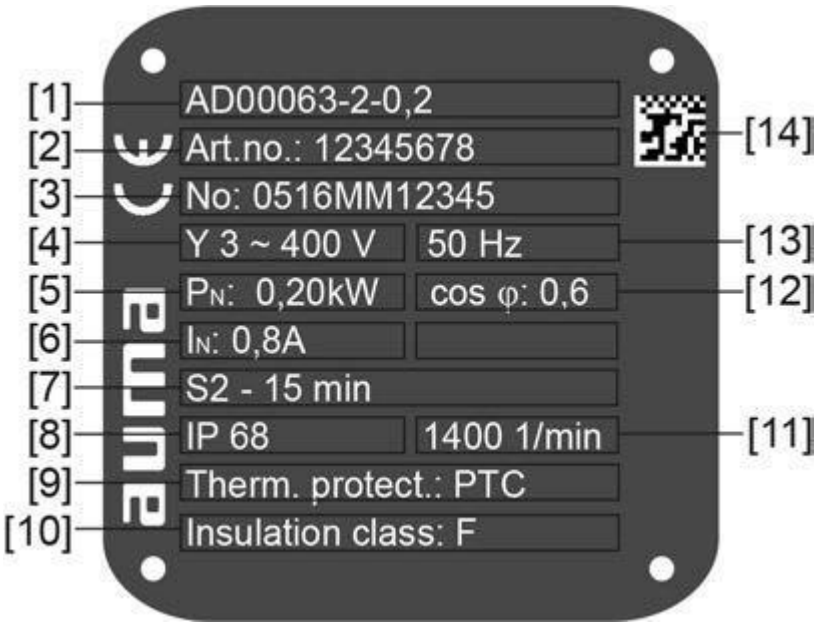


Figure 4: Motor name plate (example).

auma (= manufacturer logo)

CE (= CE mark)

[1]	Motor type
[2]	Motor article number
[3]	Serial number
[4]	Current type, mains voltage
[5]	Rated power
[6]	Rated current
[7]	Type of duty
[8]	Enclosure protection
[9]	Motor protection (temperature protection)
[10]	Insulation class
[11]	Speed
[12]	Power factor cos phi
[13]	Mains frequency
[14]	Data Matrix code

Descriptions referring to name plate indications

Type designation

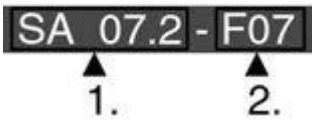


Figure 5: Type designation (example)

[1]	Type and size of actuator
[2]	Flange size

Type and size

These instructions apply to the following devices types and sizes:

SA 07.6/ GS 125.3 = A226.21K
SA 10.2/GS 100.3 = A226.41K
Multi-turn actuator for On/Off duty

SAR 07.6/ GS 125 = A266.21K
SAR 10.2/ GS 100.3 = A266.41K
Multi-turn actuator for modulating duty

Actuator serial number

Description of serial number (with example 0516MD12345)

05 16 MD12345

05 Positions 1+2: Assembly in week = week 05

16 Positions 3+4: Year of manufacture = 2016

MD12345 Internal number for unambiguous product identification

Actuator terminal plan

Position 9 after **TPA**: Position transmitter version **I, Q** = MWG (magnetic limit and torque transmitter)

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 maximum 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, see 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 maximum rated power in kW.

Control

Control examples (indications on actuator controls name plate)

Input signal	Description
24 Vdc	Control voltage 24 Vdc for OPEN - CLOSE control using digital inputs (OPEN, STOP, CLOSE)
48 Vdc	Control voltage 48 Vdc OPEN – CLOSE control using digital inputs (OPEN, STOP, CLOSE)
60 Vdc	Control voltage 60 Vdc OPEN - CLOSE control using digital inputs (OPEN, STOP, CLOSE)
115 Vac	Control voltage 115 Vac for OPEN - CLOSE control using digital inputs (OPEN, STOP, CLOSE)
0/4 to 20 mA	Input current for setpoint control using analog input

Short description

Multi-turn actuator

Definition in compliance with EN 15714-2/EN ISO 5210:

A multi-turn actuator is an actuator that transmits torque to a valve for at least one full revolution. It is capable of withstanding thrust.

AUMA multi-turn actuators are driven by an electric motor. A handwheel is provided for manual operation. End positions can be switched off by limit or torque seating. Actuator controls are required to operate or process the actuator signals.

Actuator controls

AC 01.2 actuator controls are used to operate AUMA actuators and are supplied ready for use. The actuator controls may be mounted directly to the actuator or separately on a wall bracket.

The functions of AC 01.2 actuator controls include standard valve control in OPEN-CLOSE duty, positioning, process control, logging of operating data right through to diagnostic functions.

Local controls/AUMA CDT

Operation, setting, and display can be performed directly at the actuator controls. When set to local control, it is possible to:

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

Non-Intrusive

Non-Intrusive version (control unit: electronic):

Limit and torque settings are performed using the controls, without removing the actuator or actuator controls covers. For this purpose, the actuator is equipped with an MWG (magnetic limit and torque transmitter), also capable to supply analog torque feedback signals/torque indication and analog position feedback signals/position indication at the actuator controls output.

Transport, storage and packaging

Transport

Use sturdy packaging when transporting to the installation site.

	**⚠ DANGER**
	Hovering load! Risk of death or serious injury. • Do NOT stand below hovering load. • Attach ropes or hooks for lifting by hoist only to the housing and NOT to the handwheel. • Actuators mounted on valves: Attach ropes or hooks for lifting by hoist to the valve and NOT to the actuator. • Actuators mounted to gearboxes: Attach ropes or hooks for lifting by hoist only to the gearbox using eyebolts and NOT to the actuator. • Actuators mounted to controls: Attach ropes or hooks for lifting by hoist only to the actuator and NOT to the controls. • Note the total combined weight (actuator, actuator controls, gearbox, valve). • Secure the load from falling, sliding or tilting. • Perform a lift trial at a low height to eliminate any potential danger, for example, by tilting.

Figure 6: Example: Lifting the actuator.

Table 1: Weights for A2x6.21K and A2x6.41K models.

Type designation Actuator	Weight approx. Lbs (kg)
SA 07.6/ SAR 07.6 A226.21K A266.21K	55 (25)
SA 10.2/ SAR 10.2 A226.41K A266.41K	68 (31)

Storage

⚠ CAUTION

Inappropriate storage may result in corrosion!

- 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.

⚠ CAUTION

Temperatures below permissible level can result in display damage!
Do not store AC actuator controls below -22°F (-30°C).

Long-term storage

For long-term storage (more than six months), do the following:

Prior to storage:

Protect uncoated surfaces, in particular the output drive parts and mounting surface, with a long-term corrosion protection agent.

Approximately every six months:

Check for corrosion. At the first sign of corrosion, apply new corrosion protection.

Packaging

Special packaging for transport when leaving the factory protects the A-Series Industrial Electric Actuators (AUMA). The packaging consists of environmentally friendly materials that 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 centers.

Assembly

Mounting position

The A-Series Industrial Electric Actuators (AUMA) can be operated in any mounting position.

Restriction: When using oil instead of grease within the actuator gear housing, the hollow shaft mounting position must be perpendicular, with the flange pointing downward. The type of lubricant used is indicated on the actuator name plate (**F**...= grease; **O**...= oil).

Handwheel fitting Information

For transport reason, handwheels with a diameter of 15.75” (400 mm) and larger are supplied separately within the scope of delivery.

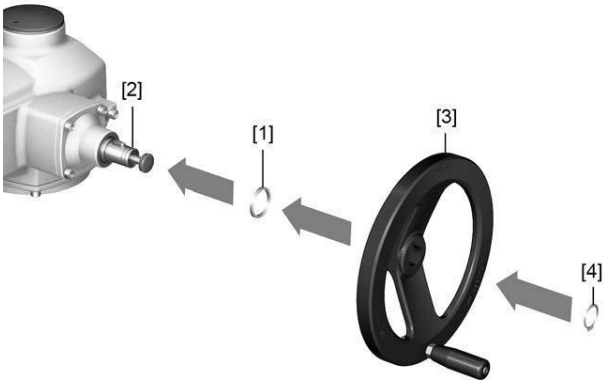


Figure 7: Handwheel.

[1]	Spacer
[2]	Input shaft
[3]	Handwheel
[4]	Retaining ring

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

Information

The retaining ring [4] (together with these operation instructions) is stored in a weatherproof bag, which is attached to the device prior to delivery.

Mounting the actuator

!	***NOTICE***
	Danger of corrosion due to damage to paint finish and condensation! • Touch up any damage to the paint finish after working on the device. • After mounting, connect the device immediately to electrical mains to ensure that heater minimizes condensation.

Mounting to valve/gearbox

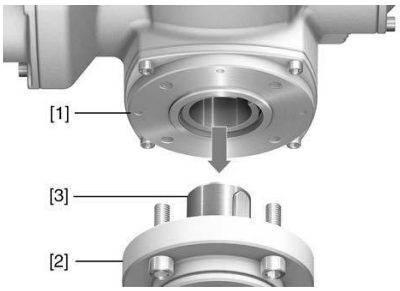


Figure 8: Mounting output drive types B

[1]	Multi-turn actuator
[2]	Valve/gearbox
[3]	Valve/gearbox shaft

1. Check if mounting flanges fit together.
2. Check if output drive of multi-turn actuator [1] matches the output drive of valve/gearbox or valve/gearbox valve shaft [2/3].
3. Apply a small quantity of grease to the valve or gearbox shaft [3].
4. Fit multi-turn actuator [1].
   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 torque according to the following Table *Tightening Torques for Screws*.
7. Turn multi-turn actuator with handwheel in the **OPEN** direction until the valve flange and output drive Type A firmly connect.
8. Tighten fastening screws (5) between the valve and output drive Type A crosswise, applying torque according to the above table.

Table 2: Tightening Torques for Screws.

Threads	Tightening torque lb-ft (Nm) Strength class A2-80/A4–80
M6	7 (10)
M8	17 (24)
M10	35 (48)
M12	60 (82)
M16	148 (200)
M20	289 (392)

Mounting positions of local controls

Figure 9: Mounting positions.

The mounting position of the local controls is implemented according to the order. If, after mounting the actuator to the valve or the gearbox on site, the local controls are not positioned properly, the mounting position can be changed at a later date. Four mounting positions shifted by respectively 90° are possible (maximum 180° into one direction).

Mounting positions: modify

⚠ DANGER

Hazardous voltage! Risk of electric shock.

Disconnect device from the power source before opening.

!	***NOTICE***
	Electrostatic discharge ESD! Risk of damage to electronic components. • Ground both operators and devices. • Loosen screws and remove the local controls. • Check if the O-ring is in good condition, correctly insert O-ring. • Turn local controls into new position and re-place.

!	***NOTICE***
	Cable damage due to twisting or pinching! Risk of functional failures. • Turn local controls by a maximum of 180°. • Carefully assemble local controls to avoid pinching the cables. • Fasten screws evenly crosswise.

Electrical connection

Basic information

	**⚠ WARNING**
	Danger due to incorrect electrical connection • Failure to observe this warning can result in death, serious injury, or property damage. • The electrical connection must be carried out exclusively by suitably qualified personnel. • Prior to connection, observe basic information contained in this chapter. • After connection but prior to applying the voltage, observe the <Commissioning> and <Test run> chapters.

Permissible networks (supply networks)

Actuator controls (actuators) are suitable for use in TN and TT networks with directly grounded star point for mains voltage up to maximum 690 Vac. Use in IT networks for nominal voltages up to maximum 600 Vac are permissible. For IT networks, a suitable, approved insulation monitor measuring the pulse code is required.

Current type, mains voltage, mains frequency

Type of current, mains voltage and mains frequency must match the data on the actuator controls and motor name plates. Also see chapter <Identification>/<Name plate>.

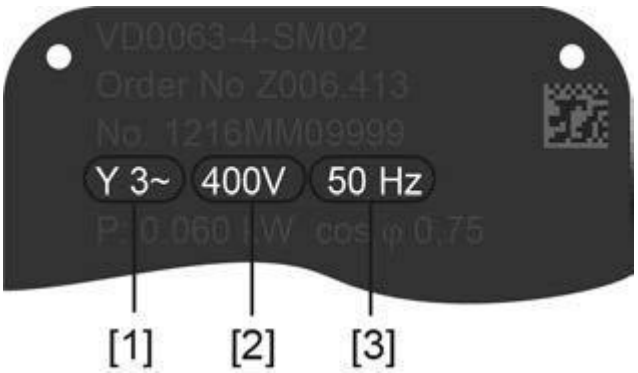


Figure 10: Motor name plate (example).

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

External supply of the electronics

For external electronics supply with 24 Vdc and simultaneous use of DC motors (24 Vdc, 48 Vdc, 60 Vdc, 110 Vdc, 220 Vdc), the 24 Vdc controls' voltage supply should be ensured using the XK25/26 terminals, separately from the power supply (U1, V1).

In case of common supply using a single cable (links from U1, V1 with XK25/26, for 24 Vdc only !!!), short-term excess or falling below the permissible voltage limits can occur when switching (24 Vdc +10 %/–10 %). Any possibly incoming operation commands are not executed outside the admissible limit values. The actuator controls briefly signal a fault condition.

Protection and sizing on site

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

The current values for sizing the protection can be derived from the current consumption of the motor (see the motor name plate) plus the current consumption of actuator controls.

We recommend adapting the switchgear sizing to the maximum current (I_{max}) and selecting and setting the overcurrent protection device in compliance with the indications in the electrical data sheet.

Table 3: Current consumption of actuator controls.

Mains voltage	**Maximum current consumption**	
Permissible variation of the mains voltage	±10%	–30%
100 to 120 Vac	750 mA	1,000 mA

Table 4: Maximum permissible protection.

Switchgear (switchgear with power class)[1)]	**Rated power**	**max. protection**	
Reversing contactor A1	up to 1.5 kW	16	A (gL/gG)
Reversing contactor A2	up to 7.5 kW	32	A (gL/gG)
Reversing contactor A3	up to 15 kW	63	A (gL/gG)
Thyristor B1	up to 1.5 kW	16	A (g/R) $I^2t<1,500A^2s$
Thyristor B2	up to 3 kW	32	A (g/R) $I^2t<1,500A^2s$
Thyristor B3	up to 5.5 kW	63	A (g/R) $I^2t<5,000A^2s$

1) The AUMA power class (A1, B1, ...) is indicated on the actuator controls name plate

Consider the motor starting current (I_A) (see the electrical data sheet) when selecting the circuit breaker. We recommend tripping characteristics D or K for circuit breakers in accordance with IEC 60947-2. For controls with thyristors, we recommend safety fuses instead of circuit breakers.

We recommend refraining from using residual current devices (RCD). However, if an RCD is used within the mains, the residual current device must be of type B.

For actuator controls equipped with a heating system and external electronics power supply, the fuses for the heating system must be provided by the customer (see the wiring diagram F4 ext.)

Table 5: Fuse for Heating System.

Designation in wiring diagram = F4 ext.	
External power supply	115 Vac
Fuse	2 AT

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

Potential of customer connections

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

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

Safety standards

Safety measures and safety equipment must comply with the respectively valid national on-site specifications. All externally connected devices shall comply with the relevant safety standards for the place of installation.

Connecting cables

- We recommend using connecting cables and connecting terminals according to rated current (I_N) (see the motor name plate or electrical data sheet).
- For device insulation, use appropriate (voltage-proof) cables. 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.
- Use screened cables for the connection of position transmitters.

Cable installation in accordance with EMC

- Signal and fieldbus cables are susceptible to interference. Motor cables are interference sources.
- Lay cables being susceptible to interference or sources of interference at the highest possible distance from each other.
- The interference immunity of signal and fieldbus cables increases if the cables are laid close to the ground potential.
- If possible, avoid laying long cables and ensure that they are installed in areas with low interference.
- Avoid parallel paths with little cable distance of cables being either susceptible to interference or interference sources.

Wiring

	CAUTION
	When wiring an A-Series Industrial Electric Actuator for two-position (on/off) control and the power to the actuator is commanded to be off, you must ensure that there is no extraneous or leakage voltage between hot and common. Leakage voltage greater than 3 Vac can cause actuator failure. When wiring an A-Series Industrial Electric Actuator for two-position control, the controller should use at minimum a one-second time delay for command signal reversal. Instantaneous command reversals may cause actuator failure.

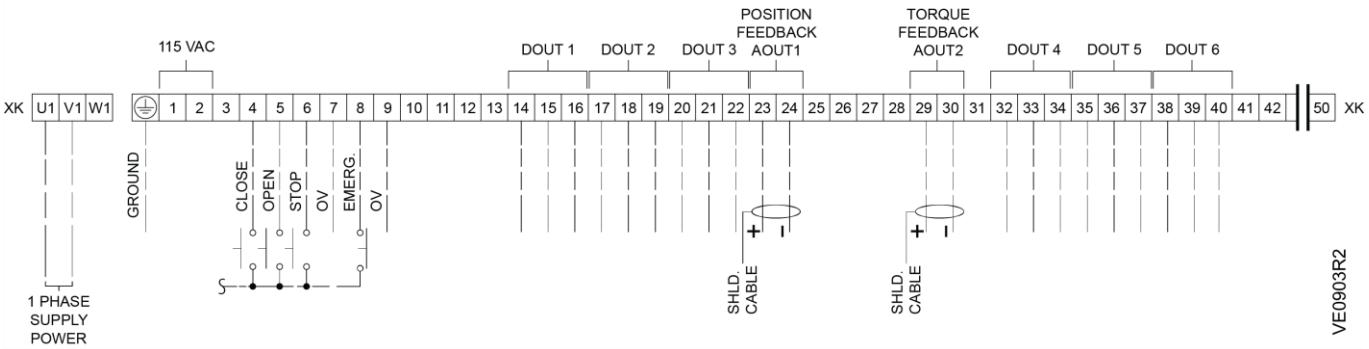


Figure 11: On/Off Wiring.

NOTE:
Use this A-Series Industrial Electric Actuator only to control equipment under normal operating conditions. Where failure or malfunction of the electric actuator could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices such as supervisory or alarm systems or safety or limit controls intended to warn of, or protect against, failure or malfunction of the electric actuator.

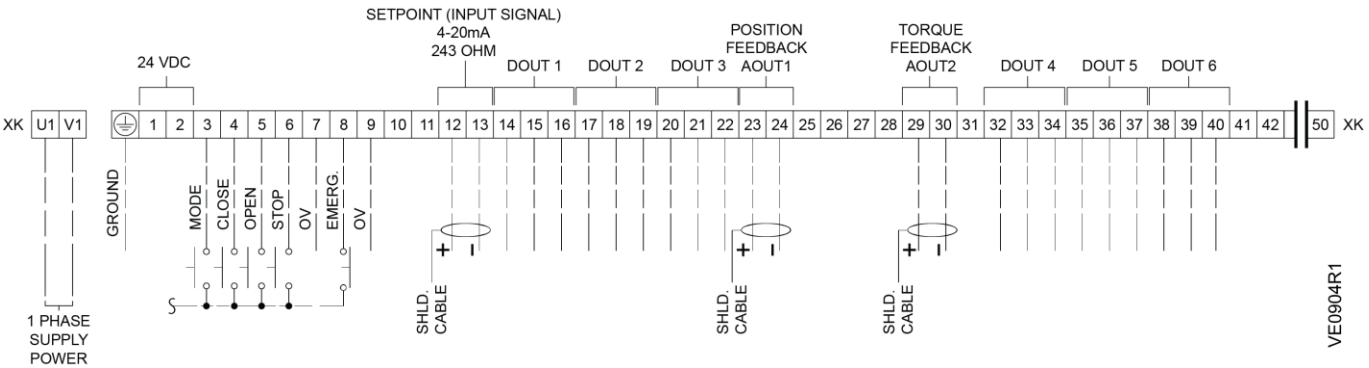


Figure 12: Modulating Wiring.

Operation

Manual operation

In case of motor or power failure, the actuator may be operated manually for setting and commissioning. Manual operation is engaged by an internal changeover mechanism.

Engage manual operation

!	***NOTICE***
	Damage at the motor coupling due to faulty operation! Engage manual operation only during motor standstill.

1. Press push button.

Figure 13: Engage manual operation.

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

Manual operation: disengage

Manual operation is automatically disengaged when the motor is restarted. The handwheel does not rotate during motor operation.

Motor operation

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

!	***NOTICE***
	Valve damage due to incorrect basic setting! Prior to electrical operation of the actuator, complete the basic settings such as type of seating, torque and limit switching.

Local actuator operation

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

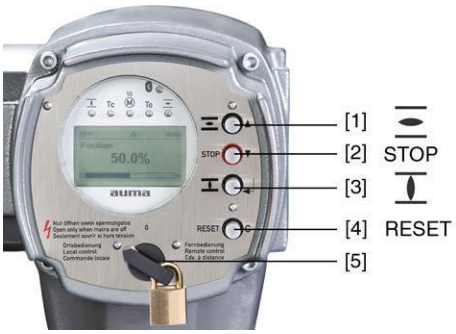


Figure 14: Local controls.

[1] Push button for operation command in direction **OPEN**

[2] Push button **STOP**

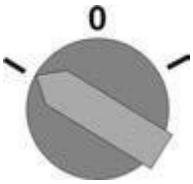
[3] Push button for operation command in direction **CLOSE**

[4] Push button **RESET**

[5] Selector switch

	⚠ CAUTION
	Hot surfaces, for example, possibly caused by high ambient temperatures or strong direct sunlight! Danger of burns. Check surface temperature and wear protective gloves, if required.

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



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

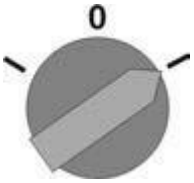
- To run the actuator in the **OPEN** direction: Press the [1] push button.
- To stop the actuator: Press the [2] **STOP** push button.
- To run the actuator in the **CLOSE** direction: Press the [3] push button.

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

Remote actuator operation

	⚠ CAUTION
	Risk of immediate actuator operation when switching on! Risk of personal injuries or damage to the valve • If the actuator starts unexpectedly: Immediately turn the selector switch to the **0** (OFF) position. • Check input signals and functions.

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



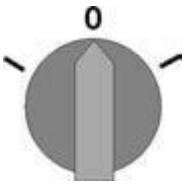
▶ The actuator can now be operated with the remote control, though operation commands (**OPEN**, **STOP**, **CLOSE**) or analog setpoints (for example, 0 to 20 mA).

Information For actuators equipped with a positioner, it is possible to change over between **OPEN - CLOSE control** (Remote **OPEN-CLOSE**) and **setpoint control** (Remote **SETPOINT**). Selection is made using the MODE input, for example, based on a 24 Vdc signal (see the wiring diagram).

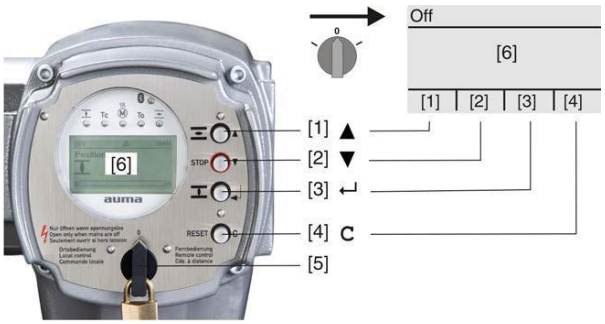
Push button menu navigation (for settings and indications)

Use push buttons [1 through 4] of the local controls for display and setting menu navigation.

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



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



[1–4] Push buttons or navigation support

[5] Selector switch

[6] Display

Table 6: Important push button functions for menu navigation.

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

Backlight

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

Menu layout and navigation

Groups

The display indications are divided into 3 groups:

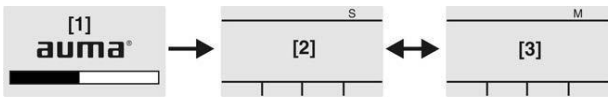


Figure 15: Groups

[1] Startup menu

[2] Status menu

[3] Main menu

ID

The status and main menus are marked with an ID.

Figure 16: ID Markings

ID starts with S = Status Menu; ID starts with M = Main Menu

Group selection

To select between status menu S and main menu M:

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

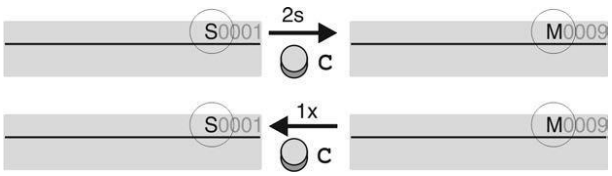


Figure 17: Select menu groups

To return to the status menu:

- Do not push the buttons on the local controls within 10 minutes or
- Briefly press **C**

Direct display using ID

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

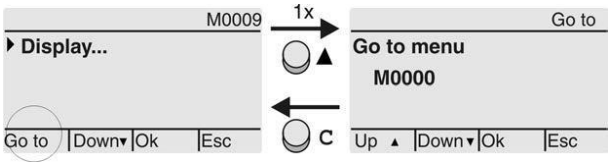


Figure 18: Direct display (example)

Display indicates in the bottom row: Go to

1. Press push button ▲ Go to.
   – Display indicates: Go to menu M0000
2. Use push buttons ▲▼ **Up ▲Down ▼** to select figures 0 to 9.
3. Press push button ↵ **Ok** to confirm the first digit.
4. Repeat steps 2 and 3 for remaining digits.

To cancel the process: Press **C Esc**.

User level, password

User level

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

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

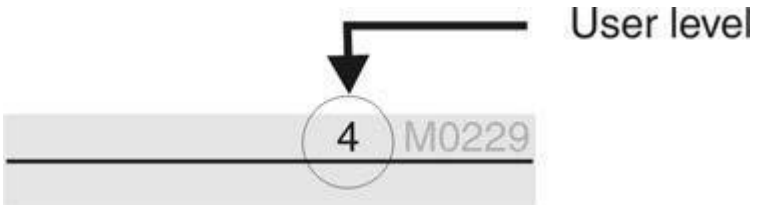


Figure 19: User level display (example)

Password

Enter a password to allow parameter modification. The display indicates:
Password 0***
Each user level has a specific password and permits different actions.

User levels and authorizations

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

Password entry

1. Select desired menu and hold down push button ↵ for approximately 3 seconds.
   – Display indicates the set user level, for example, Observer (1)
2. Press ▲ Up ▲to select a higher user level and press ↵ Ok to confirm.
   – Display shows: **Password 0*****
3. Use push buttons ▲▼ Up ▲ Down ▼ to select figures 0 to 9.
4. Confirm the first digit of the password using push button ↵ Ok.
5. Repeat Steps 1 and 2 for all further digits.
   – Confirm the last digit with ↵ Ok.

Correct password entry allows access to all parameters within one user level.

Password change

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

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

. **Device configuration M0053**

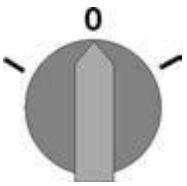
Service functions M0222

Change passwords M0229

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

Select main menu

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

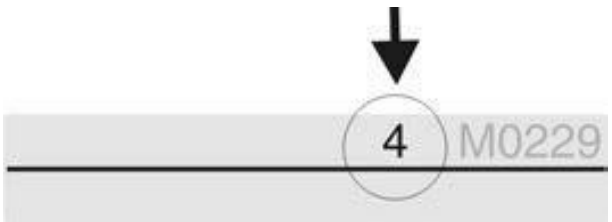


2. Press push button **C** Setup and hold it down for approximately 3 seconds.
   – Display goes to main menu and indicates: ▶ Display...

Change passwords

◈ Select parameter **Change passwords** either:

- click via the menu M ▷ to parameter, or
- using the direct display: press ▲ and enter **ID M0229**
- Display indicates: ▶ **Change passwords**
- The user level displays in the top row (1 through 6), for example:



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

1. For a user level between 2 and 6: Press push button ↵ Ok.
   – The display indicates the highest user level, for example.: For user 4
2. Select the user level using the ▲▼ Up ▲ Down ▼ push buttons, and confirm with ↵ Ok.
   – Display shows: ▶ **Change passwords Password 0*****
3. Enter current password (→ enter password).
   – Display shows: ▶ **Change passwords Password (new) 0*****
4. Enter new password (→ enter password).
   – Display shows: ▶ **Change passwords For user 4 (example)**
5. Select the next user level using the ▲▼ Up ▲ Down ▼ push buttons or cancel the process by clicking **Esc**.

Language in the display

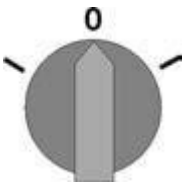
The AUMATIC actuator controls display is multilingual.

Changing the language

M ▷ **Display... M0009**
Language M0049

Select main menu

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



2. Press push button **C** Setup and hold it down for approximately 3 seconds.
   – The display goes to the main menu and shows: ▶ Display...

Change language

1. Press ↵ Ok.
   – The display shows: ▶ Language
2. Press ↵ Ok.
   – The display indicates the selected language, for example: ▶ Deutsch

The bottom row of the display indicates:

- Save → continue with step 10
- Edit → continue with step 6

3. Press ↵ Edit.
   The display indicates: ▶ Observer (1)
4. Select the user level using the ▲▼ Up ▲ Down ▼ buttons, resulting in the following:

- black triangle: ▶ = current setting
- white triangle: ▷ = selection (not saved yet)

5. Press ↵ Ok.
   – The display shows: **Password 0*****
6. Enter password (→ enter password).
   – Display indicates: ▶ Language and Save (bottom row)

Language selection

1. Select a new language using the ▲▼ Up ▲ Down ▼ buttons, resulting in the following:

- black triangle: ▶ = current setting
- white triangle: ▷ = selection (not saved yet)

2. Confirm the selection using the ↵ Save button.
   – The display changes to the new language and saves the selection.

Indications

Indications during commissioning

LED test

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

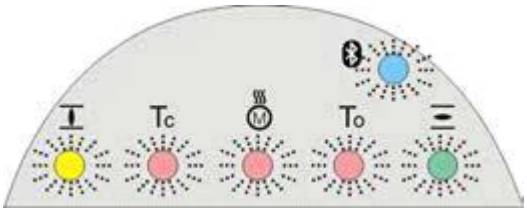


Figure 20: LED test.

Language selection

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

Activate language selection

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

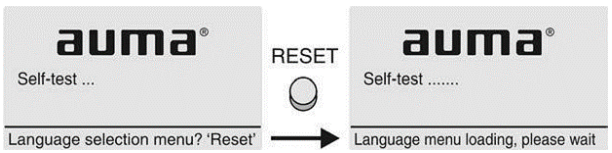


Figure 21: Self-test.

The language selection menu follows the startup menu.

Startup menu

The current firmware version displays during the startup procedure:

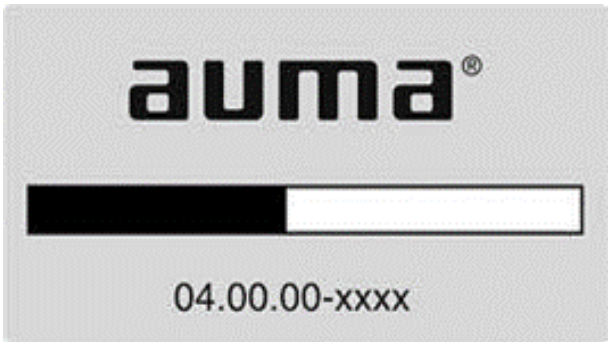


Figure 22: Startup menu with firmware version: 04.00.00–xxxx.

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

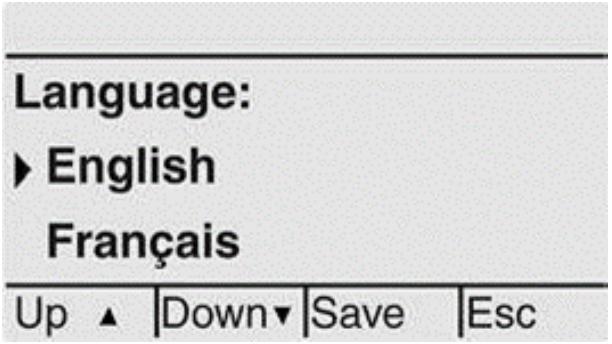


Figure 23: Language selection.

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

Indications in the display

Status bar

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

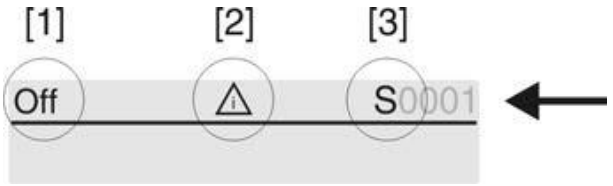


Figure 24: Information in the status bar (top).

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

Navigation support

If further details or information is available for the display, the following indications **Details** or **More** appear in the navigation support (bottom display row). Then, further information can be displayed using the ↵ push button.

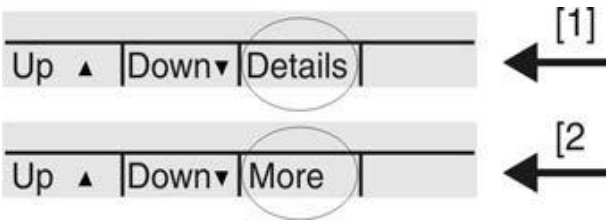


Figure 25: Navigation support (bottom).

[1] List with detailed indications

[2] Further available information

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

Feedback indications from actuator and valve

Display indications depend on the actuator version.

Valve position (S0001)

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

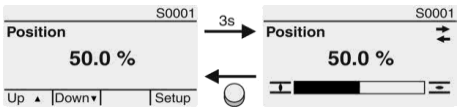


Figure 26: Valve position and direction of operation.

Reaching adjusted end positions is also shown with symbols (CLOSED) and (OPEN).

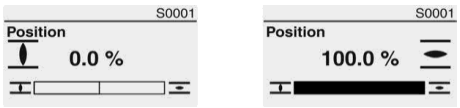


Figure 27: End position CLOSED/OPEN reached.

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

Torque (S0002)

- S0002 on the display indicates the torque applied at the actuator output.
- The bar graph display appears after approximately 3 seconds.

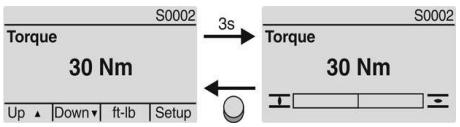


Figure 28: Torque.

Select unit

Select the unit displayed (percent %, Newton meter Nm or "foot-pound" ft-lb) by using the push button .

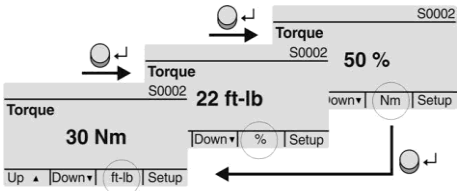


Figure 29: Units of torque

Display in percent

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

Example: SA 07.6 with 20 to 60 Nm.

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

Operation commands (S0003)

The display S0003 indicates:

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

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

OPEN - CLOSE control

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

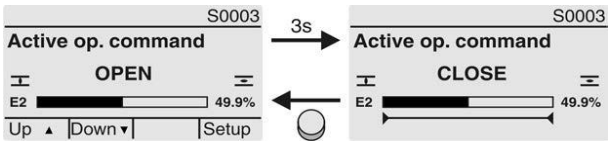


Figure 30: Display for OPEN - CLOSE control

E2 Actual position value

Setpoint control

If the positioner is enabled and activated, the bar graph indication for E1 (position setpoint) displays.

An arrow above the bar graph indication displays the direction of the operation command. The figure below shows the operation command in the CLOSE direction.

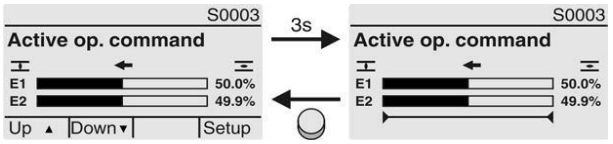


Figure 31: Indication for setpoint control (positioner)

- E1 Position setpoint
- E2 Actual position value

Pivot point axis

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

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

- **Operation profile M0294**
- **Timer CLOSE M0156**
- **Timer OPEN M0206**

Figure 32: Examples: on the left pivot points (intermediate positions); on the right stepping mode.

Table 7: Symbols along the pivot point axis.

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

Multiport valve positions (S0017)

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

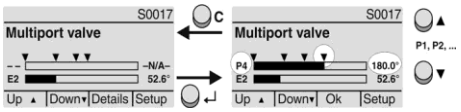


Figure 33: Status indication for multiport valve (example P4 = 180°)

P (P1, P2, ...) selected position (1, 2, ...)
(– –) no position selected

E2 Actual position value

Status indications according to AUMA classification

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

Warnings (S0005)

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

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

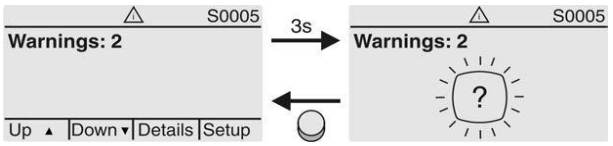


Figure 34: Warnings.

For further information, see <Corrective action>.

Not ready REMOTE (S0006)

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

If this indication has occurred, the display shows S0006:

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

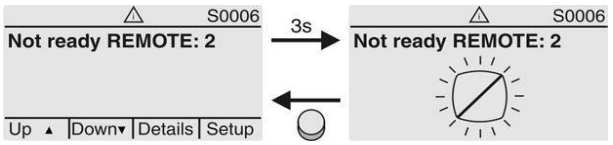


Figure 35: Not ready REMOTE indications.

For further information, see <Corrective action>.

Fault (S0007)

If a fault has occurred, the display shows S0007:

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

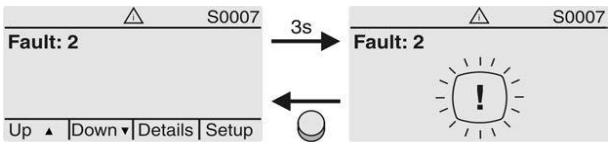


Figure 36: Fault.

For further information, see <Corrective action>.

Status indications according to NAMUR recommendation

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

Out of Specification (S0008)

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

If this indication has occurred, the display shows **S0008**:

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

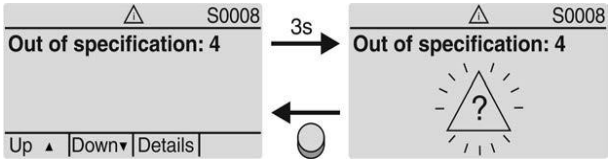


Figure 37: Out of specification..

For further information, see <Corrective action>.

Function check (S0009)

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

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

- the number of indications occurred
- a blinking triangle with a wrench after approximately 3 seconds

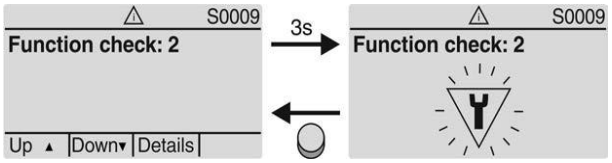


Figure 38: Function check.

For further information, see <Corrective action>.

Maintenance required (S0010)

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

If this indication has occurred, the display shows **S0010**:

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

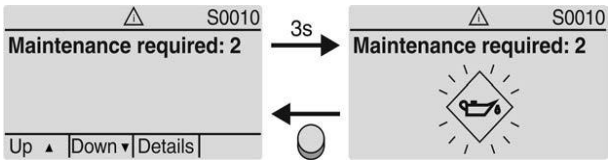


Figure 39: Maintenance required.

For further information, see <Corrective action>.

Failure (S0011)

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

If this indication has occurred, the display shows **S0011**:

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

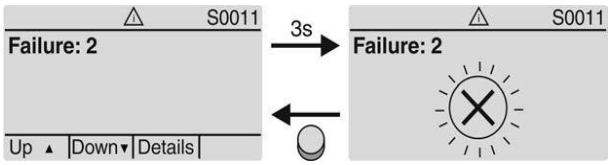


Figure 40: Failure.

For further information, see <Corrective action>.

Indication lights of local controls

Figure 41: Arrangement and meaning of indication lights.

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

Modify indication light assignment (indications)

Different indications can be assigned to LEDs 1 – 5.

Device configuration M0053

Local controls M0159

- Indication light 1 (left) M0093
- Indication light 2 M0094
- Indication light 3 M0095
- Indication light 4 M0096
- Indication light 5 (right) M0097
- Signal intermediate position M0167

Default values:

Indication light 1 (left) = End p. CLOSED, blink

Indication light 2 = Torque fault CLOSE

Indication light 3 = Thermal fault

Indication light 4 = Torque fault OPEN

Indication light 5 (right) = End p. OPEN, blink

Signal interm. pos. = OPEN/CLOSED = Off

Further setting values:

See Manual (Operation and setting).

Optional indications

Mechanical position indication (self-adjusting)

Figure 42: Mechanical position indicator.

- End position **OPEN** reached
- End position **CLOSED** reached

Characteristics

- Independent of power supply
- Used as running indication: Indicator disc (with arrow ⇨) rotates during actuator operation and continuously indicates the valve position
  (For “clockwise closing version”, the arrow rotates in a clockwise direction for operation in the CLOSE direction)
- Indicates that end positions (OPEN/CLOSED) have been reached
- Arrow ⇨ points to the ⎺ (OPEN) or ⏐ (CLOSED) symbols.
- Self-adjusting upon commissioning
  (The cover does not have to be opened)

Mechanical position indication using the indicator mark (not self-adjusting)

Figure 43: Mechanical position indicator.

[1]	End position OPEN reached
[2]	End position CLOSED reached
[3]	Indicator mark at cover

Characteristics

- Independent of power supply
- Used as running indication: Indicator disc rotates during actuator operation and continuously indicates the valve position
- (For “clockwise closing version”, the symbols  rotate in a counterclockwise direction for operation in the CLOSE direction)
- Indicates that end positions (OPEN/CLOSED) have been reached (Symbols  (OPEN)/  (CLOSED) point to the indicator mark ▲ at the cover).

Signals (output signals)

Status signals using output contacts (digital outputs)

Characteristics

Output contacts send status signals (for example, reaching the end positions, selector switch position, faults, and so on) as binary signals to the control room.

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

Assignment of outputs

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

Required user level: Specialist (4) or higher.

Device configuration M0053

I/O interface M0139

Digital outputs M0110

Signal DOUT 1 M0109

Default values:

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

Coding the outputs

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

- High active = output contact closed = signal active Low active = output contact open = signal active
- Signal active means that the conditions for the signal are fulfilled.

Required user level: Specialist (4) or higher.

Device configuration M0053

I/O interface M0139

Digital outputs M0110

Coding DOUT 1 M0102

Default values:

- Coding DOUT 1 = Low active
- Coding DOUT 2 – Coding DOUT 12 = High active

Analog signals

Valve position

- Signal: E2 = 0/4 – 20 mA (galvanically isolated)
- Designation in the wiring diagram:
- ANOUT1 (position)

Torque feedback

- Signal: E6 = 0/4 – 20 mA (galvanically isolated)
- Designation in the wiring diagram:
- ANOUT2 (torque)

For further information on this topic, see the Manual (Operation and setting).

Commissioning (basic settings)

1. Set selector switch to the **0** (OFF) position.
   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: Observe heat-up time for ambient temperatures below -22°F **(**-30°C).
3. Perform basic settings.

Type of seating: set

!	***NOTICE***
	Valve damage due to incorrect setting! The type of seating must suit the valve. Only change the setting with the consent of the valve manufacturer.

M ▷ **Customer settings M0041**

Type of seating M0012

End position CLOSED M0086

End position OPEN M0087

Defaut value: Limit

Setting values:

Limit	Seating in end positions via limit switching.
Torque	Seating in end positions via torque switching.

Type of seating: set

1. Set selector switch to position **0** (OFF) to Select main menu.
2. Press push button **C** Setup and hold it down for approx. 3 seconds.
   ⇨ Display goes to main menu and indicates: ▶ **Display...**
3. Select parameter either:
   – click via the menu M ▷ to parameter, or
   – via direct display: Press ▲ and enter ID M0086 or M0087
   ⇨ Display indicates: End position CLOSED
4. Use ▲▼ Up ▲ Down ▼ to select:
   – End position CLOSED
   – End position OPEN
   ⇨ The black triangle ▶ indicates the current selection.

5. Press ↵ Ok.
   ⇨ Display indicates the current setting: Limit or Torque
   ⇨ The bottom row of the display indicates either:
   Edit → continue with step 6
   Save → continue with step 10
6. Press ↵ Edit.
   ⇨ Display indicates: ▶ Specialist (4)

Log on user

1. Use Up ▲ Down ▼ to select user for login:
   Information: Required user level: Specialist (4) or higher
   ⇨ The symbols have the following meaning:
   black triangle: ▶ = current setting
   white triangle: ▷ = selection (not saved yet)
2. Press Ok.
   ⇨ Display indicates: **Password 0*****
3. Enter password (→ enter password).
   ⇨ A black triangle ▶ on the screen indicates the pre-set type of seating (▶Limit or ▶Torque).

Change setting

1. Use Up ▲ Down ▼ to select new setting.
   ⇨ Symbol definitions:
   black triangle: ▶ = current setting
   white triangle: ▷ = selection (not saved yet)
2. Confirm selection using **Save**.
   ⇨ The setting for the type of seating is complete.
3. Return to Step 4 (CLOSED or OPEN): Press **Esc** .

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.

M ▷ **Customer settings M0041**

Torque switching M0013

Trip torque CLOSE M0088

Trip torque OPEN M0089

Default value: According to order data

Setting range: Torque range according to actuator name plate

Torque switching: set

1. Set the selector switch to the **0** (OFF) position to select the main menu.

2. Press push button **C** Setup and hold it down for approximately 3 seconds.
   ⇨ The display goes to the main menu and indicates: ▶ Display...

3. Select parameter either:
   – click via the menu M ▷ to parameter, or
   – using direct display: press ▲ and enter ID M0088.
   ⇨ Display indicates: Trip torque CLOSE

4. Use ▲▼ Up ▲ Down ▼ to select:
   – Trip torque CLOSE
   – Trip torque OPEN
   ⇨ The black triangle ▶ indicates the current selection.

5. Press ↵ Ok.
   ⇨ Display shows the set value.
   ⇨ The bottom row indicates: **Edit Esc**

6. Press ↵ Edit.
   ⇨ Display indicates:
   Specialist (4) → continue with Step 7
   in bottom row Up ▲ Down ▼ Esc → continue with Step 11

7. Use ▲▼ Up ▲ Down ▼ to select user login:
   Information: Required user level: Specialist (4) or higher.
   ⇨ The symbols have the following meanings:
   -black triangle: ▶ = current setting
   -white triangle: ▷ = selection (not saved yet)

8. Press ↵ Ok.
   ⇨ Display indicates: **Password 0*****

9. Enter password (→ enter password).
   ⇨ Display shows the set value.
   ⇨ The bottom row indicates: Edit Esc

10. Press ↵ Edit.

11. Enter new value for tripping torque via ▲▼ Up ▲ Down ▼.
    Information: The adjustable torque range is shown in round brackets.

12. Save new value via ↵ Save.
    The tripping torque is set.

13. Back to step 4 (CLOSED or OPEN): Press ↵ Esc.

Information

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

- In the display of the local controls: Status indication S0007 Fault = Torque fault OPEN or Torque fault CLOSE

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

- either by an operation command in the opposite direction.
  - For Torque fault OPEN: Operation command in the CLOSE direction
  - For Torque fault CLOSE: Operation command in the OPEN direction
- or, in case the torque applied is lower than the preset tripping torque:
  - in selector switch position **Local control** (LOCAL) via push button **RESET**.
  - in selector switch position **Remote control** (REMOTE):

    via a digital (I/O interface) with the Reset command if a digital input is configured for RESET signal.

Limit switching: set

!	***NOTICE***
	Valve damage at valve/gearbox due to incorrect setting! When setting with motor operation: Stop the actuator **prior** reaching end of travel (press the **STOP** push button).

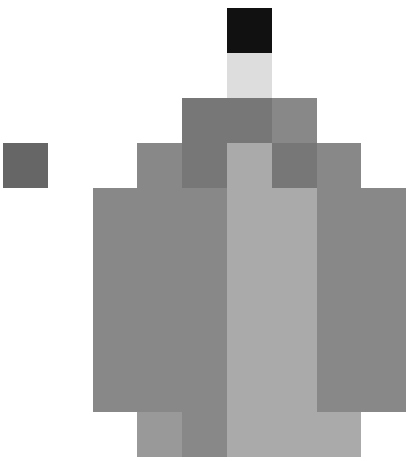
Customer settings M0041

Limit switching M0010

- **Set end pos.CLOSED? M0084**
- **Set end pos. OPEN? M0085**

Select main menu

1. Set selector switch to the **0** (OFF) position.
2. Press push button **C** and hold it down for approximately 3 seconds.



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

Select parameter

◈ Select parameter either:

- click using the menu M ▷ to parameter, or
- using direct display: press ▲ and enter ID M0084.

Display indicates: Set end pos. CLOSED?

CLOSED or OPEN

1. Use the ▲▼ Up ▲ Down ▼ buttons to select:

- Set end pos.CLOSED? M0084
- Set end pos. OPEN? M0085

The black triangle ▶ indicates the current selection.

2. Press ↵ Ok.

The display indicates either:

- Set end pos.CLOSED? CMD0009 → continue with Step 9.
- Set end pos. OPEN? CMD0010 → continue with Step 12..
- Specialist (4) → continue with step 6

Log on user

1. Use the ▲▼ Up ▲ Down ▼ buttons to select the user:

Information: Required user level: Specialist (4) or higher

Symbol descriptions:

- -black triangle: ▶ = current setting
- -white triangle: ▷ = selection (not saved yet)

2. Press ↵ Ok to confirm to selected user.

Display indicates: **Password 0*****

◈ Enter password (→ enter password).

The display indicates either:

- Set end pos.CLOSED? CMD0009 → continue with Step 9.
- Set end pos. OPEN? CMD0010 → continue with Step 12.

Set end position CLOSED CMD0009

Reset end position CLOSED:

- For large strokes: Set selector switch in position **Local control** (LOCAL) and operate actuator in motor operation using push button (CLOSE) in direction of the end position.

Information: Stop the actuator **before** reaching end of travel (press **STOP** push button to avoid damage.

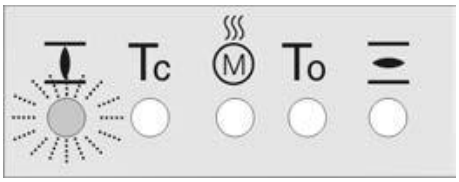
- Engage manual operation.
- Turn the handwheel until valve is closed.
- Turn the handwheel by approximately half a turn (overrun) in the opposite direction of end position.
- Set selector switch to the **0** (OFF) position.

Display indicates: Set end pos.CLOSED? Yes No

1. Press ↵ Yes to accept new end position setting.

Display indicates: End pos. CLOSED set!

The left LED is illuminated (standard version) indicating that the end position CLOSED setting is complete.



Make selection:

- Edit → back to Step 9: Set end position CLOSED "once again"
- Esc → back to Step 4; either set end position OPEN or exit the menu.

Set end position OPEN CMD0010

◈ Reset end position OPEN:

For large strokes: Set selector switch in position **Local control** (LOCAL) and operate actuator in motor operation via push button (OPEN) in direction of the end position.

Information: Stop the actuator **before** reaching end of travel (press **STOP** push button to avoid damage.

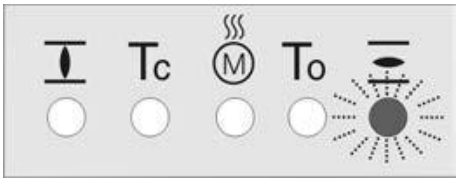
- Engage manual operation.
- Turn the handwheel until the valve is open.
- Turn the handwheel by approximately half a turn (overrun) in the opposite direction of end position.
- Set selector switch to the **0** (OFF) position.

Display indicates: Set end pos. OPEN? Yes No

1. Press Yes to accept new end position setting.

Display indicates: End pos. OPEN set!

The right LED is illuminated (standard version) and thus indicates that the end position OPEN setting is complete.



◈ Make selection:

Edit → back to step 12: Set end position OPEN "once again"

Esc → back to step 4; either set end position CLOSED or exit the menu.

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

Test run

Only perform the test run once all settings previously described have been performed.

The direction of rotation can be checked at the position indicator if available. (Chapter <Direction of rotation at mechanical position indicator: check>)

The direction of rotation must be checked at the hollow shaft/stem if no mechanical position indicator is available. (Chapter <Direction of rotation at hollow shaft/stem: check>)

Direction of rotation at mechanical position indicator: 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.

Information Switch off before reaching the end position.

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

Switch on actuator in the **CLOSE** direction and observe the direction of rotation on the mechanical position indication:

For self-adjusting mechanical position indication:

➥ The direction of rotation is correct if the actuator operates in the **CLOSE direction** and the arrow ⇨ turns **clockwise** in the **CLOSE** direction (symbol).

Figure 44: Direction of rotation (for clockwise closing version.

For mechanical position indication using the indicator mark: (not self-adjusting)

➥ The direction of rotation is correct if the actuator operates in the **CLOSE direction** and the symbols (/) turn **counterclockwise**:

Figure 45: Direction of rotation (for clockwise closing version).

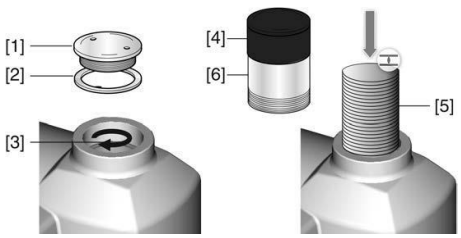
Direction of rotation at hollow shaft/stem: check

!	***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.

Information Switch off before reaching the end position.

1. Move actuator manually to intermediate position or to sufficient distance from end position.
2. Unscrew threaded plug [1] and seal [2] or protective cap for stem protection tube [4].
3. Switch on actuator in the **CLOSE** direction and observe direction of rotation at hollow shaft [3] or stem [5]:

➥ The direction of rotation is correct if the actuator moves in the **CLOSE** direction and the hollow shaft in a **clockwise** direction, or the stem moves downward.



Hollow shaft/stem movement (for “clockwise closing”).

[1] Threaded plug

[2] Seal

[3] Hollow shaft

[4] Protective cap for stem protection tube

[5] Stem

[6] Stem protection tube

Correctly fit/screw on threaded plug [1] and seal [2] or protective cap for stem protection tube [4], fasten thread.

Limit switching: check

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

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

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

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

➥ The limit switching is set incorrectly if:

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

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

Commissioning (settings/options in the actuator)

For actuators without mechanical position indicator (cover without indicator glass), no settings are required within the actuator when commissioning.

When equipped with the self-adjusting mechanical position indicator [A], the position indicator automatically adjusts upon the initial operation (for example, from **CLOSED** to **OPEN**). This self-adjustment is generally performed when setting the limit switches (approaching the end positions). Manual setting and consequently opening the switch compartment is not necessary when commissioning.

In case the mechanical position indicator integrated within the actuator is NOT self-adjusting [B], the switch compartment must be opened for mechanical position indication adjustment when commissioning.

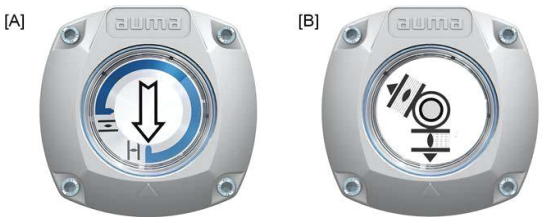


Figure 46: Mechanical position indicators

[A] Mechanical position indicator (self-adjusting)

[B] Mechanical position indicator using indicator mark (not self-adjusting)

Switch compartment: open/close

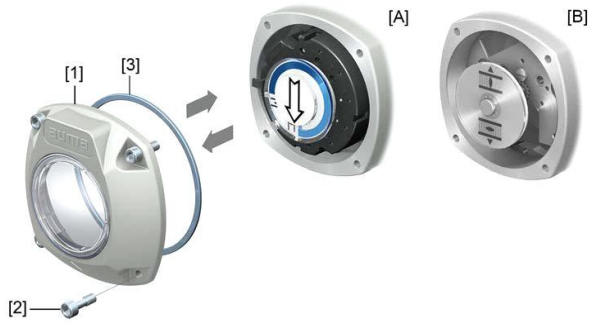


Figure 47: Open/close switch compartment

[A] Mechanical position indication (self-adjusting)

[B] Mechanical position indication via indicator mark

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

Close 2. 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.

Place cover [1] on switch compartment.

Fasten screws [2] evenly crosswise.

Mechanical position indicator (self-adjusting)

Figure 48: Mechanical position indicator (self-adjusting)

The self-adjusting mechanical position indicator shows the valve position with an arrow ⇨. When correctly set, the arrow points to the symbols ⬭ (**OPEN**) or ▮ (**CLOSED**) in the end positions.

Information The position indications is housed in the actuator switch compartment. Opening the switch compartment for manual setting is only necessary if the gear stage setting must be modified of if the factory settings of pre-defined end position **CLOSED** (or **OPEN**) must be adapted when commissioning.

Mechanical position indicator: set

Move valve to end position **CLOSED**.

Push both lower discs with the symbols ⬭ (OPEN) and ▮ (CLOSED) towards each other. The disc with the arrow is thereby ⇨ is driven:

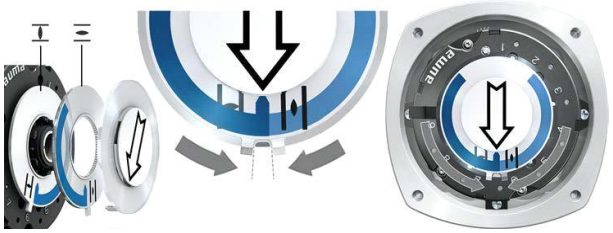


Figure 49: Setting position in CLOSED.

Move actuator to end position **OPEN**.

➥ The arrow ⇨ rotates in **OPEN** direction, driving the indicator disc with symbol ⬭ (OPEN) until the actuator stops in the **OPEN** position.

Figure 50: Operation in direction OPEN (left) and position OPEN (right)

Check settings:

➥ The setting of the mechanical position indicator is correct, if the angle between the symbols  (OPEN) and  (CLOSED) ranges between approx. 120° and 280°.

➥ If all three discs are turned at the same time, the indicator can be shifted in steps of 15°. Individual shifts of 5° are possible.

➥ If the indicator is rotated too far (more than 280°) or the angle too small (below 120°), adapt the turns/stroke of the actuator. See the <Gear stage of the reduction gearing: test/set>.

Gear stage of the reduction gearing: test/set

The test/setting is only required if the mechanical position indicator cannot be correctly set.

See the table below and check if turns/stroke correspond to the setting of the reduction gearing (stages 1– 9).

Table 19: Turns of actuator per valve stroke and suitable reduction gearing setting.

for 1 – 500 turns/stroke	for 10 – 5,000 turns/stroke	Reduction gearing
[exceeding – to]	[exceeding – to]	Stage
1.0 – 1.9	10 – 19	1
1.9 – 3.7	19 – 37	2
3.7 – 7.9	37 – 79	3
7.9 – 15.0	79 – 150	4
15.0 – 31.5	150 – 315	5
31.5 – 60.0	315 – 600	6
60.0 – 126	600 – 1,260	7
126 – 240	1,250 – 2,500	8
240 – 500	2,500 – 5,000	9

To modify settings, lift the lever at the reduction gearing and engage at the selected stage.

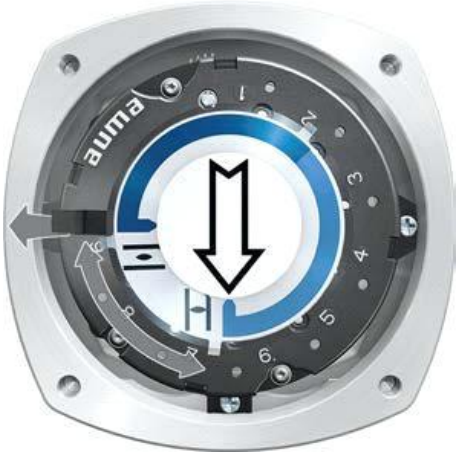


Figure 51: Set reduction gearing.

Mechanical position indication using the indicator mark (not self-adjusting)

Figure 52: Mechanical position indication via indicator mark.

The mechanical position indicator shows the valve position using two indicator discs with symbols ⎓ (OPEN) and ⏚ (CLOSED). When correctly set, the symbols OPEN/CLOSED point to the indicator mark ▲ at the cover in the end positions.

Setting elements: The position indications are housed in the actuator switch compartment. The switch compartment must be opened to perform any settings. See <Switch compartment: open/close>.

Mechanical position indicator: set

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

Figure 53: Closed position.

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

Figure 54: Open position.

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

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

Corrective action

Faults during operation/commissioning

*Table 8: **Faults during operation/**commissioning**.***

Fault	Description/cause	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Set gear stage of the reduction gearing. The control unit may need to be exchanged.
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 actuator controls.	• Determine overrun: Overrun = travel covered from switching off until complete standstill. • Set limit switching again considering the over-run. (Turn handwheel back by the amount of the overrun)
Handwheel rotates on the shaft without transmitting torque.	Actuator in version with overload protection for manual operation: Shear pin rupture due to excessive torque at handwheel.	Dismount handwheel. Replace overload protection and remount handwheel.

Fault indications and warning indications

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

Warnings have no influence on the electrical actuator operation. They are for information only. The display remains white.

Collective signals include further indications. They can be displayed using the ↵ Details push button. The display remains white.

Table 9: Faults and warnings through status indications in the display.

Indication on display	Description/cause	Remedy
S0001	Instead of the valve position, a status text displays	For a description of the status texts, see the Manual (Operation and setting).
S0005 Warnings	Collective signal 02: Indicates the number of active warnings.	For indicated value > 0: Press push button ↵ Details. For details, see the <Warnings and Out of specification> table.
S0006 Not ready REMOTE	Collective signal 04: Indicates the number of active signals.	For indicated value > 0: Press push button ↵ Details. For details, see the <Not ready REMOTE and Function check> table.
S0007 Fault	Collective signal 03: Indicates the number of active faults. The actuator cannot be operated.	For indicated value > 0: Press push button ↵ Details to display a list of detailed indications. For details, see the <Faults and Failure> table.

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

Table 10: Warnings and Out of specification.

Indication on display	Description/cause	Remedy
Config. warning	Collective signal 06: Possible cause: Configuration setting is incorrect. The device can still be operated with restrictions.	Press push button ↵ Details to display a list of indi-vidual indications. For a description of the individual signals, see the Manual (Operation and setting).
Internal warning	Collective signal 15: Device warnings The device can still be operated with restrictions.	Press push button ↵ Details for a list of individual indications. For a description of the individual signals, see the Manual (Operation and setting).
24 Vdc external	The external 24 Vdc voltage supply of the controls has exceeded the power supply limits.	Check 24 Vdc voltage supply.
Wrn op.mode run time	Warning on time maximum running time/h exceeded	• Check modulating behavior of actuator. • Check parameter Perm. run time M0356, re-set if required.
Wrn op.mode starts	Warning on time max. number of motor starts (starts) exceeded	• Check modulating behavior of actuator. • Check parameter Permissible starts M0357, reset if required.
Failure behav. active	The failure behavior is active since all required setpoints and actual values are incorrect.	Verify signals: • Setpoint E1 • Actual value E2 • Actual process value E4
Wrn input AIN 1	Warning: Loss of signal analogue input 1	Check wiring.

Indication on display	Description/cause	Remedy
Wrn input AIN 2	Warning: Loss of signal analogue input 2	Check wiring.
Wrn setpoint position	Warning: Loss of signal setpoint position Possible causes:	Check setpoint signal. For an adjusted setpoint range of e.g. 4 to 20 mA, the input signal is 0 (signal loss). For a setpoint range of 0 to 20 mA , monitoring is not possible. The set time (parameter Perm.op. time, manual M0570) has been exceeded. The preset operating time is exceeded for a complete travel from the **OPEN** to the **CLOSED** end position. Temperature within controls housing too high. Real time clock has not yet been set. Voltage of the RTC button cell is too low.
	The warning indications are automatically cleared once a new operation command is executed.	
	Check valve. Check parameter Perm.op. time, manual M0570.	Measure/reduce ambient temperature. Replace button cell.
	Partial Valve Stroke Test (PVST) could not be successfully completed.	Check actuator (PVST settings).
	Partial Valve Stroke Test (PVST) was aborted or could not be started.	Perform RESET or restart PVST.
	No actuator reaction to operation commands within the set reaction time.	• Check movement at actuator. • Check parameter Reaction time M0634.
	Optical receiving signal (channel 1) incorrect (no or insufficient Rx receive level) or RS-485 format error (incorrect bit[s])	Check/repair FO cables.
	Warning: FO cable system reserve reached (critical or permissible Rx receive level)	Check/repair FO cables
	Limit value for torque warning in direction OPEN exceeded	Check parameter Wrn torque OPEN M0768, reset if required.
	Limit value for torque warning in direction CLOSE exceeded	Check parameter Wrn torque CLOSE M0769, reset if required.
	SIL sub-assembly fault has occurred.	See separate Manual Functional Safety.
PVST required	Execution of PVST (Partial Valve Se Tests) is required.	
Maintenance required	Maintenance is required	
FQM fail-safe fault [3)]	FQM fault	Checking and fault remedy are required. See the FQM operation instructions.

1. For actuator controls with FOC connection
2. For actuators controls in SIL version
3. For actuators with fail safe unit

Faults and Failure

Indication on display	Description/cause	Remedy
Configuration error	Collective signal 11: Configuration error has occurred.	Press push button Details to display a list of individual indications. For a description of the individual signals, see the Manual (Operation and setting).
Config. error REMOTE	Collective signal 22: Configuration error has occurred.	Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, see the Manual (Operation and setting).
Internal error	Collective signal 14: Internal error has occurred.	AUMA service Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, see the Manual (Operation and setting).
Torque fault CLOSE	Torque fault in direction CLOSE	Perform one of the following measures: • Issue operation command in direction OPEN. • Set selector switch to position **Local control** (LOCAL) and reset fault indication using push button **RESET**.
Torque fault OPEN	Torque fault in direction OPEN	Perform one of the following measures: • Issue operation command in direction CLOSE. • Set selector switch to position **Local control** (LOCAL) and reset fault indication via push button **RESET**.
Phase fault	• When connecting to a 3-ph AC system and with internal 24 Vdc supply of the electronics: Phase 2 is missing. • When connecting to a 3-ph or 1-ph AC system and with external 24 Vdc supply of the electronics: One of the phases L1, L2 or L3 is missing.	Test/connect phases.

Indication on display	Description/cause	Remedy
Incorrect phase seq	The phase conductors L1, L2 and L3 are connected in the wrong sequence. Only applicable if connected to a 3-ph AC system	Correct the sequence of the phase conductors L1, L2 and L3 by exchanging two phases.
Mains quality	Due to insufficient mains quality, the controls cannot detect the phase sequence (sequence of phase conductors L1, L2 and L3) within the pre-set time frame provided for monitoring.	Check mains voltage. For 3-phase/1-phase AC current, the permissible variation of the mains voltage is ±10% (option ±30%). The permissible variation of the mains voltage is ±5% Check parameter Tripping time M0172, extend timeframe if required.
Thermal fault	Motor protection tripped	• Cool down, wait. • If the fault indication display persists after cooling down: - Set selector switch to position **Local control** (LOCAL) and reset fault indication using the **RESET push button**. • Check fuses.
Fault no reaction	No actuator reaction to operation commands within the set reaction time.	Check movement at actuator.
Poti Out of Range	Potentiometer is outside the permissible range.	Check device configuration: Parameter Low limit Uspan M0832 must be less than parameter Volt.level diff. potent. M0833.
LPV not ready	LPV: Lift Plug Valve function. The master actuator signals a fault	
Wrn input AIN 1	Loss of signal analog input 1	Check wiring.
Wrn input AIN 2	Loss of signal analog input 2	Check wiring.
Incorrect rotary direct.	Contrary to the configured direction of rotation and the active operation command, the motor turns into the wrong direction.	Check operation command control. For 3-phase AC current mains, activate phase the wrong direction. monitoring (parameter Adapt rotary dir. M0171). Check device configuration setting (parameter Closing rotation M0176). To delete the fault indication: Disconnect actuator controls from the mains and perform reboot.
Syn. link deviation	Synchronous link function: Actual position values of master actuator and slave actuator are not synchronous (excessive deviation).	Check Deviation MA/SA [%] parameter.
Syn. link NotReady	Synchronous link function: Slave actuator is not ready.	Check Deviation MA/SA [%] parameter.

Indication on display	Description/cause	Remedy
Syn. link wire break SA	Synchronous link function: Signal loss of actual po sition value from master actuator or slave actuator.	Check wiring.
DMF fault OPEN[1)]	The torque in direction OPEN, measured at the output drive shaft using the torque measurement flange, is too high.	Check DMF trip torque OP parameter.
DMF fault CLOSE[1)]	The torque in direction CLOSE, measured at the output drive shaft using the torque measurement flange, is too high	Check DMF fault level parameter. Check DMF trip torque CL parameter.
FQM collective fault[2)]	Collective signal 25:	Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, see the Manual (Operation and setting).

1. For actuators equipped with torque measurement flange (DMF)
2. For actuators equipped with fail safe-unit

Table 11: ***Not ready REMOTE and Function check (collective signal 04)***

Indication on display	Description/cause	Remedy
Wrong oper. cmd	Collective signal 13: Possible causes: • Several operation commands (e.g. **OPEN** and **CLOSE** simultaneously, or **OPEN** and **SET-POINT** operation simultaneously) • A setpoint is present and the positioner is not active	• Check operation commands (reset/clear all operation commands and send one operation command only). • Set parameter Positioner to Function active. • Check setpoint. Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, see the Manual (Operation and setting).
Sel. sw. not REMOTE	Selector switch is not in position REMOTE.	Set selector switch to position REMOTE.
Service active	Operation via service interface (Bluetooth) and AUMA CDT service software.	Exit service software
Disabled	Actuator is in operation mode Disabled.	Check setting and status of function <Local controls enable>.
EMCY stop active	The EMERGENCY stop switch has been operated. The motor control power supply (contactors or thyristors) is disconnected.	• Enable EMERGENCY stop switch. • Reset EMERGENCY stop state by means of Reset command.

Indication on display	Description/cause	Remedy
EMCY behav. active	Operation mode EMERGENCY is active (EMERGENCY signal was sent). 0V are applied at the EMERGENCY input.	• Detect cause for EMERGENCY signal. • Verify failure source. • Apply +24 Vdc at EMERGENCY input.
I/O interface	The actuator is controlled using the I/O interface (parallel).	Check I/O interface.
Handwheel active	Manual operation is activated.	Start motor operation.
Interlock	An interlock is active.	Check interlock signal.
Interlock by-pass	By-pass function is interlocked.	Check states of main and by-pass valve.
PVST active	Partial Valve Stroke Test (PVST) is active.	Wait until PVST function is complete.
SIL function active [1)]	SIL function is active	

For actuators controls in SIL version

Fuses

Fuses within the actuator controls

Fuses used

Table 12: ***Primary fuses F1/F2 (for power supply unit)***

G-fuse	F1/F2	AUMA art. no.
Size	6.3 × 32 mm	
Reversing contactors Power supply ≤ 500V	1 A T; 500V	K002.277
Reversing contactors Power supply > 500V	2 A FF; 690V	K002.665
Thyristor units for motor power up to 1.5 kW	1 A T; 500V	K002.277
Thyristor units for motor power up to 3.0 kW		
Thyristor units for motor power up to 5.5 kW		

Table 13: ***Secondary fuses F3 (internal 24 Vdc supply)***

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

Table 14: ***Secondary fuses F4 (internal AC supply)***[1]

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

Fuse for: Switch compartment heater, reversing contactor control, PTC tripping device (at 24 Vac only), at 115 Vac also control inputs OPEN, STOP, CLOSE

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

Replace fuses F1/F2

⚠ DANGER

Hazardous voltage!

Risk of electric shock.
Disconnect device from the mains before opening.

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

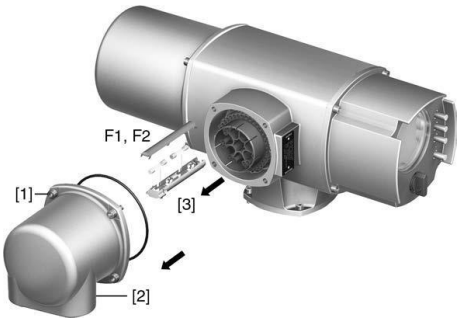


Figure 55: Fuse components.

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

Test/replace fuses F3/F4

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

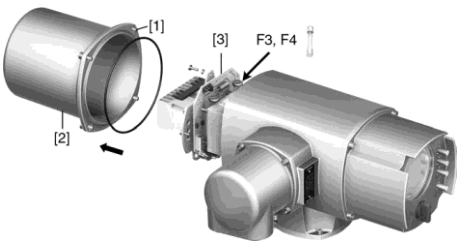


Figure 56: Fuse replacement.

The power supply unit has measurement points (solder pins) that enable resistance (continuity) measurement:

Verifying	Measuring points
F3	MTP5 – MTP6
F4	MTP7 – MTP8

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

!	***NOTICE***
	Cable damage due to pinching! Risk of functional failures. Carefully assemble power supply unit to avoid pinching the cables.

Motor protection (thermal monitoring)

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

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

- LED 3 (motor protection trippped) on the local controls is illuminated.
- Status indication **S0007** displays a fault.

The fault **Thermal fault** displays when selecting **Details**.

The motor must cool down before operation can be resumed.

Depending on the parameter setting (motor protection behavior), the fault signal is either automatically reset or the fault signal must be reset using the **RESET** push button with selector switch position **Local operation** (LOCAL).

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

Servicing and maintenance

	⚠ CAUTION
	Damage caused by inappropriate maintenance! Servicing and maintenance must be carried out exclusively by suitably qualified personnel having been authorized 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.

Preventive measures for servicing and safe operation

The following actions are required to ensure safe device operation:

6 months after commissioning and then once a year

- Carry out visual inspection:
  - Check threaded plugs, cable entries, cable glands, shorting plugs, and so on for correct tightness and sealing.
  - Consider torques according to manufacturer's details.
- Check fastening screws between the 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 Type A: Press in Lithium soap EP multi-purpose grease on mineral oil base at the grease nipple with a grease gun.
- Lubricate the valve stem separately.

Figure 57: Output drive Type A.

[1] Output drive type A

[2] Grease nipple

Table 15: Grease quantities for bearing of output drive Type A.

Output drive type	A2x6.21K	A2x6.41K
Quantity [g] [1)]	1.5	3

For grease with density r = 0.9 kg/dm³

For enclosure protection IP68

After submersion:

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

Maintenance

Lubrication

- The gear housing is filled with grease at the factory.
  - 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 infrequently (open-close duty).
- Replace the seals when changing the grease.
- Additional lubrication of the gear housing is not required during operation.

Disposal and recycling

The A-Series AUMA industrial electrical actuators have a long lifetime. However, they must be replaced at some point. The devices have a modular design and may, therefore, be easily separated and sorted according to materials used, such as:

- 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.

Technical data

Information The following tables include standard and optional features. For detailed information on the customer-specific version, see the order-related data sheet.

Technical data Multi-turn actuators

Features and functions		
Type of duty (Multi-turn actuators for open-close duty)	Standard	Short-time duty S2 - 15 minutes, classes A and B according to EN 15714-2. For nominal voltage and 104°F (40°C) ambient temperature and at load with 35% of the maximum torque.
Type of duty (Multi-turn actuators modulating duty)	Standard	Intermittent duty S4 - 25%, class C according to EN 15714-2. For nominal voltage and 104°F (40°C) ambient temperature and at modulating torque load.
Motors	Standard	Single-phase AC motor with permanent split capacitor (PSC), type IM B9 according to IEC 60034-7, IC410 cooling procedure according to IEC 60034-6.
Mains voltage, mains frequency		See the nameplate of actuator controls. Permissible variation of mains voltage: ±10% Permissible variation of mains frequency: ±5% (for 3-phase and single-phase AC current).
Overvoltage category		Category III according to IEC 60364-4-443
Insulation class	Standard	F, tropicalized
Motor protection	Standard Option	Thermoswitches (NC) DC motors: Without PTC thermistors (according to DIN 44082) PTC thermistors additionally require a suitable tripping device in the actuator controls.
Self-locking		Self-locking: Output speeds up to 90 rpm (50 Hz), 108 rpm (60 Hz). NOT self-locking: Output speeds from 125 rpm (50 Hz), 150 rpm (60 Hz) Multi-turn actuators are self-locking, if the valve position cannot be changed from standstill while torque acts upon the output drive.
Motor heater	Standard	Voltages: 110 – 120 Vac, 220 – 240 Vac (3-phase and single-phase AC motors) 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.
Indication for manual operation	Option	Indication whether manual operation is active/not active using a single switch (1 change-over contact)

Features and functions		
Electrical connection	Standard	AUMA plug/socket connector with screw-type connection. Motor connection for some DC motors using a separate motor terminal board.
Threads for cable entries	Standard	NPT threads
Terminal plan		Terminal plan according to order number enclosed with delivery
Valve attachment	Standard	B1 according to EN ISO 5210

Electronic control unit (option, only in combination with AC actuator controls)	
Non-Intrusive setting	Magnetic limit and torque transmitter (MWG) Turns per stroke: 1 to 500 (standard) or 10 to 5,000 (option)
Position feedback signal	Through actuator controls
Torque feedback signal	Through actuator controls
Mechanical position indicator (option)	Continuous indication, adjustable indicator disc with OPEN and CLOSED symbols
Running indication	Blinking signal using actuator controls
Heater in switch compartment	Resistance type heater with 5W, 24 Vac

Service conditions		
Use		Indoor and outdoor permissible
Mounting position		Any position
Installation altitude		≤ 2,000 m above sea level > 2,000 m above sea level, on request
Ambient temperature	Standard	-22°F to 158°F (-30°C to 70°C)
Humidity		Up to 100% relative humidity across the entire permissible temperature range
Enclosure protection according to EN 60529	Standard	IP68 (with AUMA 3-phase/1-phase AC or DC motor) According to AUMA definition, enclosure protection IP68 meets the following requirements: • Depth of water: Maximum 8 m head of water • Duration of continuous immersion in water: Maximum 96 hours • Up to 10 operations during flooding. • Modulating duty is not possible during continuous immersion • For exact version, see the actuator nameplate.
Pollution degree according to IEC 60664-1		Pollution degree 4 (when closed), pollution degree 2 (internal)

Service conditions		
Vibration resistance according to IEC 60068-2-6		2 g, from 10 to 200 Hz (for actuators in AUMA NORM version) 1 g, from 10 to 200 Hz (for actuators with mounted AUMA actuator controls) Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this. Indications apply to actuators with AUMA 3-phase AC motor and AUMA plug/socket connector. They are not valid in combination with gearboxes.
Corrosion protection	Standard	KS: Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
Coating		Double layer powder coating Two-component iron-mica combination
Color	Standard	AUMA silver-grey (similar to RAL 7037)
Lifetime		AUMA multi-turn actuators meet or exceed the lifetime requirements of EN 15714-2. For further details, contact AUMA.
Noise level		< 72 dB (A)

Further information	
EU Directives	Electromagnetic Compatibility (EMC): (2014/30/EU) Low Voltage Directive: (2014/35/EU) Machinery Directive: (2006/42/EC)

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

Technical data Actuator controls

Features and functions		
Power supply		See the nameplate Permissible variation of mains voltage: ±10% Permissible variation of mains voltage: ±30% (optional) Permissible variation of mains frequency: ±5%
External electronics supply	Option	24 Vdc +20%/–15% Current consumption: Basic version approx. 250 mA, with options up to 500 mA. External power supply must have reinforced insulation against mains voltage in accordance with IEC 61010-1 and may only be supplied by a circuit limited to 150 VA in accordance with IEC 61010-1.
Current consumption		Current consumption of the actuator controls depending on mains voltage: For permissible variation of mains voltage of ±10 %: 100 to 120 Vac = maximum 740 mA
Overvoltage category		Category III according to IEC 60364-4-443
Rated power		The actuator controls are designed for the nominal motor power, see the motor nameplate. The reversing contactors are designed for a lifetime of 2 million starts. For applications requiring a high
Switchgear	Standard	Reversing contactors (mechanically and electrically interlocked) for AUMA power classes A1/A2 number of starts, we recommend the use of thyristor units.For the assignment of AUMA power classes, see the Electrical data on the actuator.
Control inputs		6 digital inputs: OPEN, STOP, CLOSE, EMERGENCY (using opto-isolator, thereof OPEN, STOP, CLOSE with one common and EMERGENCY without common, respect minimum pulse duration for modulating actuators)
Control voltage/current consumption	Standard	24 Vdc, current consumption: approx. 10 mA per input All input signals must be supplied with the same potential.
Status signals (Output signals)	Standard	6 programmable output contacts: 6 potential-free change-over contacts without one common, per contact max. 250 Vac, 5A (resistive load) All output signals must be supplied with the same potential.
Voltage output	Standard Option	Auxiliary voltage 24 Vdc: max. 100 mA for supply of control inputs, galvanically isolated from internal voltage supply. Auxiliary voltage 115 Vsv: max. 30 mA for supply of control inputs, galvanically isolated from internal voltage supply/ (Not possible in combination with PTC tripping device.)
Analog output		2 analog outputs: With position transmitter option: Output of travel and torque as continuous values between 0/4 and 20 Ma.

Features and functions		
Analog input		2 analog inputs: With positioner/process controller option: Input of actual position value/actual process value as continuous values between 0/4 and 20 mA.
Local controls	Standard	• Selector switch: LOCAL - OFF - REMOTE (lockable in all three positions) • Push buttons OPEN, STOP, CLOSE, RESET Local Stop: The actuator can be stopped via push button STOP of local controls if the selector switch is in position REMOTE. (Not activated when leaving the factory.) – 6 Indication lights. End position and running indication CLOSED (yellow), torque fault CLOSE (red), motor protection tripped (red), torque fault OPEN (red), end position and running indication OPEN (green), Bluetooth (blue) – Graphic LC display: illuminated
Bluetooth Communication interface		Bluetooth class II chip, version 2.1: With a range up to 10 m in industrial environments, supports the SPP Bluetooth profile (Serial Port Profile).
Application functions	Standard	• Selectable type of seating, limit or torque seating for end positions OPEN and CLOSED • Torque by-pass: Adjustable duration (with adjustable peak torque during start-up time) Start and end of stepping mode as well as ON and OFF times can be set individually for directions OPEN and CLOSE, 1 to 1,800 seconds • Any 8 intermediate positions: can be set between 0 and 100 %, reaction and signal behavior programmable • Running indication blinking: can be set
	Options Modulating SV units only	• Positioner – Position setpoint via analog input 0/4 –20 mA – Programmable behavior on loss of signal – Automatic adaptation of dead band (adaptive behavior selectable) – Split range operation – MODE input for selecting between OPEN-CLOSE and setpoint control • PID process controller: with adaptive positioner, via 0/4 – 20 mA analog inputs for process setpoint and actual process value • Multiport valve: Up to 16 positions, signals (pulse or edge) • Automatic deblocking: Up to 5 operation trials, travel time in opposite direction can be set • Static and dynamic torque recording for both rotation directions with torque measurement flange as additional accessory

Features and functions		
Safety functions	Standard	EMERGENCY operation (programmable behavior) - Digital input: Low active - Reaction can be selected: Stop, run to end position CLOSED, run to end position OPEN, run to intermediate position - Torque monitoring can be by-passed during EMERGENCY operation - Thermal protection can be by-passed during EMERGENCY operation (only in combination with thermoswitch within actuator, not with PTC thermistor).
Monitoring functions		• Valve overload protection: adjustable, results in switching off and generates fault signal • Motor temperature monitoring (thermal monitoring): results in switching off and generates fault indication • Monitoring the heater within actuator: generates warning signal. • Monitoring of permissible on-time and number of starts: adjustable, generates warning signal • Operation time monitoring: adjustable, generates warning signal • Phase failure monitoring: results in switching off and generates fault signal • Automatic correction of rotation direction upon wrong phase sequence (3-ph AC current)
Diagnostic functions		• Electronic device ID with order and product data • Logging of operating data: A resettable counter and a lifetime counter each for: – Motor running time, number of starts, torque switch trippings in end position CLOSED, limit switch trippings in end position CLOSED, torque switch trippings in end position OPEN, limit switch trippings in end position OPEN, torque faults CLOSE, torque faults OPEN, motor protection trippings • Time-stamped event report with history for setting, operation and faults • Status signals according to NAMUR recommendation NE 107: **Failure**, **Function check**, **Out of specification**, **Maintenance required.** • Torque characteristics (for version with MWG in actuator): – 3 torque characteristics (torque-travel characteristic) for opening and closing directions can be saved separately. – Stored torque characteristics can be displayed.

Features and functions		
Motor protection evaluation	Standard	Monitoring the motor temperature in combination with thermoswitches within actuator motor.
Electrical connection	Standard	AUMA plug/socket connector with screw-type connection
Cable entry threads	Standard	NPT threads
Wiring diagram		See the nameplate.

Further options for Non-intrusive version with MWG in the actuator

Setting of limit and torque switching via local controls	
Torque feedback signal	Galvanically isolated analog output 0/4 – 20 mA (load maximum 500 Ω).

Service conditions		
Uses		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		See the actuator controls nameplate
Humidity		Up to 100% relative humidity across the entire permissible temperature range
Enclosure protection according to EN 60529	Standard	IP68 According to AUMA definition, enclosure protection IP68 meets the following requirements: • Depth of water: Maximum 8 m head of water • Duration of continuous immersion in water: Maximum 96 hours • Up to 10 operations during continuous immersion • Modulating duty is not possible during continuous immersion. • For exact version, see the actuator controls name plate.
Pollution degree according to IEC 60664-1		Pollution degree 4 (when closed), pollution degree 2 (internal)

Service conditions		
Corrosion protection	Standard	KS: Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
Coating		Double layer poser coating Two component iron-mica combination
Color	Standard	AUMA silver-grey (similar to RAL 7037)

Accessories	
Wall bracket	For actuator controls mounted separately from the actuator, including plug/socket connector. Connecting cable on request. Recommended for high ambient temperatures, difficult access, or heavy vibration during service. Cable length between actuator and actuator controls is max. 100 m (Not suitable for version with potentiometer in the actuator). Instead of the potentiometer, the actuator must be equipped with an electronic position transmitter. (MWG requires a separate data cable.)
Programming software	AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PC) AUMA Assistant App (Commissioning and Diagnostic Tool for Android devices)
Torque measurement flange DMF	Accessory for torque measurement for SA/SAR 07.2 – SA/SAR 16.2

Further information	
Weight	Approx. 7 kg (with AUMA plug/socket connector)
EU directives	Electromagnetic Compatibility (EMC): (2014/30/EU) Low Voltage Directive: (2014/35/EU) Machinery Directive: (2006/42/EC)

Issued by
Siemens Industry, Inc.
Smart Infrastructure
1000 Deerfield Pkwy
Buffalo Grove IL 60089
+1 847-215-1000