auma®
Solutions for a world in motion

Multi-turn actuators
SAN 07.2 – SAN 16.2
(without actuator controls)
for use in nuclear power plants

Operation instructions

Assembly, operation, commissioning

Read operation instructions first.

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

Purpose of the document:

This document contains information for installation, commissioning, operation and maintenance staff. It is intended to support device installation and commissioning.

Table of contents

1. Safety instructions

1.1. Basic information on safety

Standards/directives

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

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

They include among others standards, directives on operation in nuclear power plants and regulations on radiation protection in nuclear power plants.

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 radiation exposed areas is subject to special regulations which have to be observed. The end user or contractor of the plant are responsible for respect and control of these regulations, standards, and laws.

Commissioning

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

Operation

Prerequisites for safe and smooth operation:

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

Protective measures

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

Maintenance

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

Any device modification requires prior written consent of the manufacturer.

1.2. Range of application

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

The actuators are qualified for use in nuclear power plants outside containment.

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

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

- Industrial trucks according to EN ISO 3691
- Lifting appliances according to EN 14502
- Passenger lifts according to DIN 15306 and 15309
- Service lifts according to EN 81-1/A1
- Escalators
- Continuous duty
- Buried service
- Continuous submersion (observe enclosure protection)
- Potentially explosive atmospheres

No liability can be assumed for inappropriate or unintended use.

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

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

1.3. Warnings and notes

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

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

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

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

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

Arrangement and typographic structure of the warnings

⚠ DANGER

Type of hazard and respective source!

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

→ Measures to avoid the danger

→ Further measure(s)

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

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

1.4. 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)

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

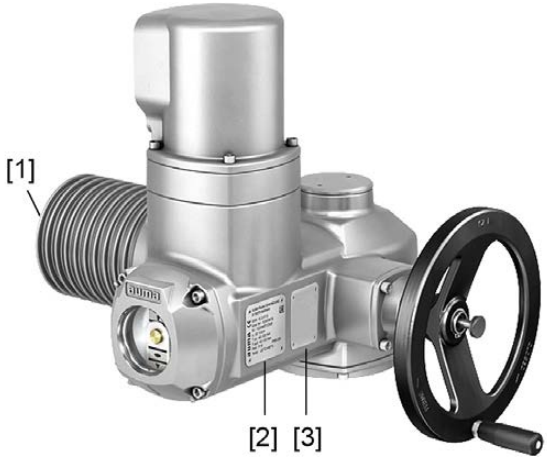
< > Reference to other sections

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

2. Identification

2.1. Name plate

Figure 1: Arrangement of name plates



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

Actuator name plate

Figure 2: Actuator name plate (example)

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

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

Motor name plate

Figure 3: Motor name plate (example)

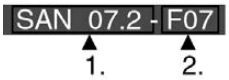
auma (= manufacturer logo); CE (= CE mark)

[1] Motor type
[2] Motor article number
[3] Serial number
[4] Rated voltage
[5] Consumed rated power
[6] Maximum current
[7] Type of duty
[8] Enclosure protection
[9] Motor protection (temperature protection)
[10] Insulation class
[11] Perm. number of starts (for SARV)
[12] Rated current
[13] Data Matrix code

Descriptions referring to name plate indications

Type designation

Figure 4: Type designation (example)



1. Type and size of actuator
2. Flange size

Type and size

These instructions apply to the following devices types and sizes:

- Type SAN = Multi-turn actuators for open-close duty
  Sizes: 07.2, 07.6, 10.2, 14.2, 14.6, 16.2
- Type SA**R**N = Multi-turn actuators for modulating duty
  Sizes: 07.2, 07.6, 10.2, 14.2, 14.6, 16.2

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 1:

Description of serial number (with example 0516MD12345)			
05	16	MD12345	
05	Positions 1+2: Assembly in week = week 05		
	16	Positions 3+4: Year of manufacture = 2016	
		MD12345	Internal number for unambiguous product identification

Data Matrix code

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

Figure 5: Link to AUMA Assistant App:

For further Service & Support, software/apps/... refer to www.auma.com.

2.2. Short description

Multi-turn actuator

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

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

AUMA multi-turn actuators SAN 07.2 – SAN 16.2 are driven by an electric motor and are capable of withstanding thrust in combination with output drive type A. For manual operation, a handwheel is provided. Switching off in end positions may be either by limit or torque seating. Actuator controls are required to operate or process the actuator signals.

3. Transport, storage and packaging

3.1. Transport

For transport to place of installation, use sturdy packaging.

DANGER

Hovering load!

Risk of death or serious injury.

→ Do NOT stand below hovering load.

→ 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.

→ Respect total weight of combination (actuator, 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 6: Example: Lifting the actuator

Table 2:

Weights for output drive type A 07.2 – A 16.2		
Type designation	Flange size	[kg]
A 10.2	F10	2.8
A 14.2	F14	6.8
A 16.2	F16	11.7

3.2. Storage

NOTICE

Danger of corrosion due to inappropriate storage!

→ Store in a well-ventilated, dry room.

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

→ Cover to protect against dust and dirt.

→ Apply suitable corrosion protection agent to uncoated surfaces.

Long-term storage

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.

3.3. Packaging

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

4. Assembly

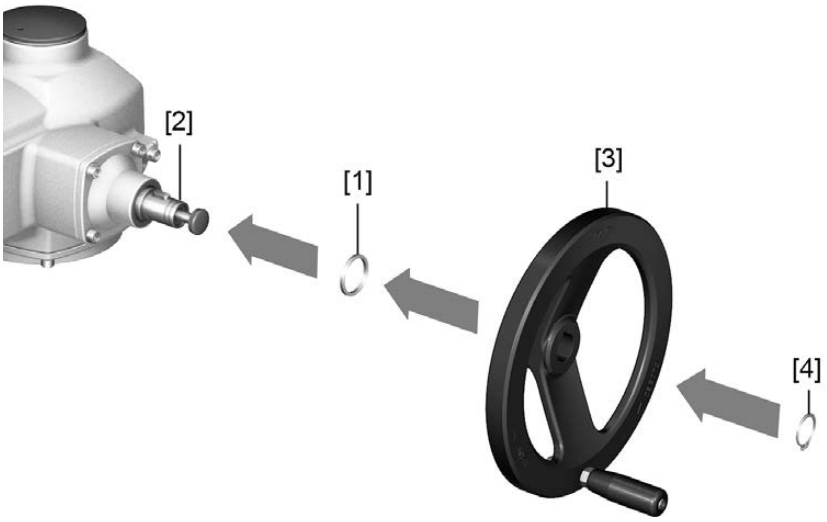
4.1. Mounting position

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

4.2. Handwheel fitting

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

Figure 7: Handwheel



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

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

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

4.3. Multi-turn actuator: mount to valve/gearbox

NOTICE

Danger of corrosion due to damage to paint finish!

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

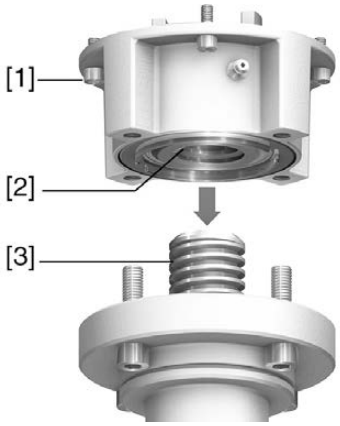
4.3.1. Output drive type A

Application

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

Design Output mounting flange [1] with axial bearing stem nut [2] form one unit. Torque is transmitted to valve stem [3] via stem nut [2].

Figure 8: Design of output drive type A

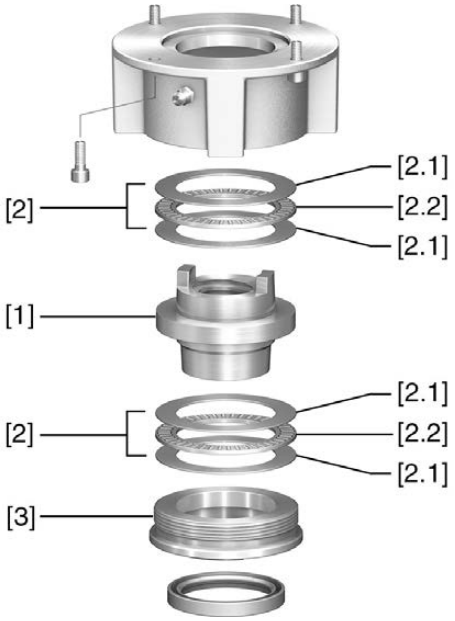


[1] Output mounting flange
[2] Stem nut with dog coupling
[3] Valve stem

4.3.1.1. Stem nut: finish machining

✔ This working step is only required if stem nut is supplied unbored or with pilot bore.

Figure 9: Output drive type A



[1] Stem nut
[2] Axial needle roller bearing
[2.1] Axial bearing washer
[2.2] Axial needle roller and cage assembly
[3] Spigot ring

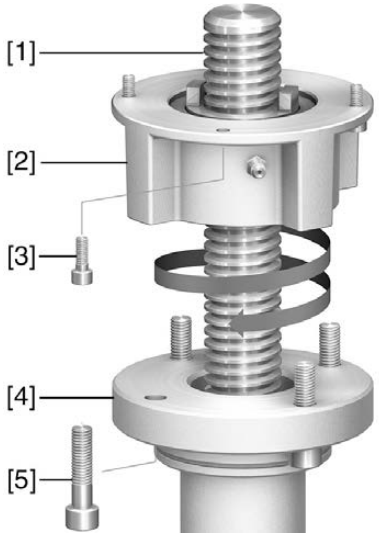
1. Remove spigot ring [3] from output drive.
2. Remove stem nut [1] together with axial needle roller bearings [2].
3. Remove axial bearing washers [2.1] and axial needle roller and cage assemblies [2.2] from stem nut [1].
4. Drill and bore stem nut [1] and cut thread.
   Information: When fixing in the chuck, make sure stem nut runs true!
5. Clean the machined stem nut [1].

6. Apply sufficient "AEROSHELL GREASE 22" to axial needle roller and cage assemblies [2.2] and axial bearing washers [2.1], ensuring that all hollow spaces are filled with grease.
7. Place greased axial needle roller and cage assemblies [2.2] and axial bearing washers [2.1] onto stem nut [1].
8. Re-insert stem nut [1] with bearings [2] into output drive.

   Information: Ensure that dogs or splines are placed correctly in the keyway of the hollow shaft.
9. Screw in spigot ring [3] until it is firm against the shoulder.

4.3.1.2. Multi-turn actuator (with output drive type A): mount to valve

Figure 10: Assembly of output drive type A



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

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

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

8. Adjust multi-turn actuator until alignment of the fixing holes.
9. Fasten multi-turn actuator with screws [3].

10. Fasten screws [3] crosswise with a torque according to table.

Table 3:

Tightening torques for screws	
Threads	Tightening torque [Nm]
	Strength class 10.9
M6	15
M8	37
M10	75
M12	128
M16	314
M20	615

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

4.3.2. Output drive types B

Application

- For rotating, non-rising valve stem
- Not capable of withstanding thrust

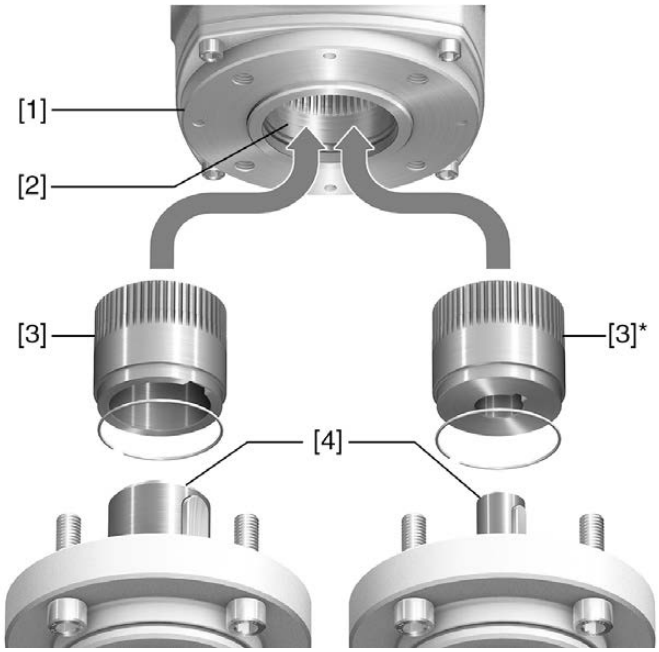
Design

Connection between hollow shaft and valve or gearbox via output drive sleeve fixed to the hollow shaft of the multi-turn actuator via retaining ring.

When exchanging the output drive sleeve, later retrofitting to a different output drive type is possible

- Output drive types B and E: Output drive sleeve with bore according to DIN 3210
- Output drive types B1 – B4: Output drive sleeve with bore according to EN ISO 5210

Figure 11: Output drive type B

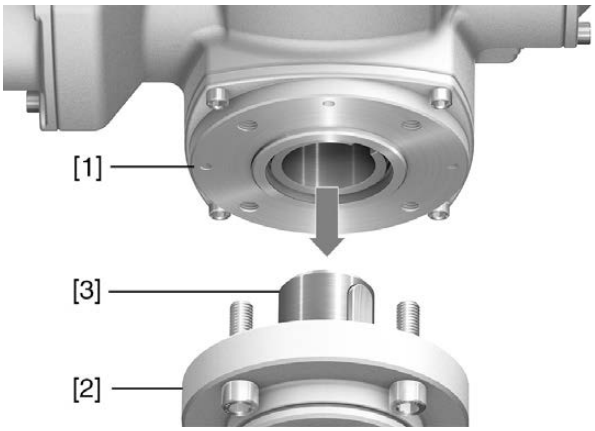


[1] Flange multi-turn actuator (e.g. F07)
[2] Hollow shaft
[3] Output drive sleeve (illustration examples)
[3] B/B1/B2 and [3]* B3/B4/E, respectively with bore and keyway
[4] Gearbox/valve shaft with parallel key

Information Spigot at valve flanges should be loose fit.

4.3.2.1. Multi-turn actuator with output drive types B: mount to valve/gearbox

Figure 12: Mounting output drive types B



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

1. Check if mounting flanges fit together.
2. Check if output drive of multi-turn actuator [1] matches the output drive of valve/gearbox or valve/gearbox valve shaft [2/3].
3. Apply a small quantity of grease to the valve or gearbox shaft [3].
4. Fit multi-turn actuator [1].
   Information: Ensure that the spigot fits uniformly in the recess and that the mounting faces are in complete contact.

5. Fasten multi-turn actuator with screws according to table.
   Information: We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.
6. Fasten screws crosswise to a torque according to table.

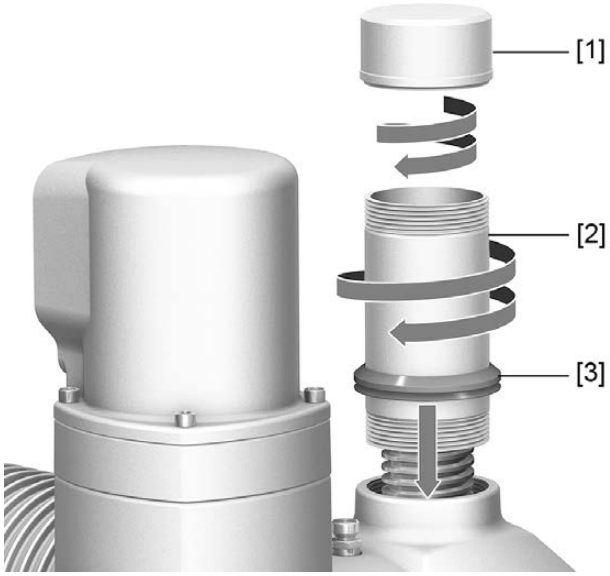
Table 4:

Tightening torques for screws	
Threads	Tightening torque [Nm]
	Strength class 10.9
M6	15
M8	37
M10	75
M12	128
M16	314
M20	615

4.4. Accessories for assembly

4.4.1. Stem protection tube for rising valve stem

Figure 13: Assembly of the stem protection tube



[1] Protective cap made of steel (screwed)
[2] Stem protection tube
[3] V-seal

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

5. Electrical connection

5.1. Basic information

WARNING

Danger due to incorrect electrical connection

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

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

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

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

Wiring diagram/terminal plan

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

NOTICE

Valve damage for connection without controls!

→ NORM actuators require controls: Connect motor via controls only (reversing contactor circuit).

→ Observe the type of seating specified by the valve manufacturer.

→ Observe wiring diagram.

Delay time

The delay time is the time from the tripping of the limit or torque switches to the motor power being switched off. To protect the valve and the actuator, we recommend a delay time < 50 ms. Longer delay times are possible provided the operating time, output drive type, valve type, and the type of installation are considered. We recommend switching off the corresponding contactor directly by limit or torque switch.

Protection on site

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

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

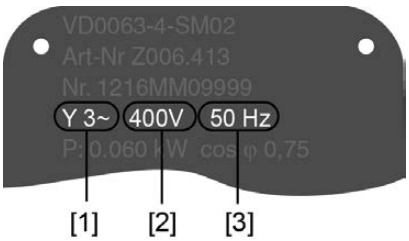
Limit and torque switches

Limit and torque switches can be provided as single, tandem, or triple switches. Only the same potential can be switched on the two circuits (NC/NO contact) of each single switch. If different potentials are to be switched simultaneously, tandem switches or triple switches are required. When using tandem/triple switches:

- For signalling use the leading contacts TSC1, TSO1, LSC1, LSO1.
- For switching off use the lagging contacts TSC, TSO, LSC, LSO.

Type of current, mains voltage and mains frequency

Figure 14: Motor name plate (example)



[1] Type of current

[2] Mains voltage

[3] Mains frequency (for 3-ph and 1-ph AC motors)

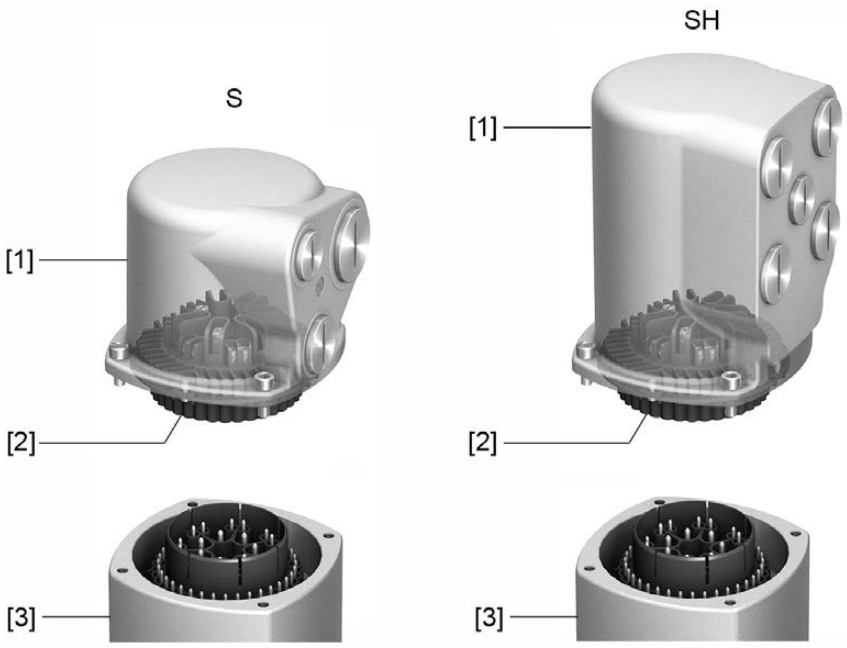
Type of current, mains voltage and mains frequency must match the data on the motor name plate.

Connecting cables

- For device insulation, appropriate (voltage-proof) cables must be used. Specify cables for the highest occurring rated voltage.
- Use connecting cable with appropriate minimum rated temperature.
- For connecting cables exposed to UV radiation (outdoor installation), use UV resistant cables.

5.2. S/SH electrical connection (AUMA plug/socket connector)

Figure 15: S and SH electrical connection



[1] Cover
[2] Socket carrier with screw-type terminals
With crimp-type connection as an option
[3] Actuator housing with pin carrier

Short description

Plug-in electrical connection with screw-type terminals for power and control contacts. Control contacts also available as crimp-type connection as an option.

S version (standard) with three cable entries. SH version (enlarged) with additional cable entries. For cable connection, remove the AUMA plug/socket connector and the socket carrier from cover.

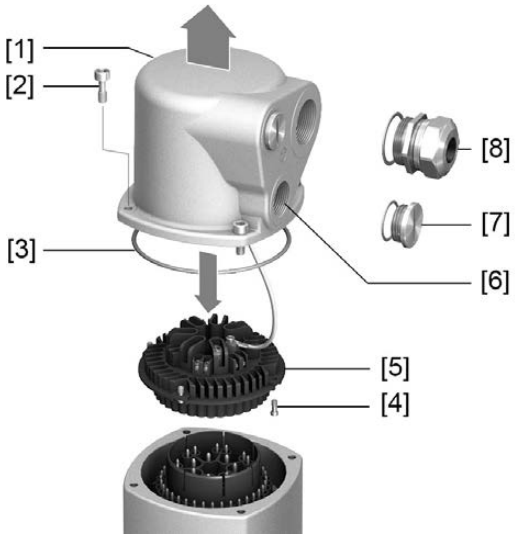
Technical data

Table 5:

Electrical connection via AUMA plug/socket connector		
	Power contacts	Control contacts
No. of contacts max.	6 (3 equipped) + protective earth conductor (PE)	50 pins/sockets
Designation	U1, V1, W1, U2, V2, W2, PE	1 to 50
Connection voltage max.	750 V	250 V
Rated current max.	25 A	16 A
Type of customer connection	Screw connection	Screw connection, crimp-type (option)
Connection diameter max.	6 mm^2 (flexible) 10 mm^2 (solid)	2.5 mm^2 (flexible or solid)

5.2.1. Terminal compartment : open

Figure 16: Open terminal compartment



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

DANGER

Hazardous voltage!

Risk of electric shock.

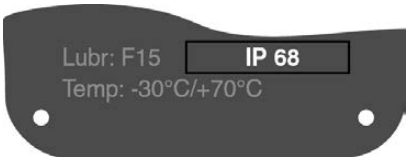
→ Disconnect device from the mains before opening.

1. Loosen screws [2] and remove cover [1].
2. Loosen screws [4] and remove socket carrier [5] from cover [1].

3. Insert cable glands [8] suitable for connecting cables.

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

Figure 17: Example: Name plate for enclosure protection IP68



➥ Only cables and cable glands must be used which are appropriate for use in nuclear conditions.

4. Seal unused cable entries [6] with suitable blanking plugs [7].

5.2.2. Cable connection

Table 6:

Terminal cross sections and terminal tightening torques		
Designation	Terminal cross sections	Tightening torques
Power contacts (U1, V1, W1, U2, V2, W2)	1.0 – 6 mm^2 (flexible) 1.5 – 10 mm^2 (solid)	1.2 – 1.5 Nm
Protective earth connection ⏚ (PE)	1.0 – 6 mm^2 (flexible) with ring lugs 1.5 – 10 mm^2 (solid) with loops	1.2 – 2.2 Nm
Control contacts (1 to 50)	0.25 – 2.5 mm^2 (flexible) 0.34 – 2.5 mm^2 (solid)	0.5 – 0.7 Nm

NOTICE

Danger of motor damage if PTC thermistors or thermoswitches are not connected!

Our warranty for the motor will lapse if the motor protection is not connected.

→ Connect PTC thermistors or thermoswitches to external controls.

1. Remove cable sheathing.
2. Insert the wires into the cable glands.
3. Fasten cable glands with the specified torque to ensure required enclosure protection.
4. Strip wires.
   → Controls approx. 6 mm, motor approx. 10 mm
5. For flexible cables: Use wire end sleeves according to DIN 46228.
6. Connect cables according to order-related wiring diagram.

⚠ WARNING

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

Risk of electric shock.

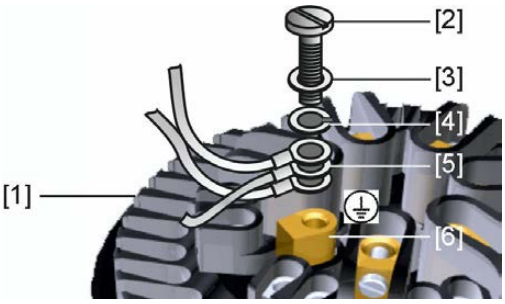
→ Connect all protective earth conductors.

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

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

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

   Figure 18: Protective earthing

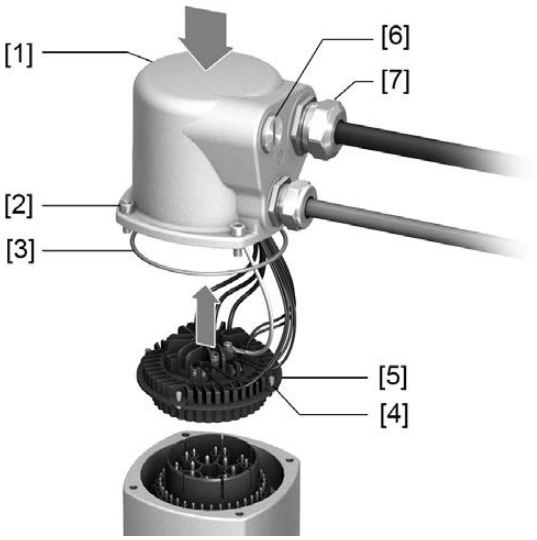


   [1] Socket carrier
   [2] Screw
   [3] Washer
   [4] Lock washer
   [5] Protective earth with ring lugs/loops
   [6] Protective earthing, symbol: ⏚

8. For shielded cables: Link the cable shield end via the cable gland to the housing (earthing).

5.2.3. Terminal compartment : close

Figure 19: Close terminal compartment



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

⚠ WARNING

Short-circuit due to pinching of cables!

Risk of electric shock and functional failures.

→ Carefully fit socket carrier to avoid pinching the cables.

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

5.3. Accessories for electrical connection

5.3.1. Parking frame

Figure 20: Parking frame, example with plug/socket connector and cover

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

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

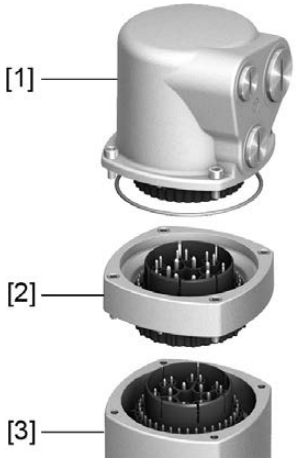
5.3.2. Protection cover

Application Protection cover for plug compartment when plug is removed.

The open terminal compartment can be closed using a protective cover (not illustrated).

5.3.3. DS intermediate frame for double sealing

Figure 21: Electrical connection with DS intermediate frame



[1] Electrical connection

[2] DS intermediate frame

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

5.3.4. External earth connection

Figure 22: Earth connection for multi-turn actuator

Application

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

Table 7:

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. Operation

6.1. 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.

6.1.1. Engage manual operation

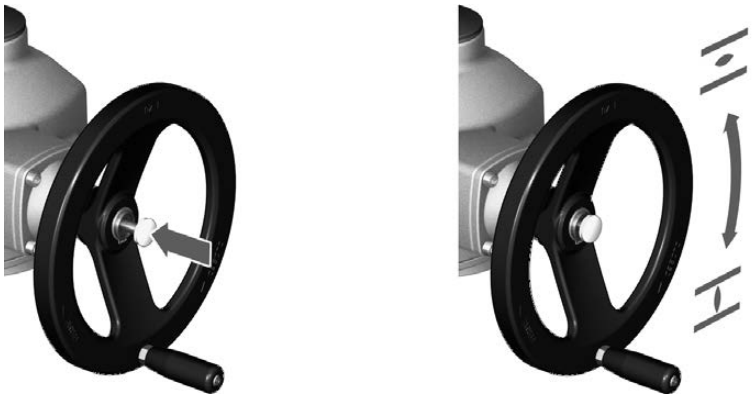
NOTICE

Damage at the motor coupling due to faulty operation!

→ Engage manual operation only during motor standstill.

1. Press push button.

Figure 23: Engage manual operation



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

6.1.2. Manual operation: disengage

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

6.2. Motor operation

NOTICE

Valve damage due to incorrect setting!

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

Actuator controls are required to operate an actuator during motor operation. If the actuator is to be operated locally, additional local controls are required.

1. Switch on power supply.
2. To close the valve, switch on motor operation in direction CLOSE.

➥ Valve shaft turns clockwise in direction CLOSE.

7. Indications

7.1. Mechanical position indication via indicator mark

Figure 24: 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 operation in direction CLOSE)
- Indicates that end positions (OPEN/CLOSED) have been reached
  (Symbols ⏤ (OPEN)/ ⏥ (CLOSED) point to the indicator mark ▲ at cover)

8. Signals (output signals)

8.1. Feedback signals from actuator

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

Table 8:

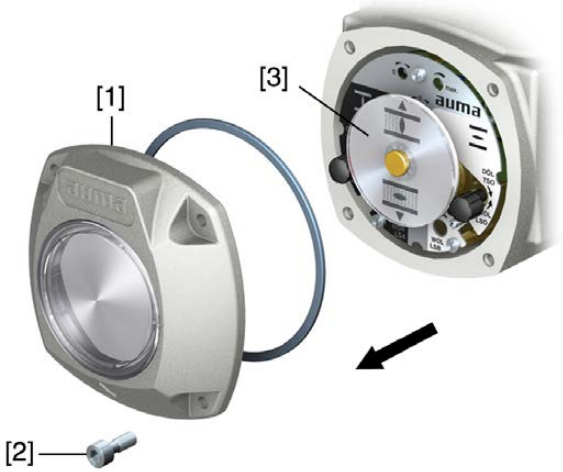
Feedback signal	Type and designation in wiring diagram	
End position OPEN/CLOSED reached	Setting via limit switching Switches: 1 NC and 1 NO (standard)	
	LSC (WSR)	Limit switch, closing, clockwise rotation
	LSO	Limit switch, opening, counterclockwise rotation
Intermediate position reached (option)	Setting via DUO limit switching Switches: 1 NC and 1 NO (standard)	
	WDR	DUO limit switch, clockwise rotation
	LSB (WDL)	DUO limit switch, counterclockwise rotation
Torque OPEN/CLOSED reached	Setting via torque switching Switches: 1 NC and 1 NO (standard)	
	TSC	Torque switch, closing, clockwise rotation
	TSO (DÖL)	Torque switch, opening, counterclockwise rotation
Motor protection tripped	Thermoswitch (NC) in motor winding	
	F1, Th	Thermoswitch
Position feedback signal (option)	Depending on version either with potentiometer or electronic position transmitter EWG/RWG	
	R2	Potentiometer
	R2/2	Potentiometer in tandem arrangement (option)
	B1/B2, EWG/RWG	3-wire or 4-wire system (0/4 – 20 mA) – without nuclear qualification
	B3/B4, EWG/RWG	2-wire system (0/4 – 20 mA) – without nuclear qualification

9. Commissioning (basic settings)

9.1. Switch compartment: open

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

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



2. If indicator disc [3] is available:
   Remove indicator disc [3] using a spanner (as lever).
   Information: To avoid damage to paint finish, use spanner in combination with soft object, e.g. fabric.

9.2. Torque switching: set

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

Information The torque switches may also trip during manual operation.

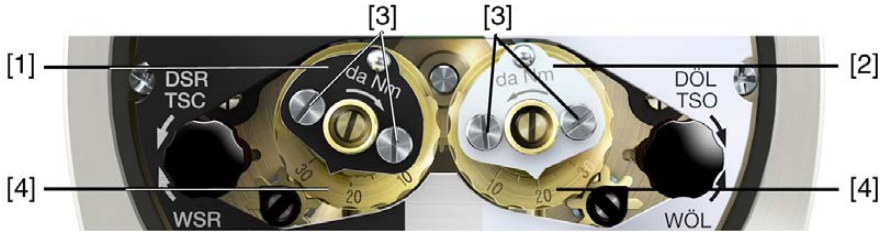
NOTICE

Valve damage due to excessive tripping torque limit setting!

→ The tripping torque must suit the valve.

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

Figure 25: Torque measuring heads



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

1. Loosen both lock screws [3] at the indicator disc.
2. Turn torque dial [4] to set the required torque (1 da Nm = 10 Nm). Example:

- Black torque switching head set to approx. 25 da Nm ≙ 250 Nm for direction CLOSE
- White torque switching head set to approx. 20 da Nm ≙ 200 Nm for direction OPEN

3. Fasten lock screws [3] again.
   Information: Maximum tightening torque: 0.3 – 0.4 Nm

➥ The torque switch setting is complete.

9.3. Limit switching: set

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

Figure 26: Setting elements for limit switching

Black section:
[1] Setting spindle: End position CLOSED
[2] Pointer: End position CLOSED
[3] Mark: End position CLOSED is set
White section:
[4] Setting spindle: End position OPEN
[5] Pointer: End position OPEN
[6] Mark: End position OPEN is set

9.3.1. End position CLOSED (black section): set

1. Engage manual operation.
2. Turn handwheel clockwise until valve is closed.

3. Turn handwheel by approximately half a turn (overrun) in the opposite direction.
4. **Press down** and turn setting spindle [1] with screw driver in direction of the arrow and observe the pointer [2]: While a ratchet click is felt and heard, the pointer [2] moves 90° every time.
5. As soon as the pointer [2] is 90° from mark [3]: Continue turning slowly.
6. As soon as the pointer [2] moves to mark [3]: Stop turning and release setting spindle.

➥ The end position CLOSED setting is complete.

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

9.3.2. End position OPEN (white section): set

1. Engage manual operation.
2. Turn handwheel counterclockwise until valve is open.
3. Turn handwheel by approximately half a turn (overrun) in the opposite direction.
4. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet click is felt and heard, the pointer [5] moves 90° every time.
5. As soon as the pointer [5] is 90° from mark [6]: Continue turning slowly.
6. As soon as the pointer [5] moves to mark [6]: Stop turning and release setting spindle.

➥ The end position OPEN setting is complete.

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

9.4. Test run

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

9.4.1. Direction of rotation: check

NOTICE

Valve damage due to incorrect direction of rotation!

→ If the direction of rotation is wrong, switch off immediately.
→ Correct phase sequence.
→ Repeat test run.

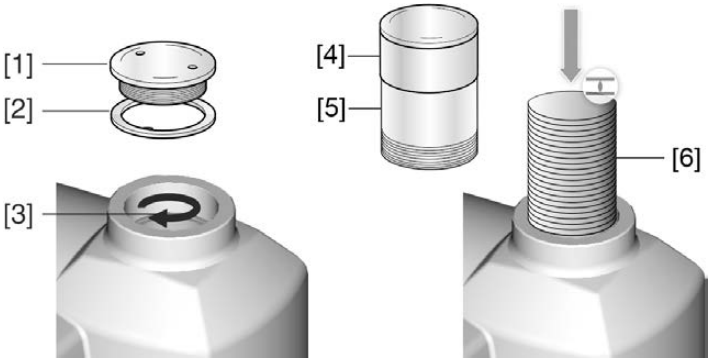
1. Move actuator manually to intermediate position or to sufficient distance from end position.
2. Switch on actuator in direction CLOSE and observe the direction of rotation:
   With mechanical position indication: Step 3
   Without mechanical position indication: Step 4 (hollow shaft)
   → Switch off before reaching the end position.

3. With mechanical position indication:
   → Observe direction of rotation.
   ➥ The direction of rotation is correct if the **actuator moves in direction CLOSE** and:
   - For position indication with symbols OPEN/CLOSED = indicator disc turns **counterclockwise**.

   Figure 27: Position indication with symbols OPEN/CLOSED

4. Without mechanical position indication:
   4.1 Unscrew threaded plug [1] and seal [2] or protective cap for stem protection tube [4] and observe direction of rotation at hollow shaft [3] or stem [5].
   ➥ The direction of rotation is correct if the **actuator moves in direction CLOSE** in **clockwise** direction, or the stem moves downward.

   Figure 28: Hollow shaft/stem



   [1] Threaded plug
   [2] Seal
   [3] Hollow shaft
   [4] Stem protection tube
   [5] Stem

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

9.4.2. Limit switching: check

1. Manually operate actuator into both valve end positions.
➥ The limit switching is set correctly if:
- LSC switch trips in end position CLOSED
- LSO switch trips in end position OPEN
- the switches release the contacts after turning back the handwheel

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

9.5. Switch compartment: close

✔ If options (e.g. potentiometer, position transmitter) are available: Only close switch compartment once all optional equipment has been successfully set.

NOTICE

Danger of corrosion due to damage to paint finish!

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

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

   Figure 29:

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

10. Commissioning (optional equipment settings)

10.1. Potentiometer

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

Setting elements

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

Setting is made via potentiometer [1].

Figure 30: View on control unit

[1] Potentiometer

10.1.1. Potentiometer: set

Information

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

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

➥ End position CLOSED corresponds to 0 %

➥ End position OPEN corresponds to 100 %

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

10.2. RWG electronic position transmitter

Information

RWG electronic position transmitter is not qualified for nuclear applications.

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

Technical data

Table 9: RWG 4020

Data	3-wire and 4-wire systems	2-wire system
Output current I_a	0 – 20 mA, 4 – 20 mA	4 – 20 mA
Power supply U_V [1)]	24 V DC (18 – 32 V)	14 V DC + (I x R_B), max. 30 V
Max. current consumption	24 mA at 20 mA output current	20 mA
Max. load R_B	600 Ω	(U_V – 14 V)/20 mA
Impact of power supply	0.1 %/V	0.1 %/V
Load influence	0.1 %/(0 – 600 Ω)	0.1 %/100 Ω

Data	3-wire and 4-wire systems	2-wire system
Temperature impact	< 0.3 ‰/K	
Ambient temperature[2)]	–60 °C to +80 °C	
Transmitter potentiometer	5 kΩ	

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

Setting elements

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

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

Figure 31: View on control unit when switch compartment is open

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

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

10.2.1. Measuring range: set

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

1. Move valve to end position CLOSED.
2. Connect measuring equipment for 0 – 20 mA to measuring points [4] and [5]. If no value can be measured:
   → Check whether external load is connected to customer connection XK (for standard wiring: terminals 23/24). Consider maximum load R_B.
   → Or connect link across customer connection XK (for standard wiring: terminals 23/24).
3. Turn potentiometer [1] clockwise to the stop.
4. Turn potentiometer [1] slightly in opposite direction.
5. Turn potentiometer [2] clockwise until output current starts to increase.
6. Turn potentiometer [2] in opposite direction until the following value is reached:

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

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

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

10.3. Intermediate positions: set

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

Figure 32: Setting elements for limit switching

Black section:

[1] Setting spindle: Running direction CLOSE

[2] Pointer: Running direction CLOSE

[3] Mark: Intermediate position CLOSED is set

White section:

[4] Setting spindle: Running direction OPEN

[5] Pointer: Running direction OPEN

[6] Mark: Intermediate position OPEN is set

Information After 177 turns (control unit for 2 – 500 turns/stroke) or 1,769 turns (control unit for 2 – 5,000 turns/stroke), the intermediate switches release the contact.

10.3.1. Running direction CLOSE (black section): set

1. Move valve in direction CLOSE to desired intermediate position.
2. If you override the tripping point inadvertently: Turn valve into the opposite direction and approach intermediate position again in direction CLOSE.

   Information: Always approach the intermediate position in the same direction as in later electrical operation.
3. **Press down** and turn setting spindle [1] with screw driver in direction of the arrow and observe the pointer [2]: While a ratchet click is felt and heard, the pointer [2] moves 90° every time.
4. As soon as the pointer [2] is 90° from mark [3]: Continue turning slowly.
5. As soon as the pointer [2] moves to mark [3]: Stop turning and release setting spindle.

➥ The intermediate position setting in running direction CLOSE is complete.

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

10.3.2. Running direction OPEN (white section): set

1. Move valve in direction OPEN to desired intermediate position.
2. If you override the tripping point inadvertently: Move valve in opposite direction and approach intermediate position again in direction OPEN (always approach the intermediate position in the same direction as in later electrical operation).

3. **Press down** and turn setting spindle [4] with screw driver in direction of the arrow and observe the pointer [5]: While a ratchet click is felt and heard, the pointer [5] moves 90° every time.
4. As soon as the pointer [5] is 90° from mark [6]: Continue turning slowly.
5. As soon as the pointer [5] moves to mark [6]: Stop turning and release setting spindle.

➥ The intermediate position setting in running direction OPEN is complete.

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

10.4. Mechanical position indicator: set

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

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

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

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

11. Corrective action

11.1. Faults during commissioning

Table 10:

Faults during operation/commissioning		
Fault	Description/cause	Remedy
Mechanical position indicator cannot be set.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
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.
No value can be measured at measuring points of the RWG.	Current loop across RWG is open. (Position feedback 0/4 – 20 mA is only possible if the current loop is closed across the RWG.)	• Connect link across RWG to XK (terminals 23/24) • Connect external load to XK, e.g. remote indication. • Observe maximum load R_B.
Measuring range 0/4 – 20 mA or maximum value 20 mA at position transmitter cannot be set or supplies an incorrect value.	Reduction gearing is not suitable for turns/stroke of the actuator.	Exchange reduction gearing.
Limit and/or torque switches do not trip.	Switch is defective or switch setting is incorrect.	Check setting, if required, reset end positions. Refer to <Check switches> and replace the switches if required. It is advised to check the actuator in the event of tripping failure, also refer to <Maintenance>.

Switch check

The black test buttons [1] and [2] are used for manual operation of the switches:

1. Turn test button [1] in direction of the TSC arrow: Torque switch CLOSED trips.
2. Turn test button [2] in direction of the TSO arrow: Torque switch OPEN trips.

If the actuator is equipped with a DUO limit switching (option), the intermediate position switches (LSA and LSB) will be operated at the same time as the torque switches.

1. Turn test button [1] in direction of the LSC arrow: Limit switch CLOSED trips.
2. Turn test button [2] in direction of the LSO arrow: Limit switch OPEN trips.

11.2. Motor protection (thermal monitoring)

Thermoswitches are provided in the motor winding to monitor the motor winding temperature. They trip as soon as the nominal thermoswitch temperature is reached.

Possible causes for motor protection tripping:

Overload, running time exceeded, max. number of starts exceeded, max. ambient temperature exceeded

⚠ WARNING

Thermoswitches may only be used to monitor the motor during standard operation. Switching off in case of DBE is not permitted!

12. Servicing and maintenance

CAUTION

Damage caused by inappropriate maintenance!

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

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

AUMA Service & Support

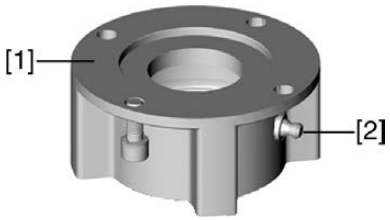
AUMA offers extensive service such as servicing and maintenance as well as customer product training. For the relevant contact addresses, please refer to <Addresses> in this document or to the Internet (www.auma.com)

12.1. Preventive measures for servicing and safe operation

The following actions are required to ensure safe device operation:

6 months after commissioning and then once a year

- Carry out visual inspection:
  Check threaded plugs, cable entries, cable glands, blanking plugs, etc. for correct tightness and sealing.
  Consider torques according to manufacturer's details.
- Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>.
- When rarely operated: Perform test run.
- For devices with output drive type A: Use grease gun to press in AEROSHELL GREASE 22 at the grease nipple.
  Figure 33: Output drive type A



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

- Lubrication of the valve stem must be done separately.
  Exception: For output drive type A in version with stem lubrication (option), the stem is lubricated together with the output drive.

Table 11:

Grease quantities for bearing of output drive type A				
Output drive type	A 07.2	A 10.2	A 14.2	A 16.2
Quantity [g] 1)	1.5	3	5	10

1) For grease with density r = 0.9 kg/dm³

For enclosure protection IP68

After submersion:

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

12.2. Maintenance

Lubrication

- In the factory, the gear housing is filled with grease.
- Grease change is performed during maintenance
  - Generally after 4 to 6 years for modulating duty.
  - Generally after 6 to 8 years if operated frequently (open-close duty).
  - Generally after 10 to 12 years if operated infrequently (open-close duty).
- We recommend replacing the seals when changing the grease.
- Additional lubrication of the gear housing is not required during operation.

12.3. Disposal and recycling

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

- electronic scrap
- various metals
- plastics
- greases and oils

The following generally applies:

- Greases and oils are hazardous to water and must not be released into the environment.
- Arrange for controlled waste disposal of the disassembled material or for separate recycling according to materials.
- Observe the national regulations for waste disposal.

13. Technical data

Information The following 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).

13.1. Technical data Multi-turn actuators

Features and functions		
Type of duty	Short-time duty S2 - 15 min, classes A and B according to EN 15714-2	
	For nominal voltage and +40 °C ambient temperature and at load with 35 % of the max. torque.	
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 motor name plate Permissible variation of mains voltage: ±10 % Permissible variation of mains frequency: ±5 %	
Overvoltage category	Category III according to IEC 60364-4-443	
Insulation class	F, tropicalized	
Motor protection	Thermoswitches (NC)	
Self-locking	Multi-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.	
Electrical connection	AUMA plug/socket connector with screw-type connection Double sealed	
Threads for cable entries	Standard:	Metric threads
	Option:	Pg-threads, NPT-threads, G-threads
	Double sealed cable glands (FKM)	
Terminal plan	Terminal plan according to order number enclosed with delivery	
Valve attachment	Standard:	B1 according to EN ISO 5210
	Option:	A, B2, B3, B4, according to EN ISO 5210 A, B according to DIN 3210 C according to DIN 3338
	Special valve attachment: AF	

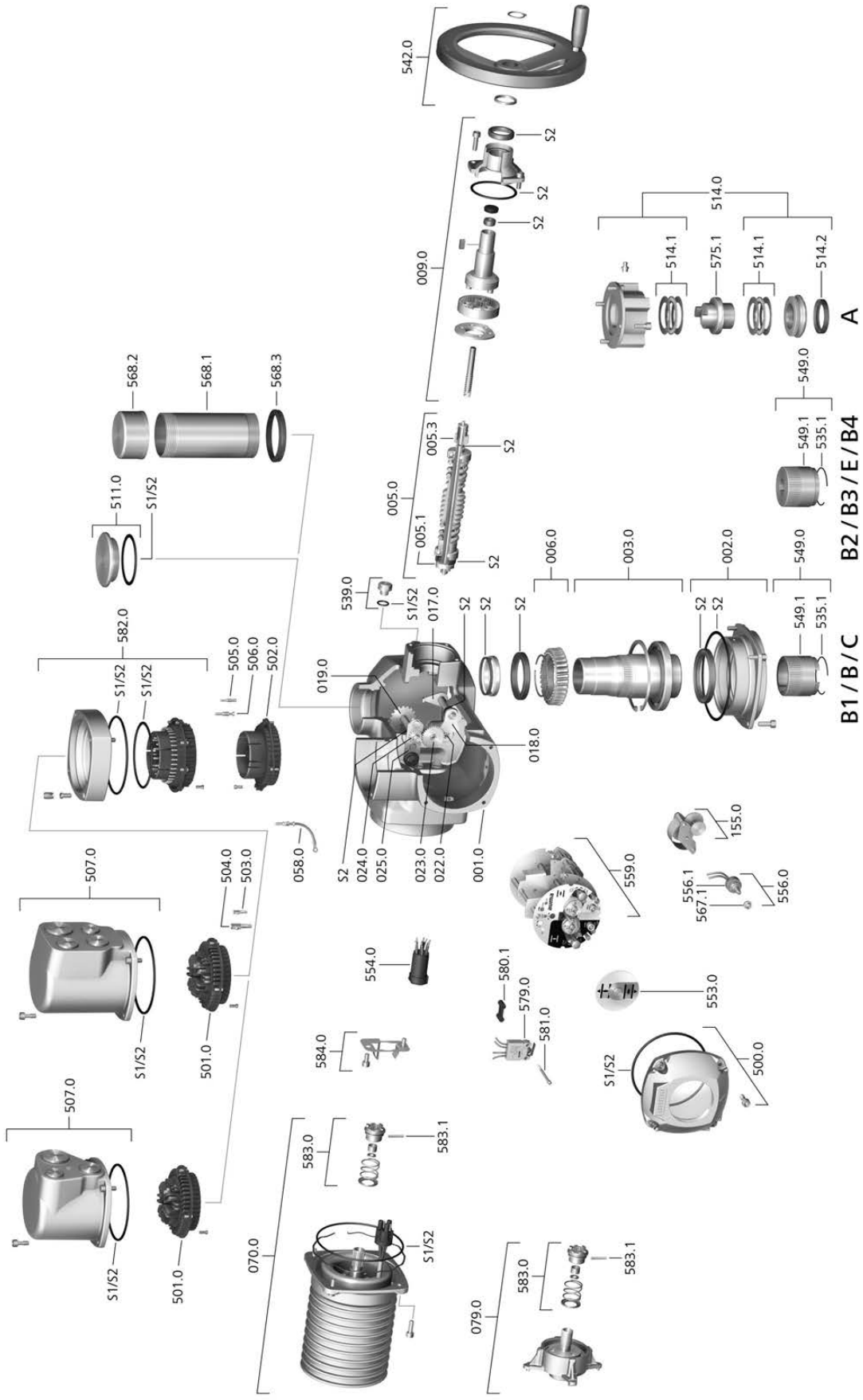
Electromechanical control unit		
Limit switching	Counter gear mechanism for end positions OPEN and CLOSED Turns per stroke: 2 to 500 (standard) or 2 to 5,000 (option)	
	Standard:	Single switches (1 NC and 1 NO) for each end position, not galvanically isolated
	Options:	Tandem switches (2 NC and 2 NO) for each end position, switches galvanically isolated Intermediate position switch (DUO limit switching), adjustable for any position
Torque switching	Torque switching adjustable for directions OPEN and CLOSE	
	Standard:	Single switches (1 NC and 1 NO) for each direction, not galvanically isolated
	Options:	Tandem switch (2 NC and 2 NO) for each direction, switch galvanically isolated
Switch contact material	Standard:	Silver (Ag)
	Options:	Gold (Au), recommended for low voltage actuator controls
Position feedback signal, analogue (option)	Potentiometer No qualification according to NSQ D305918005344 (EDF)	
Mechanical position indicator	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED	

Service conditions		
Use	Indoor and outdoor use permissible Qualification according to NSQ D305918005344 (EDF) on the basis of RCC-E (2012) and BTS 74.C.021.04, K3ad.	
Mounting position	Any position	
Installation altitude	≤ 2,000 m above sea level > 2,000 m above sea level on request	
Ambient temperature	–15 °C to +80 °C	
DBE conditions	Max. 100 °C / 1.2 bar for 15 days, then 90 °C at 100 % relative humidity for 1 year	
	The torque available under DBE conditions must be considered when selecting the appropriate multi-turn actuators for the valve.	
Enclosure protection according to EN 60529	IP68	
	According to AUMA definition, enclosure protection IP68 meets the following requirements: • Depth of water: maximum 20 m head of water • Duration of continuous immersion in water: Max. 48 hours	
Irradiation	160 kGy	
Vibration resistance	• Induced vibration: 0.75 g/5 to 200 Hz + 30 g EDF NSQ D305918005344 • Seismic-OBE: 3 g/2 to 35 Hz • Seismic-SSE line mount: 4.5 g/2 to 35 Hz • Seismic-SSE hard mount: 9.5 g/2 to 60 Hz	
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.
Top coat	Decontaminable paint based on polyurethane (powder coating)	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Available colours on request
Lifetime	Operating cycles (OPEN - CLOSE - OPEN) 2,000 cycles	
Sound pressure level	< 72 dB (A)	

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

14. Spare parts

14.1. Multi-turn actuators SAN 07.2 – SAN 16.2/SARN 07.2 – SARN 16.2



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
001.0	Housing	Sub-assembly	514.0	Output drive type A (without stem nut)	Sub-assembly
002.0	Bearing flange	Sub-assembly	514.1	Axial needle roller bearing	Sub-assembly
003.0	Hollow shaft	Sub-assembly	514.2	Radial seal for output drive type A	
005.0	Drive shaft	Sub-assembly	535.1	Snap ring	
005.1	Motor coupling		539.0	Screw plug	Sub-assembly
005.3	Manual drive coupling		542.0	Handwheel with ball handle	Sub-assembly
006.0	Worm wheel		549.0	Output drive types B/B1/B2/B3/B4/C/E	Sub-assembly
009.0	Manual gearing	Sub-assembly	549.1	Output drive sleeve B/B1/B2/B3/B4/C/E	Sub-assembly
017.0	Torque lever	Sub-assembly	553.0	Mechanical position indicator	Sub-assembly
018.0	Gear segment		554.0	Socket carrier for motor plug/socket connector with cable harness	Sub-assembly
019.0	Crown wheel		556.0	Potentiometer as position transmitter	Sub-assembly
022.0	Drive pinion II for torque switching	Sub-assembly	556.1	Potentiometer without slip clutch	Sub-assembly
023.0	Output drive wheel for limit switching	Sub-assembly	559.0	Control unit without torque switching heads and switches	Sub-assembly
024.0	Drive wheel for limit switching	Sub-assembly	567.1	Slip clutch for potentiometer	Sub-assembly
025.0	Locking plate	Sub-assembly	568.1	Stem protection tube (without cap)	
058.0	Cable for protective earth	Sub-assembly	568.2	Protective cap for stem protection tube	
070.0	Motor (only for V... motors incl. ref. no. 079.0)	Sub-assembly	568.3	V-seal	
079.0	Planetary gearing for motor drive (only for V... motors)	Sub-assembly	575.1	Stem nut A (without thread)	
155.0	Reduction gearing	Sub-assembly	579.0	Switch for limit/torque	Sub-assembly
500.0	Cover	Sub-assembly	580.1	Spacer	
501.0	Socket carrier (complete with sockets)	Sub-assembly	581.0	Stud bolts for switches	Sub-assembly
502.0	Pin carrier without pins	Sub-assembly	582.0	Double sealed frame	
503.0	Socket for controls	Sub-assembly	583.0	Motor coupling on motor shaft	Sub-assembly
504.0	Socket for motor	Sub-assembly	583.1	Pin for motor coupling	
505.0	Pin for controls	Sub-assembly	584.0	Retaining spring for motor coupling	Sub-assembly
506.0	Pin for motor	Sub-assembly	S1	Seal kit, small	Set
507.0	Cover for electrical connection	Sub-assembly	S2	Seal kit, large	Set
511.0	Threaded plug	Sub-assembly			

15. Certificates

Information Certificates are valid as from the indicated date of issue. Subject to changes without notice. The latest versions are attached to the device upon delivery and also available for download at http://www.auma.com.

15.1. Declaration of Incorporation and EC Declaration of Conformity

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auma®
Solutions for a world in motion

EU Declaration of Conformity / Declaration of Incorporation in compliance with Machinery Directive

for electric actuators of the following type designations:

SAN 07.2, SAN 07.6, SAN 10.2, SAN 14.2, SAN 14.6, SAN 16.2,
SARN 07.2, SARN 07.6, SARN 10.2, SARN 14.2, SARN 14.6, SARN 16.2

in versions:

AUMA NORM

AUMA Riester GmbH & Co. KG as manufacturer declares herewith, that the above mentioned actuators meet the basic requirements of the following Directives:

2014/30/EU (EMC Directive)
2006/42/EC (Machinery Directive)

The following harmonised standards in terms of the specified directives have been applied:

Directive 2014/30/EU

EN 61000-6-4:2007 / A1:2011
EN 61000-6-2:2005 / AC:2005

Directive 2006/42/EC

EN ISO 12100:2010
EN ISO 5210:1996

AUMA actuators are designed to be installed on industrial valves and qualified for use in nuclear power plants (outside containment). AUMA actuators must not be put service until the final machinery into which they are to be incorporated has been declared in conformity with the provisions of the EC Directive 2006/42/EC.

The following basic requirements in compliance with Annex I of the Directive are respected:

Appendix I, articles 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.6, 1.3.1, 1.3.7, 1.5.1, 1.6.3, 1.7.1, 1.7.3, 1.7.4

The manufacturer shall be obligated to electronically submit the documents for the partly completed machinery to national authorities on request. The relevant technical documentation pertaining to the machinery described in Annex VII, part B has been prepared.

Authorised person for documentation: Peter Malus, Aumastrasse 1, 79379 Muellheim, Germany

Furthermore, the essential health and safety requirements in compliance with Directive 2014/35/EU (Low Voltage Directive) are fulfilled by applying the following harmonised standards, as far as applicable for the products:

EN 60204-1:2006 / A1:2009 / AC:2010
EN 60034-1:2010 / AC:2010
EN 50178:1997

Muellheim, 2016-07-01

Dr J. Hoffmann, Managing Director

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

Y007.245/003/en/1.16

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