auma®
Solutions for a world in motion

Part-turn actuators
SQVEx 05.2 – SQVEx 14.2
SQRVEx 05.2 – SQRVEx 14.2
Control unit: electronic (MWG)
with actuator controls
ACVExC 01.2 Non-Intrusive

Control
Parallel
Profibus DP
→ Profinet
Modbus RTU
Modbus TCP/IP
Foundation Fieldbus
HART



Operation instructions

Assembly, operation, 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:

- Manual (Operation and setting) of actuator controls ACVExC 01.2 Profinet
- Manual (Fieldbus device integration) of actuator controls ACVExC 01.2 Profinet

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

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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.

Depending on the actuator version, this includes:

- Standards and directives such as IEC 60079 “Explosive atmospheres":
  - Part 14: Electrical installations design, selection and erection.
  - Part 17: Electrical installations inspection and maintenance.
- Configuration guidelines for the respective fieldbus or network 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.

Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant is responsible for respect and control of these regulations, standards, and laws.

Electrostatic charging

Highly efficient charge generating processes (processes more efficient than manual friction) on the device surface must be excluded at any time, since they will lead to propagating brush discharges and therefore to ignition of a potentially explosive atmosphere.

This also applies to fireproof coatings or covers available as an option.

Ignition dangers

Gearboxes were subjected to an ignition hazard assessment in compliance with the currently applicable standard according to ISO 80079-36/ -37. Hot surfaces, mechanically generated sparks as well as static electricity and stray electric currents were identified and assessed as major potential ignition sources. Protective measures to prevent the likelihood that ignition sources arise were applied to the gearboxes. This includes in particular lubrication of the gearbox, the IP protection codes and the warnings and notes contained in these operation instructions.

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 SQVEx 05.2 – SQVEx 14.2/SQRVEx 05.2 – SQRVEx 14.2 are designed for the operation of industrial valves, e.g. butterfly valves and ball valves.

The devices described below are approved for use in the potentially explosive atmospheres of zones 1, 2, 21, and 22.

If temperatures >40 °C are to be expected at the valve flange or the valve stem (e.g. due to hot media), please consult AUMA. Temperatures > 40 °C are not considered with regard to the non-electrical explosion protection.

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

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

- Industrial trucks according to EN ISO 3691
- Lifting appliances according to EN 14502
- Passenger lifts according to DIN 15306 and 15309
- Service lifts according to EN 81-1/A1
- Escalators
- Continuous duty
- Buried service
- Continuous underwater use (observe enclosure protection)
- Potentially explosive areas of zones 0 and 20
- Potentially explosive areas of group I (mining)
- 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.

These operation instructions are only valid for the “clockwise closing” standard version, i.e. driven shaft turns clockwise to close the valve. For “counterclockwise closing” version, a supplement must be observed in addition to these operation instructions.

Specific conditions of use

The particular conditions of use are listed on the certificates supplied. Among others, this includes the following conditions:

- Refer to page 5, Electrostatic charging for further references to minimise the risk of electrostatic charging within a potentially explosive atmosphere.
- For information regarding the dimensions of the flameproof joints, contact the manufacturer.
- Special fasteners according to IEC 60079-0 to seal flameproof enclosures must at least have a strength class of A*-70.
- For fixing the screws, please also refer to page 79, Tightening torques for screws.
- After tripping of the thermal motor protection (TMS), an acknowledgement (RESET) of the thermal fault is required.

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)

M ▷ **Via the menu to parameter**

Describes the menu path to the parameter. When using the local controls, the required parameter can be quickly found in the display. Display texts are shaded in grey: Display.

➥ **Result of a process step**

Describes the result of a preceding process step.

Warning signs at the device

The following warning signs can be attached to the device.



General warning sign

General warning of a danger zone.



Hot surface

Warning of hot surfaces, e.g. possibly caused by high ambient temperatures or strong direct sunlight.



Electrical voltage

Hazardous voltage! Warning of electric shock. At some devices, the warning sign additionally includes a time interval, e.g. 30 s. Once power supply is switched off, you will have to wait for the indicated period. Only then may the device be opened.

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 SQVEx 10.2 part-turn actuators



[1] Part-turn actuator with motor and handwheel
[2] Actuator controls
[3] Local controls with display, (a) selector switch and (b) push button
[4] Valve attachment

AUMA part-turn actuators SQVEx 05.2 – SQVEx 14.2/SQRVEx 05.2 – SQRVEx 14.2 are driven by an electric motor. For manual operation, a handwheel is provided. Switching off in end positions may be either by limit or torque seating. Actuator controls are required to operate or process the actuator signals.

For non-intrusive version (control unit: electromechanical version), limit and torque setting is made via switches within the actuator.

For non-intrusive version (control unit: electronic version), limit and torque setting is made via the actuator controls, neither actuator nor the actuator controls housing have o be opened. For this purpose, the actuator is equipped with an MWG (magnetic limit and torque transmitter), also capable of supplying analogue torque feedback signals/torque indication and analogue position feedback signals/position indication at the actuator controls output.

For variable speed actuators SQVEx 05.2 – SQVEx 14.2/SQRVEx 05.2 – SQRVEx 14.2, the actuator speed is modified by means of a frequency converter in the actuator controls.

Actuator controls

The actuator controls ACVExC 01.2 may be mounted directly to the actuator or separately on a wall bracket.

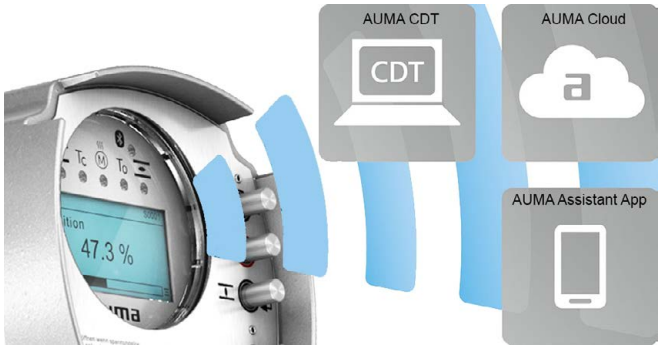
The actuator can be operated via the push buttons on the local controls of the actuator controls or settings can be made in the actuator controls menu. The display shows information on the actuator as well as the menu settings.

The functions of the actuator controls include standard valve control in OPEN-CLOSE duty, positioning, process control, logging of operating data, diagnostic functions right through control via various interfaces (e.g. fieldbus, Ethernet and HART).

App and software

Using the **AUMA CDT** software for Windows-based computers (notebooks or tablets) and the **AUMA Assistant App**, actuator data can be uploaded and read, settings can be modified and stored. The connection between computer and AUMA actuator is established wireless via Bluetooth interface. With the **AUMA Cloud**, we provide an interactive platform to collect and assess e.g. detailed device data of all actuators within a plant.

Figure 2: Communication via Bluetooth



AUMA CDT



AUMA CDT is a user-friendly setting and operation program for AUMA actuators.

Connection between computer (notebook, tablet) and actuator is wireless via Bluetooth interface.

AUMA CDT software can be downloaded free of charge from our website www.auma.com.

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.

AUMA Assistant App



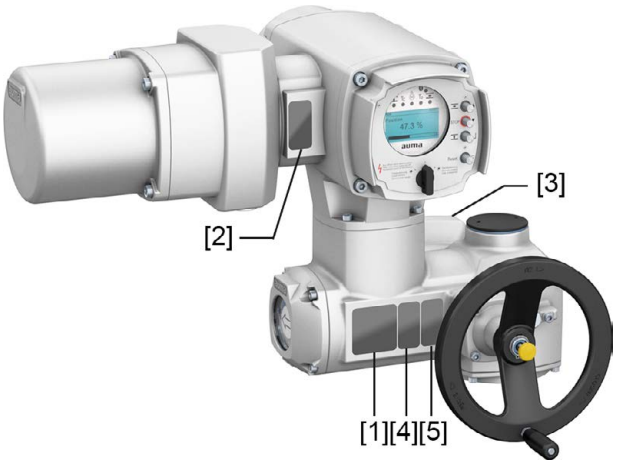
The AUMA Assistant App enables remote setting and remote diagnostics of AUMA actuators via Bluetooth using either smartphone or tablet.

The AUMA Assistant App can be downloaded free of charge from the Play Store (Android) or App Store (iOS).

Figure 3: Link to AUMA Assistant App

3. Name plate

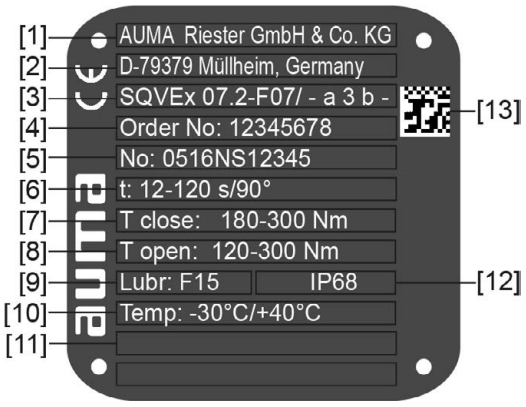
Figure 4: Arrangement of name plates



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

Actuator name plate

Figure 5: Actuator name plate (example)

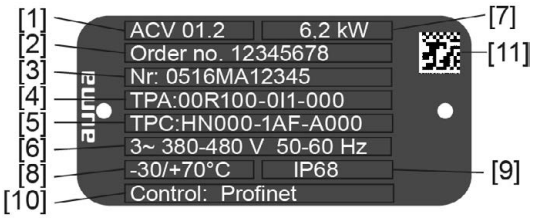


auma (= manufacturer logo); CE (= CE mark)

[1] Name of manufacturer
[2] Address of manufacturer
[3] **Type designation**
[4] **Order number**
[5] **Serial number**
[6] Operating time range
[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

Actuator controls name plate

Figure 6: Name plate for actuator controls (example)

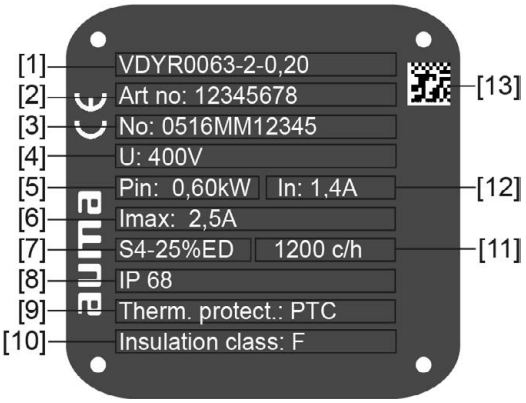


auma (= manufacturer logo)

[1] **Type designation**
[2] **Order number**
[3] **Serial number**
[4] **Actuator terminal plan**
[5] Actuator controls terminal plan
[6] Mains/voltage range/frequency range
[7] **Rated motor power of ACVExC**
[8] Permissible ambient temperature
[9] Enclosure protection
[10] **Control**
[11] Data Matrix code

Motor name plate

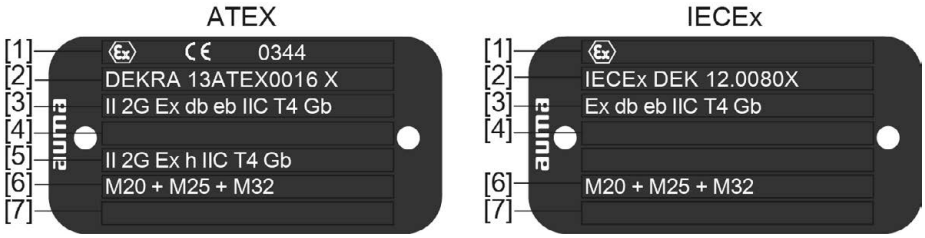
Figure 7: Motor name plate (example)



auma (= manufacturer logo); CE (= CE mark)

[1] Motor type
[2] Motor article number
[3] Serial number
[4] Rated voltage
[5] Consumed nominal power by the mains P_N
[6] Consumed nominal current by the mains I_N
[7] Type of duty
[8] Enclosure protection
[9] Motor protection (temperature protection)
[10] Insulation class
[11] Perm. number of starts (for SQRV)
[12] Nominal current
[13] Data Matrix code

Approval plate in explosion-proof version



[1] Ex symbol, CE mark, number of test authority
[2] Ex certificate (number)
Classification:
[3] Electrical gas explosion protection
[4] Not used
[5] Non-electrical explosion protection
[6] Threads for cable entries at electrical connection
[7] Not used

Type designation

Table 1:

Description of type designation (with the example of SQVEx 07.2-F07)			
SQVEx	07.2	-F10	
SQVEx			Type **SQ** VEx = Part-turn actuators for open-close duty Type **SQR**VEx = Part-turn actuators for modulating duty V = variable operating times Ex = explosion-proof version
	07.2		Size These instructions apply to sizes 05.2, 07.2, 10.2, 12.2, 14.2
		F10	Flange size

Ex marking

Table 2:

Marking for explosion protection (example of /-a3b1)						
	–	a	3	b	1	
	–	Not used				
		a	**Motor type** a = VDY, SDY: 3-phase AC motor (for 3-phase mains voltage via frequency converter) VSY, SSY: 3-phase motor (for 1-phase mains voltage via frequency converter)			
			3	**Protection type of electrical connection** 3 = Terminal compartment Ex **e** increased safety 4 = Terminal compartment Ex **d** flameproof enclosure		
				b	**Protection type of position transmitter** a = Without intrinsically safe electric circuit b = Electric circuit Ex **i** Intrinsic safety (RWG 5020.2Ex)	
					1	**Protection type of fieldbus** 1 = Without intrinsically safe Ex **ic** fieldbus connection 3= Ex **ic** intrinsically safe fieldbus connection

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.

Actuator serial number

Table 3:

Description of serial number up to 2022 (example of 0522MD12345)			
05	22	MD12345	
05			Positions 1+2: Assembly in week = week 05
	22		Positions 3+4: Year of manufacture = 2022
		MD12345	Internal number for unambiguous product identification

Table 4:

Description of serial number as from 2023 (example of 0000-00101-2023)			
0000-00101	–	2023	
0000-00101			Serial number of sales articles 11-digit, internal number for unambiguous product identification
		2023	Year of manufacture = 2023

Actuator terminal plan

Position 9 after **TPA**: Position transmitter version

I, Q = MWG (magnetic limit and torque transmitter)

Control

Table 5:

Control examples (indications on actuator controls name plate)	
Input signal	Description
Profinet	Control via Profinet interface
Profinet/24 V DC	Control via Profinet interface and control voltage for OPEN-CLOSE control via digital inputs (OPEN, STOP, CLOSE)

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 8: 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!

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.

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

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

→ Respect total weight of combination (actuator, actuator controls, gearbox, valve)

→ Secure load against falling down, sliding or tilting.

→ Perform lift trial at low height to eliminate any potential danger e.g. by tilting.

Figure 9: Example: Lifting the actuator



NOTICE

Delicate cooling fins, risk of damage!

During transport or assembly without the supplied transport protection, the cooling fins may either break or bend if they hit other objects during inappropriate transport.

→ During transport and installation, leave the supplied cooling fin transport protection on the cooling fins.

Table 6:

Weights for part-turn actuators SQVEx 05.2 – SQVEx 14.2 / SQRVEx 05.2 – SQRVEx 14.2 with 3-phase AC motors	
Type designation Actuator	Weight [1] approx. [kg]
SQVEx 05.2/ SQRVEx 05.2	29
SQVEx 07.2/ SQRVEx 07.2	29
SQVEx 10.2/ SQRVEx 10.2	34
SQVEx 12.2/ SQRVEx 12.2	42
SQVEx 14.2/ SQRVEx 14.2	51

1) Indicated weight includes AUMA NORM part-turn actuator with 3-phase AC motor, electrical connection in standard version, unbored coupling and handwheel. For other output drive types, consider additional weights.

4.2. Storage

NOTICE

Risk of corrosion due to inappropriate storage!

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

NOTICE

Risk of damage due to excessively low temperatures!

→ Actuator controls may only be stored permanently down to –30 °C.
→ On request, actuators controls may be transported in specific cases and for short duration at temperatures down to –60 °C.

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.

5. Assembly

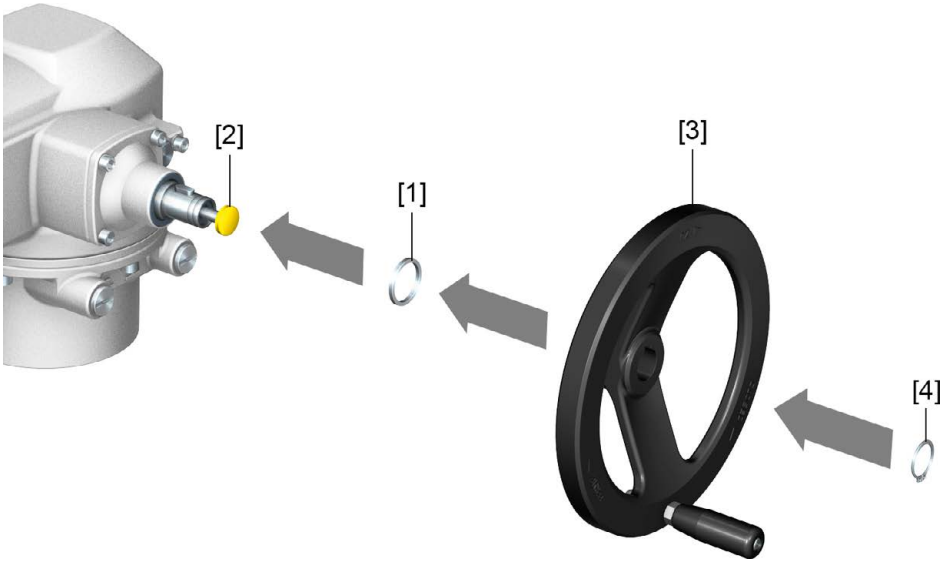
5.1. Mounting position

When using grease as lubricant, the product described herein can be operated in any mounting position.

When using oil instead of grease within the actuator gear housing, perpendicular mounting position is specified whereby the flange is pointing downward. The type of lubricant used is indicated on the actuator name plate (short designation **F**...= grease; **O**...= oil).

5.2. Handwheel fitting

Figure 10: Handwheel



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

How to proceed

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

   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.

5.3. Mount actuator to valve

NOTICE

Corrosion due to damage to paint finish and condensation!

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

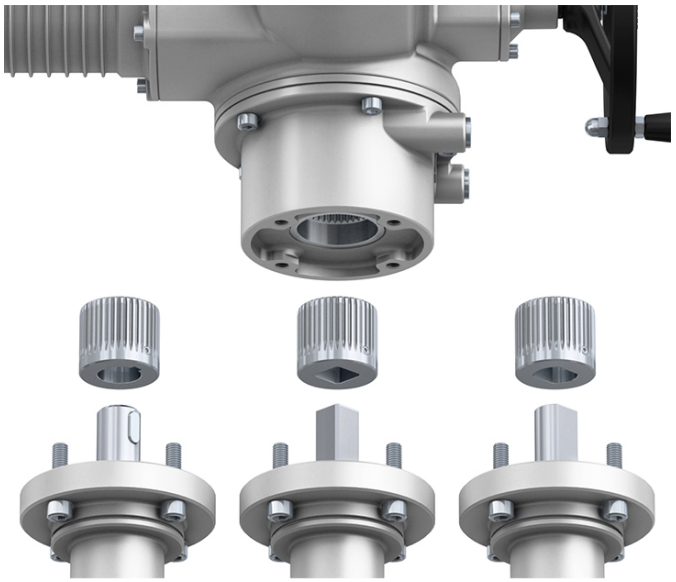
→ After mounting, connect the device immediately to electrical mains to ensure that heater minimises condensation.

The actuator is mounted to the valve using a coupling (standard) or via lever. Separate instructions are available for actuator mounting to the valve when equipped with base and lever.

5.3.1. Overview on coupling variants

Design

Figure 11: Valve attachment via coupling



[1] Bore with keyway
[2] Square bore
[3] Bore with two-flats

Application

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

5.3.2. 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.

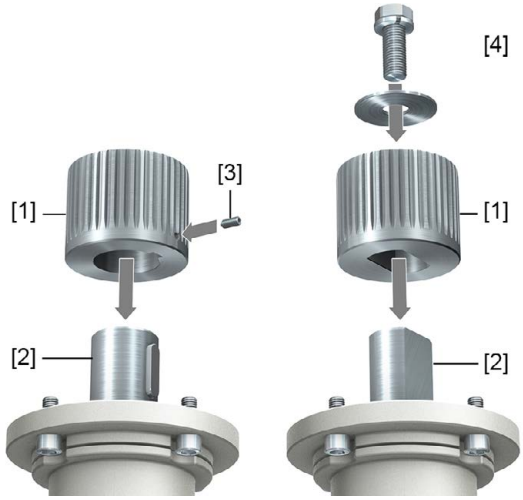
→ Recommended mounting position for **ball valves**: End position OPEN.

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 12: Examples: Fit coupling



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

Figure 13: Mounting positions for coupling

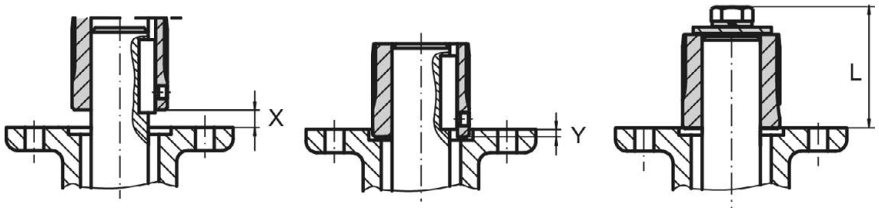
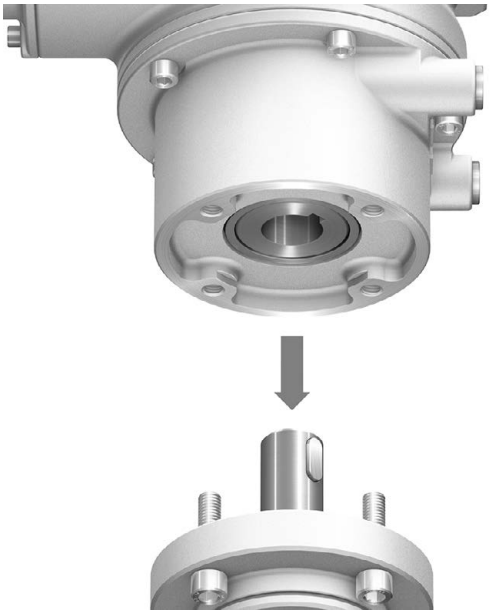


Table 7:

Mounting position of the coupling within fitting dimensions according to AUMA definition											
Dimensions [mm]	SQEx 05.2		SQEx 07.2			SQEx 10.2		SQEx 12.2		SQEx 14.2	
EN ISO 5211	F05	F07	F05	F07	F10	F10	F12	F12	F14	F14	F16
X max.	3	3	3	3	3	4	4	5	5	8	8
Y max.	2	2	2	2	2	5	5	10	10	10	10
L max.	40	40	40	40	66	50	82	61	101	75	125

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.
   Figure 14:



Information Ensure that the spigot (if provided) fits uniformly in the recess and that the flanges are in complete contact.

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 8:

Tightening torques for screws	
Threads	Tightening torque [Nm]
	Strength class A2-80/A4–80
M6	10
M8	24
M10	48
M12	82
M16	200
M20	392

5.4. Mounting positions of local controls

Figure 15: 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 in an unfavourable position, the mounting position can be changed at a later date. Four mounting positions shifted by respectively 90° are possible (by maximum 180° into one direction).

5.4.1. Modify mounting positions

WARNING

Ignition of potentially explosive atmospheres caused by sparks!

Risk of death or serious injury!

→ Before opening the flameproof enclosure, ensure absence of gas and voltage.
→ Wait for 30 seconds after power cut-off prior to opening the housing.
→ Handle cover and housing parts with care.
→ Flameproof joints must neither be damaged nor soiled in any way.
→ Do not jam cover during fitting.

NOTICE

Electrostatic discharge ESD!

Risk of damage to electronic components.

→ Earth both operators and devices.

1. Loosen screws and remove the local controls.
2. Check whether O-ring is in good condition, correctly insert O-ring.
3. Turn local controls into new position and re-place.

NOTICE

Cable damage due to twisting or pinching!

Risk of functional failures.

→ Turn local controls by a maximum of 180°.
→ Carefully assemble local controls to avoid pinching the cables.

4. Fasten screws evenly crosswise.

6. Electrical connection

6.1. Basic information

WARNING

Electric shock due to presence of hazardous voltage!

Risk of death or serious injury!

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

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

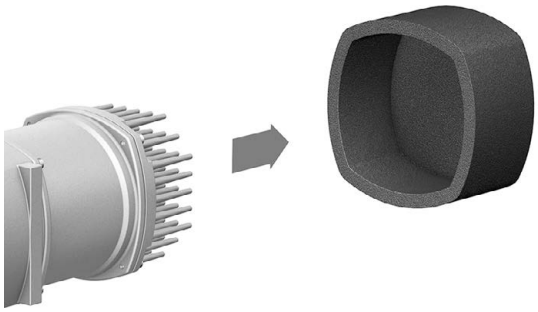
→ After connection but prior to applying the voltage, observe the <Commissioning> and <Test run> chapters.

NOTICE

Risk of overheating during operation with mounted transport protection!

→ Prior to connection, remove transport protection from cooling fins.

Figure 16: Remove transport protection



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).

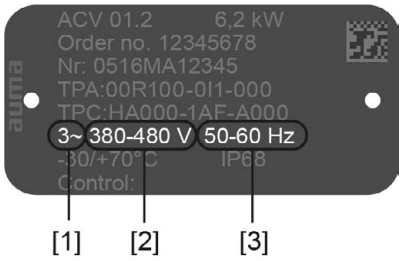
Permissible networks (supply networks)

The actuators are suitable for use in TN and TT networks with directly grounded star point for nominal voltages up to maximum 480 V AC. Use in IT network is permissible for nominal voltages up to maximum 480 V AC. For IT network, 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 refer to chapter <Identification>/<Name plate>.

Figure 17: Actuator controls name plate (example)



[1] Type of current

[2] Mains voltage (voltage range)

[3] Mains frequency (frequency range)

Protection and sizing 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.

Table 9:

Protection on site				
Part-turn actuator	3-phase AC motor 380 V – 480 V/50 Hz – 60 Hz[1)]			Fuse[2)]
Type	Consumed nominal power P_{IN} [kW]	Nominal current I_N [A]	Max. current I_{max} [A]	Blow characteristics: Time-delay (gG) [A]
SQVEx 05.2	0.21	0.8	1.3	6.0
SQRVEx 05.2	0.17	0.7	1.1	6.0
SQVEx 07.2	0.39	1.3	1.9	6.0
SQRVEx 07.2	0.18	0.8	1.0	6.0
SQVEx 10.2 SQRVEx 10.2	0.21	1.0	1.5	6.0
SQVEx 12.2 SQRVEx 12.2	0.21	1.0	1.5	6.0
SQVEx 14.2 SQRVEx 14.2	0.27	1.0	1.5	6.0

1) For motor with different current type/mains voltage/mains frequency (refer to motor name plate). Select fuse referring to the Electrical data sheet.
2) The actuators are suitable for use in current circuits with a maximum short-circuit 1-phase 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: 32 A/600 V at a maximum mains short-circuit alternating current of 5,000 A AC.

Consider the max. current (I_{max}) (refer to motor name plate or electrical data sheet) when selecting the circuit breaker.

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. DC current may be present within the PE conductor.

Implementation of overcurrent protection devices is not required. Actuator controls are equipped with own protection mechanisms, adapted to the actuator system. Therefore, we recommend refraining from using overcurrent protection devices.

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

Table 10:

Fuse for heating system Designation in wiring diagram = F4 ext.		
External power supply	115 V AC	230 V AC
Fuse	2 A T	1 A T

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

Refer to Technical data for options of isolated potentials.

NOTICE

Actuator failure after short-term power supply failure!

If the mains voltage is switched on again too soon after a brief failure, F12 fuse may blow. F12 fuse is used for protection of the power supply of the switchgear DC link. The fuse may trip if the DC link is not yet completely de-energised when rebooting the ACV.

→ Ensure that in the event of a brief mains failure, the mains voltage is only switched on again after a waiting time of 15 seconds.

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.

Connecting cables, cable glands, reducers, blanking plugs

- We recommend using connecting cables and connecting terminals according to rated current (I_N) (refer to motor name plate or electrical data sheet).
- For device insulation, appropriate (voltage-proof) cables must be used. Specify cables for the highest occurring rated voltage.
- Use connecting cables, cable glands, reducers, blanking plugs with a minimum temperature range of +80 °C.
- To avoid contact corrosion, we recommend the use of sealing agents for cable glands and blanking plugs made of metal.
- For connecting cables exposed to UV radiation (outdoor installation), use UV resistant cables.
- For the connection of position transmitters, screened cables must be used.

Cable installation in accordance with EMC

Signal and fieldbus cables are susceptible to interference. Motor cables are interference sources.

NOTICE

This product potentially causes high frequency interference!

→ The measures eliminating interference described hereafter must be observed for cable installation in accordance with EMC.

- Use shielded power cable and earth shield at both ends.
- 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.
- In a residential environment, this product may cause radio interference, in which case supplementary mitigation measures might be required.

Profinet cables

The following minimum requirements with regard to LAN cables apply for Profinet networks: Category 5 according to ISO/IEC 11801 Edition 2.0 Class D.

Connector is suitable for wiring dual pair Profinet cables.

The following tables list the available cable types Profinet types A through C with regard to the respective application:

Table 11:

Cable types for dual pair Profinet cables			
Cable types	**Application type A**	**Application type B**	**Application type C**
Version	Dual pair data cable	Dual pair data cable	Dual pair data cable
Type of installation	fixed installation, immobile after installation	flexible installation (e.g. for continuous movement, vibration or twisting after installation)	special applications (e.g. for continuous movement, vibration or twisting)
Cable parameter			
Designation (minimum)	“PROFINET type A”	“PROFINET type B”	“PROFINET type C”
Cross section	AWG 22/1 ≥ 0.610 mm²	AWG 22/7 ≥ 0.318 mm²	AWG 22/.. ≥ 0.318 mm²
Outer cable diameter	5.5 – 8.0 mm		depending on application
Wire diameter	1.4 ± 0.2 mm		depending on application
Colour of shield	Green RAL6018		depending on application
Colour of wire insulation	Pair 1: white, blue Pair 2: yellow, orange		

Cable types for dual pair Profinet cables			
Cable types	**Application type A**	**Application type B**	**Application type C**
Number of wires	4		
Cable design	Dual pair or star quad		
Shield	Alumium foil + copper braid		depending on application
Communication requirements			
Applicable standards	ISO/IEC 11801 Edition 2.0 IEC 61140-1 IEC 61156-5 (minimum device group 5)		ISO/IEC 11801 Edition 2.0 IEC 61140-1 IEC 61156-6 (minimum device group 5)
Delay	≦20 ns/100 m		
Coupling attenuation	≥80 dB at 30 – 100 MHz “Channel class-D” according to EN 50174-2		

Minimum cable spacing

The minimum spacing (according to IEC 61918) required between laying Profinet cables and other cables must be respected. They are shown in the table below.

Table 12:

Minimum spacing for Profinet cables			
	Spacing to Profinet cable		
	Without or with non-metal cutoff bridge	Aluminium cutoff bridge	Steel cutoff bridge
Signal transmission cables			
E.g. other Profinet cables, Profibus cables, data cables for PCs, programming devices, shielded analogue inputs	0 mm	0 mm	0 mm
Power supply cables			
Unshielded power supply cables	200 mm	100 mm	50 mm
Shielded power cables	0 mm	0 mm	0 mm

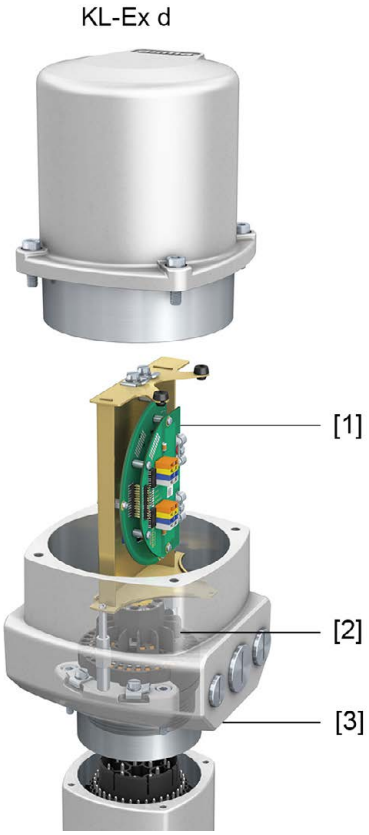
Further references

Ensure absence of equipotential earth bonding differences between the individual devices at Profinet (perform an equipotential earth bonding).

Available Profinet recommendations, particularly planning, assembly and commissioning guidelines of the Profibus User Organisation (PNO) (www.profibus.com) must be met.

6.2. KL electrical connection

Figure 18: KL-Ex d electrical connection



[1] Mounting frame with connection board
[2] Terminal carrier with screw-type terminals
[3] Connection frame

Short description

KL plug-in electrical connection with screw-type terminals for power connection and connection board for control contacts assembled onto a mounting frame.

KL version is available with terminal compartment in protection type Ex e (increased safety) as well as in protection type Ex d (flameproof enclosure) (refer to Ex marking on name plate).

Plug-in connection is made via the connection frame. For cable connection, simply remove the cover. The connection frame with the cable entries remains within the device. The flameproof interior of the connected devices remains sealed.

Technical data

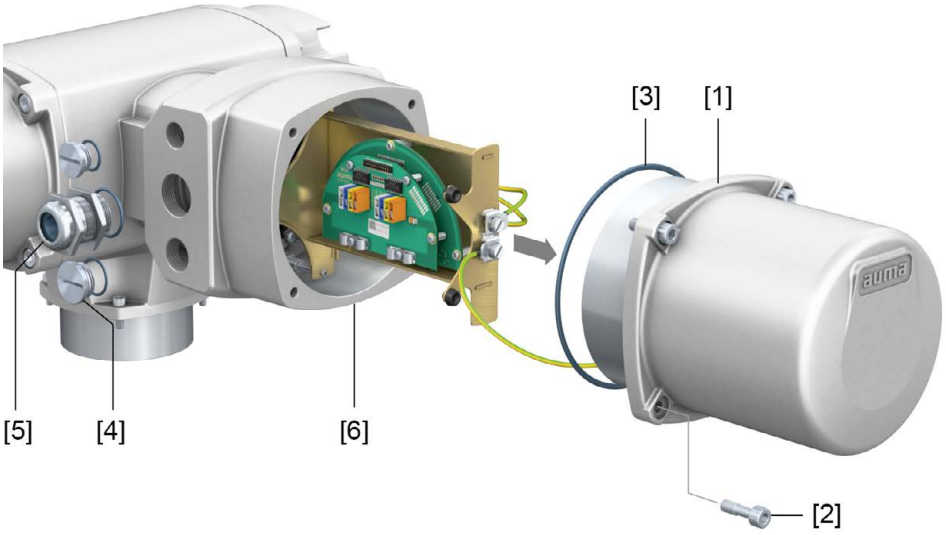
Table 13:

KT/KM/KL electrical connection		
	Power contacts	Control contacts
No. of contacts max.	6 + PE conductors[1)]	50
Designations	U1, V1, W1, U2, V2, W2, ⏚	1 to 36, 37 to 50
Support terminals max.	3	12
Connection voltage max.	1,000 V	250 V
Rated current max.	25 A	5 A[2)]
Type of customer connection	Screw connection PE = Ring lug/U-bracket	Spring clamp terminals
Connection diameter max.	10 mm^2	2.5 mm^2

1) Four protective earth connections within frame
2) The sum of the currents of all control contacts must not exceed 50 A.

6.2.1. Terminal compartment: open

Figure 19: Open terminal compartment



[1] Cover (illustration shows KL version in type of protection Ex d)
[2] Screws for cover
[3] O-ring
[4] Blanking plug
[5] Cable gland (example)
[6] KL-Ex d connection frame

Terminal compartment is designed either in type of protection Ex e (increased safety) or in type of protection Ex d (flameproof enclosure) (refer to Ex marking on name plate). The flameproof interior of the connected device remains closed when removing the cover [1].

How to proceed

DANGER

Electric shock due to presence of hazardous voltage!

Death or serious injury.

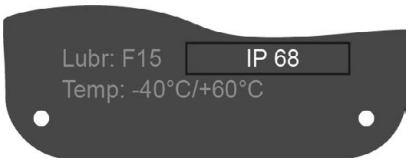
→ Disconnect device from the mains before opening.
→ Wait for 30 seconds after power cut-off prior to opening the housing.

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

2. Insert cable glands suitable for connecting cables.

   Information: When selecting cable glands, observe type of protection (with Ex e or Ex d approval) and enclosure protection IP (refer to name plate). The enclosure protection stated on the name plate IP is only ensured if suitable cable glands are used. Thread types and thread sizes are specified on the approval plate in explosion-proof version. Refer to chapter <Identification/name plate>.

   Figure 20: Name plate, example with enclosure protection IP68



   Information: For shielded cables: Use EMC cable glands.

3. Seal unused cable entries with approved plugs suitable for the required protection type.

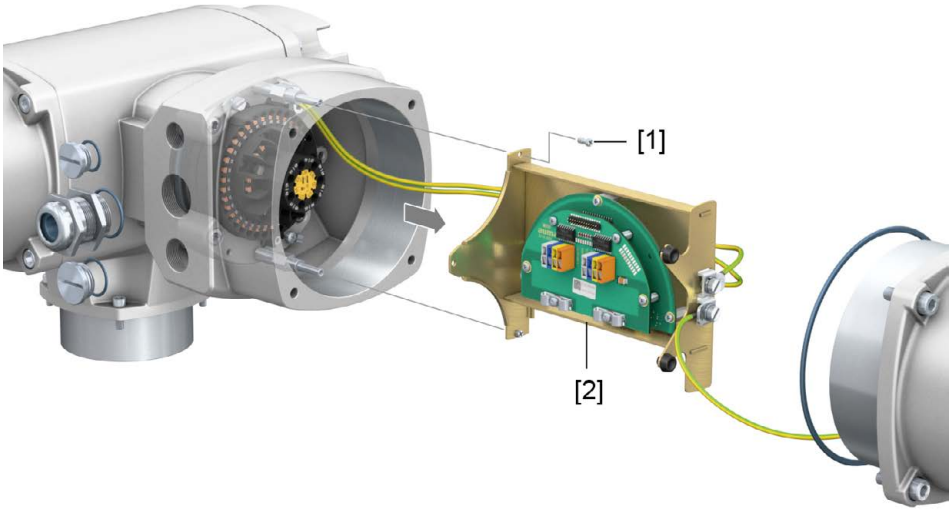
6.2.2. Cable connection

Table 14: Customising the cables

Terminal designation	Type	Wires per terminal	Terminal cross sections	Dismantling length[1]		Type of connection and (tightening torque)
				Without wire end sleeve	With wire end sleeve according to DIN 46228 Length of wire end sleeve Insulated (not insulated)	
Power contacts (U1, V1, W1, U2, V2, W2) Protective earth connection (PE) ⏚	solid	1	0.25 – 10.0 mm^2	12 mm	Not permissible	Screw-type terminals[2] (M = 1.2 – 1.5 Nm)
	flexible	1	up to 2.5 mm^2 up to 4 mm^2 up to 10 mm^2	Not permissible	8 (8) mm 10 (10) mm 12 (12) mm	
	flexible	2[3]	0.25 – 6 mm^2	Not permissible	12 (12) mm	
Control contacts (1 to 36, 37 to 50)	solid	1	0.25 – 2.5 mm^2	10 mm	Not permissible	Spring clamp terminals[4]
	flexible	1	up to 1.0 mm^2 up to 1.5 mm^2 up to 2.5 mm^2	10 mm	10 (6) mm 10 (7) mm 10 (10) mm	
	flexible	2[3]	0.25 – 0.75 mm^2	Not permissible	10 (10) mm	
Protective earth connection within frame (customer connection)	solid	2	1.5 mm^2 – 10 mm^2	10 mm	Not permissible	U-bracket (M = 3 – 4 Nm)
	flexible	2	1.5 mm^2 – 10 mm^2	Not permissible	10 (10) mm With M6 ring lug as an alternative[1]	

1) For dismantling length, refer to manufacturer's specifications for wire end sleeve or ring lug
2) Flexible cables for screw-type terminal with wire end sleeves
3) For two wires per terminal, a twin wire end sleeve must be used
4) Flexible cables for spring clamp terminals permissible even without wire end sleeve. Dismantling: 10 mm

Figure 21: Disassembly of mounting frame



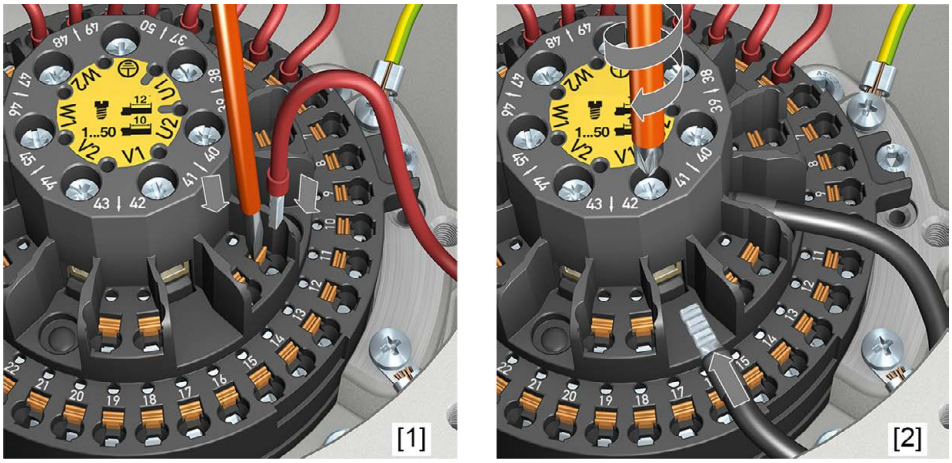
[1] Screws
[2] Mounting frame with connection board

How to proceed

1. Loosen screws [1] and remove mounting frame [2].
2. Remove cable sheathing in a length of 250 – 300 mm.
3. Insert the wires into the cable glands.
4. Fasten cable glands with the specified torque to ensure required enclosure protection.
   Information: For shielded cables: Link the cable shield end via the cable gland to the housing (earthing).
5. Strip wires:
   5.1 Remove wire sheathing of control cables (1...50) in a length of approx. 10 mm
   5.2 Remove wire sheathing of motor cables (U,V,W) in a length of approx. 12 mm
6. For flexible cables: Use wire end sleeves according to DIN 46228. For spring clamp terminals, connection is also possible without wire end sleeves.
   Information: For two flexible wires per terminal, a joint wire end sleeve must be used (twin wire end sleeve).

7. Connect cables according to order-related wiring diagram.
   Information: Only connect control cables if binary signals are required in addition to the Profinet cables.

   Figure 22: Connect cables to terminal carrier.



[1] Fitting control cables into spring clamp terminals

[2] Tightening power terminals

Information For service purposes, each spring clamp terminal for control cables is equipped with a test contact located above the numbering.

WARNING

In case of a fault, electric shock due to presence of hazardous voltage if the PE conductor is NOT connected!

Risk of death or serious injury!

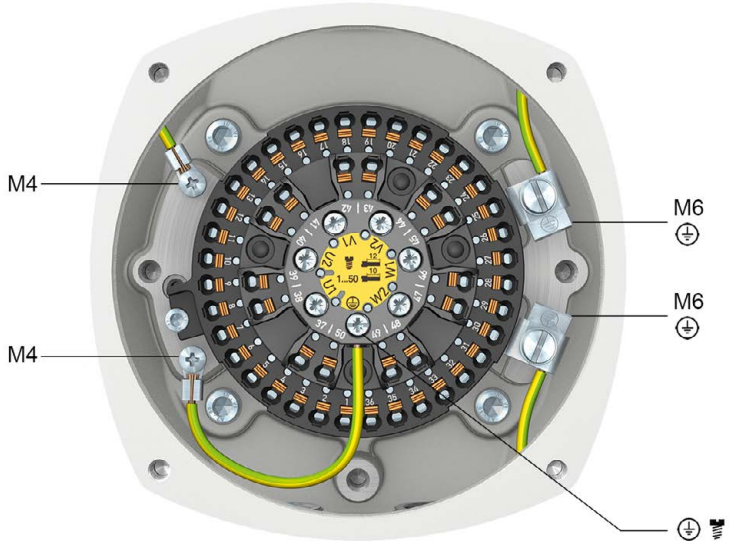
→ Connect all protective earth conductors.

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

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

8. Firmly tighten protective earth to PE connection (M6 ⏚).

Figure 23: Protective earth connections within connection frame



M6 Customer protective earth connection for M6 ring lug or with U-bracket for up to two wires.

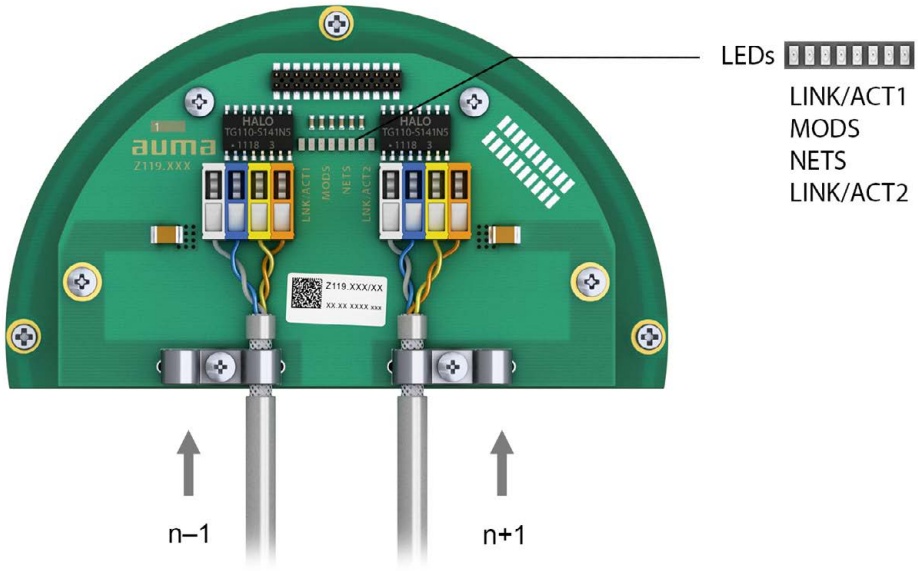
M4 Internal protective earth connections via M4 ring lug (to cover and terminal carrier) connected in the factory

⏚ Protective earth connection to terminal carrier (power terminals); connected in the factory.

9. Assemble mounting frame [2] with screws [1] within connection frame.

6.2.3. Profinet cables: connect

Figure 24: Profinet connection board with connection terminals



n–1 Profinet cable from previous device

n+1 Profinet cable to next device

(For line topology or redundant ring/MRP - Media Redundancy Protocol)

Profinet connection is made individually by means of a safe Ethernet-capable insulation displacement connection. The colour coding of connection terminals are matching the Ethernet cable according to Profinet (white/blue/yellow/orange).

Table 15: Connecting data

Connection capacity (solid wire)	0.2 mm² – 0.34 mm² / AWG 24 – AWG 22
Connection capacity (stranded)	0.2 mm² – 0.34 mm² / AWG 24 – AWG 22

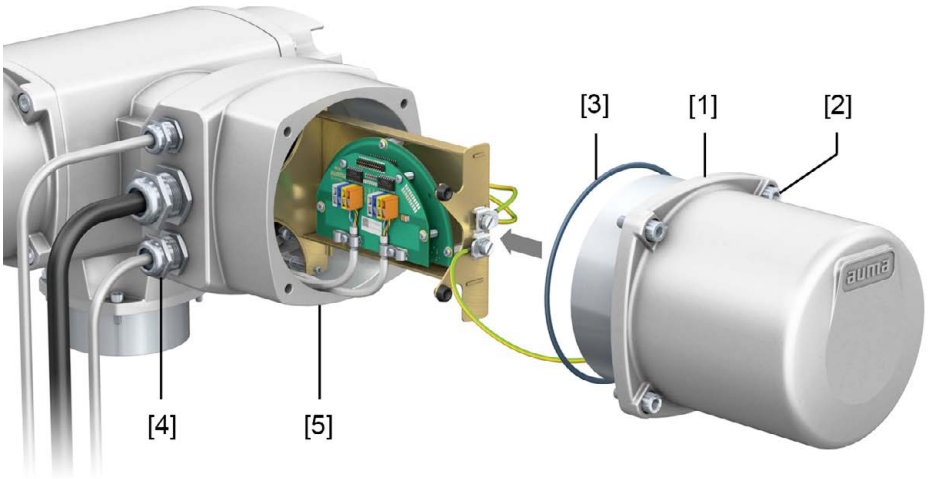
1. Remove cable sheathing and clamp shield under strain relief.
2. Connect cables to connection terminals. For this, use a small screwdriver to lift or push down the levers.

Table 16:

Connection terminal assignment		
Signal	**Function**	**Colour of wire insulation**
TD +	Transmit Data +	Yellow
TD –	Transmit Data –	Orange
RD +	Receive Data +	White
RD –	Receive Data –	Blue

6.2.4. Terminal compartment: close

Figure 25: Close terminal compartment



[1] Cover (illustration shows KL version in type of protection Ex d)
[2] Screws for cover
[3] O-ring
[4] Cable gland
[5] Connection frame

How to proceed

1. Clean sealing faces of cover [1] and connection frame [5].
2. For design in flameproof enclosure (Ex d): Preserve joint surfaces with an acid-free corrosion protection agent.
3. Check whether O-ring [3] is in good condition, replace if damaged.
4. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.
5. Fit cover [1] and fasten screws [2] evenly crosswise.

   For design in flameproof enclosure (Ex d):

⚠ WARNING

Risk of explosion in case of damage to flameproof enclosure!

Risk of death or serious injury!

→ Handle cover and housing parts with care.
→ Joint surfaces must not be damaged or soiled in any way.
→ Do not jam cover during fitting.

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6. Fasten cable glands and blanking plugs applying the specified torque to ensure the required enclosure protection.

6.3. External earth connection

Figure 26: Earth connection for part-turn actuator

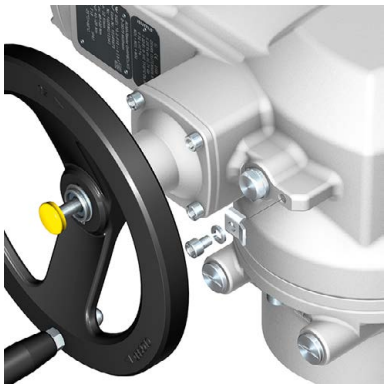


Figure 27: Earth connection for wall bracket



Application External earth connection (U-bracket) for connection to equipotential compensation.

Table 17:

Terminal cross sections and earth connection tightening torques		
Conductor type	Terminal cross sections	Tightening torques
Solid wire and stranded	2.5 mm² to 6 mm²	3 – 4 Nm
Fine stranded	1.5 mm² to 4 mm²	3 – 4 Nm
For fine stranded (flexible) wires, connection is made via cable lugs/ring terminals. When connecting two individual wires with a U-bracket, cross sections have to be identical.		

6.4. Accessories for electrical connection

6.4.1. Parking frame

Figure 28: PAFEx 01.1 parking frame



Application

Parking frame for safe storage of a disconnected plug or cover.

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

⚠ WARNING

Risk of explosion!

Risk of death or serious injury!

→ Prior to opening the device (removing the plug) ensure that the device is free of gas and voltage!

→ Do NOT switch on voltage in potentially explosive atmospheres.

For PAFEx 01.1, separate operation instructions are available.

7. Operation

7.1. Manual operation

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

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

7.1.1. Manual valve operation

⚠ CAUTION

Damage at the manual change-over mechanism/motor coupling due to faulty operation!

→ Engage manual operation only during motor standstill.

→ Do NOT use extensions as lever for operation.

1. Press push button.
2. Turn handwheel in desired direction.



➥ The closing direction is marked on the handwheel.

Table 18: Handwheel marking (examples)

→ For valve closing, turn handwheel in direction of the arrowhead.	
 Clockwise closing	 Counterclockwise closing
Drive shaft (valve) turns **clockwise** in direction CLOSE.	Drive shaft (valve) turns **counterclockwise** in direction CLOSE.

7.2. Motor operation

NOTICE

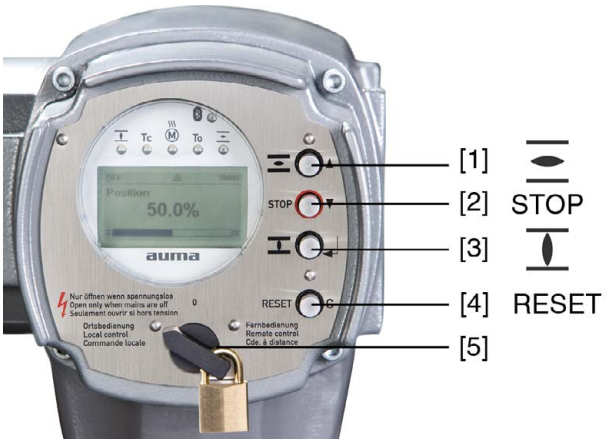
Valve damage due to incorrect basic setting!

→ Prior to electric actuator operation, perform the basic settings for “type of seating” and “torque switching”.

7.2.1. Actuator operation from local controls

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

Figure 29: 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

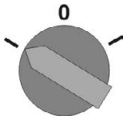
⚠ CAUTION

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

Risk of burns

→ Verify surface temperature and wear protective gloves.

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



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

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

Information

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

7.2.2. Actuator operation from remote

⚠ CAUTION

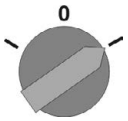
Risk of immediate actuator operation when switching on!

Risk of personal injuries or damage to the valve

→ If the actuator starts unexpectedly: Immediately turn selector switch to **0** (OFF).

→ Check input signals and functions.

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

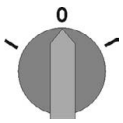


Information For actuators equipped with a positioner, it is possible to change over between **OPEN - CLOSE control** (Remote OPEN-CLOSE) and **setpoint control** (Remote SET-POINT). For further information, please refer to the Manual (Operation and setting).

7.3. Menu navigation via push buttons (for settings and indications)

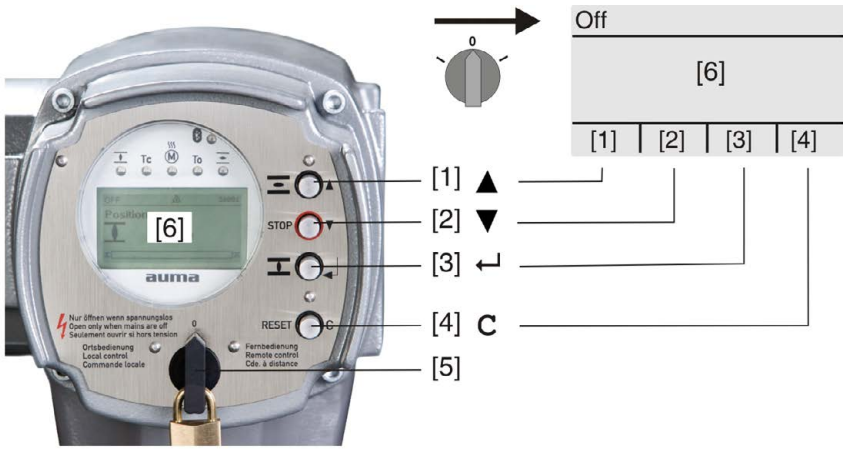
Menu navigation for display and setting is made via the push buttons [1 – 4] of the local controls.

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



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

Figure 30:



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

Table 19: 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

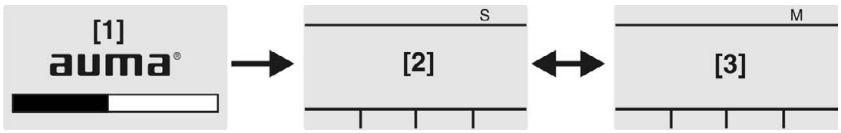
- The display is illuminated in white during normal operation. It is illuminated in red in case of a fault.
- The screen illumination is brighter when operating a push button. If no push button is operated for 60 seconds, the display will become dim again.

7.3.1. Menu layout and navigation

Groups

The indications on the display are divided into 3 groups:

Figure 31: Groups



[1] Start menu
[2] Status menu
[3] Main menu

ID

Status menu and main menu are marked with an ID.

Figure 32: Marking with ID



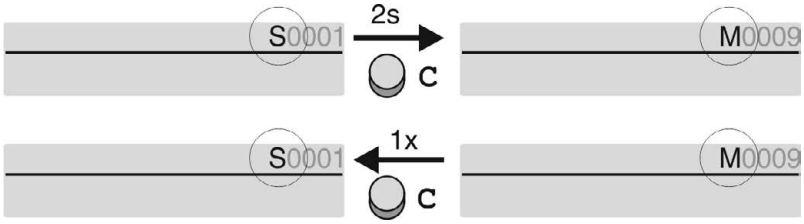
S ID starts with S = status menu
M ID starts with M = main menu

Group selection

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

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

Figure 33: Select menu groups



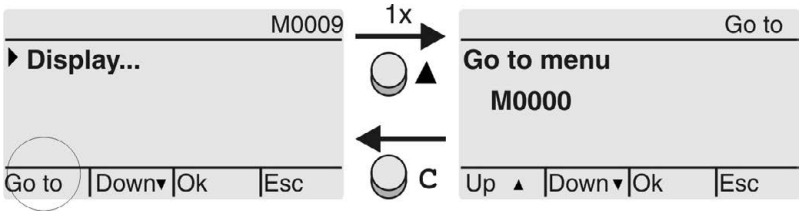
You return to the status menu if:

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

Direct display via ID

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

Figure 34: Direct display (example)



Display indicates in the bottom row: Go to

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

7.4. User level, password

User level

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

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

Figure 35: User level display (example)



Password

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

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

Table 20:

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

Unauthorised access is made easier due to insecure password!

→ We urgently recommend changing the password during initial commissioning.

7.4.1. Password entry

1. Select desired menu and hold down push button ↵ for approx. 3 seconds.

➥ Display indicates the set user level, e.g Observer (1)

2. Select higher user level via ▲ Up ▲ and confirm with ↵ Ok.

➥ Display indicates: Password 0***

3. Use push buttons ▲▼ Up ▲ Down ▼ to select figures 0 to 9.
4. Confirm first digit of password via push button ↵ Ok.
5. Repeat steps 1 and 2 for all further digits.

➥ Having confirmed the last digit with ↵ Ok, access to all parameters within one user level is possible if the password entry is correct.

7.4.2. Password change

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

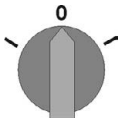
Example: If the user is signed in as Specialist (4), he/she can change passwords as for password levels (1) through (4).

M ▷ Device configuration M0053
Service functions M0222
Change passwords M0229

Menu item Service functions M0222 is only visible, if user level Specialist (4) or higher is selected.

Select main menu

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

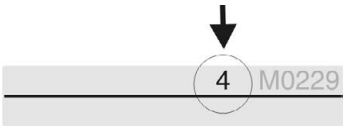


2. Press push button **C** Setup and hold it down for approx. 3 seconds.

➥ Display goes to main menu and indicates: ▸ Display

Change passwords

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



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

4. For a user level between 2 and 6: Press push button ↵ Ok.

➥ The display indicates the highest user level, e.g.: For user 4

5. Select user level via push buttons ▲▼ Up ▲ Down ▼ and confirm with ↵ Ok.

➥ Display indicates: ▸ Change passwords Password 0***

6. Enter current password (→ enter password).

➥ Display indicates: ▸ Change passwords Password (new) 0***

7. Enter new password (→ enter password).

➥ Display indicates: ▸ Change passwords For user 4 (example)

8. Select next user level via push buttons ▲▼ Up ▲ Down ▼ or cancel the process via Esc.

7.4.3. Timeout for incorrect password entry

A timeout for incorrect password entry is provided with actuator controls. This prevents unauthorised access by systematic trials. The timeout is active for incorrect entries via the local controls as well as incorrect entries via our software tools (AUMA CDT, AUMA Assistant App). After five subsequent incorrect trials, further entry is inhibited for one minute. Each further incorrect entry doubles the timeout period. An active timeout is displayed on the screen. An individual timeout is available for each user level. This means that you may still log on with user level 3 if user level 4 is inhibited.

The incorrect entry counter can be reset in two ways:

1. Correct password entry with successful access authorisation.
2. 8 hours after the last incorrect entry.

7.5. Language in the display

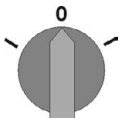
The display language can be selected.

7.5.1. Language change

M ▷ Display M0009
Language M0049

Select main menu

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



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

➥ Display goes to main menu and indicates: ▸ Display

Change language

3. Press ↵ Ok.

➥ Display indicates: ▸ Language

4. Press ↵ Ok.

➥ Display indicates the selected language, e.g.: ▸ Deutsch

5. The bottom row of the display indicates:
   → Save → continue with step 10
   → Edit → continue with step 6
6. Press ↵ Edit.

➥ Display indicates: ▸ Observer (1)

7. Select user level via ▲▼ Up ▲ Down ▼ resulting in the following significations:
   → black triangle: ▸ = current setting
   → white triangle: ▹ = selection (not saved yet)
8. Press ↵ Ok.

➥ Display indicates: Password 0***

9. Enter password (→ enter password).

➥ Display indicates: ▸ Language and Save (bottom row)

Language selection

10. Select new language via ▲▼ Up ▲ Down ▼ resulting in the following significations:
    → black triangle: ▸ = current setting
    → white triangle: ▹ = selection (not saved yet)
11. Confirm selection via ↵ Save.

➥ The display changes to the new language. The new language selection is saved.

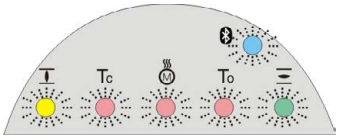
8. Indications

8.1. Indications during commissioning

LED test

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

Figure 36: LED test



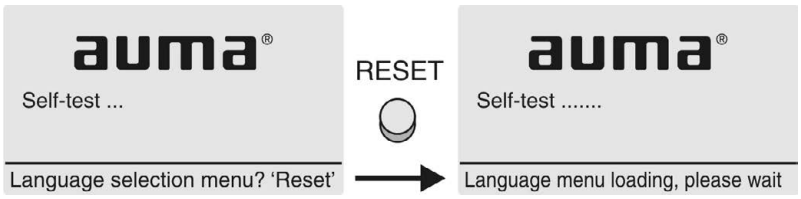
Language selection

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

Activate language selection:

1. Display indicates in the bottom line: Language selection menu? 'Reset'
2. Hold down push button **RESET** until display of the following text in the bottom line: Language menu loading, please wait.

Figure 37: Self-test

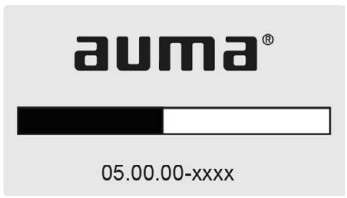


The language selection menu follows the startup menu.

Startup menu

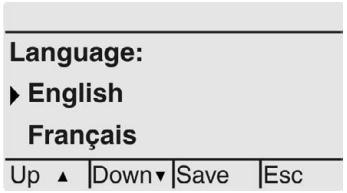
The current firmware version is displayed during the startup procedure:

Figure 38: Startup menu with firmware version: 05.00.00–xxxx



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

Figure 39: Language selection



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

8.2. Indications in the display

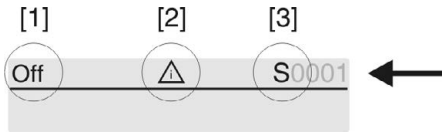
Menus and functions depend on the actuator controls firmware version!

→ Should menus or functions be unavailable, please contact the AUMA Service.

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 40: Information in the status bar (top)



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

Navigation support

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

Figure 41: Navigation support (bottom)



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

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

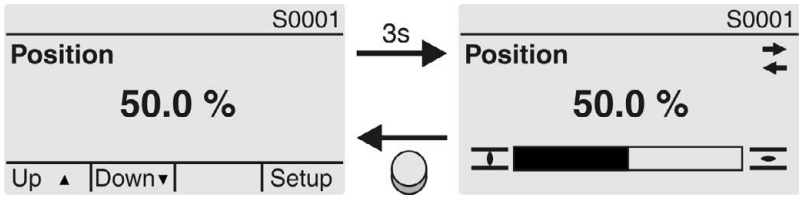
8.2.1. Feedback signals from actuator and valve

Display indications depend on the actuator version.

Valve position (S0001)

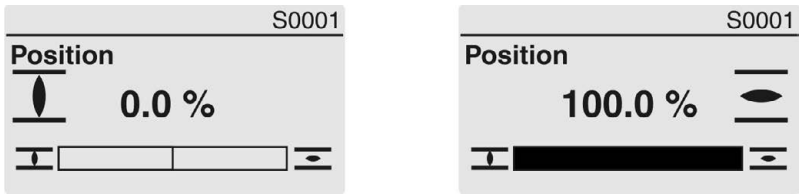
- S0001 on the display indicates the valve position in % of the travel.
- The bar graph display appears after approx. 3 seconds.
- When issuing an operation command, an arrow indicates the direction (OPEN/CLOSE).

Figure 42: Valve position and direction of operation



Reaching the pre-set end positions is additionally indicated via ⊥ (CLOSED) and ⊤ (OPEN) symbols.

Figure 43: End position CLOSED/OPEN reached



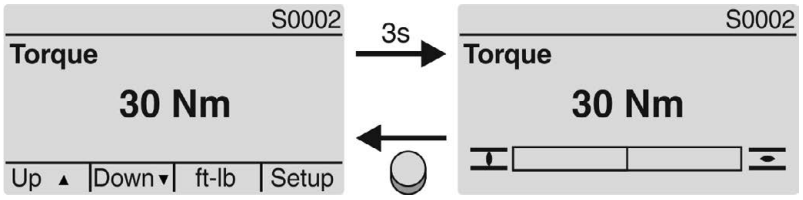
0% Actuator is in end position CLOSED
100% Actuator is in end position OPEN

Torque (S0002)

- S0002 on the display indicates the torque applied at the actuator output.

- The bar graph display appears after approx. 3 seconds.

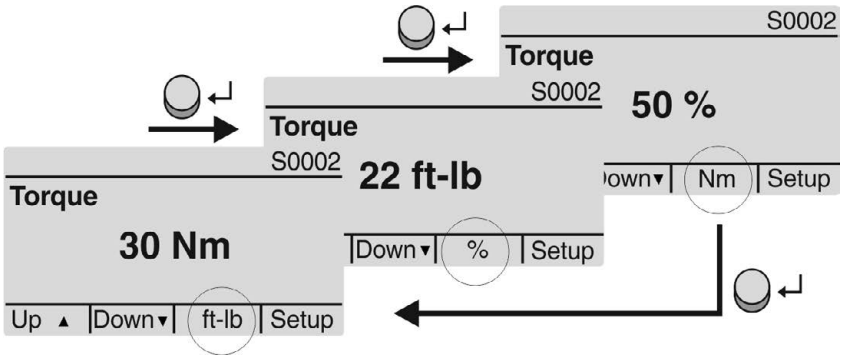
Figure 44: Torque



Select unit

The push button ↵ allows to select the unit displayed (percent %, Newton metre Nm or "foot-pound" ft-lb

Figure 45: Units of torque



Display in percent

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

Example: Torque range on name plate = 20 – 60 Nm.

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

Operation commands (S0003)

The display S0003 indicates:

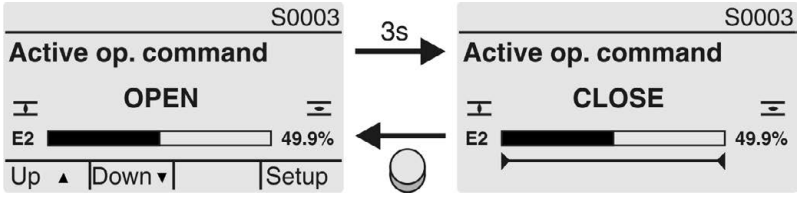
- active operation commands, like e.g.: Operation in direction CLOSE or in direction OPEN
- the actual value E2 as bar graph indication and as value between 0 and 100 %.
- for setpoint control (positioner): setpoint E1
- for stepping mode or for intermediate positions with operation profile: pivot points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

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

OPEN - CLOSE control

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

Figure 46: Display for OPEN - CLOSE control



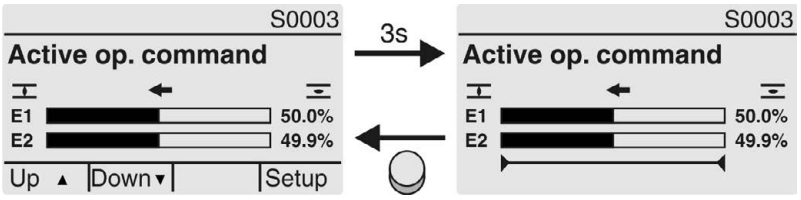
E2 Actual position value

Setpoint control

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

The direction of the operation command is displayed by an arrow above the bar graph indication. The figure below shows the operation command in direction CLOSE.

Figure 47: Indication for setpoint control (positioner)



E1 Position setpoint

E2 Actual position value

Pivot point axis

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

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

Operation profile M0294

Timer CLOSE M0156

Timer OPEN M0206

Figure 48: Examples: on the left pivot points (intermediate positions); on the right stepping mode



Table 21: Symbols along the pivot point axis

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

8.2.2. Status indications according to AUMA classification

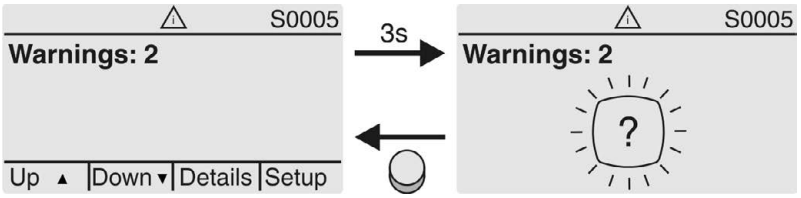
These indications are available if the parameter Diagnostic classific. M0539 is set to AUMA.

Warnings (S0005)

If a warning has occurred, the display shows S0005:

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

Figure 49: Warnings



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

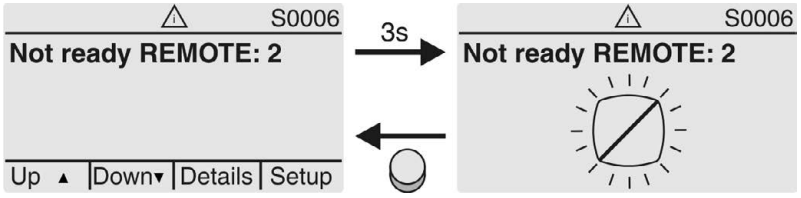
Not ready REMOTE (S0006)

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

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

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

Figure 50: Not ready REMOTE indications



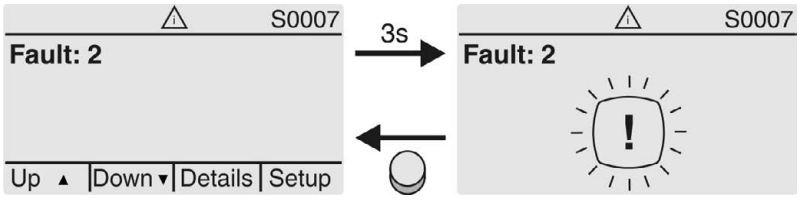
For further information, please also refer to <Corrective action>.

Fault (S0007)

Once a fault has occurred, the S0007 display shows:

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

Figure 51: Fault



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

8.2.3. Status indications according to NAMUR recommendation

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

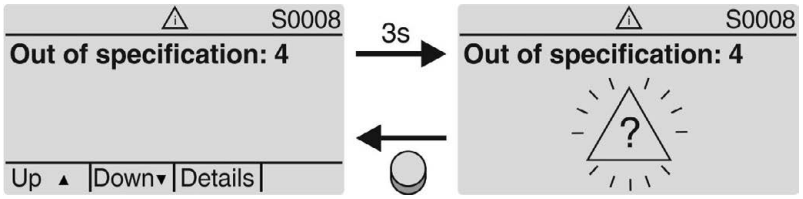
Out of Specification (S0008)

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

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

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

Figure 52: Out of specification



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

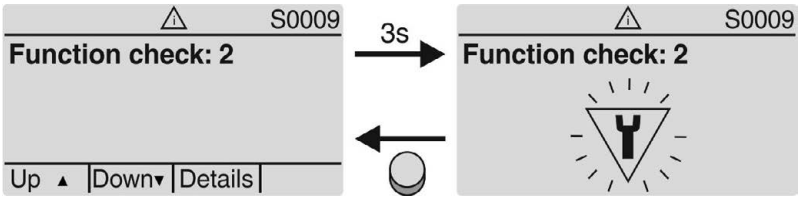
Function check (S0009)

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

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

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

Figure 53: Function check



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

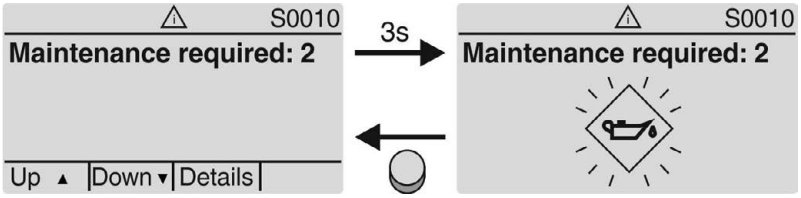
Maintenance required (S0010)

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

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

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

Figure 54: Maintenance required



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

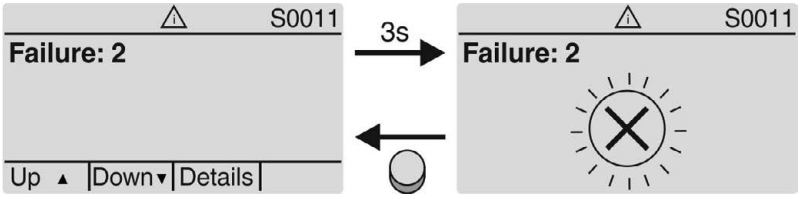
Failure (S0011)

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

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

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

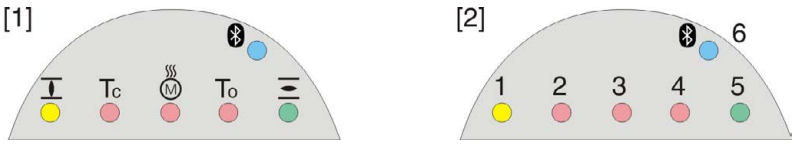
Figure 55: Failure



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

8.3. Indication lights of local controls

Figure 56: Arrangement and signification 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 active

Modify indication light assignment (indications)

Different indications can be assigned to LEDs 1 – 5.

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

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

Further setting values:

Refer to Manual (Operation and setting).

8.4. Mechanical position indication (self-adjusting)

Figure 57: Mechanical position indicator



[1] End position OPEN reached
[2] 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 clockwise direction for operation in direction CLOSE)
- Indicates that end positions (OPEN/CLOSED) have been reached
  Arrow ⇨ points to symbol ⌓ (OPEN) or ⏊ (CLOSED)
- Self-adjusting when increasing the swing angle

8.5. Mechanical position indication via indicator mark (not self-adjusting)

Figure 58: 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)

9. Signals (output signals)

9.1. Signals via Profinet

Feedback signals via Profinet can be configured using the engineering tool of the DCS/PLC and the GSD(ML) file of actuator controls with Profinet (available for download at www.auma.com).

Refer to Manual Device integration Profinet for information on control commands and feedback signals via Profinet.

9.2. Status signals via output contacts (digital outputs)

Conditions Output contacts are only available if a parallel interface is provided in addition to the fieldbus interface.

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

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

9.2.1. Assignment of outputs

The output contacts (outputs DOUT 1 – 6) can be assigned to various signals.

Required user level: Specialist (4) or higher.

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

Default values:

Signal DOUT 1 = Fault
Signal DOUT 2 = End position CLOSED
Signal DOUT 3 = End position OPEN
Signal DOUT 4 = Selector sw. REMOTE
Signal DOUT 5 = Torque fault CLOSE
Signal DOUT 6 = Torque fault OPEN

9.2.2. Coding the outputs

The output signals Coding DOUT 1 – Coding DOUT 6 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.

M ▷ 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 6 = High active

9.3. Analogue signals (analogue outputs)

Requirements Analogue signals are only available if additional input signals are provided.

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

Designation in the wiring diagram: AOUT1 (position)

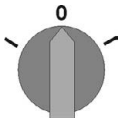
Torque feedback Signal: E6 = 0/4 – 20 mA (galvanically isolated)

Designation in the wiring diagram: AOUT2 (torque)

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

10. Commissioning (basic settings)

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



Information: The selector switch is not a mains switch. In **0** (OFF) position, actuator control via operation commands OPEN/STOP/CLOSE is prevented. The controls' power supply is maintained.

2. Switch on the power supply.

   Information: Observe heat-up time for ambient temperatures below –30 °C.

3. Perform basic settings.

10.1. End stops in part-turn actuator

The following description applies for clockwise closing standard version.

Separate instructions are available for counterclockwise special version.

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. They may not be used for torque tripping in end positions during standard operation.

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 should be set by suitably qualified personnel only.

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

→ Observe dimension $T_{min.}$

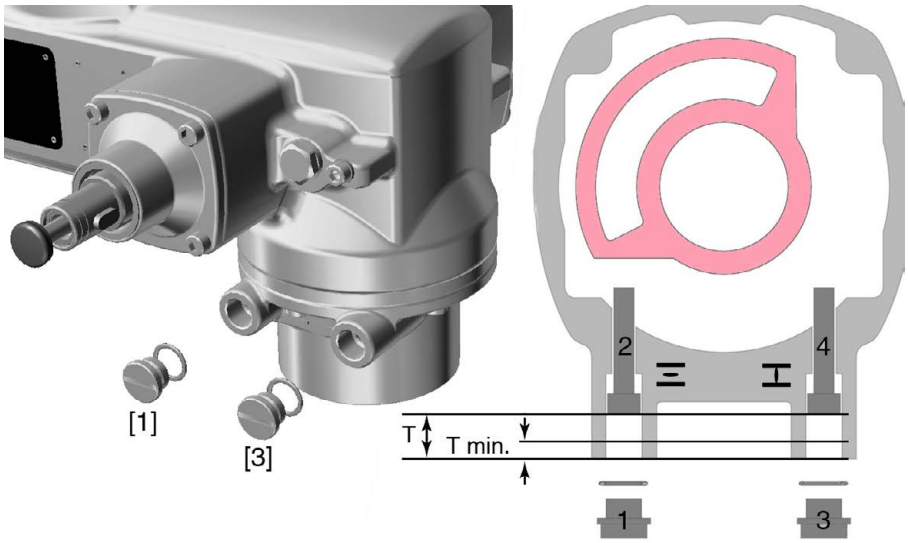
Information

- The swing angle set in the factory is indicated on the name plate:
  Figure 59: Example: Swing angle on name plate



- 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 60: End stop



[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

Dimensions/sizes	05.2	07.2	10.2	12.2	14.2
T (for 90°)	17	17	20	23	23
$T_{min.}$	11	11	12	13	12

10.1.1. Set end stop CLOSED

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 safely set.
   ➥ Turning the setting screw [4] clockwise results in a smaller swing angle.
   ➥ Turning the setting screw [4] counterclockwise results in a larger swing angle.



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

➥ This completes the setting of end stop CLOSED.

5. Check O-ring of screw plug for seat and condition, replace if damaged.
6. Fasten and tighten screw plug [1].

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

10.1.2. Set end stop OPEN

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 safely set.
   ➥ Turning the setting screw [2] clockwise results in a smaller swing angle.
   ➥ Turning the setting screw [2] counterclockwise results in a larger swing angle.



4. Turn setting screw [2] clockwise to the stop.
➥ This completes the setting of end stop OPEN.
5. Check O-ring of screw plug for seat and condition, replace if damaged.
6. Fasten and tighten screw plug [1].

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

10.2. 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.

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

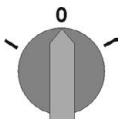
Default value: Limit

Setting values:

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

Select main menu

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



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

Select parameter

3. Select parameter either:
   → click via the menu M ▷ to parameter, or
   → via direct display: Press ▲ and enter ID M0086 or M0087
➥ Display indicates: End position CLOSED

CLOSE or OPEN

4. Use ▲▼ Up ▲ Down ▼ to select:
   → ▸ End position CLOSED
   → ▸ End position OPEN
➥ The black triangle ▸ indicates the current selection.

5. Press ↵ Ok.

➥ Display indicates the current setting: Limit or Torque

➥ The bottom row of the display indicates either:

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

6. Press ↵ Edit.

➥ Display indicates: ▸ Specialist (4)

User login

7. Use ▲▼ Up ▲ Down ▼ to select user:
   Information: Required user level: Specialist (4) or higher

➥ The symbols have the following meaning:

- black triangle: ▸ = current setting
- white triangle: ▹ = selection (not saved yet)

8. Press ↵ Ok.

➥ Display indicates: Password 0***

9. Enter password (→ enter password).

➥ The screen indicates the pre-set type of seating (▸Limit or ▸Torque) by means of a black triangle ▸.

Change settings

10. Use ▲▼ Up ▲ Down ▼ to select new setting.

➥ The symbols have the following meaning:

- black triangle: ▸ = current setting
- white triangle: ▹ = selection (not saved yet)

11. Confirm selection via ↵ Save.

➥ The setting for the type of seating is complete.

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

10.3. Set torque switching

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 ▷

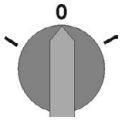
Customer settings M0041
Torque switching M0013
Trip torque CLOSE M0088
Trip torque OPEN M0089

Default value: According to order data

Setting range: Torque range according to actuator name plate

Select main menu

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



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

➥ Display goes to main menu and indicates: ▸ Display

Select parameter

3. Select parameter either:
   → click via the menu M ▷ to parameter, or
   → via direct display: press ▲ and enter ID M0088.

➥ Display indicates: Trip torque CLOSE

CLOSE or OPEN

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

User login

7. Use ▲▼ Up ▲ Down ▼ to select user:
   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.

Change value

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 has to be acknowledged before the operation can be resumed. The acknowledgement is made:

1. either by an operation command in the opposite direction.
   - For Torque fault OPEN: Operation command in direction CLOSE
   - For Torque fault CLOSE: Operation command in direction OPEN
2. 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 the fieldbus, command reset., if the fieldbus is the active command source.
     - via a digital input (I/O interface) with RESET command if a digital input is configured for signal RESET and the I/O interface is the active command source.

10.4. Set limit switching

NOTICE

Valve damage at valve/gearbox due to incorrect setting!

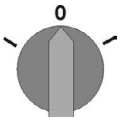
→ When setting with motor operation: Stop actuator **prior** to reaching end of travel (press STOP push button).

→ For limit seating, provide for sufficient backlash between end position and mechanical end stop due to potential overrun.

M ▷ Customer settings M0041
Limit switching M0010
Set end pos.CLOSED? M0084
Set end pos. OPEN? M0085

Select main menu

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



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

➥ Display goes to main menu and indicates: ▸ Display

Select parameter

3. Select parameter either:
   → click via the menu M ▷ to parameter, or
   → via direct display: press ▲ and enter ID M0084.

➥ Display indicates: Set end pos.CLOSED?

CLOSED or OPEN

4. Select via ▲▼ Up ▲ Down ▼:
   → ▸ Set end pos.CLOSED? M0084
   → ▸ Set end pos. OPEN? M0085

➥ The black triangle ▸ indicates the current selection.

5. 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

User login

6. Use ▲▼ Up ▲ Down ▼ to select user:
   Information: Required user level: Specialist (4) or higher

➥ The symbols have the following meaning:

- black triangle: ▸ = current setting
- white triangle: ▹ = selection (not saved yet)

7. Press Ok to confirm selected user.

➥ Display indicates: Password 0***

8. Enter password (→ enter password).

➥ The display indicates either:

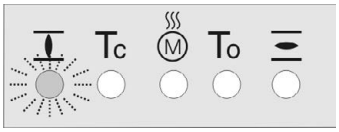
- Set end pos.CLOSED? CMD0009 → continue with step 9
- Set end pos. OPEN? CMD0010 → continue with step 12

Set end position CLOSED CMD0009

9. Set end position CLOSED again :
   - 9.1 For large strokes: Set selector switch in position **Local control** (LOCAL) and operate actuator in motor operation via push button (CLOSE) in direction of the end position.
     Information: Stop actuator **before** reaching end of travel (press **STOP** push button to avoid damage.
   - 9.2 Engage manual operation.
   - 9.3 Turn handwheel until valve is closed.
   - 9.4 Set selector switch to position **0** (OFF).
   - ➥ Display indicates: Set end pos.CLOSED? Yes No

Confirm new end position

10. Press ↵ Yes to confirm new end position.
    - ➥ Display indicates: End pos. CLOSED set!
    - ➥ The left LED is illuminated (standard version) and thus indicates that the end position CLOSED setting is complete.



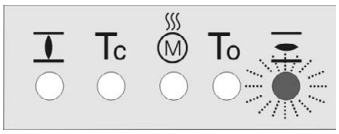
11. Make selection:
    - → Edit → back to step 9: Set end position CLOSED "once again"
    - → Esc → back to step 4; either set end position OPEN or exit the menu.

Set end position OPEN CMD0010

12. Re-set end position OPEN:
    - 12.1 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 actuator **before** reaching end of travel (press **STOP** push button to avoid damage.
    - 12.2 Engage manual operation.
    - 12.3 Turn handwheel until valve is open.
    - 12.4 Set selector switch to position **0** (OFF).
    - ➥ Display indicates: Set end pos. OPEN? Yes No

Confirm new end position

13. Press ↵ Yes to confirm new end position.
    - ➥ Display indicates: End pos. OPEN set!
    - ➥ The right LED is illuminated (standard version) and thus indicates that the end position OPEN setting is complete.



14. 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.

10.5. Operating time (internal): set

Internal operation time setting is only possible if the speed source is set to internal operating time. If the actuator is controlled via an external speed source, the internal operating values will not have an impact on the operation behaviour.

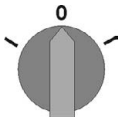
Table 22:

Speed sources		
Parameters	Value	Adjustable internal operating time
Sp. source LOC OP M1700 Sp. source LOCAL CL M2039 Sp. source REM OP M1701 Sp. source REM CL M2040	Internal 1	Yes
	Internal 2	Yes
	Internal 3	Yes
	2 DigIn: "Internal (1-4)"	Yes
	Internal 4	Yes
	Analogue input	No (external speed source)
	Fieldbus	No (external speed source)

For further information on setting the speed sources, refer to Manual (Operation and Setting):

Select main menu

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



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

➥ Display goes to main menu and indicates: ▸ Display

Select parameter for operating time

3. Either click via the menu M ▷ to the parameter or via direct display

→ **Via the menu** M ▷:
Customer settings M0041
Speed functions M1699
Operat. time internal1 M1940
Operat. time internal2 M1941
Operat. time internal3 M1942
Operat.time internal4 M1943
Oper. time rem. max. M1946
Oper. time rem. max. M1947

→ **Via direct display** For this, press ▲ and enter ID, e.g.: M1940.

➥ Display indicates: Operat. time internal1

Selection

4. Select via ▲ ▼ Up ▲ Down ▼:

→ ▸ Operat. time internal1 M1940
→ ▸ Operat. time internal2 M1941
→ ▸ Operat. time internal3 M1942
→ ▸ Operat.time internal4 M1943
→ ▸ Oper. time rem. max. M1946
→ ▸ Oper. time rem. max. M1947

➥ 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 the bottom row Up ▲ Down ▼ Esc → continue with step 11

Log on user

7. Use ▲▼ Up ▲ Down ▼ to select user:
   Information: Required user level: Specialist (4) or higher
   ➥ The symbols have the following meaning:
   - black triangle: ▸ = current setting
   - white triangle: ▹ = selection (not saved yet)
8. Press Ok ↵.
   ➥ Display indicates: Password 0***
9. Enter password (→ enter password).
   ➥ Display shows the set value.
   ➥ The bottom row indicates: Edit Esc
10. Press Edit ↵.

Change value

11. Enter new value for operating time via ▲▼ Up ▲ Down ▼.
    Information: The adjustable operating time range is specified on the actuator name plate and is indicated on the display in round brackets.
12. Save new value via ↵ Save.
    ➥ Operating time setting is complete
13. Return to step 4 (Selection): Press Esc ↵.

10.6. Test run

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

10.6.1. Direction of rotation at mechanical position indicator (self-adjusting): check

NOTICE

Valve damage due to incorrect direction of rotation!

→ If the direction of rotation is wrong, switch off immediately (press STOP).
→ Eliminate cause, i.e. correct phase sequence for cable set wall bracket.
→ Repeat test run.

1. Move actuator manually to intermediate position or to sufficient distance from end position.
2. Switch on actuator in direction CLOSE and observe the direction of rotation:
   Information: Switch off before reaching the end position.
3. Observe direction of rotation at mechanical position indicator:

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

Figure 61: Direction of rotation at mechanical position indicator (for clockwise closing)



10.6.2. Direction of rotation at mechanical position indicator: check

Figure 62: Direction of rotation of the position indicator for operation in direction CLOSE (“clockwise closing” version)



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.

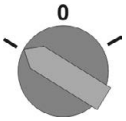
Check direction of rotation

1. Move actuator manually to intermediate position or to sufficient distance from end position.
2. Switch on actuator in direction CLOSE and observe the direction of rotation on the mechanical position indication.

➥ The direction of rotation is correct if the actuator operation in direction **CLOSE** and the symbols (⎺/⎽) turn **counterclockwise**.

10.6.3. Check limit switching

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



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

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

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

➥ The limit switching is set incorrectly if:

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

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

11. Commissioning (settings in the actuator)

Figure 63: Mechanical position indicator (self-adjusting)



The actuator is supplied with the swing angle set in the factory in compliance with the order. The mechanical position indication is set to this swing angle.

If the factory swing angle is changed at a later date, the position indicator must be adapted to the new swing angle:

- Increasing the swing angle: The mechanical position indication automatically adjusts with the subsequent operation.
- Decreasing the swing angle: The mechanical position indication must be newly set (refer to the subsequent chapters).

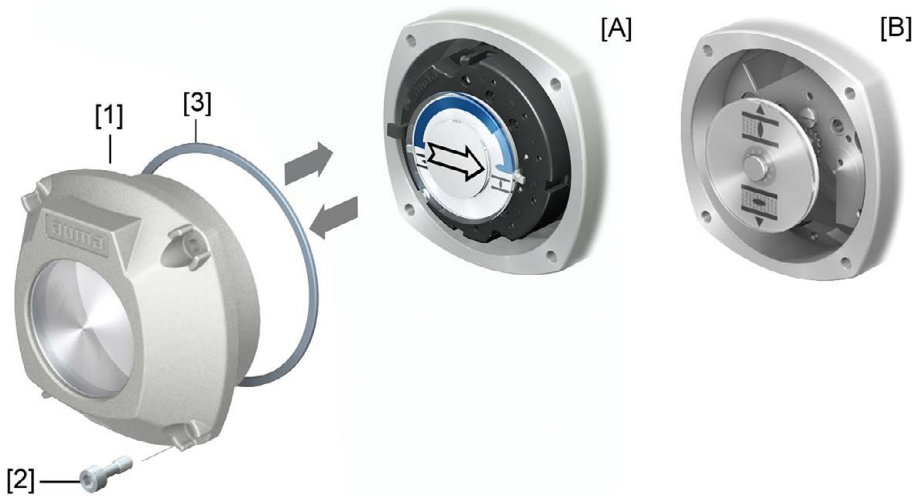
Figure 64: Mechanical position indication via indicator mark (not self-adjusting)



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

11.1. Switch compartment: open/close

Figure 65: Open/close switch compartment



[A] Mechanical position indication (self-adjusting)
[B] Mechanical position indication via indicator mark

WARNING

Ignition of potentially explosive atmospheres caused by sparks!

Risk of death or serious injury!

→ Before opening the flameproof enclosure, ensure absence of gas and voltage.
→ Wait for 30 seconds after power cut-off prior to opening the housing.
→ Handle cover and housing parts with care.
→ Flameproof joints must neither be damaged nor soiled in any way.
→ Do not jam cover during fitting.

Open
Close

1. Loosen screws [2] and remove cover [1] from the switch compartment.
2. Clean sealing faces of housing and cover.
3. Preserve joint surfaces with an acid-free corrosion protection agent.
4. Check whether O-ring [3] is in good condition, replace if damaged.
5. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-ring and insert it correctly.
6. Place cover [1] on switch compartment.
7. Fasten screws [2] evenly crosswise.

11.2. Mechanical position indicator (self-adjusting)

Figure 66: Mechanical position indicator (self-adjusting)



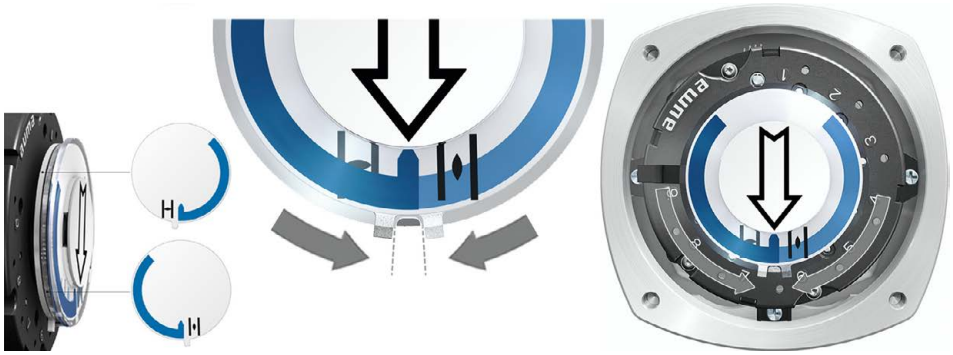
The self-adjusting mechanical position indicator shows the valve position by means of an arrow ⇨. When correctly set, the arrow points to symbol (OPEN) or (CLOSED) in the end positions.

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 predefined end position CLOSED (or OPEN) must be adapted when commissioning.

11.2.1. Mechanical position indicator: set

1. Move valve to end position CLOSED.
2. Push both lower discs with the symbols (OPEN) and (CLOSED) towards each other. The disc with the arrow is thereby ⇨ is driven:

Figure 67: Setting position in CLOSED



3. Move actuator to end position OPEN.

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

Figure 68: Operation in direction OPEN (left) and position OPEN (right)



4. 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 if the angle is too small (below 120°), adapt the gear stage setting to the actuator swing angle. Refer to <Gear stage of the reduction gearing: test/set>.

11.2.2. Gear stage of the reduction gearing: test/set

The test/setting is only required if the mechanical position indicator cannot be correctly set or if another swing angle range is ordered subsequently, for example, 120° ±15° instead of 90° ±15° (replacement by the AUMA Service only).

1. Refer to table and check if swing angle corresponds to the setting of the reduction gearing (stages 1– 9).

Table 23:

Actuator swing angle and suitable reduction gearing setting				
	SQV 05.2 / SQV 07.2	SQV 10.2	SQV 12.2	SQV 14.2
30° +/–15°	2	2	3	4
60° +/–15°	3	3	4	5
90° +/–15°	3	3	4	6
120° +/–15°	3	4	5	6
150° +/–15°	4	4	5	6
180° +/–15°	4	4	5	7
210° +/–15°	4	5	6	7
290° +/–70°	5	5	6	7

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

Figure 69: Set reduction gearing



11.3. Mechanical position indication via indicator mark (not self-adjusting)

Figure 70: Mechanical position indication via indicator mark



The mechanical position indicator shows the valve position via 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 is housed in the actuator switch compartment. The switch compartment must be opened to perform any settings. Refer to <Switch compartment: open/close>.

11.3.1. Set mechanical position indicator

✔ If options (e.g. potentiometer, position transmitter) are available: Only set mechanical position indication once all optional equipment have been successfully 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:

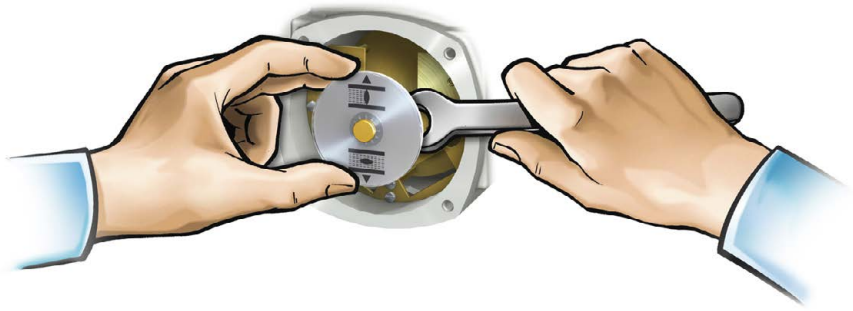
   If the symbol ⊥ (CLOSED) is no longer in alignment with ▲ mark on the cover:
   → Repeat setting procedure.

11.3.2. Gear stage of the reduction gearing: test/set

This test/setting is only required if a different swing angle is subsequently required:

Information The adjustable swing angle range is available in the order-related technical data sheet (e.g. “90° +/–15°”).

1. Pull off indicator disc using a spanner as lever if required.



2. Refer to table and check if swing angle of the actuator corresponds to the setting of the reduction gearing (stages 1– 9).

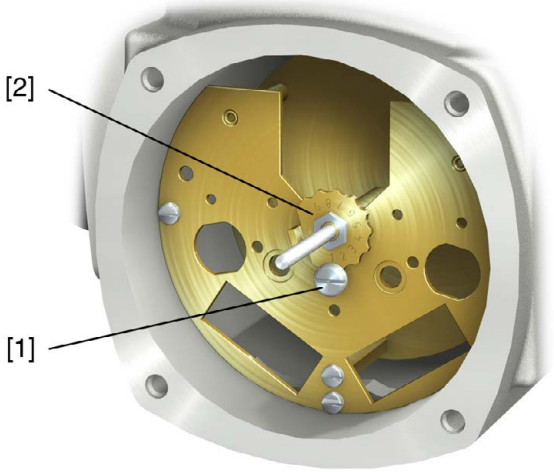
   If the setting is **not correct**: continue with step 4.
   If the setting is correct: continue with step 7.

Table 24:

Actuator swing angle and suitable reduction gearing setting				
	SQV 05.2 / SQV 07.2	SQV 10.2	SQV 12.2	SQV 14.2
30° +/–15°	2	2	3	4
60° +/–15°	3	3	4	5
90° +/–15°	3	3	4	6
120° +/–15°	3	4	5	6
150° +/–15°	4	4	5	6
180° +/–15°	4	4	5	7
210° +/–15°	4	5	6	7
290° +/–70°	5	5	6	7

3. Loosen screw [1].
4. Set crown wheel [2] to desired stage according to table.
5. Tighten screw [1].
6. Place indicator disc on shaft.
7. Set mechanical position indicator.

Figure 71: Control unit with reduction gearing



[1] Screw
[2] Crown wheel

12. Corrective action

12.1. Faults during commissioning

Table 25:

Faults during operation/commissioning		
Fault	Description/cause	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for actuator swing angle.	Set gear stage of the reduction gearing. The control unit might have to be exchanged.
In spite of correct setting of mechanical limit switching, actuator operates into the valve or actuator 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 overrun. (Turn handwheel back by the amount of the overrun)
Actuator operation is too fast or too slow.	Operating time setting is incorrect.	Modify operating time.
Actuator suddenly stops in end positions.	Velocity reduction switched off or incorrectly set before reaching end positions.	Modify velocity.

12.2. Fault indications and warning indications

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

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

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

Table 26:

Faults and warnings via status indications in the display		
Indication on display	Description/cause	Remedy
S0001	Instead of the valve position, a status text is displayed.	For a description of the status texts, refer to 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, refer to <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, refer to <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↵Detailsto display a list of detailed indications. For details, refer to <Faults and Failure> table.
S0008 Out of specification	Collective signal 07: Indication according to NAMUR recommendation NE 107 Actuator is operated outside the normal operation conditions.	For indicated value > 0: Press push button↵Details. For details, refer to <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, refer to <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↵Detailsto 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↵Detailsto display a list of detailed indications. For details, refer to <Faults and Failure> table.

Table 27:

Warnings and Out of specification		
Indication on display	Description/cause	Remedy
Config. warning	Collective signal 06: Possible cause: Configuration setting is incorrect. The device can still be operated with restrictions.	Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Internal warning	Collective signal 15: Device warnings The device can still be operated with restrictions.	Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
24 V DC external	The external 24 V DC voltage supply of the controls has exceeded the power supply limits.	Check 24 V DC voltage supply.
Wrn op.mode run time	Warning on time max. running time/h exceeded	• Check modulating behaviour of actuator. • Check parameter Perm. run timeM0356, re-set if required.
Wrn op.mode starts	Warning on time max. number of motor starts (starts) exceeded	• Check modulating behaviour of actuator. • Check parameter Permissible startsM0357, re-set if required.
Failure behav. active	The failure behaviour is active since all required setpoints and actual values are incorrect.	Verify signals: • Setpoint E1 • Actual value E2 • Actual process value E4 • Check connection to master. • Check (clear) status of master.
Wrn input AIN 1	Warning: Loss of signal analogue input 1	Check wiring.
Wrn input AIN 2	Warning: Loss of signal analogue input 2	Check wiring.
Wrn setpoint position	Warning: Loss of signal setpoint position Possible causes: For an adjusted setpoint range of e.g. 4 – 20 mA, the input signal is 0 (signal loss). For a setpoint range of 0 – 20 mA , monitoring is not possible.	Check setpoint signal.
Op. time warning	The set time (parameterPerm.op. time, manualM0570) has been exceeded. The preset operating time is exceeded for a complete travel from end position OPEN to end position CLOSED.	The warning indications are automatically cleared once a new operation command is executed. • Check valve. • Check parameter Perm.op. time, manualM0570.
Wrn controls temp.	Temperature within controls housing too high.	Measure/reduce ambient temperature.
Time not set	Real time clock has not yet been set.	Set time.
RTC voltage	Voltage of the RTC button cell is too low.	Replace button cell.
PVST fault	Partial Valve Stroke Test (PVST) could not be successfully completed.	Check actuator (PVST settings).
PVST abort	Partial Valve Stroke Test (PVST) was aborted or could not be started.	Perform RESET or restart PVST.
Wrn no reaction	No actuator reaction to operation commands within the set reaction time.	• Check movement at actuator. • Check parameter Reaction timeM0634.
Torque wrn OPEN	Limit value for torque warning in direction OPEN exceeded.	Check parameter Wrn torque OPENM0768, re-set if required.
Torque wrn CLOSE	Limit value for torque warning in direction CLOSE exceeded.	Check parameter Wrn torque CLOSEM0769, re-set if required.
PVST required	Execution of PVST (Partial Valve Stroke Tests) is required.	
Maintenance required	Maintenance is required.	

Table 28:

Faults and Failure		
Indication on display	Description/cause	Remedy
Configuration error	Collective signal 11: Configuration error has occurred.	Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Config. error REMOTE	Collective signal 22: Configuration error has occurred.	Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Internal error	Collective signal 14: Internal error has occurred.	AUMA service Press push button ↵ Details to display a list of individual indications. For a description of the individual signals, refer to Manual (Operation and setting).
Torque fault CLOSE	Torque fault in direction CLOSE	Perform one of the following measures: • Issue operation command in direction OPEN. • Set selector switch to position **Local control** (LOCAL) and reset fault indication via push button **RESET**. • Execute reset command via fieldbus.
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**. • Execute reset command via fieldbus.
Phase fault	• When connecting to a 3-phase AC system and with internal 24 V DC supply of the electronics: Phase 2 is missing. • When connecting to a 3-phase AC system: One of the phases L1, L2 or L3 is missing.	Test/connect phases.
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 via push button **RESET**. - Execute reset command via fieldbus. • 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 UspanM0832must be less than parameter Volt.level diff. potent.M0833.
Wrn input AIN 1	Loss of signal analogue input 1	Check wiring.
Wrn input AIN 2	Loss of signal analogue 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. For a 1-phase AC motor, this can be caused by a defective auxiliary capacitor.	Check operation command control. For 3-phase AC current mains, activate phase monitoring (parameter Adapt rotary dir.M0171). Check device configuration setting (parameter Closing rotationM0176). To delete the fault indication: • Set selector switch to position **Local control** (LOCAL) and reset fault indication via push button **RESET**. • Execute reset command via fieldbus.
Converter fault	Motor protection: Fault within converter	

Table 29:

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 SETPOINT 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, refer to 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 is disconnected.	• Enable EMERGENCY stop switch. • Reset EMERGENCY stop state by means of Reset command.
EMCY behav. active	Operation mode EMERGENCY is active (EMERGENCY signal was sent). 0 V are applied at the EMERGENCY input.	• Detect cause for EMERGENCY signal. • Verify failure source. • Apply +24 V DC at EMERGENCY input.
I/O interface	The actuator is controlled via the I/O interface (parallel).	Check I/O interface.
Handwheel active	Manual operation is activated.	Start motor operation.
FailState fieldbus	Fieldbus connection available, however no process data transmission by the master.	Verify master configuration
Local STOP	A local STOP is active. Push button STOP of local controls is operated.	Release push button STOP.
Interlock OPEN + CLOSE	An interlock is active.	Check interlock signal.
Interlock bypass	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.

Temperature monitoring of PTC tripping device

The temperature monitoring of PTC tripping device must be connected and monitored in an external system circuit. The signal is issued via an output contact.

Designation in the wiring diagram: TEMP-WARNING PTC TRIPPING DEVICE

Active signal = NC contact open (NO contact = closed)

Active signal means: The PTC tripping device temperature is not within the permitted temperature range.

Table 30:

Signal on temperature monitoring of PTC tripping device active		
	Possible causes	Remedy
for ambient temperatures below –30 °C	Heating system (wiring diagram designation: R5 H) failure	Check external power supply of heating system.
for ambient temperatures exceeding –30 °C	Heating system defective PTC tripping device defective	Switch off heater control unitM1338 Switch off external power supply of heating system. Contact AUMA service

12.3. Fuses

12.3.1. Fuses within the actuator controls

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

12.3.2. Motor protection (thermal monitoring)

In order to protect against overheating and impermissibly high surface temperatures at the actuator, PTC thermistors are embedded in the motor winding. Motor protection trips as soon as the max. 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.
- The status indications S0007 or S0011 Failure display a fault.
  The fault Details is displayed when selecting Thermal fault.

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

Depending on the parameter setting (motor protection behaviour), the fault signal is either automatically reset or the fault signal has to be acknowledged.

The acknowledgement is made:

- in selector switch position **Local control** (LOCAL) via push button **RESET**.
- In selector switch position **Remote control** (REMOTE) with Reset command via fieldbus.

Proof-test motor protection

The functionality of the motor protection must be verified at the latest when performing the maintenance (refer to chapter <Servicing and maintenance>).

The test is performed by simulating the motor protection signal via actuator controls local controls:

Required user level: Specialist (4) or higher.

M ▷ Diagnostics M0022
TMS proof test M1950

Test procedure:

1. Set selector switch to position **0** (OFF).
2. Return to the main menu and select the simulation value in parameter TMS proof test M1950: Select Thermal test.
3. Activate motor protection simulation: Press Ok push button.
   The safety function is correct if no fault signal is displayed.
4. Reset simulation: Press Ok push button or exit the simulation menu and reset the selector switch to its initial position.

13. 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).

13.1. 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

- Carry out visual inspection:
  Cable entries, cable glands, blanking plugs, etc. have to be checked for correct fit and sealing. If required, tighten cable glands and blanking plugs with torque in compliance with the manufacturer's specifications.
  Check actuator for damage as well as for grease or oil leakage.
- When deployed in areas where dust formation represents a potential explosion hazard, perform visual inspection for deposit of dirt or dust on a regular basis. Clean devices if required.
- Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>.
- When rarely operated: Perform test run.

For 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.

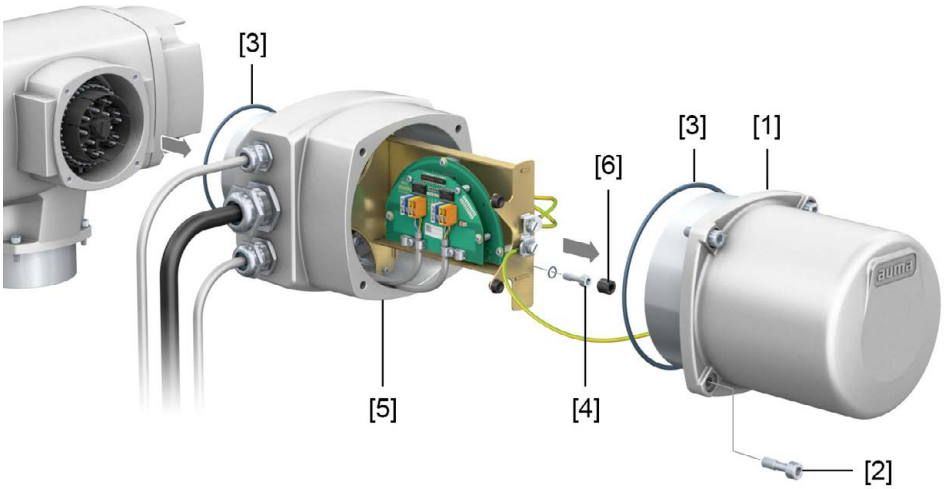
At the latest every 3 years

- Check functionality of motor protection. Refer to chapter <Motor protection (thermal monitoring)>.

13.2. Disconnection from the mains

If the device must be dismantled, e.g. for service purposes, it can be isolated from the mains without having to remove the wiring at the electrical connection.

Figure 72: KL electrical connection



[1] Cover
[2] Screws for cover
[3] O-ring
[4] Screws (with gaskets) within connection frame
[5] Connection frame
[6] Grub screws within connection frame

WARNING

Ignition of potentially explosive atmospheres caused by sparks!

Risk of death or serious injury!

→ Before opening the flameproof enclosure, ensure absence of gas and voltage.
→ Wait for 30 seconds after power cut-off prior to opening the housing.
→ Handle cover and housing parts with care.
→ Flameproof joints must neither be damaged nor soiled in any way.
→ Do not jam cover during fitting.

Removing the plug:

1. Loosen the screws [2].
2. Remove cover [1].
3. Remove grub screws [6] inside the connection frame.
4. Loosen screws [4] inside the connection frame.
5. Remove electrical connection.

Fitting the plug/socket connector:

6. Clean sealing faces of plug/socket connector, cover and housing.
7. Preserve joint surfaces with an acid-free corrosion protection agent.
8. Check whether O-rings [3] are in good condition, replace if damaged.
9. Apply a thin film of non-acidic grease (e.g. petroleum jelly) to the O-rings and insert them correctly.
10. Fit electrical connection (connection frame) and fasten screws [4] (with gaskets) evenly crosswise.
11. Fasten grub screws [6] (tightening torque approx. 10 Nm).
    Information: The flameproof enclosure is only guaranteed provided the grub screws are fastened [6].
12. Fit cover [1] and fasten screws [2] evenly crosswise.

13.3. Maintenance

Maintenance intervals

In compliance with EN 60079-17, Ex certified products either require repeated testing at an interval of 3 years or continuous monitoring by trained personnel.

Manual operation

During maintenance, the mechanical parts of the handwheel activation, in particular motor coupling and retaining spring, must be checked. Replace the parts in case of visible wear.

Lubrication

- In the factory, the gear housing is filled with grease.
- Additional lubrication of the gear housing is not required during operation.
- 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).
- We recommend replacing the seals when changing the grease.

Notes relating to maintenance

- Perform visual inspection of actuator and mounted accessories. Ensure that no outside damage, changes or leakage of grease and oil are visible.
- Check actuator for unusual running or grinding noise or vibration which might be an indication of bearing or gear damage.
- Electrical connection cables must be placed properly and in perfect condition.
- Thoroughly touch up any possible damage to painting to prevent corrosion. Original paint in small quantities can be supplied by AUMA.
- Cables and wire entries, blanking plug, cable glands, plugs etc. have to be checked for correct tightness and sealing. Consider torques according to manufacturer's details. If required, replace the components. Only use components with appropriate Ex approval.
- Check whether Ex connections are fastened correctly.
- Take care of possible discolouration of the terminals and wires. This would indicate an increased temperature.
- For Ex housings, pay special attention to a possible collection of water. This may originate from “breathing” due to severe temperature variations (e. g. change of night and day), from damaged seals etc. Remove any water immediately.
- The process temperature range must be within the range of the specified ambient temperature.
- Check the flame path gaps of flameproof enclosures for dirt and corrosion.
- Since the dimensions of all flameproof joints are strictly defined and inspected, no mechanical work (such as grinding) shall be performed on them. The joint surfaces have to be cleaned chemically (e. g. with Esso-Varsol).
- Consult manufacturer for indications regarding flameproof joints.
- Repair interventions on flameproof joints is not permitted.
- Prior to fitting, preserve joint surfaces with an acid-free corrosion protection agent (e. g. Esso Rust-BAN 397).
- Ensure that all housing covers are handled carefully and that the seals are checked.
- All cable and motor protection components have to be checked.
- If defects impairing the safety are detected during maintenance, repair measures have to be initiated without delay.
- Any kind of surface coating for the joint surfaces is not permitted.
- When replacing parts, sealing elements, etc. only original spare parts shall be used.

13.4. Disposal and recycling

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

- Electronic scrap
- Various metals
- 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.

14. 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).

14.1. Technical data Part-turn actuator

Features and functions		
Explosion protection	Standard:	II 2G Ex db eb IIC T4 or T3 Gb II 2G Ex h IIC T4 or T3 Gb
	Options:	II 2G Ex db IIC T4 or T3 Gb II 2G Ex db eb IIB T3 Gb II 2G Ex db IIB T3 Gb II 2G Ex h IIB T3 Gb
Product certificates	DEKRA 13ATEX0016 X	
Type of duty (Part-turn actuators for open-close duty)	Short-time duty S2- 15 min, classes A and B according to EN ISO 22153	
	For 100 % nominal voltage and +40 °C ambient temperature and at load with 35 % of the max. torque.	
Type of duty (Part-turn actuators for modulating duty)	Intermittent duty S4 - 25 %, class C according to EN ISO 22153	
	For 100 % nominal voltage and +40 °C ambient temperature and at modulating torque load.	
Motors	3-phase AC asynchronous motor, type IM B9 according to IEC 60034-7, IC410 cooling procedure according to IEC 60034-6	
Mains voltage, mains frequency	Refer to name plate of ACVExC actuator controls	

3-phase AC Voltages/frequencies		
Volt	220 – 240	380 – 480
Hz	50 – 60	50 – 60

1-phase AC Voltages/frequencies		
Volt	110 – 120	220 – 240
Hz	50 – 60	50 – 60

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

Overvoltage category	Category III according to IEC 60364-4-443	
Insulation class	Standard:	F, tropicalized
	Option:	H, tropicalized
Motor protection	Standard:	Thermoswitches (NC)
	Option:	PTC thermistors (according to DIN 44082)
Motor protection	PTC thermistors (according to DIN 44082) PTC thermistors additionally require a suitable tripping device in the actuator controls.	
Motor heater (option)	Voltages:	110 – 120 V AC, 220 – 240 V AC or 380 – 480 V AC
	Power	12.5 W
Swing angle	Standard:	Adjustable between 75° and < 105°
	Options:	15° to < 45°, 45° to < 75°, 105° to < 135°, 135° to < 165°, 165° to < 195°, 195° to < 225°
Self-locking	Yes (Part-turn actuators are self-locking if the valve position cannot be changed from standstill while torque acts upon the output drive.)	
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation.	
	Option:	Handwheel lockable Handwheel stem extension Power tool for emergency operation with square 30 mm or 50 mm

Features and functions		
Indication for manual operation (option)	Indication whether manual operation is active/not active via single switch (1 change-over contact)	
Electrical connection	Standard:	AUMA Ex plug/socket connector (KT); screw-type motor terminals; push-in type control terminals
	Option:	AUMA Ex plug/socket connector with terminal blocks (KES)
Threads for cable entries	Standard:	Metric threads
	Option:	Pg threads, NPT threads, G threads
Terminal plan	Terminal plan according to order number enclosed with delivery	
Splined coupling for connection to the valve shaft	Standard:	Coupling without bore
	Options:	Machined coupling with bore and keyway, square bore or bore with two-flats according to EN ISO 5211
Valve attachment	Dimensions according to EN ISO 5211 without spigot	

With base and lever (option)	
Swing lever	Made of spheroidal cast iron with two or three bores for fixing a lever arrangement. Considering the installation conditions, the lever may be mounted to the output shaft in any desired position.
Ball joints (option)	Two ball joints matching the lever, including lock nuts and two welding nuts, suitable for pipe according to dimension sheet.
Fixing	Base and four holes for fastening screws

Electronic control unit	
Non-Intrusive setting	Magnetic limit and torque transmitter (MWG)
Position feedback signal	Via actuator controls
Torque feedback signal	Via actuator controls
Mechanical position indicator	Continuous self-adjusting indication with symbols OPEN and CLOSED
Running indication	Blinking signal via actuator controls
Heater in switch compartment	Resistance type heater with 5 W, 24 V AC

Service conditions		
Use	Indoor and outdoor use permissible	
Mounting position	Any position	
Installation altitude	≤ 2,000 m above sea level > 2,000 m above sea level on request	
Ambient temperature	Refer to actuator name plate	
Humidity	Up to 100 % relative humidity across the entire permissible temperature range	
Enclosure protection in accordance with IEC 60529	Standard:	IP68 Refer to name plates at motor and actuator for exact version
	Option:	DS terminal compartment additionally sealed against interior of actuator (double sealed)
	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)	
Corrosion protection	Standard:	KS: Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
	Option:	KX: Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
Coating	Double layer powder coating Two-component iron-mica combination	

Service conditions		
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Other colours on request
Lifetime	AUMA part-turn actuators meet or exceed the lifetime requirements of EN ISO 22153. Detailed information can be provided on request.	
Sound pressure level	< 72 dB (A)	

Other	
EU Directives	ATEX Directive 2014/34/EU Machinery Directive 2006/42/EC Low Voltage Directive 2014/35/EU EMC Directive 2014/30/EU RoHS Directive 2011/65/EU RED Directive 2014/53/EU
Reference documents	Dimensions Part-turn actuators SQVEx 05.2 – SQVEx 14.2/SQRVEx 05.2 – SQRVEx 14.2 with ACVExC 01.2 Electrical data Part-turn actuators SQVEx 05.2 – SQVEx 14.2 Electrical data Part-turn actuators SQRVEx 05.2 – SQRVEx 14.2

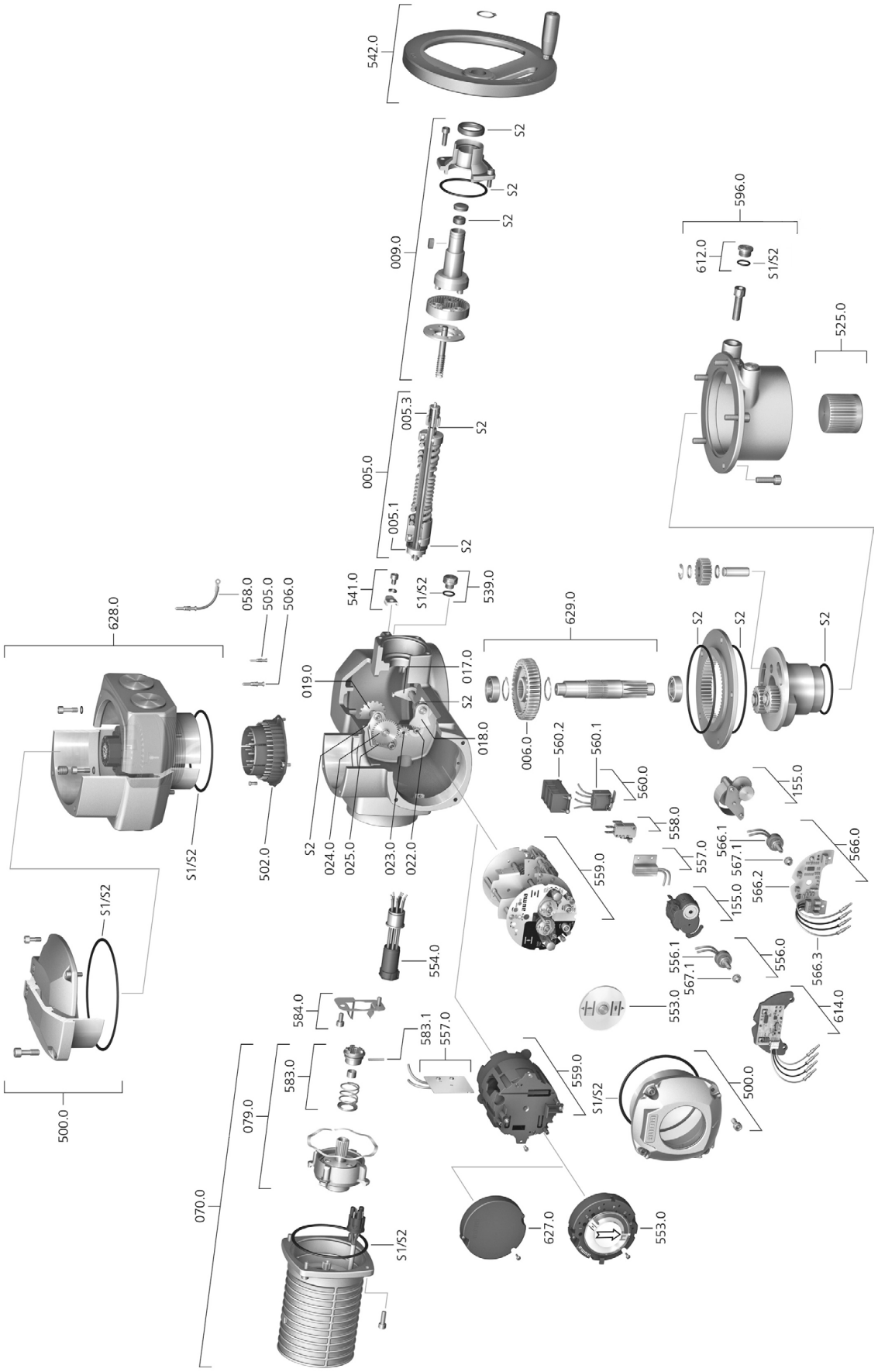
14.2. Tightening torques for screws

Table 31:

Tightening torques for screws		
Threads	Tightening torque [Nm]	
	Strength class	
	A2-70/A4-70	A2-80/A4-80
M6	7.4	10
M8	18	24
M10	36	48
M12	61	82
M16	150	200
M20	294	392
M30	1,015	1,057
M36	1,769	2,121

15. Spare parts

15.1. Part-turn actuators SQVEx 05.2 – SQVEx 14.2/SQRVEx 05.2 – SQRVEx 14.2 KT/KM



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	Ref. no.	Designation	Type
005.0	Drive shaft	Sub-assembly	556.1	Potentiometer without slip clutch	Sub-assembly
005.1	Motor coupling	Sub-assembly	557.0	Heater	Sub-assembly
005.3	Manual drive coupling	Sub-assembly	558.0	Blinker transmitter including pins at wires (without impulse disc and insulation plate)	Sub-assembly
006.0	Worm wheel		559.0–1	Electromechanical control unit with switches, including torque switching heads	Sub-assembly
009.0	Manual gearing	Sub-assembly	559.0–2	Electronic control unit with magnetic limit and torque transmitter (MWG)	Sub-assembly
017.0	Torque lever	Sub-assembly	560.0–1	Switch stack for direction OPEN	Sub-assembly
018.0	Gear segment		560.0–2	Switch stack for direction CLOSE	Sub-assembly
019.0	Crown wheel	Sub-assembly	560.1	Switch for limit/torque	Sub-assembly
022.0	Drive pinion II for torque switching		560.2–1	Switch case for direction OPEN	
023.0	Output drive wheel for limit switching	Sub-assembly	560.2–2	Switch case for direction CLOSE	
024.0	Drive wheel for limit switching	Sub-assembly	566.0	RWG position transmitter	Sub-assembly
025.0	Locking plate	Sub-assembly	566.1	Potentiometer for RWG without slip clutch	Sub-assembly
058.0	Cable for protective earth	Sub-assembly	566.2	Position transmitter board for RWG	Sub-assembly
070.0	Motor (incl. ref. no. 079.0)	Sub-assembly	566.3	Cable set for RWG	Set
079.0	Planetary gearing for motor drive	Sub-assembly	567.1	Slip clutch for potentiometer	Sub-assembly
155.0	Reduction gearing	Sub-assembly	583.0	Motor coupling on motor shaft	Sub-assembly
500.0	Cover	Sub-assembly	583.1	Pin for motor coupling	
502.0	Pin carrier without pins	Sub-assembly	584.0	Retaining spring for motor coupling	Sub-assembly
505.0	Pin for controls	Sub-assembly	596.0	Output drive flange with end stop	Sub-assembly
506.0	Pin for motor	Sub-assembly	612.0	Screw plug for end stop	Sub-assembly
525.0	Coupling	Sub-assembly	614.0	EWG position transmitter	Sub-assembly
539.0	Screw plug	Sub-assembly	627.0	MWG 05.3 cover	
541.0	Protective earthing	Sub-assembly	628.0	Ex plug/socket connector with terminal connection (KT)	
542.0	Handwheel with ball handle	Sub-assembly	629.0	Pinion shaft	Sub-assembly
553.0	Mechanical position indicator	Sub-assembly	S1	Seal kit, small	Set
554.0	Socket carrier for motor plug/socket connector with cable harness		S2	Seal kit, large	Set
556.0	Potentiometer for position transmitter	Sub-assembly			

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