auma®
Solutions for a world in motion

Part-turn actuators
SGM 04.1 – SGM 14.1
SGMR 04.1 – SGMR 14.1
with integral actuator controls

Control
Parallel
Profibus DP
→ Modbus RTU

Operation instructions

Assembly and commissioning

Read operation instructions first.

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

Target group:

This document contains information for assembly, commissioning and maintenance staff.

Reference documents:

Reference documents are available on the Internet at: http://www.auma.com.

Table of contents

1. Safety instructions

1.1. Prerequisites for the safe handling of the product

Standards/directives

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.

They include among others:

- Applicable configuration guidelines for fieldbus applications.

Safety instructions/ warnings

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

Qualification of staff

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

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

Commissioning

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

Operation

Prerequisites for safe and smooth operation:

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

Protective measures

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

Maintenance

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

Any device modification requires prior written consent of the manufacturer.

1.2. Range of application

AUMA part-turn actuators are designed for the operation of valves, e.g. butterfly valves and ball valves. For actuators made of bronze, the deployment on military vessels is restricted.

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

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

- Industrial trucks according to EN ISO 3691
- Lifting appliances according to EN 14502
- Passenger lifts according to DIN 15306 and 15309

- Service lifts according to EN 81-1/A1
- Escalators
- Buried service
- Continuous underwater use (observe enclosure protection)
- Potentially explosive atmospheres
- Radiation exposed areas in nuclear power plants

No liability can be assumed for inappropriate or unintended use.

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

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

1.3. Warnings and notes

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

⚠ DANGER	**Indicates an imminently hazardous situation with a high level of risk. Failure to observe this warning results 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 could result in minor or moderate injury. May also be used with property damage.**
NOTICE	**Potentially hazardous situation. Failure to observe this warning could result in property damage. Is not used for personal injury.**

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

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

1.4. 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)

➥ **Result of a process step**

Describes the result of a preceding process step.

2. Short description

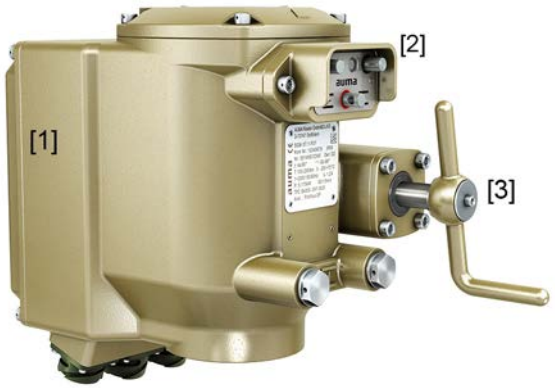
Part-turn actuator

Definition in compliance with EN 15714-2/EN ISO 5211:

A part-turn actuator is an actuator which transmits a torque to the valve for less than one full revolution. It need not be capable of withstanding thrust.

AUMA part-turn actuator

Figure 1: AUMA part-turn actuator SGM 07.1



[1] Integral controls
[2] Local controls
[3] Crank handle (or handwheel)

AUMA part-turn actuators are driven by an electric motor. For control in motor operation and for processing the actuator signals, controls are integrated within the housing. Local controls allow for local actuator operation. A handwheel or crank is provided for manual operation. Manual operation is possible without change-over.

The swing angle is limited by internal end stops. Switching off in end positions may be either by limit or torque seating.

Software

Using the **AUMA CDT** software for Windows-based computers (notebooks or tablets), actuator data can be uploaded and read, settings can be modified and stored. Further information ➪ page 39, AUMA CDT software (accessories)

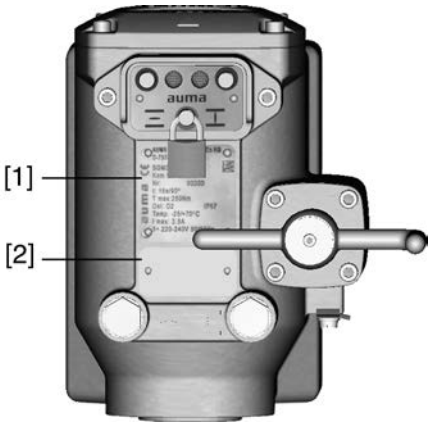
With the **AUMA Cloud**, we provide an interactive platform to collect and assess e.g. detailed device data of all actuators within a plant.

AUMA Cloud

The AUMA Cloud is the driving element of the digital AUMA world, acting as interactive platform for efficient maintenance of AUMA actuators at moderate cost. The AUMA Cloud collects all device data of all actuators within one site and provides a clear overview at a glance. Detailed analysis provides valuable information on potential maintenance requirements. Additional functions foster smooth asset management.

3. Name plate

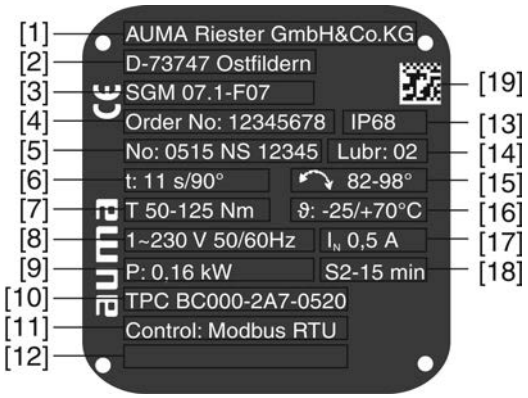
Figure 2: Arrangement of name plates



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

Description of actuator name plate

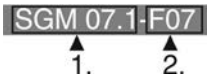
Figure 3: Actuator name plate (example)



[1] Name of manufacturer
[2] Address of manufacturer
[3] **Type designation**
[4] **Order number**
[5] **Actuator serial number**
[6] Operating time
[7] Torque range
[8] Current type, mains voltage, mains frequency
[9] Electric power (motor)
[10] Wiring diagram number
[11] **Control**
[12] Can be assigned as an option upon customer request
[13] Enclosure protection
[14] Type of lubricant
[15] Setting range of swing angle
[16] Permissible ambient temperature
[17] Rated current
[18] Type of duty
[19] **Data Matrix code**

Type designation

Figure 4: Type designation (example)



1. Type and size of actuator
2. Flange size

Type and size

These instructions apply to the following devices types and sizes:

Part-turn actuators for open-close duty: SGM 04.1, 05.1, 07.1, 10.1, 12.1, 14.1

Part-turn actuators for modulating duty: SGM**R** 04.1, 05.1, 07.1, 10.1, 12.1, 14.1

Order number

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

Please always state this number for any product inquiries.

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

Serial number Actuator

Table 1:

Description of serial number (example of 0520NS12345)			
05	20	NS12345	
05	Positions 1+2: Assembly in week = week 05		
	20	Positions 3+4: Year of manufacture = 2020	
		NS12345	Internal number for unambiguous product identification

Control

Modbus RTU = Control via Modbus RTU interface.

Data Matrix code

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

Figure 5: Link to AUMA Assistant App:

For further Service & Support, Software/Apps/... refer to www.auma.com

4. Transport, storage and packaging

4.1. Transport

For transport to place of installation, use sturdy packaging.

DANGER

Suspended load!

Risk of death or serious injury.

→ Do NOT stand below suspended load.

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

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

4.2. Storage

NOTICE

Danger of corrosion due to inappropriate storage!

→ Store in a well-ventilated, dry room.

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

→ Cover to protect against dust and dirt.

→ Apply suitable corrosion protection agent to uncoated surfaces.

Long-term storage

For long-term storage (more than 6 months), observe the following points:

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

Plastic protective caps supplied when leaving the factory are for transport protection only. They have to be replaced for long-term storage. (Heed protection type indicated on name plate.)

4.3. Packaging

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

5. Assembly

5.1. Mounting position

The product described in this document can be operated without restriction in any mounting position.

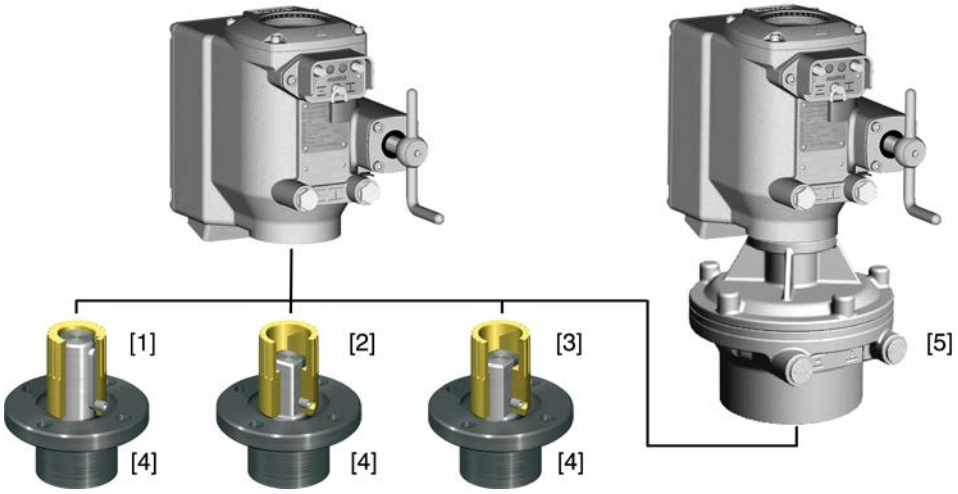
5.2. Mount actuator to valve

The actuator is mounted to the valve using a coupling.

5.2.1. Overview on coupling variants

Design principle

Figure 6: Coupling variants



[1] Bore with keyway
[2] Square bore
[3] Bore with two-flats
[4] Valve shaft
[5] Output mounting flange (size 12.1/14.1)

Application

- For valve attachments according to EN ISO 5211
- For rotating, non-rising valve stem

5.2.2. Mount actuator (with coupling)

Unbored couplings or couplings with pilot bore must be machined to match the valve shaft prior to mounting the actuator to the valve (e.g. with bore and keyway, two-flat or square bore).

Assemble valve and actuator in the same end position. As standard, the actuator is supplied in end position CLOSED.

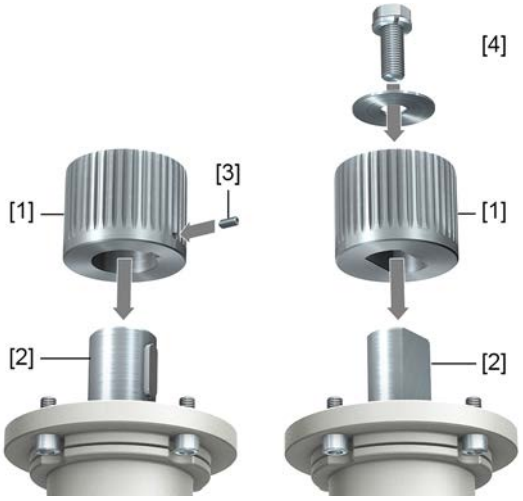
→ Recommended mounting position for **butterfly valves**: End position CLOSED.
→ Recommended mounting position for **ball valves**: End position OPEN.

Assembly steps

1. If required, move actuator in same end position as valve using the handwheel.
2. Clean mounting faces, thoroughly degrease uncoated mounting surfaces.
3. Apply a small quantity of grease to the valve shaft [2].

4. Place coupling [1] onto valve shaft [2] and secure against axial slipping by using a grub screw [3] or a clamping washer and a screw with curved spring lock washer [4]. Thereby, ensure that dimensions X, Y or L are observed (refer to figure and table <Mounting positions for coupling>).

Figure 7: Examples: Fit coupling



[1] Coupling
[2] Valve shaft
[3] Grub screw
[4] Clamping washer and screw with curved spring lock washer

Figure 8: Mounting positions for coupling

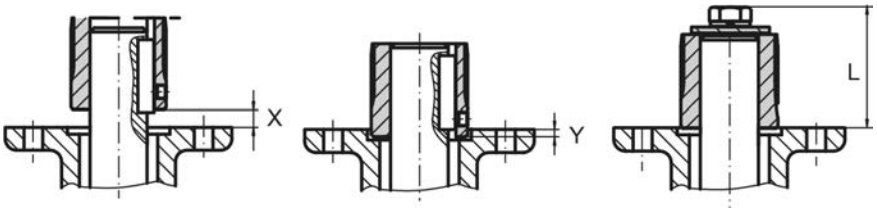


Table 2:

Mounting position of the coupling within fitting dimensions according to AUMA definition			
Type, size - output mounting flange	X max [mm]	Y max [mm]	L max [mm]
SGM/SGMR 04.1-F07	2.5	6	40
SGM/SGMR 05.1-F07	2.5	6	40
SGM/SGMR 07.1-F07	2.5	6	50
SGM/SGMR 10.1-F10	3.5	10	60
SGM/SGMR 12.1-F12	5	10	61
SGM/SGMR 14.1-F14	8	10	75

5. Apply non-acidic grease at splines of coupling (e.g. Gleitmo by Fuchs).
6. Fit actuator. If required, slightly turn actuator until splines of coupling engage.
7. If flange bores do not match thread:
   7.1 Slightly rotate handwheel until bores line up.
   7.2 If required, shift actuator by one tooth on the coupling.
8. Fasten actuator with screws.

   Information: We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.

9. Fasten screws crosswise to a torque according to table.

Table 3:

Tightening torques for screws, valid for all actuators which are not shock resistant and all actuators with housing made of bronze	
Threads	Tightening torque [Nm]
	Strength class 8.8
M8	25
M10	51
M12	87
M16	214
M20	431

Table 4:

Tightening torques for screws, valid for actuators with housing made of aluminium in shock-resistant version.[1)]			
Flange	Screws		Tightening torque [Nm]
	Threads	Min. reach of screw into the actuator	Strength class 8.8
F07	M8	12 mm	28
F10	M10	14.5 mm	54
F12	M12	18 mm	87
F14	M16	24 mm	214
F16	M20	30 mm	431

1) Actuators with aluminium housing are powder coated, colour: standard AUMA silver-grey.

6. Electrical connection

6.1. Basic information

⚠ WARNING

Electric shock due to presence of hazardous voltage!

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.

Wiring diagram/terminal plan

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

Permissible networks (supply networks)

The actuators are suitable for use in TN and TT networks with directly earthed star point. Use in IT networks is permitted while heeding the indications with regard to on-site protection.

Protection on site

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

The current value for respective sizing is derived from the current consumption of the actuator (refer to electrical data sheet).

The actuators are suitable for use in current circuits with a maximum short-circuit AC current value of 5,000 A root-mean-square (R.M.S). The output data of the fuses to be provided on site must not exceed the following values: 15 A/250 V at a maximum mains current of 5,000 A AC.

For IT networks, a suitable, approved insulation monitor measuring the pulse code is required.

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.

Power supply for the controls (electronics)

In case of external supply of the controls (electronics): For external electronics supply, the power supply of actuator controls must have an enhanced isolation against mains voltage in compliance with IEC 61010-1 and the output power be limited to 150 VA.

Potential of customer connections

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

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

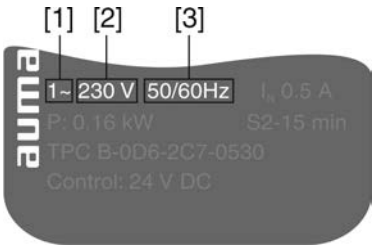
Safety standards

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 applicable for the place of installation.

All connected electric circuits shall comply with the requirements for protective separation.

Type of current, mains voltage and mains frequency

Figure 9: Name plate (example)



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

Type of current, mains voltage and mains frequency must match the data on the motor name plate.

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 earth potential.
- If possible, avoid laying long cables and make sure that they are installed in areas being subject to low interference.
- Avoid parallel paths with little cable distance of cables being either susceptible to interference or interference sources.

Connecting cables
Cable glands
Reductions
Blanking plug

- We recommend using connecting cables and connecting terminals according to rated current (I_N) (refer to motor or electrical data sheet).
- For device insulation, appropriate (voltage-proof) cables must be used. Specify cables for the highest occurring rated voltage.
- It is advised to use a shielded cable.
- For connecting cables exposed to UV radiation (outdoor installation), use UV resistant cables.
- The cross-sectional area of every protective earthing conductor which does not form not part of the supply cable or the cable enclosure, shall, in any case, not be less than:
  - For mechanical protection: minimum 2.5 mm²
  - Without mechanical protection: minimum 4 mm²
- For the connection of position transmitters, screened cables must be used.

Fieldbus cable

Only cables complying with the recommendations of EIA-485 specifications should be used for Modbus wiring.

Cable recommendation:

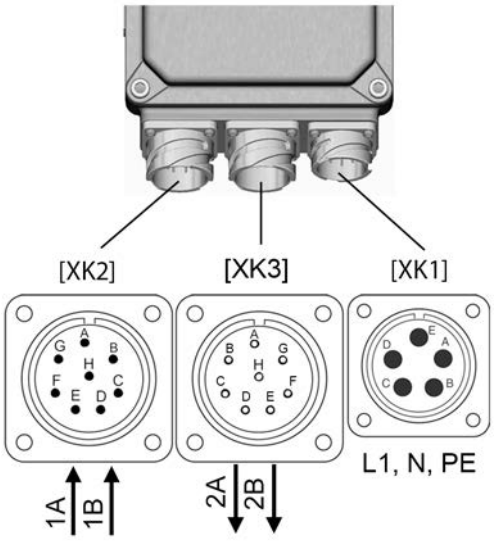
Impedance:	135 to 165 Ohm, at a measurement frequency between 3 and 20 MHz
Cable capacity:	< 30 pF per metre
Wire diameter:	> 0.64 mm
Wire cross section:	> 0.34 mm², corresponds to AWG 22 or higher
Loop resistance:	< 110 Ohm per km
Screening:	CU shielding braid or shielding braid and shielding foil

Prior to installation, please note:

- Connect maximum 32 devices to one segment.
- If more devices are to be connected:
  - Connect several segments using repeaters.
- Install fieldbus cables at a distance of minimum 20 cm to other cables.
- If possible, fieldbus cables should be laid in a separate, conductive, and earthed cable tray.
- Ensure absence of equipotential earth bonding differences between the individual devices at fieldbus (perform an equipotential earth bonding).

6.2. Connection via bayonet connector

Figure 10: Arrangement of connections



[XK1] Power terminals (mains cables)
[XK2] Control contacts/fieldbus cables ↑ from previous device
[XK3] Control contacts/fieldbus cables ↓ to next device

Cross sections:

- Power terminals: max. 1.5 mm² flexible
- Control contacts: max. 1.5 mm² flexible

WARNING

Hazardous voltage at open connector (capacitor discharge)!

Risk of electric shock.

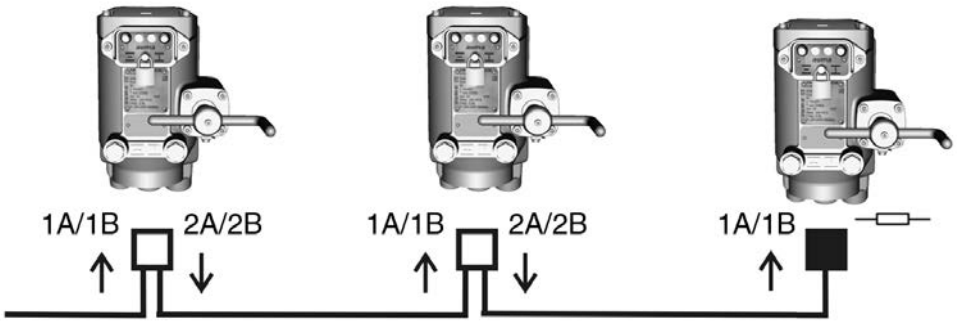
→ After disconnecting the power supply (removing connector for power terminals), wait at least 5 seconds before touching the pins/sockets.

6.2.1. Mains and fieldbus cables: connect

Observe prior to connection

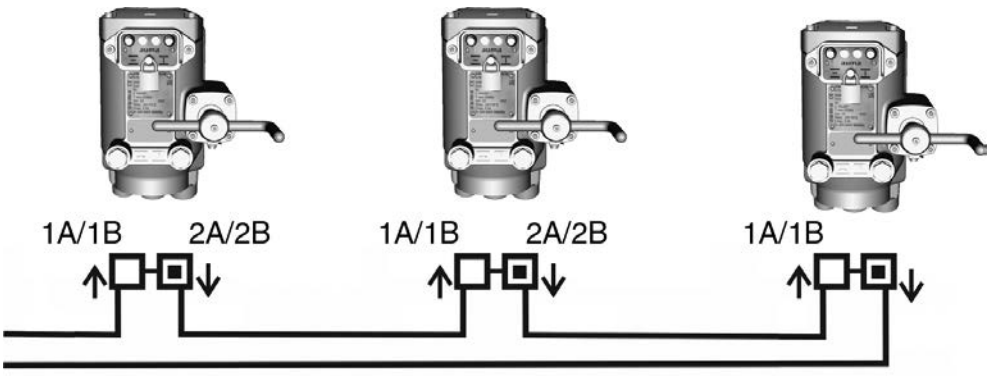
- Observe permissible cross sections of connectors used.
- Use suitable crimping tools to connect wires:
  - For bayonet connectors:
    e.g. Cannon four indent crimping tool
- Observe operation instructions of the connector manufacturer.
- Upon request, AUMA provide suitable connection sets.
- For further information refer to separate "Technical data Connector".
- Observe characteristics of network topology used.

Figure 11: Structure for line topology



□	further fieldbus devices will follow
■	last fieldbus device, termination must be activated
↑	from the previous device
↓	to the next device

Figure 12: Structure for redundant loop topology



□	Input
▣	Output
↑	from the previous device
↓	to the next device

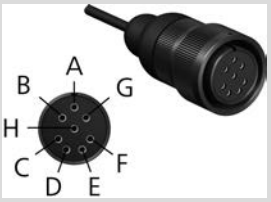
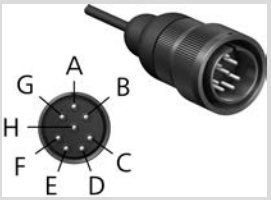
Information

- For loop topology, automatic termination is performed as soon as the actuator is connected to the power supply.
- In case of a power failure, the two RS-485 loop segments will be automatically connected so that the actuators following these segments remain available.
- Redundant loop topology may only be established when using a SIMA Master Station.

Steps

1. Connect mains and fieldbus cables according to the order related wiring diagram.

Table 5:

Assignment of fieldbus cables			
Plug/socket connector	Pin	Assignment	Colour
For XK2 (socket) 	A	1A	Green
	B	1B	Red
	E ⏚ 1)		
	Screw connection	Shield	
For XK3 (socket) 	A	2A	Green
	B	2B	Red
	E ⏚ 1)		
	Screw connection	Shield	

1) As an option, pin E can be connected to the shielding. This is, however, not recommended.

⚠ WARNING

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

Risk of electric shock.

→ Connect all protective earth conductors.

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

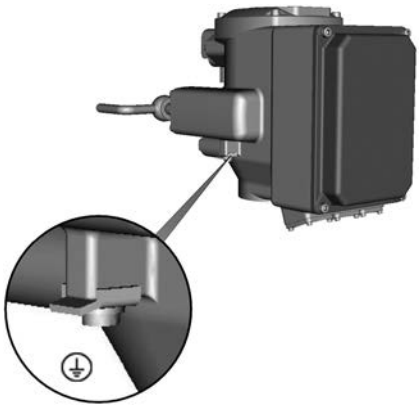
→ Start running the device only after having connected the protective earth conductor.

2. Connect protective earth conductor according to wiring diagram, symbol: ⏚ .
3. If the actuator is the last fieldbus device, seal open connector [XK3] with protective cap. Heed protection type indicated on name plate. Plastic protective caps supplied when leaving the factory are for transport protection only. They are not appropriate for permanent use.

6.3. Earth connection, external

The housing is equipped with an external earth connection (U-bracket) to integrate the device in equipotential earth bonding.

Figure 13: Earth connection



⏚ Earth connection (U-bracket), external

6.4. Accessories for electrical connection

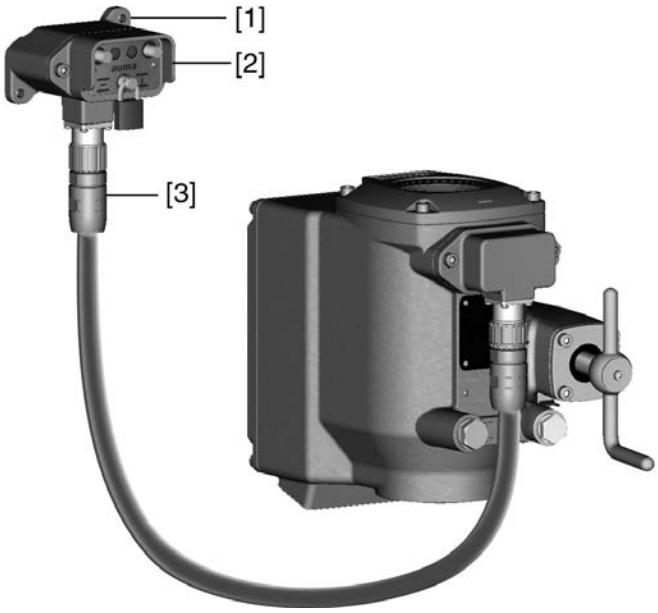
6.4.1. Local controls mounted on wall bracket

— Option —

Application

The wall bracket allows separate mounting of local controls and actuator.

If the actuator cannot be accessed safely.



[1] Wall bracket
[2] Local controls
[3] Phoenix connector with connecting cable

Observe prior to connection

- Permissible length of connecting cables: max. 30 m.
- We recommend using an AUMA cable set (5 m).
- A retrofit kit is available for actuators without wall bracket.
- Establish cable connection via plug/socket connector as illustrated.

7. Indications

7.1. Mechanical position indication via indicator mark

Figure 14: 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 counterclockwise direction for operations in direction CLOSE)
- Indicates that end positions (OPEN/CLOSED) have been reached
  (Symbols ⊖ (OPEN)/ ⊥ (CLOSED) point to the indicator mark ▲ at cover)

7.2. Indication lights

Figure 15: Indication lights on local controls

[1] Indication light OPEN/warning/fault (green/yellow/red)
[2] Indication light CLOSE/LOCAL/set end position (yellow/blue)

Table 6:

Indication light [1] (default setting)		
Colour/state	Signification	Description
illuminated in green	OPEN	Actuator is in end position OPEN.
blinking in yellow	Warning	Stroke between selected end positions (OPEN/CLOSED) is below the preset minimum stroke (factory setting 60 % of maximum rotation). Refer to <Corrective action> chapter.
blinking in red	Fault	The number of blinking signals indicates the number of fault signal. Refer to <Corrective action> chapter.

Table 7:

Indication light [2] (default setting)		
Colour/state	Signification	Description
illuminated in yellow	CLOSE	Actuator is in end position CLOSED.
blinking in blue (1 Hz)	LOCAL	Operation mode LOCAL is active. The actuator can be operated via push buttons.
blinking in blue (5 Hz)	Set end position	Setting mode for end position setting is active.

8. Signals (output signals)

8.1. Signals via fieldbus

The feedback signals via Modbus RTU can be read using the appropriate Modbus function codes.

For further information, please refer to the Manual (Device integration fieldbus) Modbus.

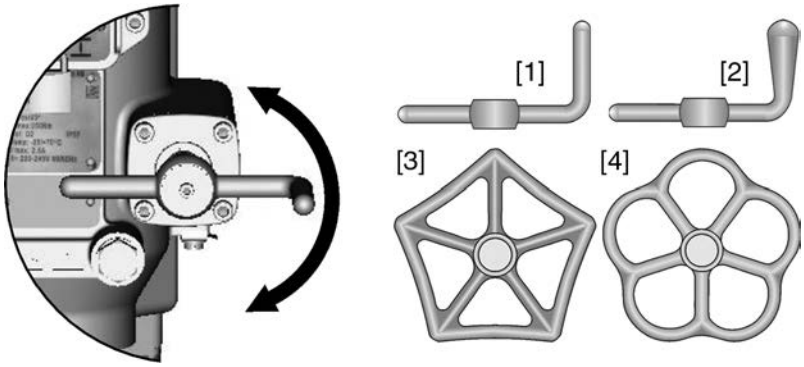
9. Operation

9.1. Manual operation

For purposes of setting and commissioning, in case of motor failure or power failure, the actuator may be operated manually.

The handwheel does not rotate during motor operation. Change-over from motor operation to manual operation is not required.

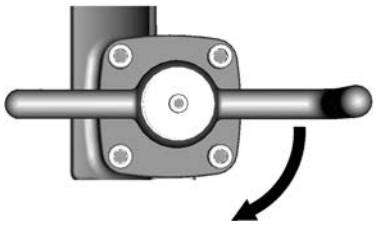
Figure 16: Manual operation



Handwheel versions:

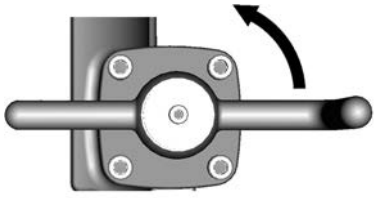
[1] Crank handle with cylindrical grip (standard)
[2] Crank handle with conical grip
[3] Handwheel with five edge ring
[4] Handwheel with five ripple ring

1. Close valve: Turn crank handle/handwheel clockwise.



➥ Drive shaft (valve) turns clockwise in direction CLOSE.

2. Open valve: Turn crank handle/handwheel counterclockwise.



➥ Drive shaft (valve) turns counterclockwise in direction OPEN.

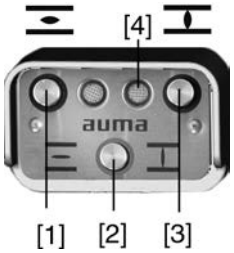
Information Turning the handwheel during motor operation extends or reduces the operating time, depending on the direction of rotation.

9.2. Motor operation

9.2.1. Local actuator operation

The actuator can be locally operated by means of push buttons.

Figure 17: Local controls



[1] Push button OPEN
[2] Push button STOP - operation mode LOCAL/REMOTE
[3] Push button CLOSE
[4] Indication light for operation mode LOCAL (blue)

CAUTION

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

Risk of burns

→ Verify surface temperature and wear protective gloves.

Activate operation mode LOCAL:

→ Hold down push button [2] for approx. 3 seconds until the indication light [4] is blinking in blue.

➥ If the right indication light is blinking in blue, the actuator can be operated via push buttons [1 – 3]:

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

Information

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

Push-to-run operation or self-retaining is set via the controls software. Refer to <AUMA CDT software (accessories)> chapter. It is possible to temporarily (for one operation command) activate self-retaining by means of the push buttons:

→ Press and hold down push buttons OPEN [1] or CLOSE [3] for more than 3 seconds.

During this procedure, self-retaining is not saved. The setting programmed within the software is taken over for the subsequent operation command.

9.2.2. Actuator operation from remote

Operation mode Remote can be activated via local controls.

Figure 18: Local controls

[2] Operation mode LOCAL/REMOTE
[4] Indication light for operation mode LOCAL (blue)

Activate operation mode Remote by means of local controls:

→ If indication light [4] is blinking in blue: Hold down push button [2] for approx. 3 seconds until the blue indication light goes out.

➥ Now, the actuator can be remote-controlled via fieldbus.

Change-over between OPEN - CLOSE control and setpoint control:

For actuators equipped with a positioner, it is possible to select between **OPEN CLOSE control** (Fieldbus REMOTE/Fieldbus CLOSE) and **setpoint control** (Fieldbus SETPOINT).

EMERGENCY operation:

- An EMERGENCY operation is initiated by the Fieldbus EMERGENCY command bit.
- The actuator moves to a predefined EMERGENCY position (i.e. end position OPEN or end position CLOSED).
- During EMERGENCY operation, the actuator does not react to other operation commands such as Fieldbus/OPEN/Fieldbus/CLOSE or Fieldbus SETPOINT.

10. Commissioning (basic settings of controls)

To prevent valve damage and disturbances during commissioning, the basic settings of controls must be verified prior to electrical actuator operation (motor operation) and adapted in compliance with the requirements of both valve and application.

Basic settings of controls comprise:

- Setting the type of seating
- Setting the torque switches
- Setting the fieldbus address (slave address)
- Setting the termination resistor
- Setting the operating time

To perform basic settings, proceed as follows:

1. via **switches** (directly at the device);
   For switch setting, open controls cover.
2. via **AUMA CDT software** (accessories);
   By connecting a PC, laptop or PDA.
   Also refer to <AUMA CDT software (accessories)> chapter.
3. by means of commands via **fieldbus**;
   (Except the termination resistor – this item can only be selected via a switch within the device.)
   For fieldbus configuration, please also refer to the Manual (Device integration Fieldbus).

Please also refer to <AUMA CDT software (accessories)> chapter for further settings.

10.1. Cover to controls: open

The cover to the integral controls must be opened to perform the following settings (options).

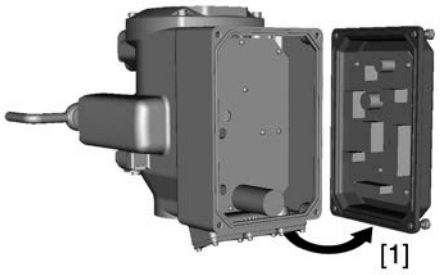
DANGER

Electric shock due to presence of hazardous voltage!

Failure to observe this warning results in death or serious injury.

→ Disconnect device from the mains before opening.

→ Loosen 4 screws and remove cover [1] to controls.



10.2. Setting via hardware (switches) or via software

The switch [S5] position determines whether the hardware settings (switches) or the software settings (via AUMA CDT software) are currently active.

Figure 19: Switch [S5] = Hardware/software mode

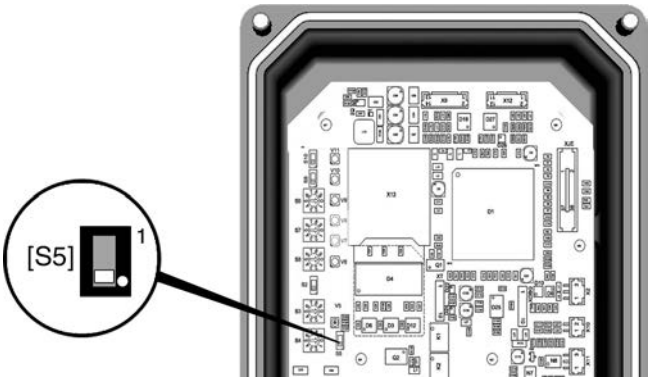


Table 8:

Switch [S5] functions		
OFF (1)		**Hardware mode** (Factory setting on delivery for line topology) Settings of switches [S2] through [S4] and [S6] through [S10] are valid. The values cannot be changed via AUMA CDT software.
ON (0)		**Software mode** (sliding switch at white dot) (Factory setting on delivery for loop topology) Settings of switches [S2] through [S4] and [S6] through [S10] are NOT relevant. Settings are defined via software parameters.

10.3. Type of seating: set

NOTICE

Valve damage due to incorrect setting!

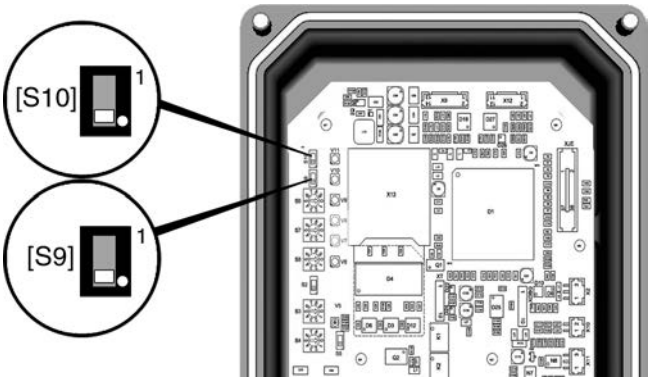
→ The type of seating setting (limit or torque seating) must match the selection for the valve.

→ Only change the setting with prior consent of the valve manufacturer.

Setting via switches

Condition: Switch [S5] in position OFF (hardware mode).

Figure 20: Switches for type of seating



[S9] End position OPEN

[S10] End position CLOSED

Table 9:

Function of switches [S9], [S10]		
ON		Limit seating, sliding switch at white dot
OFF		Torque seating

Setting via software parameters (AUMA CDT)

Condition: Switch [S5] is in position ON (software mode).

Setting parameters

M ▷ Customer settings
Type of seating
End position CLOSED
End position OPEN

Default value: Limit

Setting values:

Limit — Limit seating in end positions.

Torque — Torque seating in end positions.

10.4. Torque switching: set

NOTICE

Valve damage due to excessive tripping torque limit setting!

→ The tripping torque must suit the valve.

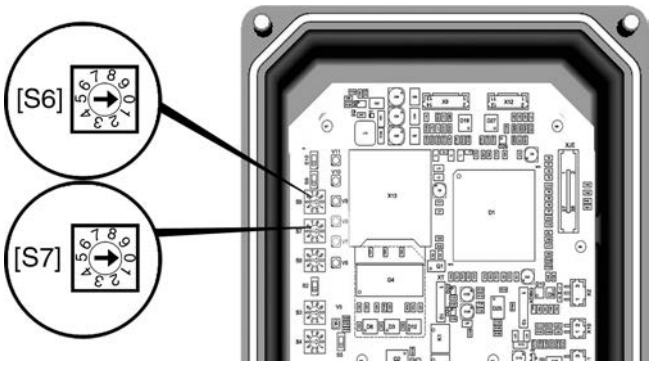
→ Only change the setting with the consent of the valve manufacturer.

Once the set tripping torque is reached, the controls automatically switch off the actuator (overload protection of the valve).

Setting via switches

Condition: Switch [S5] is in position OFF (hardware mode).

Figure 21: Switches for tripping torque



[S6] Tripping torque in direction OPEN

[S7] Tripping torque in direction CLOSE

Default value: depending on the order

Setting range: in 8 steps (refer to tables), linear from 40 – 100 % of the maximum tripping torque.

Table 10:

Switch steps	Tripping torques [Nm]					
	SGM/SGMR 04.1	SGM/SGMR 05.1	SGM/SGMR 07.1	SGM/SGMR 10.1	SGM/SGMR 12.1	SGM/SGMR 14.1
0	25	50	100	200	400	–
1	25	50	100	200	400	880
2	30	60	120	240	500	880
3	35	70	140	280	550	1,100
4	40	80	160	320	650	1,300
5	45	90	180	360	700	1,500
6	50	100	200	400	800	1,750
7	55	110	220	440	900	1,950
8	63	125	250	500	1,000	2,200
9	63	125	250	500	1,000	2,200

Setting via software parameters (AUMA CDT)

Condition: Switch [S5] is in position ON (software mode).

Setting parameters

M ▷ Customer settings
Torque switching
Tripping torque CLOSE (S7)
Tripping torque OPEN (S6)

Default value: depending on the order

Setting ranges: adjustable between 40 – 100 % of the maximum tripping torque

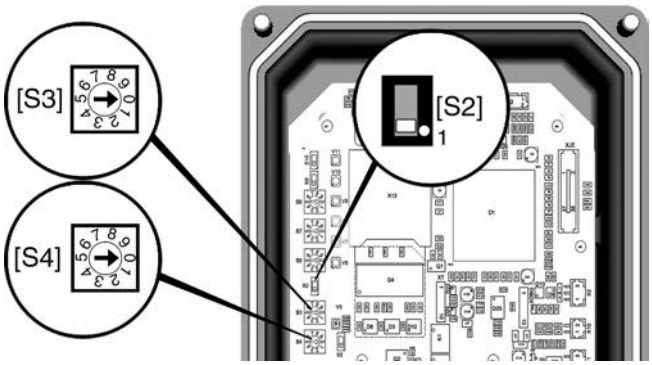
10.5. Fieldbus address (slave address), baud rate, parity and monitoring time: set

Setting the fieldbus address via switches

Condition: Switch [S5] is in position OFF (hardware mode).

Information Baud rate, parity and Modbus connection monitoring time can only be set via software parameters (AUMA CDT).

Figure 22: Switch for fieldbus address



[S2] Third position before decimal point
[S3] Second position before decimal point
[S4] First position before decimal point

Table 11:

Address	Connector [S2] [S3] [S4]	Software (AUMA CDT)
Default value	2[1)]	247[1)]
Setting range	1 – 199	1 – 247

1) For Modbus loop topology, sliding switches [S2 – S4] are deactivated in the factory. In this case, the address is 247, set via software parameters (AUMA CDT).

Table 12: Examples

	Setting value		
Address	[S2]	[S3]	[S4]
1	OFF	0	1
2	OFF	0	2
10	OFF	1	0
12	OFF	1	2
100	ON	0	0
110	ON	1	0
111	ON	1	1
200	OFF	0	0

Switch position [S2]: ON = sliding switch at white dot (pin 1)

Information

Setting via software parameters (AUMA CDT)

Condition for setting the fieldbus address via software parameters: Switch [S5] is in position ON (software mode).

Setting parameters

M ▷ Customer settings
Modbus
MD1 slave address
Baud rate
Parity/stop bit
Monitoring time

Default values:
MD1 slave address = 247
Baud rate = Auto
Parity/stop bit = Even, 1 stop bit
Monitoring time = 15.0 seconds

Setting ranges: The setting ranges are indicated in the AUMA CDT software.

10.6. Termination resistor: connect

✔ Switch [S1] is only available for line topology. For loop topology, termination is done automatically; therefore a switch for the termination resistor is not required.

✔ This setting is only required if the actuator is the last fieldbus device.

✔ The termination resistor can only be set via switch [S1] and not via the software.

→ Switch on the termination resistor for channel 1 using switch [S1] (standard).

Information: As soon as the termination resistors are switched on, the connection to the next fieldbus device (to XK3) is automatically interrupted to avoid multiple terminations.

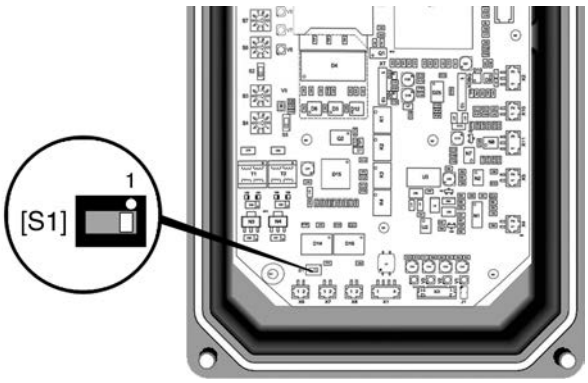


Table 13: Switch [S1] functions

OFF		Fieldbus termination OFF; sliding switch at white dot (pin 1) (delivery state)
ON		Fieldbus termination ON

10.7. Operating time: set

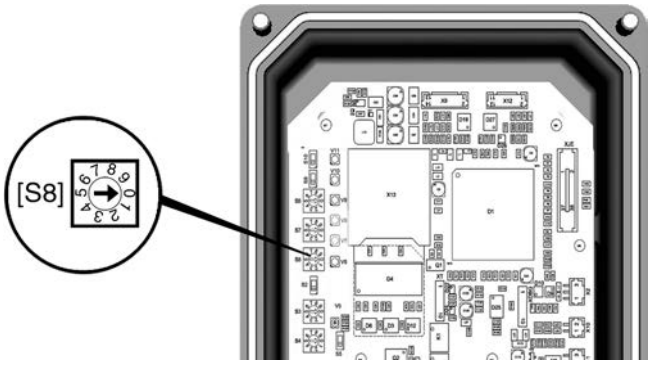
Operating time is defined by the motor speed.

Setting via switches

Switch [S8] is used to change the motor speed and thus the actuator operating time. The preset operating time is valid for both operation modes (Local **and** Remote).

Condition: Switch [S5] is in position OFF (hardware mode).

Figure 23: Switch for operating time



[S8] Operating time

Default value: depending on the order

Setting range: 9 steps (refer to table)

Table 14:

Switch [S8] Step	Operating times for 90° in [s]			
	SGM/SGMR 04.1/05.1/07.1	SGM/SGMR 10.1	SGM/SGMR 12.1	SGM/SGMR 14.1
1	63[1)]	90[1)]	275	–
2	45[1)]	63[1)]	206	–
3	32[1)]	45[1)]	150	345
4	22	32	103	240
5	16	22	75	175
6	11	16	52	120
7	8	11	41	95
8	5.6	8	30	68
9	4	5.6	20	48
0	impermissible switch position			

1) Motor is operating in stepping mode

Setting via software parameters (AUMA CDT)

Motor speed and thus actuator operating time can be modified by means of the software parameters described below. Contrary to operating time setting using switch [S8], setting via software parameter offers the following additional possibilities:

- Different motor speeds for operation modes Local and Remote
- Adjustable motor speed setting (operating times)
- Motor speed setting (target speed) for operation mode Remote by an external signal (fieldbus command)

Setting parameters

Condition: Switch [S5] is in position ON (software mode).

M ▷ Device configuration
Motor speed
Speed LOCAL
Speed REMOTE
Speed fieldbus

Description of parameters:

Speed LOCAL
Output speed for operation via local controls (operation mode Local); Setting range: linear between 0 – 100 % of max. motor speed; Default value = 50.0 %

Speed REMOTE
Output speed in operation mode Remote for setting the Speed fieldbus = Internal parameter; Setting range: linear between 0 – 100 % (0 % = min. motor speed, 100 % = max. motor speed); Default value = 50.0 %

Speed fieldbus
= External

In operation mode Remote, the output speed is defined via fieldbus.

= Internal

In operation mode Remote, the output speed is not defined via fieldbus but by means of the Speed REMOTE software parameter.

Table 15:

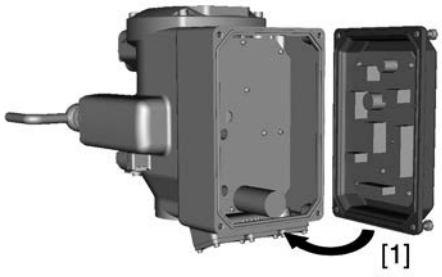
Example values of type range settings SGM/SGMR 04.1/05.1/07.1/10.1					
SGM/SGMR 04.1/05.1/07.1			SGM/SGMR 10.1		
Output speed via parameter: Speed LOCAL Speed REMOTE or via fieldbus: (Speed fieldbus = External)	Speed Motor [rpm]	Operating time Output drive [s]	**Output speed** via parameter: Speed LOCAL Speed REMOTE or via fieldbus: (Speed fieldbus = External)	Speed Motor [rpm]	Operating time Output drive [s]
0.0 %	133	52	0.0 %	133	81
9.0 %	314	22	10.0 %	338	32
14.0 %	431	16	17.0 %	491	22
23.0 %	627	11	26.0 %	675	16
34.0 %	863	8	40.0 %	928	11
52.0 %	1 232	5.6	57.0 %	1,350	8
75.0 %	1,725	4	85.0 %	1,929	5.6
100.0 %	2,250	3.1	100.0 %	2,250	4.8

Table 16:

Example values of type range settings SGM/SGMR 12.1/14.1					
SGM/SGMR 12.1			SGM/SGMR 14.1		
Output speed via parameter: Speed LOCAL Speed REMOTE or via fieldbus: (Speed fieldbus = External)	Speed Motor [rpm]	Operating time Output drive [s]	**Output speed** via parameter: Speed LOCAL Speed REMOTE or via fieldbus: (Speed fieldbus = External)	Speed Motor [rpm]	Operating time Output drive [s]
0.0 %	133	275	0.0 %	–	–
2.0 %	186	206	2.0 %	–	–
6.0 %	255	150	6.0 %	1.1	345
11.0 %	371	103	11.0 %	1.6	240
18.0 %	510	75	18.0 %	2.2	175
29.0 %	742	52	29.0 %	3.2	120
38.0 %	928	41	38.0 %	4.0	95
55.0 %	1,299	30	55.0 %	5.6	68
81.0 %	1,856	20	81.0 %	8.0	48
100.0 %	2,250	17	100.0 %	–	–

10.8. Cover to controls: close

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



5. Place cover [1].
6. Fasten screws evenly crosswise.

11. Commissioning (basic settings at actuator)

11.1. End stops in part-turn actuator

The internal end stops limit the swing angle. They protect the valve in case of limit switching failure during motor operation and serve the purpose as limitation for manual operation via handwheel.

End stop setting is generally performed by the valve manufacturer **prior** to installing the valve into the pipework.

⚠ CAUTION

Exposed, rotating parts (discs/balls) at the valve!

Pinching and damage by valve or actuator.

→ End stops may be set by suitably qualified personnel only.

→ Never completely remove the setting screws [2] and [4] to avoid oil leakage.

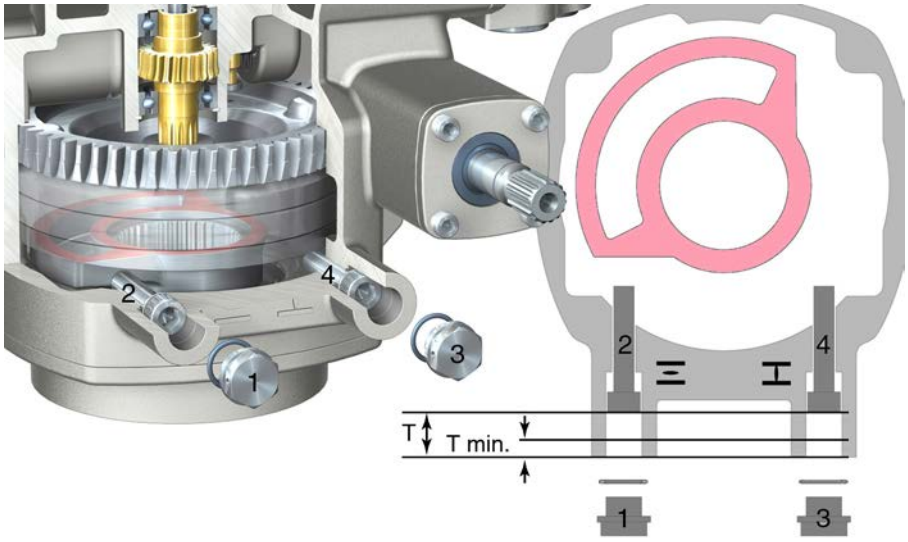
→ Observe dimension $T_{min.}$

Information

- The swing angle set in the factory (e.g. 90°) is indicated in the order-related technical data sheet.
- The setting range (e.g. 92° through 98°) is marked on the name plate and is freely adjustable within the indicated range:

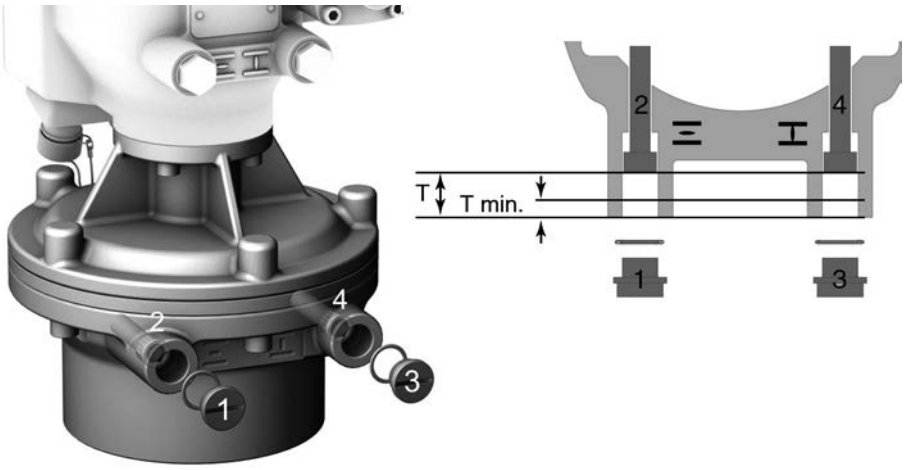
- The setting sequence depends on the valve:
  - Recommendation for **butterfly valves**: Set end stop CLOSED first.
  - Recommendation for **ball valves**: Set end stop OPEN first.

Figure 24: End stop, sizes SGM 04.1 – SGM 10.1



[1] Screw plug for end stop OPEN
[2] Setting screw for end stop OPEN
[3] Screw plug for end stop CLOSED
[4] Setting screw for end stop CLOSED

Figure 25: End stop, sizes SGM 12.1/14.1



[1] Screw plug for end stop OPEN
[2] Setting screw for end stop OPEN
[3] Screw plug for end stop CLOSED
[4] Setting screw for end stop CLOSED

Table 17:

Dimensions/sizes	04.1	05.1	07.1	10.1	12.1	14.1
T (for 90°) [mm]	13	13	16	19	23	23
$T_{min.}$ [mm]	9	9	9	9	13	12

11.1.1. End stop CLOSED: set

1. Remove screw plug [3].
2. Move valve to end position CLOSED with handwheel.
3. If the valve end position is not reached:
   → Slightly turn setting screw [4] counterclockwise until valve end position CLOSED can be correctly set.
   ➥ Turning the setting screw [4] clockwise decreases the swing angle.
   ➥ Turning the setting screw [4] counterclockwise increases the swing angle.

4. Turn setting screw [4] clockwise to the stop.
➥ This completes the setting of end stop CLOSED.
5. Check O-ring in screw plug [3] and replace if damaged.
6. Fasten and tighten screw plug [3].

Having completed this procedure, the end position detection CLOSED can be set immediately.

11.1.2. End stop OPEN: set

Information In general, the end stop OPEN does not have to be set.

1. Remove screw plug [1].
2. Move valve to end position OPEN with handwheel.

3. If the valve end position is not reached:
   → Slightly turn setting screw [2] counterclockwise until valve end position OPEN can be correctly set.
   ➥ Turning the setting screw [2] clockwise decreases the swing angle.
   ➥ Turning the setting screw [2] counterclockwise increases the swing angle.

4. Turn setting screw [2] clockwise to the stop.

➥ This completes the setting of end stop OPEN.

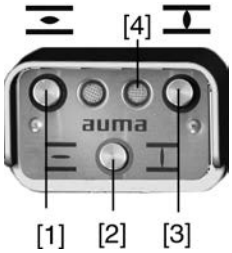
5. Check O-ring in screw plug [1] and replace if damaged.
6. Fasten and tighten screw plug [1].

Having completed this procedure, the end position detection OPEN can be set immediately.

11.2. End position detection: verify setting

1. Activate operation mode LOCAL:
   → If indication light [4] is blinking in blue: Operation mode LOCAL is already active.
   → Indication light [4] is NOT blinking in blue: → Hold down push button [2] for approx. 3 seconds until the indication light is blinking in blue.

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



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

➥ The end position detection is set correctly if (default indication):

- the right indication light [3] is illuminated in yellow in end position CLOSED
- the left indication light [1] is illuminated in green in end position OPEN
- the indication lights go out after travelling into opposite direction.

➥ The end position detection is set incorrectly, if:

- the actuator comes to a standstill before reaching the end position
- the left indication light is blinking in red

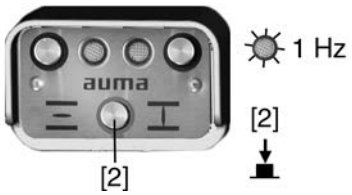
3. If the end position setting is incorrect or not precise: <End position detection: set again via local controls>.

11.3. End position detection: set again via local controls

Operation mode LOCAL must be activated for end position setting.

Activate operation mode LOCAL:

→ Hold down push button [2] for approx. 3 seconds until right indication light is blinking in blue.

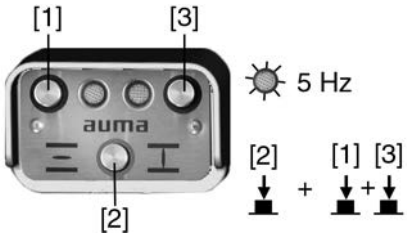


Information If the local controls are not provided on site, it is possible to connect an external control module. The setting is then performed in the same way as described below.

11.3.1. End position CLOSED: set again

Activate setting mode "end position setting":

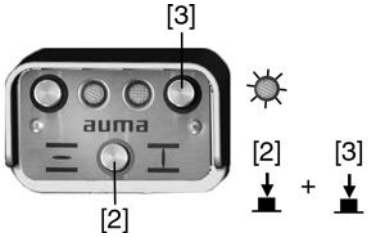
1. Press push button [2] – hold down and press push buttons [1] and [3] at the same time.



➥ Now, the right indication light is blinking faster (5 Hz).

Set end position CLOSED:

2. Use crank handle/handwheel or push button [3] for running the actuator to end position CLOSED. (Actuator runs at reduced output speed in setting mode.)
3. Press push button [2] – hold it down and press push button [3]. Hold both push buttons down until the right indication light is blinking alternately in yellow and blue (default).

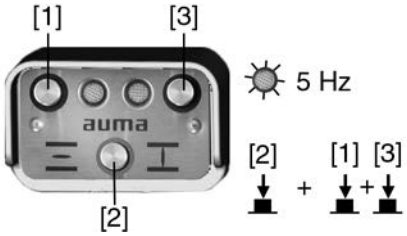


➥ If the right indication light is blinking in yellow/blue, end position CLOSED setting is complete.

11.3.2. End position OPEN: set again

Activate setting mode "end position setting":

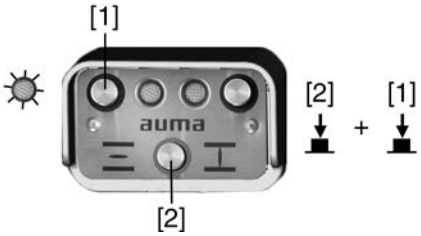
1. Press push button [2] – hold down and press push buttons [1] and [3] at the same time.



➥ Now, the right indication light is blinking faster (5 Hz).

Set end position OPEN:

2. Use crank handle/handwheel or push button [1] for running actuator to end position OPEN. (Actuator runs at reduced output speed in setting mode.)
3. Press push button [2] – hold it down and press push button [1]. Hold both push buttons down until the left indication light is blinking in green (default).



➥ Once the left indication light is illuminated in green (default), end position OPEN setting is complete.

4. Once both end positions are set, perform a reference operation, i.e. both end positions must be approached again – either via push buttons [1]/[3] (in operation mode Local) or from Remote (deactivate operation mode Local).

Deactivate operation mode Local:

5. Hold down push button [2] for approx. 3 seconds until blue indication light goes out.

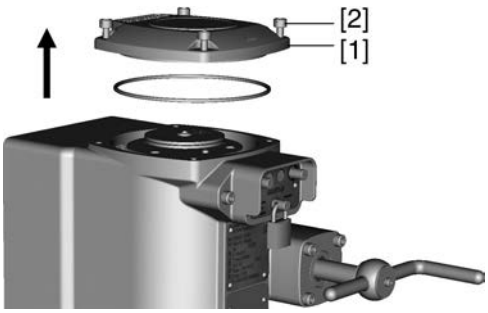
➥ Now, the actuator can be controlled from Remote:

- via operation commands (OPEN - STOP - CLOSE) in positions OPEN or CLOSED.
- via setpoint indication in defined positions between 0 % and 100 % of setting range.

11.4. Switch compartment: open

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

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



11.5. Mechanical position indicator: set

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

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

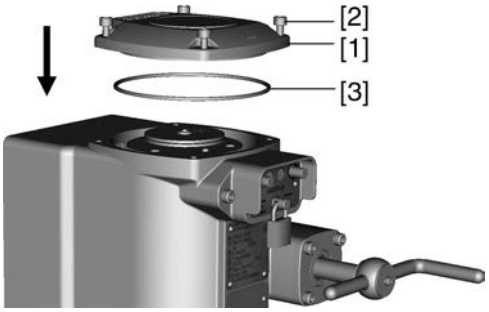
5. Move valve to end position CLOSED again.
6. Check settings:

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

11.6. Switch compartment: close

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

➥



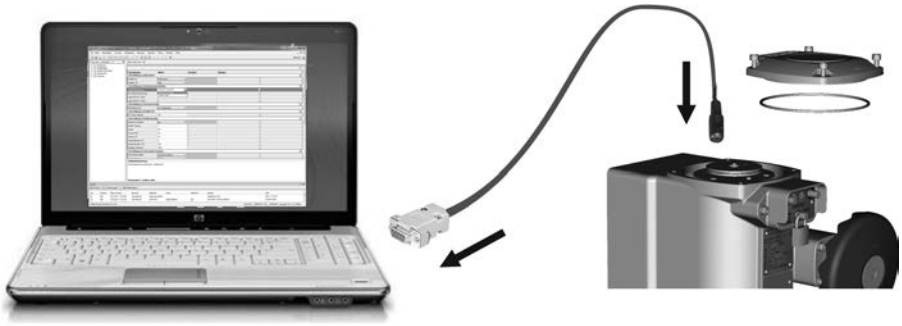
5. Place cover [1] on switch compartment.
6. Fasten screws [2] evenly crosswise.

12. AUMA CDT software (accessories)

The AUMA CDT software (accessories) can be used to establish a connection to a computer (PC, laptop or PDA).

It can be downloaded free of charge from our web site www.auma.com.

Figure 26: Connection with service cable



For connecting the computer to the integral actuator controls, a service cable (AUMA article no.: Z100.999) is required.

Read/perform basic settings via AUMA CDT software

Basic settings at the device (in controls) made via switches are read only via AUMA CDT on delivery and cannot be modified. To be able to change these parameters via software, position switch [S5] in controls to "Software mode". Refer to <Settings via hardware (switches) or via software> chapter.

Switches and software parameters are set to the same values upon delivery (factory settings).

Further settings via AUMA CDT software

Apart from basic settings, the following functions may additionally be set via AUMA CDT software:

- Torque by-pass
  Allows increasing the pre-set torque limitation to 130 % for actuator start to unseat blocked valves. Duration for torque by-pass is adjustable.
- Electronic positioner (option)
- Failure behaviour (on loss of signal)
- EMERGENCY behaviour (option)
- Timer function (option)
- Motion detector
- Type of duty monitoring (motor starts and running time)
- Operating time monitoring
- Self-retaining local

For detailed information on these functions, refer to the online help of the AUMA CDT software.

13. Corrective action

13.1. Fault indications and warning indications

Faults interrupt or prevent the electrical actuator operation.

Faults and warnings can be signalled via the fieldbus and/or via the local controls.

Should local controls be available, the fault and warning signals are indicated by the left indication light [1].

Figure 27: Fault indications and RESET

[1] Red indication light: Fault, yellow: Warning

[2] Push button RESET

In operation mode LOCAL (right indication light is blinking in blue), stored faults (cause does no longer exist), may be reset using the push button RESET [2] (hold it down for more than 1 second).

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

The tables below show the fault signalling via the indication lights of the local controls.

Table 18:

Fault signalling via the red indication light		
Indication	Signal	Signification (default)
1 blink	Fault indication 1	Torque fault → Press push buttons OPEN or CLOSE to reset the fault (indication light) by operating the device in the opposite direction.
2 blinks	Fault indication 2	Thermal fault (motor protection tripped) → Cool down, wait.
3 blinks	Fault indication 3	Signal loss of analogue input (4 – 20 mA)
4 blinks	Fault indication 4	Operation mode DISABLED: Operation via the local controls is disabled (Enable local controls function).
5 blinks	Fault indication 5	Fault E2 (actual value of positioner) → Check wiring (for possible loss of signal) of E2. → Read detailed fault indication via AUMA CDT software (accessories).
6 blinks	Fault indication 6	Actuator is outside the permissible position (potentiometer signal). → Set potentiometer again.
7 blinks	Fault indication 7	Fault of controls temperature
8 blinks	Fault indication 8	Collective signal: Internal error has occurred. → Read detailed fault indication via AUMA CDT software (accessories) and contact AUMA service.
9 blinks	Fault indication 9	Collective signal for all other faults

In case several faults have occurred, only the fault with the highest priority will be signalled. Fault indication 1 has the highest, fault indication 9 the lowest priority.

Table 19:

Warning signalling via yellow indication light		
Indication	Signal	Signification (default)
Blinking	Warning	For reasons of accuracy, we recommend selection of the stroke higher than 60 % of the maximum turn range. → Abort warning: Set again Low limit Uspan parameter via AUMA CDT software within the Position transmitter potentiometer sub-menu.

13.2. Fuses

13.2.1. Fuses within the actuator controls

The primary fuse F1 is located on the power board (device protection fuse). It becomes visible when removing the cover to the controls. The fuse cannot be replaced. Only by replacing the entire power board can the fuse be exchanged.

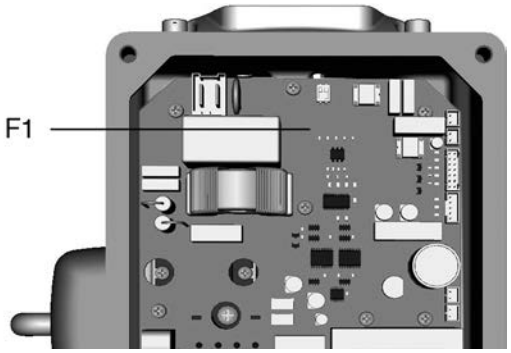
DANGER

Electric shock due to presence of hazardous voltage!

Failure to observe this warning results in death or serious injury.

→ Disconnect device from the mains before opening.

Figure 28: Primary fuse on power board



13.2.2. Motor protection (thermal monitoring)

In order to protect against overheating and impermissible high surface temperatures at the actuator, a PTC thermistor is embedded in the motor winding. Motor protection trips as soon as the max. permissible winding temperature has been reached.

The actuator is stopped and controls signals a fault. The left indication light of the local controls is blinking in red.

The motor has to cool down before operation can be resumed. Depending on the parameter setting, the fault signal is either automatically reset or the fault signal has to be acknowledged.

The acknowledgement is made:

- via push button [2] in operation mode LOCAL (press and hold down push button more than 1 second)

- or with the reset command via fieldbus.

14. Servicing and maintenance

CAUTION

Damage caused by inappropriate maintenance!

→ Servicing and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or the contractor of the plant. Therefore, we recommend contacting our service.

→ Only perform servicing and maintenance tasks when the device is switched off.

AUMA Service & Support

AUMA offers extensive service such as servicing and maintenance as well as customer product training. For the contact addresses, refer to our website (www.auma.com).

14.1. 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

- Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>.
- When rarely operated: Perform test run.

14.2. Maintenance

Maintenance intervals

The maintenance intervals depend on load and application conditions having a major influence on the lubricating characteristics of the oil. Maintenance (incl. oil change/seal replacement) may only be carried out by the AUMA service.

Recommendations for maintenance:

- Generally after 4 to 6 years for modulating duty.
- Generally after 6 to 8 years if operated frequently (open-close duty).
- Generally after 10 to 12 years if operated rarely (open-close duty).

No additional lubrication of the gear housing is required during operation.

14.3. Disposal and recycling

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

- Various metals
- Plastic materials
- 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.

15. Technical data

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

15.1. Technical data Part-turn actuator

General information

AUMA part-turn actuators SGM 04.1 – SGM 10.1/SGMR 04.1 – SGMR 14.1 are equipped with integral controls.

Type	Operating time for 90° in seconds (adjustable in 9 steps)	Torque range[1]	Run torque[2]/ Modulating torque[3]	Valve attachment	Valve shaft		
	50 Hz/60 Hz	Max. [Nm]	Max. [Nm]	Standard EN ISO 5211	Cylindrical Max. [mm]	Square Max. [mm]	Two-flat Max. [mm]
SGM/SGMR 04.1	4 – 63	25 – 63	32	F07	20	17	17
SGM/SGMR 05.1	4 – 63	50 – 125	63	F07	20	17	17
SGM/SGMR 07.1	4 – 63	100 – 250	125	F07	25.4	22	22
SGM/SGMR 10.1	5.6 – 90	200 – 500	250	F10	38	30	27
SGM/SGMR 12.1	20 – 275	400 – 1,000	500	F12	50	36	41
SGM/SGMR 14.1	48 – 345	800 – 2,200	1,100	F14	60	46	46

1) The “Torque by-pass” function (can be activated) allows increasing the pre-set torque to 130 %. This increase only applies during actuator start for an adjustable time period. This allows safer unseating of blocked valves.
2) Maximum permissible torque for 15 min. running time
3) Maximum permissible torque for modulating duty

Type	Operating time for 90° in seconds (adjustable in 9 steps)	Handwheel/crank handle according to VG 85081[1]		Weight Bronze[2]	Weight Aluminium[2]
	50 Hz/60 Hz	∅ [mm]	Turns for 90°	approx. [kg]	approx. [kg]
SGM/SGMR 04.1	4 – 63	125	13.5	11	7.5
SGM/SGMR 05.1	4 – 63	125	13.5	11	7.5
SGM/SGMR 07.1	4 – 63	125	13.5	17	10.5
SGM/SGMR 10.1	5.6 – 90	150	13.5	26	15.5
SGM/SGMR 12.1	20 – 275	125	35	32	25.5
SGM/SGMR 14.1	48 – 345	125	80	41.5	35

1) Hub does not correspond to VG 85081; other versions on request
2) Indicated weight includes part-turn actuator with controls, electrical connection in standard version, unbored coupling and handwheel/crank handle.

Features and functions of actuator		
Type of duty	Open-close duty:	Short-time duty S2 - 15 min
	Modulating duty:	Intermittent duty S4 - 40 % with maximum number of starts of 1,800 cycles per hour (option)
	For nominal voltage and +40 °C ambient temperature and at average running or modulating torque load. The type of duty must not be exceeded.	
Motor	Variable speed, brushless motor	
Insulation class	F, tropicalized	
Motor protection	PTC thermistors (according to DIN 44081)	
Housing material	Options:	• Bronze • Aluminium
Self-locking	Yes	
Swing angle	Standard:	SGM/SGMR 04.1 – 10.1: 82° – 98° adjustable between min. and max. values SGM/SGMR 12.1 – 14.1: 75 ° – 105 °
	Option:	Other swing angles on request
Limit switching device	Via position transmitter potentiometer status signals for directions OPEN and CLOSE Signalling via fieldbus interface	

Features and functions of actuator		
Torque switching	Via electronic current measurement status signals for directions OPEN and CLOSE, adjustable in 8 steps Signalling via fieldbus interface	
Mechanical position indicator	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED	
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation	
Coupling	Standard:	Coupling unbored
	Options:	• Coupling unbored extended • Finish machining of coupling (standard or extended) - Bore according to EN ISO 5211 with 1 keyway according to DIN 6885-1 - Square bore according to EN ISO 5211 - Two-flat according to EN ISO 5211
Valve attachment	Dimensions according to EN ISO 5211	

Features and functions of actuator controls		
Mains voltage, mains frequency	Standard voltages:	

1-phase AC
Standard voltages/frequencies

Volt	115	230
Hz	50/60	50/60

Permissible variation of mains voltage: ±10 %
Permissible variation of mains frequency: ±5 %

External supply of the electronics (option)	24 V DC +20 %/–15 % Current consumption: With options up to 200 mA The external power supply must have a reinforced insulation against mains voltage in accordance with IEC 61800-5-1 and may only be supplied by a circuit limited to 150 VA in accordance with IEC 61800-5-1.	
Overvoltage category	Category III according to IEC 60364-4-443	
Power electronics	Power electronics with integral motor controller	
Rated power	Controls are designed for rated motor power, refer to Electrical data Part-turn actuators SGM/SGMR	
Control (input signals)	Operation commands and setpoint via fieldbus interface	
Status signals (output signals)	Via fieldbus interface	
Local controls	Standard:	• Push buttons OPEN, STOP (LOCAL - REMOTE), CLOSE • 2 multi-colour programmable indication lights: - End position CLOSED (yellow), fault/failure (red), end position OPEN (green), operation mode LOCAL (blue)
	Option:	Local controls mounted separately on wall bracket
Functions	• Switch-off mode adjustable: - Limit or torque seating for end position OPEN and end position CLOSED • Torque monitoring across the whole travel • Torque by-pass • Programmable EMERGENCY behaviour: - Via fieldbus interface - Reaction can be selected: Stop, run to end position CLOSED, run to end position OPEN • Positioner: - Position setpoint via fieldbus interface - Programmable behaviour on loss of signal - Automatic adaptation of the dead band (adaptive behaviour selectable)	
Electrical connection	Standard:	Plug/socket connector with crimp connection
	Option:	Welded or sealed plug/socket connector (100 bar when connected)
Wiring diagram (basic version)	TPCBC000-2A7-0520 TPA50R200-0A0-000	

Settings/programming the Modbus RTU interface	
Setting the Modbus RTU interface	The Modbus address is set via switches (DIP switches in the actuator), alternatively also via parameters (using AUMA Software CDT and AUMA service cable Z100.999). Parity and baud rate are set via parameters.

General data of the Modbus RTU interface		
Communication protocol	Modbus RTU according to IEC 61158 and IEC 61784	
Network topology	Line (fieldbus) structure. When using repeaters, tree structures can also be implemented. Coupling and uncoupling of devices during operation without affecting other devices is possible.	
Transmission medium	Twisted, screened copper cable according to IEC 61158	
Fieldbus interface	EIA-485 (RS-485)	
Transmission rate/cable length	Line topology:	

Baud rate (kbit/s)	Max. cable length (segment length) without repeater	Possible cable length with repeater (total network cable length):
9.6 – 38.4	1,200 m	approx. 10 km

Redundant loop topology

Baud rate (kbit/s)	Max. cable length between actuators (without repeater)	Max. possible cable length of redundant ring
9.6 – 38.4	1,200 m	approx. 290 km

Device types	Modbus slave, e.g. devices with digital and/or analogue inputs/outputs such as actuators, sensors	
Number of devices	32 devices without repeater, with repeater expandable to 247	
Fieldbus access	Polling between master and slaves (query response)	
Supported fieldbus functions	01	Read Coil Status
	02	Read Input Status
	03	Read Holding Registers
	04	Read Input Registers
	05	Force Single Coil
	15 (0FHex)	Force Multiple Coils
	06	Preset Single Register
	16 (10Hex)	Preset Multiple Registers
	17 (11Hex)	Report Slave ID
	08	Diagnostics: • 00 00 Loopback • 00 10 (0AHex) Clear Counters and Diagnostic Register • 00 11 (0BHex) Return Bus Message Count • 00 12 (0CHex) Return Bus Communication Error Count • 00 13 (0DHex) Return Bus Exception Error Count • 00 14 (0EHex) Return Slave Message Count • 00 15 (0FHex) Return Slave No Response Count • 00 16 (10Hex) Return Slave NAK Count • 00 17 (11Hex) Return Slave Busy Count • 00 18 (12Hex) Return Character Overrun Count

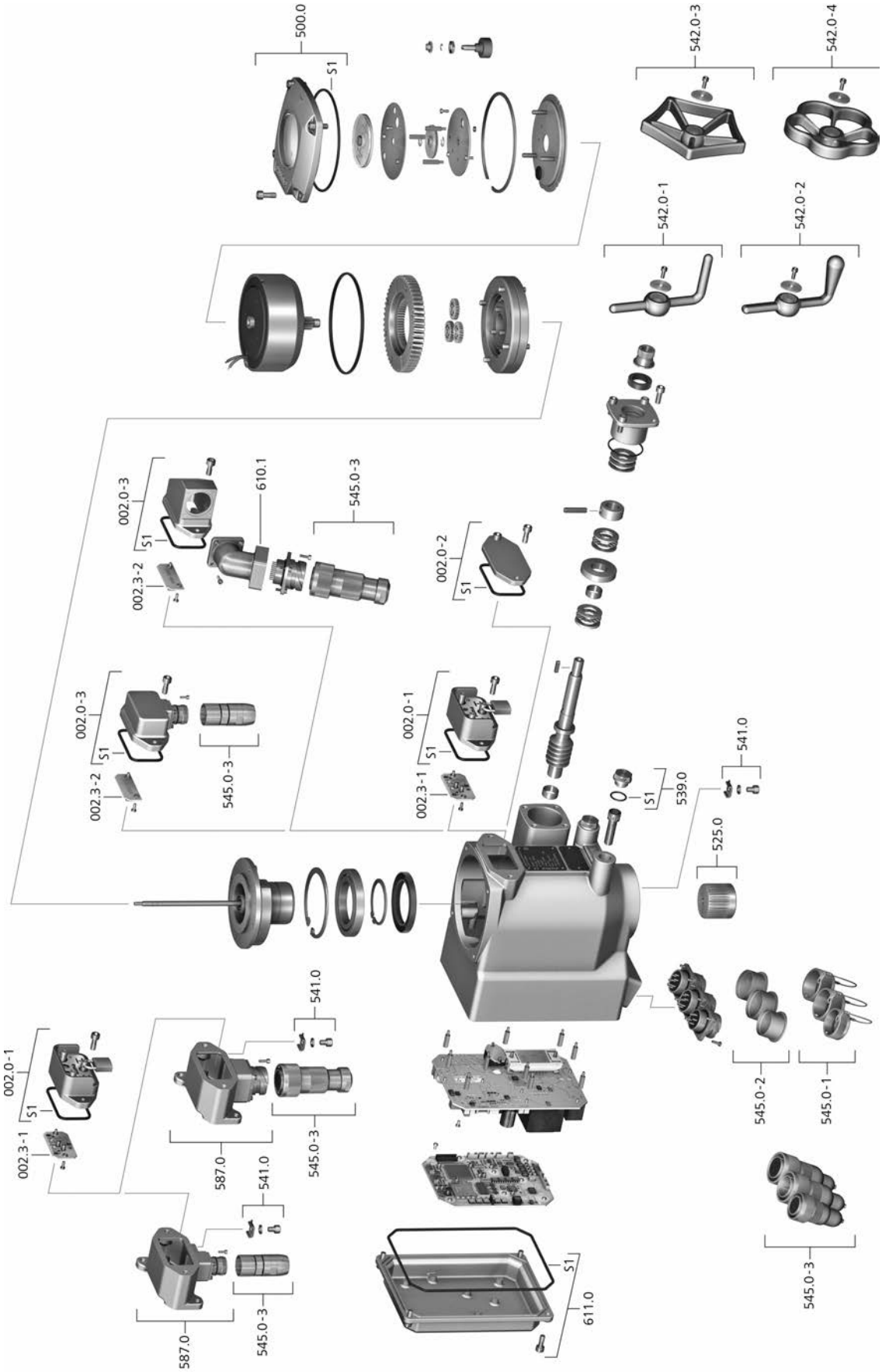
Commands and signals of the Modbus RTU interface	
Process representation output (command signals)	OPEN, STOP, CLOSE, position setpoint, RESET, EMERGENCY operation command
Process representation input (feedback signals)	• End position OPEN, CLOSED • Actual position value • Selector switch in position LOCAL/REMOTE • Torque switch OPEN, CLOSED • Limit switch OPEN, CLOSED
Process representation input (fault signals)	• Motor protection tripped • Torque switch tripped in mid-travel
Behaviour on loss of communication	The behaviour of the actuator is programmable: • Stop in current position • Travel to end position OPEN or CLOSED • Travel to any intermediate position • Execute last received operation command

Service conditions		
Mounting position	Any position	
Ambient temperature	–25 °C to +70 °C	
Humidity	Up to 100 % relative humidity over the entire permissible temperature range	
Enclosure protection in accordance with IEC 60529	IP68 According to AUMA definition, enclosure protection IP68 meets the following requirements: • Depth of water: maximum 8 m head of water • Continuous immersion in water: maximal 96 hours • Up to 10 operations during immersion • Modulating duty is not possible during immersion.	
Pollution degree according to IEC 60664-1	Pollution degree 4 (when closed), pollution degree 2 (internal)	
Vibration resistance according to IEC 60068-2-6	2 g, from 10 to 200 Hz Resistant to vibration during start-up or for failures of the plant. However, a fatigue strength may not be derived from this.	
Shock resistance	Standard:	Without
	Options:	• WTD: in accordance with BV 0430[2] for surface vessels (180 g) (applies only to SGM/SGMR 04.1 – SGM/SGMR 10.1) • WTD: in accordance with BV 0430[2] for submarines (400 g) (applies only to SGM/SGMR 04.1 – SGM/SGMR 10.1) • in accordance with MIL-S-901D (NAVY) (applies only to SGM/SGMR 04.1 – SGM/SGMR 12.1) • Shock load up to 70 g
Corrosion protection for version made of bronze	Sea water resistant bronze housing. The output drive unit for sizes SGM/SGMR 12.1– SGM/SGMR 14.1 is partially made of GJL and double layer powder coating. All external screws and shafts are made of stainless steel.	
Corrosion protection for version made of aluminium	Suitable for use in areas with high salinity, almost permanent condensation, and high pollution due to double layer powder coating. This complies with category C5-M.	
Colour	Standard:	Version made of bronze: Bronze Version made of aluminium: AUMA silver-grey (similar to RAL 7037)
	Option:	Version made of bronze or aluminium: Available colours on request
Lifetime	Open-close duty:	SGM 04.1 – 10.1: 20,000 operating cycles OPEN - CLOSE - OPEN SGM 12.1: 10,000 operating cycles OPEN - CLOSE - OPEN SGM 14.1: 7,500 operating cycles OPEN - CLOSE - OPEN An operation cycle is based on an operation from OPEN to CLOSED and back to OPEN, with a travel of 90° each.
	Modulating duty:	5 million modulating steps
	The lifetime depends on the load and the number of starts. A high starting frequency will rarely improve the modulating accuracy. To reach the longest possible maintenance and fault-free operating time, the number of starts per hour chosen should be as low as permissible for the process.	

Further information	
EU Directives	Machinery Directive 2006/42/EC Low Voltage Directive 2014/35/EU EMC Directive 2014/30/EU RoHS Directive 2011/65/EU
Reference documents	Dimensions Part-turn actuators SGM 04.1 – SGM 14.1/SGMR 04.1 – SGMR 14.1 Electrical data Part-turn actuators SGM 04.1 – SGM 14.1/SGMR 04.1 – SGMR 14.1

16. Spare parts

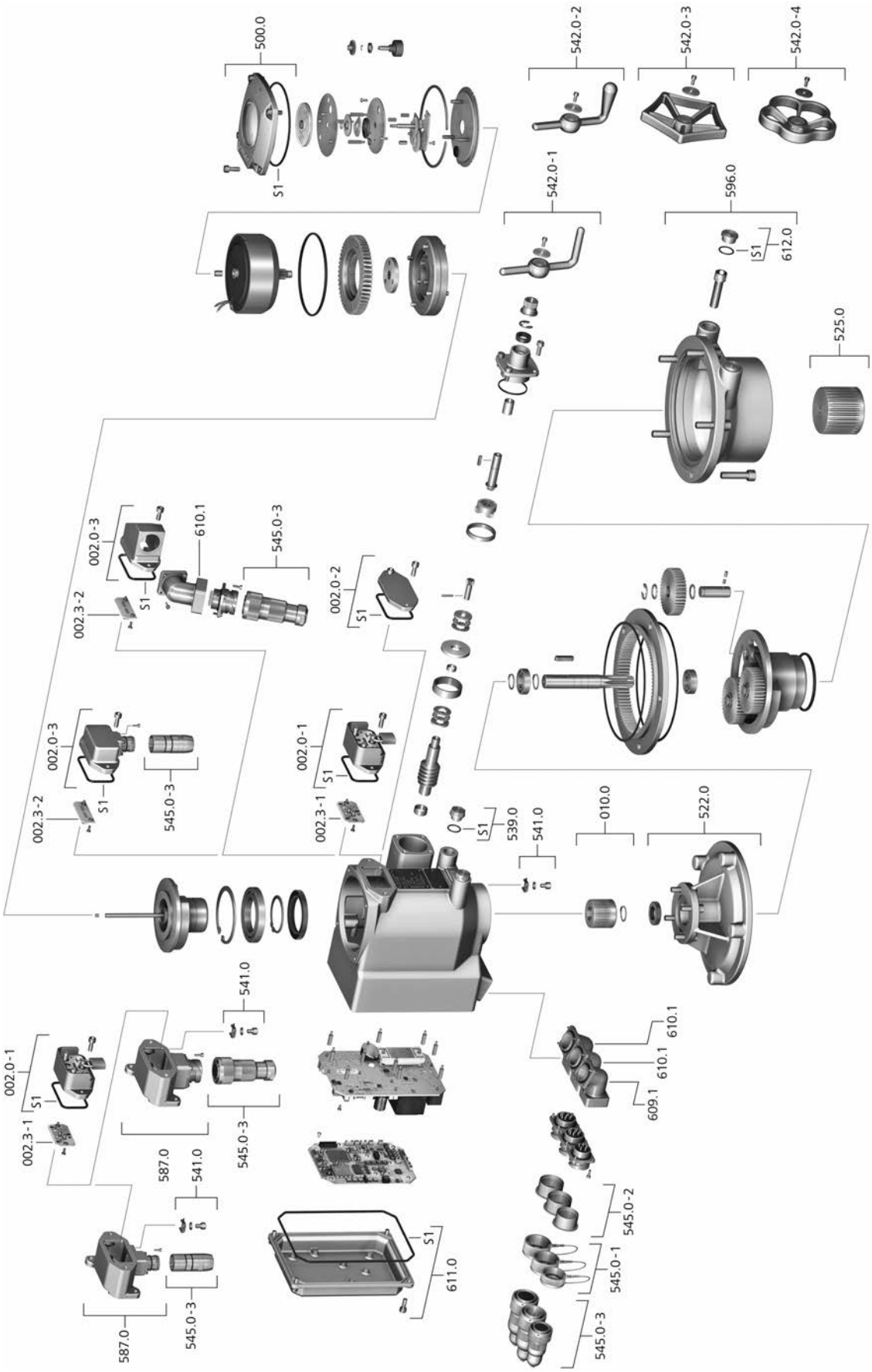
16.1. Part-turn actuators SGM 04.1 – SGM 10.1/SGMR 04.1 – SGMR 10.1



Please state device type and our order number (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Representation of spare parts may slightly vary from actual delivery.

Ref. no.	Designation	Type
002.0-1	Local controls	Sub-assembly
002.0-2	Cover (for version without local controls)	Sub-assembly
002.0-3	Cover with socket for connecting separately mounted local controls	Sub-assembly
002.3-1	Local controls board for 022.0-1	Sub-assembly
002.3-2	Board in connecting cover for 022.0-3	Sub-assembly
500.0	Cover	Sub-assembly
525.0	Coupling	Sub-assembly
539.0	Screw plug	
541.0	Protective earthing	Sub-assembly
542.0-1	Crank handle with cylindrical grip	Sub-assembly
542.0-2	Crank handle with conical grip	Sub-assembly
542.0-3	Handwheel with five-edge ring	Sub-assembly
542.0-4	Handwheel with five-ripple ring	Sub-assembly
545.0-1	Protective cap with cord	Sub-assembly
545.0-2	Protective cap without cord	Sub-assembly
545.0-3	Mating plug	Sub-assembly
587.0	Wall bracket	
610.1	Angle adapter for pins for controls	Sub-assembly
611.0	Cover	Sub-assembly
S1	Seal kit, small	Set

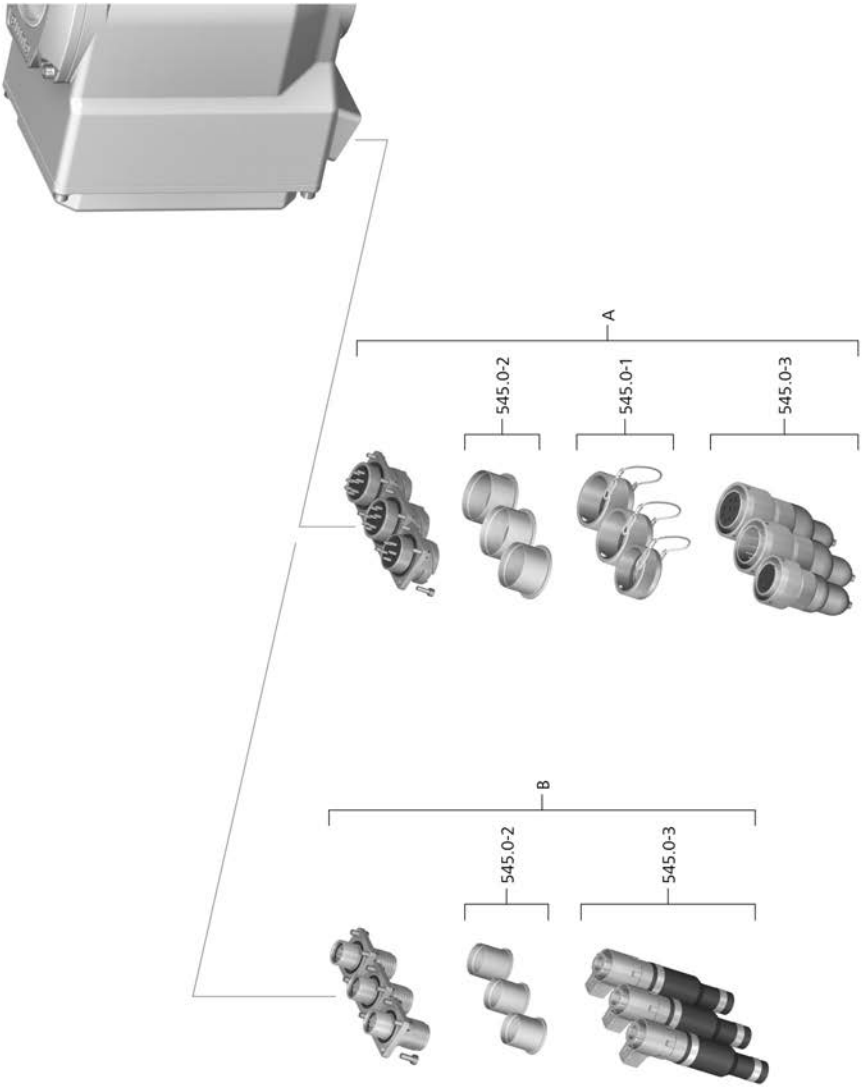
16.2. Part-turn actuators SGM 12.1 – SGM 14.1/SGMR 12.1 – SGMR 14.1



Please state device type and our order number (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Representation of spare parts may slightly vary from actual delivery.

Ref. no.	Designation	Type
002.0-1	Local controls	Sub-assembly
002.0-2	Cover (for version without local controls)	Sub-assembly
002.0-3	Cover with socket for connecting separately mounted local controls	Sub-assembly
002.3-1	Local controls board for 022.0-1	Sub-assembly
002.3-2	Board in connecting cover for 022.0-3	Sub-assembly
010.0	Coupling	Sub-assembly
500.0	Cover	Sub-assembly
522.0	Flange	Sub-assembly
525.0	Coupling	Sub-assembly
539.0	Screw plug	
541.0	Protective earthing	Sub-assembly
542.0-1	Crank handle with cylindrical grip	Sub-assembly
542.0-2	Crank handle with conical grip	Sub-assembly
542.0-3	Handwheel with five-edge ring	Sub-assembly
542.0-4	Handwheel with five-ripple ring	Sub-assembly
545.0-1	Protective cap with cord	Sub-assembly
545.0-2	Protective cap without cord	Sub-assembly
545.0-3	Mating plug	Sub-assembly
548.0	Spigot ring	
587.0	Wall bracket	
596.0	Output drive flange	Sub-assembly
609.1	Angle adapter for mains cables	Sub-assembly
610.1	Angle adapter for pins for controls	Sub-assembly
611.0	Cover	Sub-assembly
612.0	Screw plug for end stop	Sub-assembly
S1	Seal kit, small	Set

16.3. Electrical connections (straight) for actuators SGM 04.1 – SGM 10.1/SVM 05.1 – SVM 07.5 fieldbus



Please state device type and our order number (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Representation of spare parts may slightly vary from actual delivery.

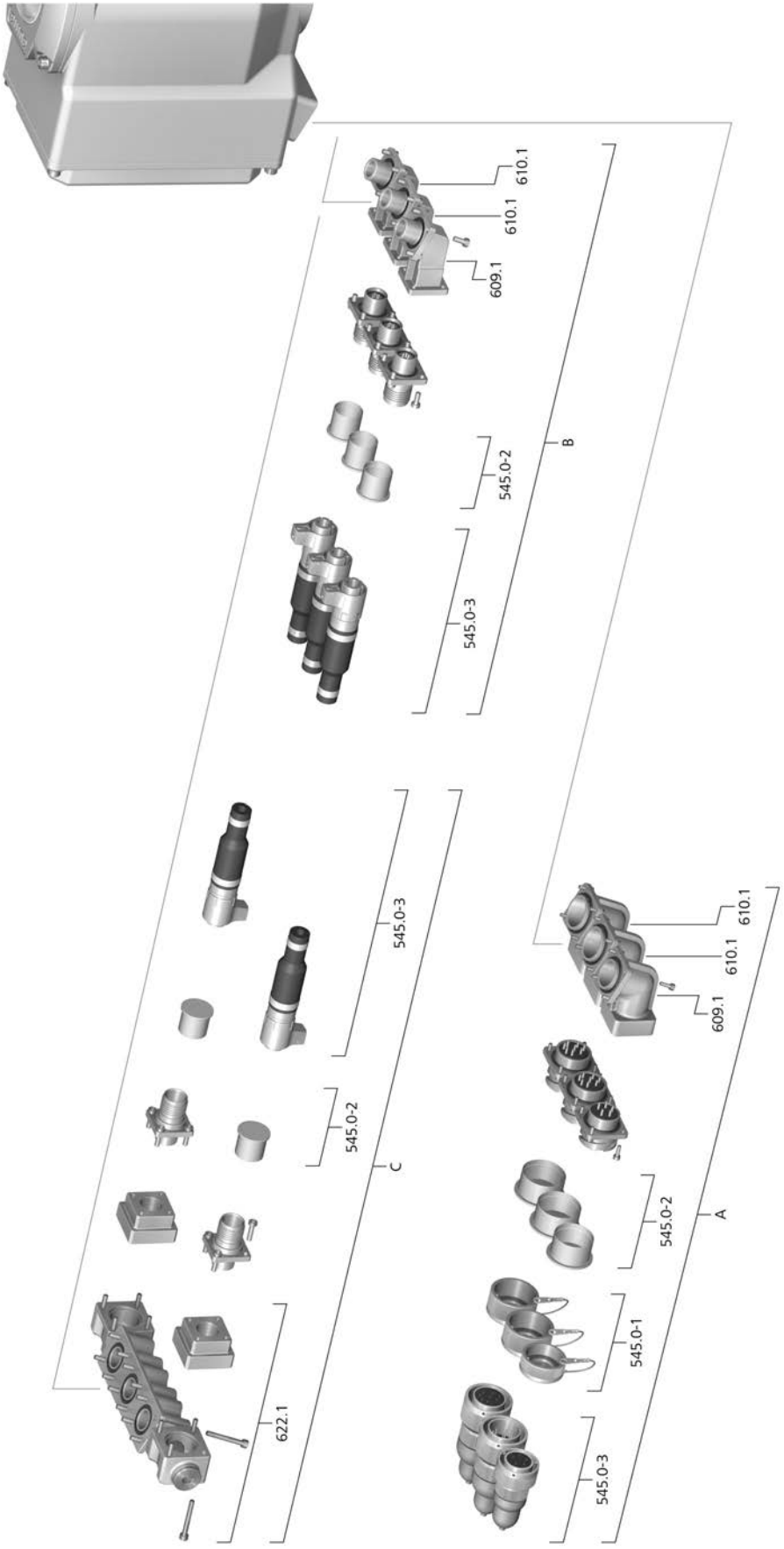
Variants:

A: Electrical connection type CANNON (bayonet connector) – not for SMG 12.1/14.1

B: Electrical connection type JOWO (screw-type connector, welded and sealed) – not for SGM 12.1/14.1

Ref. no.	Designation	Type
545.0-1	Protective cap with cord	Sub-assembly
545.0-2	Protective cap without cord	Sub-assembly
545.0-3	Mating plug	Sub-assembly

16.4. Electrical connections (angular) for actuators SGM 04.1 – SGM 14.1/SVM 05.1 – SVM 07.5 fieldbus



Please state device type and our order number (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Representation of spare parts may slightly vary from actual delivery.

Variants:

A: Electrical connection type CANNON (bayonet connector)

B: Electrical connection type JOWO (screw-type connector, welded and sealed)

C: Electrical connection type JOWO with flange plate (screw-type connector, welded and sealed)

Ref. no.	Designation	Type
545.0-1	Protective cap with cord	Sub-assembly
545.0-2	Protective cap without cord	Sub-assembly
545.0-3	Mating plug	Sub-assembly
609.1	Angle adapter for mains cables	Sub-assembly
610.1	Angle adapter for control contacts	Sub-assembly

Index

AUMA Riester GmbH & Co. KG

P.O. Box 1362
DE 79373 Muellheim
Tel +49 7631 809 - 0
Fax +49 7631 809 - 1250
info@auma.com
www.auma.com

Y005.709/003/en/1.21