auma®

Electric part-turn actuators

SG 05.1 – SG 12.1
SGR 05.1 – SGR 12.1
AUMA NORM

ISO 14001
TÜV SÜD
ISO 9001
Certificate Registration No.
12 100/104 4269

Operation instructions

Scope of these instructions: These instructions are valid for part-turn actuators of the type ranges SG 05.1 – SG 12.1 and SGR 05.1 – SGR 12.1 in version AUMA NORM. These operation instructions are only valid for “clockwise closing”, i.e. driven shaft turns clockwise to close the valve.

Table of contents

1. Safety instructions

1.1 Range of application

AUMA actuators are designed for the operation of industrial valves, e.g. butterfly valves and ball valves.
For other applications, please consult us. The manufacturer is not liable for any possible damage resulting from use in other than the designated applications. Such risk lies entirely with the user.
Observance of these operation instructions is considered as part of the actuator's designated use.

1.2 Commissioning (electrical connection)

During electrical operation, certain parts inevitably carry lethal voltages. Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

1.3 Maintenance

The maintenance instructions (refer to page 28) must be observed, otherwise a safe operation of the actuator is no longer guaranteed.

1.4 Warnings and notes

Failure to observe the warnings and notes may lead to serious injuries or damage. Qualified personnel must be thoroughly familiar with all warnings and notes in these operation instructions.
Correct transport, proper storage, mounting and installation, as well as careful commissioning are essential to ensure a trouble-free and safe operation.
During operation, the multi-turn actuator warms up and surface temperatures > 60 °C may occur. Check the surface temperature prior to contact in order to avoid burns.

The following references draw special attention to safety-relevant procedures in these operation instructions. Each is marked by the appropriate pictograph.

This pictograph means: Note!
"Note" marks activities or procedures which have major influence on the correct operation. Non-observance of these notes may lead to consequential damage.

This pictograph means: Electrostatically endangered parts!
If this pictograph is attached to a printed circuit board, it contains parts which may be damaged or destroyed by electrostatic discharges. If the boards need to be touched during setting, measurement, or for exchange, it must be assured that immediately before a discharge through contact with an earthed metallic surface (e.g. the housing) has taken place.

This pictograph means: Warning!
"Warning" marks activities or procedures which, if not carried out correctly, can affect the safety of persons or material.

2. Short description

AUMA part-turn actuators type SG 05.1 – SG 12.1 and SGR 05.1 – SGR 12.1 have a modular design. The part-turn actuators are driven by an electric motor. A handwheel is provided for manual operation. The limitation of travel is realised via limit switches in both end positions. Torque seating is also possible in both end positions. The type of seating is determined by the valve manufacturer. Additionally, a mechanical end stop is provided for the protection of the valve. This is not, however, designed to be approached during normal operation.

3. Technical data

Part-turn actuators AUMA NORM require external controls. AUMA offers actuator controls AUMA MATIC AM or AUMATIC AC. These can also easily be mounted to the actuator at a later date.		
Features and functions		
Type of duty [1]	SG: SGR:	Short time duty S2 - 15 min Intermittent duty S4 - 25 %
Motors	Standard: Options:	3-ph AC asynchronous motor, type IM B9 according to IEC 34 (SG and SGR) 1-phase AC motor (SG only) DC shunt motor (SG only)
Insulation class	Standard: Option:	F, tropicalized H, tropicalized (3-phase AC motors only)
Motor protection	Standard: Option:	Thermoswitches (NC) (DC motors without motor protection) PTC thermistors (according to DIN 44082)
Self-locking	yes	
Swing angle	Standard: Options:	80° to 110° adjustable between min. and max. value. 30° – 40°, 40° – 55°, 55° – 80°, 110° – 160°, 160° – 230° or 230° – 320°
Limit switching	Counter gear mechanism for end positions CLOSED and OPEN Standard: Options:	Single switch (1 NC and 1 NO) for each end position Tandem switch (2 NC and 2 NO) for each end position, switches galvanically isolated Triple switch (3 NC and 3 NO) for each end position, switches galvanically isolated Intermediate position switch (DUO limit switching), available for any intermediate position
Torque switching	infinitely adjustable torque switching for direction OPEN and CLOSE Standard: Options:	Single switch (1 NC and 1 NO) for each direction Tandem switch (2 NC and 2 NO) for each direction, switches galvanically isolated
Non-intrusive setting (option)	Magnetic limit and torque transmitter MWG (only possible in combination with actuator controls AUMATIC)	
Position feedback signal, analogue (options)	Potentiometer or 0/4 – 20 mA (RWG) For further details see separate data sheet	
Torque feedback signal, analogue (option)	Only in combination with magnetic limit and torque transmitter MWG and controls AUMATIC AC	
Mechanical position indicator	Continuous indication, adjustable indicator disc with symbols OPEN and CLOSED	
Running indication (option)	Blinker transmitter	
Heater in switch compartment	Standard: Options: A resistance type heater (5 W, 24 V DC) is installed within the actuator in combination with the actuator controls AM or AC.	self-regulating PTC heater, 5 – 20 W, 110 – 250 V AC/ DC 24 – 48 V AC/ DC or 380 – 400 V AC
Motor heater (option)	12.5 W	
Manual operation	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation. Option:	Handwheel lockable
Electrical connection	Plug/ socket connector with screw type connection	
Threads for cable glands	Standard: Options:	Metric threads Pg-threads, NPT-threads, G-threads
Terminal plan	KMS TP 100/001 (basic version with 3-phase AC motor)	
Splined coupling for connection to the valve shaft	Standard: Options:	Coupling without bore 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	

1) Based on 20 °C ambient temperature and at an average load with running torque

Service conditions			
Enclosure protection according to EN 60 529 [2)]	Standard:	IP 67	
	Options:	IP 68 IP 67-DS (Double Sealed) IP 68-DS (Double Sealed) (Double Sealed: = terminal compartment additionally sealed against interior)	
Corrosion protection	Standard:	KN	Suitable for installation in industrial units, in water or power plants with a low pollutant concentration
	Options:	KS	Suitable for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. in wastewater treatment plants, chemical industry)
		KX	Suitable for installation in extremely aggressive atmosphere with high humidity and high pollutant concentration
		KX-G	same as KX, however aluminium-free version (outer parts)
Finish coating	Standard:	Two-component iron-mica combination	
Standard colour	Standard:	grey (DB 702, similar to RAL 9007)	
	Option:	Other colours are possible on request	
Ambient temperature [3)]	Standard SG:	– 25 °C to + 80 °C (with 3-phase AC motor)	
		– 25 °C to + 70 °C (with 1-phase AC and DC motor)	
	Standard SGR:	– 25 °C to + 60 °C (with 3-phase AC motor)	
	Options:	– 40 °C to + 60 °C (low temperature)	
		– 50 °C to + 60 °C (extreme low temperature) (SG with 3-phase AC current only)	
Lifetime	SG 05.1/ SG 07.1:	20,000 operating cycles (OPEN - CLOSE - OPEN) for 90°	
	SG 10.1:	15,000 operating cycles (OPEN - CLOSE - OPEN) for 90°	
	SG 12.1:	10,000 operating cycles (OPEN - CLOSE - OPEN) for 90°	
	SGR 05.1 – 12.1:[4)]	min. 2.5 million operations (control steps)	
Other information			
EU Directives	Electromagnetic Compatibility (EMC): (89/336/EEC) Low Voltage Directive: (73/23/EEC) Machinery Directive: (98/37/EC)		
Reference documents	Product description “Electric part-turn actuators SG” Dimension sheets SG Electrical data SG/ SGR		

2) For version in enclosure protection IP 68, higher corrosion protection KS or KX is strongly recommended Additionally, for enclosure protection IP 68, we recommend to use the double sealed terminal compartment DS

3) Version with RWG min. – 40 °C and max. + 70 °C

4) The lifetime depends on the load and the number of starts. A high starting frequency will rarely improve the modulating accuracy. To reach the longest possible maintenance and fault-free operation time, the number of starts per hour chosen should be as low as permissible for the process

4. Transport, storage and packaging

4.1 Transport

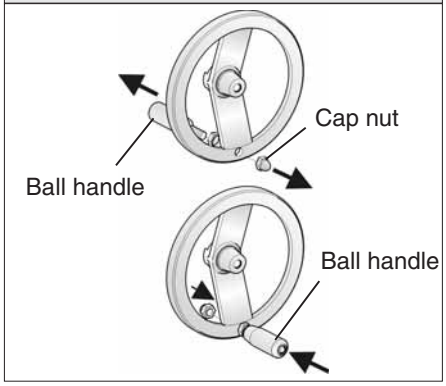
- For transport to place of installation, use sturdy packaging.
- Do not attach ropes or hooks to the handwheel for the purpose of lifting by hoist.
- If part-turn actuator is mounted on valve, attach ropes or hooks for the purpose of lifting by hoist to valve and not to part-turn actuator.

Fitting the ball handle:

To avoid damage during transport, the ball handles are fitted to the inside of the handwheel. Prior to commissioning, the ball handle has to be fitted in the correct position.

- Remove cap nut (figure 1).
- Pull out ball handle and re-insert in correct position.
- Fasten with cap nut.
- Remove label from the hand wheel for fitting the ball handle.

Figure 1



4.2 Storage

- Store in 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 bright surfaces.

If part-turn actuators are to be stored for a long time (more than 6 months), the following points must be observed additionally:

- Prior to storage: Protect bare surfaces, in particular the output drive parts and mounting surface, with long-term corrosion protection agent.
- Check for corrosion approximately every 6 months. If first signs of corrosion show, apply new corrosion protection.

After mounting, connect part-turn actuator immediately to electrical mains, so that condensation is prevented by the heater.

4.3 Packaging

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

5. Manual operation

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

Engaging manual operation: Manual operation is activated by pulling at the handwheel. A change-over is not required. The handwheel does not rotate during motor operation.

- **Turning the handwheel during motor operation results in an extension or reduction of the operating time, depending on the direction of rotation.**
- **It is not necessary to use an extension for manual operation. Excessive force may cause damage.**

Disengaging manual operation: Release handwheel.
Handwheel has to engage.

6. Mounting to valve

- **Prior to mounting, the part-turn actuator must be checked for any damage. Damaged parts must be replaced by original spare parts.**
- **After mounting, check part-turn actuator for damage to paint finish. If damage to paint-finish has occurred after mounting, it has to be touched up to avoid corrosion.**

- For **butterfly valves**, the recommended mounting position is end position CLOSED
  (Prior to mounting, bring the part-turn actuator to the mechanical end stop CLOSED by turning the handwheel clockwise.).
- For **ball valves** the recommended mounting position is end position OPEN (Prior to mounting, bring the part-turn actuator to the mechanical end stop OPEN by turning the handwheel counterclockwise.).

- Thoroughly degrease mounting faces of part-turn actuator and valve.
- Apply a small quantity of grease to the valve shaft.
- Place coupling sleeve onto valve shaft and secure
  (refer to figure 2, detail A or B), ensure that dimensions X, Y and Z are observed (refer to table 1).
- Apply non-acidic grease at splines of coupling.
- Fit actuator so that fixing holes in actuator and valve mounting flange are in alignment.
  If necessary, move actuator up or down one tooth on the coupling. If required, turn handwheel/ crank a little in direction OPEN or CLOSE until holes align to the threads.
- Ensure that the spigot (if provided) mates uniformly in the recess and that the mounting faces are in complete contact.
- Fasten the actuator with bolts of minimum quality 8.8 using lock washers. Fasten bolts evenly crosswise to the appropriate torque according to table 1.

Figure 2

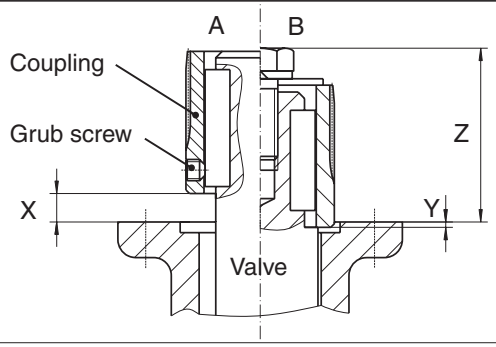


Table 1: Dimensions for couplings/ fastening torques for bolts

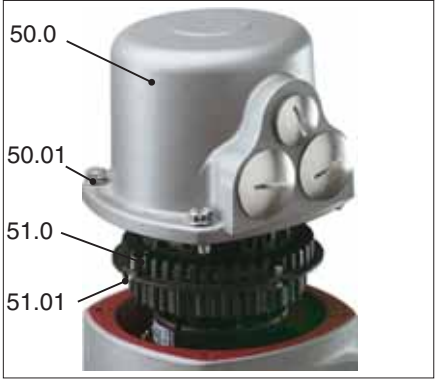
Type	X max.	Y max.	Z max.	8.8	T_A [Nm]
SG(R) 05.1-F05	5	3	60	4 x M 6	11
SG(R) 05.1-F07	5	3	60	4 x M 8	25
SG(R) 07.1-F07	7	3	60	4 x M 8	25
SG(R) 07.1-F10	7	3	60	4 x M 10	51
SG(R) 10.1-F10	10	3	77	4 x M 10	51
SG(R) 10.1-F12	10	3	77	4 x M 12	87
SG(R) 12.1-F12	10	6	100	4 x M 12	87
SG(R) 12.1-F14	10	6	100	4 x M 12	87

7. Electrical connection

Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

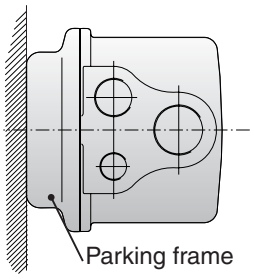
7.1 Connection with AUMA plug/ socket connector

Figure 3: Connection



- Check whether type of current, supply voltage, and frequency comply with motor data (refer to name plate at motor).
- Loosen bolts (50.01) (figure 3) and remove plug cover.
- Loosen screws (51.01) and remove socket carrier (51.0) from plug cover (50.0).
- Insert cable glands suitable for connecting cables (The enclosure protection stated on the name plate is only ensured if suitable cable glands are used.).
- Seal cable entries which are not used with suitable plugs.
- Connect cables according to order-related terminal plan.
- The terminal plan pertaining to the part-turn actuator is attached to the handwheel in a weather-proof bag, together with the operation instructions. In case the terminal plan is not available, it can be obtained from AUMA (state commission no., refer to name plate) or downloaded directly from the Internet (www.auma.com).

Figure 4: Parking frame (accessory)



A special parking frame (figure 4) for protection against touching the bare contacts and against environmental influences is available.

Table 2: Technical data AUMA plug/ socket connector

Technical data	Power terminals[1)]	Protective earth	Control terminals
No. of contacts max.	6 (3 are used)	1 (leading contact)	50 pins/ sockets
Marking	U1, V1, W1, U2, V2, W2	⏚	1 to 50
Connecting voltage max.	750 V	–	250 V
Current max.	25 A	–	16 A
Type of customer connection	Screws	Screw for ring lug	Screws
Cross section max.	6 mm²	6 mm²	2.5 mm²
Material: Pin/ socket carrier	Polyamide	Polyamide	Polyamide
Contacts	Brass (Ms)	Brass (Ms)	Brass, tin plated or gold plated (option)

1) Suitable for copper wires. For aluminium wires, please contact AUMA

7.2 Delay time

The delay time is the time from the tripping of the limit or torque switches to the motor power being removed. 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 to switch off the corresponding contactor directly by the limit or torque switch.

7.3 Controls made by AUMA

In case the required reversing contactors are not to be installed in the control cabinet, the controls AUMA MATIC or AUMATIC can easily be mounted to the actuator at a later date.
For enquiries and more information, please state our commission no. (refer to actuator name plate).

7.4 Heater

AUMA part-turn actuators have a heater installed as standard. To prevent condensation, the heater must be connected.

7.5 Motor protection

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

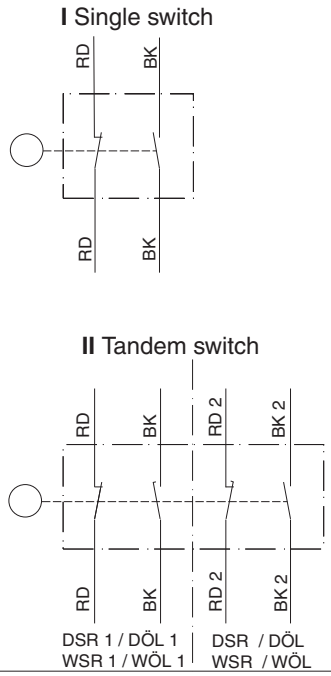
Failure to integrate PTC thermistors or thermoswitches into the control circuit voids the warranty for the motor.

7.6 Remote position transmitter

For the connection of remote position transmitters (potentiometer, RWG), screened cables must be used.

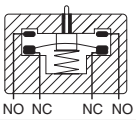
7.7 Limit and torque switches

Figure 5



Only the same potential can be switched on the two circuits (NC/ NO contact) of a limit or torque switch. If different potentials are to be switched simultaneously, tandem switches are required.
To ensure correct signalisation, the leading contacts of the tandem switches must be used for that purpose and the lagging contacts for switching off.

Table 3: Technical data limit/ torque switches

 NO NC NC NO	Mechanical life time = 2 x 10^6 starts		
Type of current	**Switch rating I_{max}**		
	30 V	**125 V**	**250 V**
1-phase AC (ind. load) cos phi = 0.8	5 A	5 A	5 A
DC (resistive load)	2 A	0.5 A	0.4 A
with gold plated contacts	**min. 5 V, max. 50 V**		
Current	min. 4 mA, max. 400 mA		

7.8 Fitting the cover

After connection:

- Insert the socket carrier (51.0) into the plug cover (50.0) and fasten it with screws (51.01).
- Clean sealing faces at the plug cover and the housing.
- Check whether O-ring is in good condition.
- Apply a thin film of non-acidic grease (e.g. Vaseline) to the sealing faces.
- Replace plug cover (50.0) and fasten bolts (50.01) evenly crosswise.
- Fasten cable glands with the specified torque to ensure the required enclosure protection.

8. Setting the end stops for part-turn actuators on butterfly valves

For actuators on ball valves refer to page 13, clause 9.

The settings can only be performed if the valve has not yet been mounted in a pipeline.

- **If part-turn actuators are supplied without a valve: hex. bolts (03, figure 6) are not fastened.**
- **If part-turn actuators are supplied with a valve: hex. bolts (03, figure 6) are fastened. End stops and limit switching have already been set and only have to be checked.**

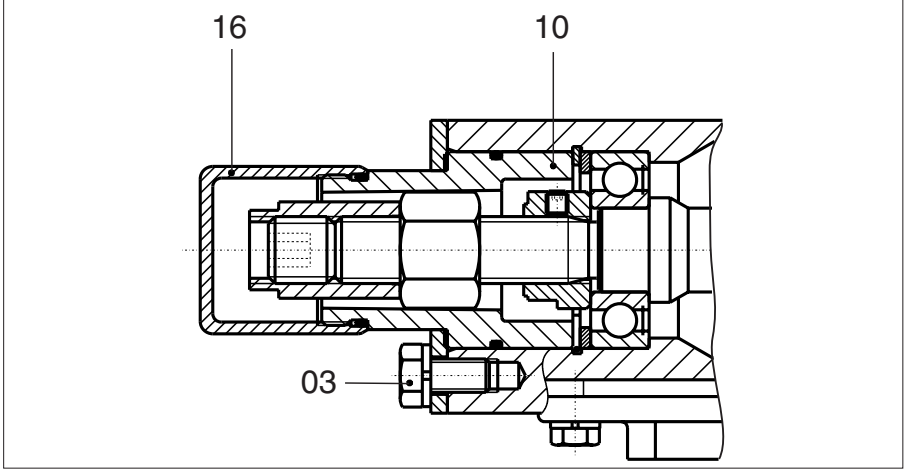
8.1 Setting end stop CLOSED

- If hex. bolts (03, figure 6) are fastened: loosen by approx. 3 turns.
- Turn handwheel clockwise (closing direction), until valve is closed (end position CLOSED). Check whether end stop (10) has rotated, otherwise turn end stop (10) clockwise up to the stop.
- In case end position CLOSED has been passed: reverse several turns at the handwheel and approach end position again.
- Turn end stop (10) by 1/8 a turn counterclockwise. (Protective cap (16) must not be loosened in the process).

The end stops are designed for the protection of the valve. They have to be set as to ensure that they are not used during normal operation.

- Fasten hex. bolts (03) crosswise with torque 25 Nm.

Figure 6: Setting end stop CLOSED



8.2 Setting end stop OPEN

The swing angle has been set in the factory. Therefore, the end stop OPEN need not be set.

8.3 Setting limit switching CLOSED

After setting the end stop CLOSED, the limit switching for end position CLOSED can be set immediately (page 16, clause 12.). For this, the switch compartment has to be opened and the indicator disc has to be removed (refer to page 15, clause 11.).

9. Setting the end stops for part-turn actuators on ball valves

For actuators on butterfly valves refer to page 12, clause 8.

The settings can only be performed if the valve has not yet been mounted in a pipeline.

- **If part-turn actuators are supplied without a valve: hex. bolts (03, figure 7) are not fastened.**
- **If part-turn actuators are supplied with a valve: hex. bolts (03, figure 7) are fastened. End stops and limit switching have already been set and only have to be checked.**

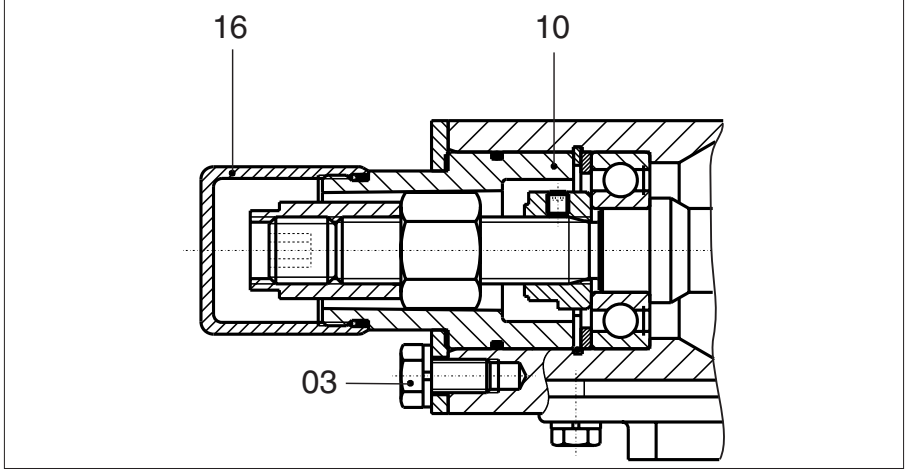
9.1 Setting end stop OPEN

- If hex. bolts (03, figure 7) are fastened: loosen by approx. 3 turns.
- Turn handwheel counterclockwise (opening direction), until valve is open (end position OPEN). Check whether end stop (10) has rotated, otherwise turn end stop (10) counterclockwise up to the stop.
- In case end position OPEN has been passed: reverse several turns at the handwheel and approach end position OPEN again.
- Turn end stop (10) by 1/8 a turn clockwise. (Protective cap (16) must not be loosened in the process).

The end stops are designed for the protection of the valve. They have to be set as to ensure that they are not used during normal operation.

- Fasten hex. bolts (03) crosswise with torque 25 Nm.

Figure 7: Setting end stop OPEN



9.2 Setting end stop CLOSED

The swing angle has been set in the factory. Therefore, the end stop CLOSED need not be set.

9.3 Setting limit switching OPEN

After setting the end stop OPEN, the limit switching for end position OPEN can be set immediately (page 16, clause 12.). For this, the switch compartment has to be opened and the indicator disc has to be removed (refer to page 15, clause 11.).

10. Changing the swing angle

The swing angle only has to be changed, if the swing range for setting the end stops (clauses 8. and 9.) is not sufficient.

Unless ordered otherwise, the swing angle is set to 90°.
In the standard version, the swing angle can be adjusted within the range of 80° to 110°.
For optional swing angle ranges, refer to Technical data, page 5.

10.1 Increasing the swing angle

- Unscrew protective cap (16) (figure 8).
- While holding end stop nut (2.4) in position with open end wrench (19 mm), remove grub screw (2.02).
- Turn end stop nut (2.4) counterclockwise.
  Do not exceed dimension A max. (table 4).
- Move valve manually to the desired end position OPEN.
- Turn end stop nut (2.4) clockwise until it is tight up to the stop nut (7).
- Degrease face of grub screw (2.02).
- Hold end stop nut in position (2.4) with open end wrench (19 mm) and fasten grub screw (2.02) with torque 85 Nm.
- Check O-ring (016) and replace if damaged.
- Replace protective cap (16).

Figure 8: Setting the swing angle

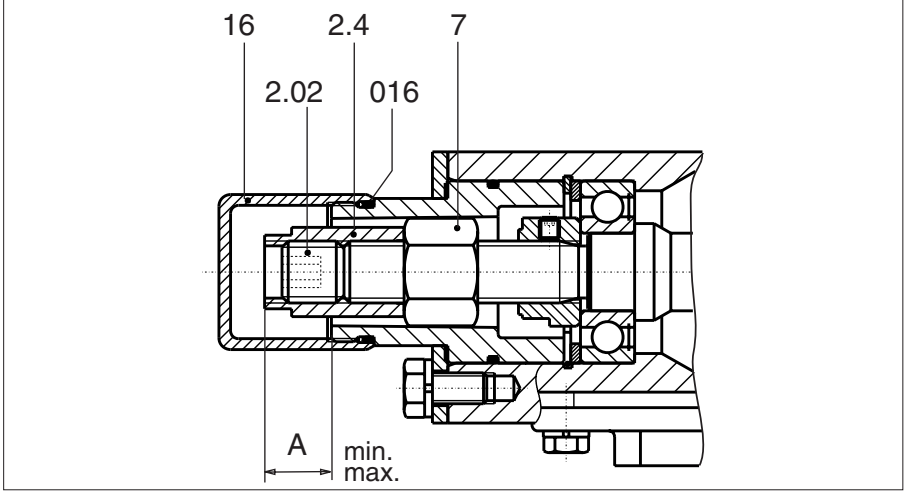


Table 4

Type	A min. [mm]	A max. [mm]
SG 05.1/ SGR 05.1	10	22
SG 07.1/ SGR 07.1	10	22
SG 10.1/ SGR 10.1	8	17
SG 12.1/ SGR 12.1	12	23

10.2 Reducing the swing angle

- Unscrew protective cap (16) (figure 8).
- While holding end stop nut (2.4) in position with open end wrench (19 mm), remove grub screw (2.02).
- Move valve into the desired end position OPEN.
- Turn end stop nut (2.4) clockwise until it is tight up to the stop nut (7) and do not fall below dimension A min.
- Degrease face of grub screw (2.02).
- Hold end stop nut in position (2.4) with open end wrench (19 mm) and fasten grub screw (2.02) with torque 85 Nm.
- Check O-ring (016) and replace if damaged.
- Replace protective cap (16).

11. Opening the switch compartment

To be able to carry out the following settings (clauses 12. to 18.), the switch compartment must be opened and the indicator disc must be removed.

These settings are only valid for “clockwise closing”, i.e. driven shaft turns clockwise to close the valve.

Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

11.1 Removing the cover from the switch compartment

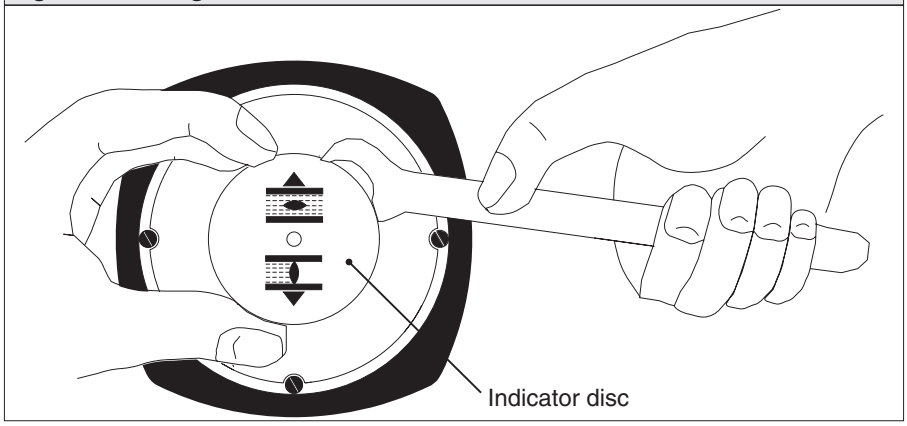
- Remove 4 bolts and take off the cover at the switch compartment (figure 9).

Figure 9: Cover with indicator glass

11.2 Pulling off the indicator disc

- Pulling off the indicator disc (figure 10). Open end wrench (approx. 14 mm) may be used as lever.

Figure10: Pulling off the indicator disc

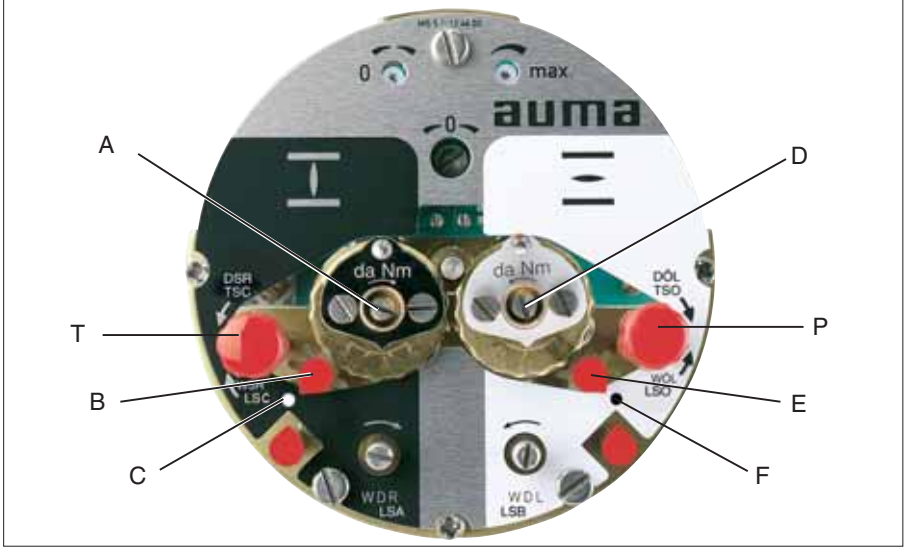


12. Setting the limit switching

12.1 Setting end position CLOSED (black section)

- Turn handwheel clockwise until valve is closed.
- To prevent that the end stop is reached (due to overrun) before the limit switch has tripped, turn handwheel 4 turns (overrun) in clockwise direction. During test run check overrun and, if necessary, correct setting of the limit switching.
- **Press down** and turn setting spindle A (figure 11) with screw driver (5 mm) in direction of arrow, thereby observe pointer B.
  While a ratchet is felt and heard, the pointer B moves 90° every time.
  When pointer B is 90° from mark C, continue turning slowly.
  When pointer B has reached the mark C, stop turning and release setting spindle. If you override the tripping point inadvertently (ratchet is heard after the pointer has snapped), continue turning the setting spindle in the same direction and repeat setting process.

Figure 11: Control unit



12.2 Setting end position OPEN (white section)

- Turn handwheel counterclockwise until valve is open.
- To prevent that the end stop is reached (due to overrun) before the limit switch has tripped, turn handwheel 4 turns (overrun) in clockwise direction. During test run check overrun and, if necessary, correct setting of the limit switching.
- **Press down** and turn setting spindle D (figure 11) with screw driver (5 mm) in direction of arrow, thereby observe pointer E.
  While a ratchet is felt and heard, the pointer E moves 90° every time.
  When pointer E is 90° from mark F, continue turning slowly.
  When pointer E has reached the mark F, stop turning and release setting spindle. If you override the tripping point inadvertently (ratchet is heard after the pointer has snapped), continue turning the setting spindle in the same direction and repeat setting process.

12.3 Checking the limit switches

The red test buttons T and P (figure 11) are used for manual operation of the limit switches.

- Turning T in direction of the arrow LSC (WSR) triggers limit switch CLOSED.
- Turning P in direction of the arrow LSO (WOEL) triggers limit switch OPEN.

13. Setting the DUO limit switching (option)

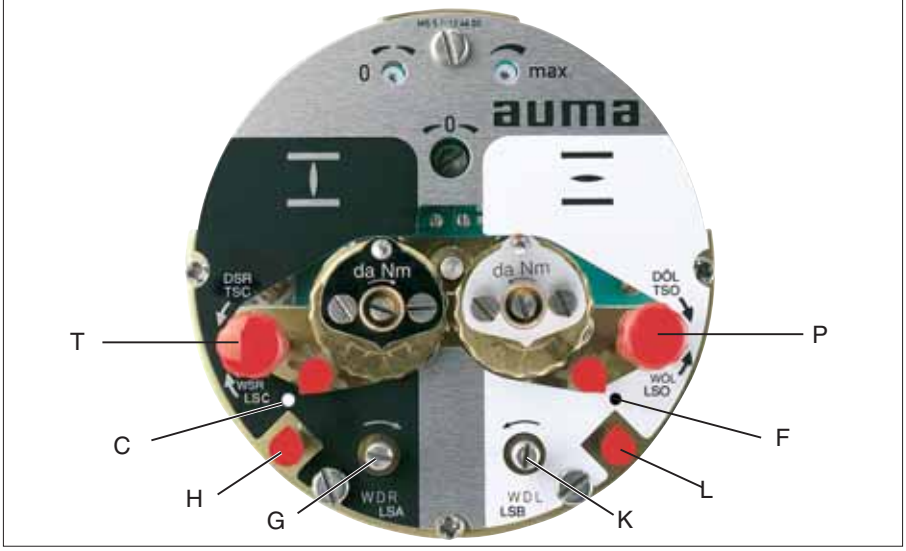
Any application can be switched on or off via the two intermediate position switches.

For setting, the switching point (intermediate position) must be approached from the same direction as afterwards in electrical operation.

13.1 Setting direction CLOSE (black section)

- Move valve to desired intermediate position.
- **Press down** and turn setting spindle G (figure 12) with screw driver (5 mm) in direction of arrow, while observing pointer H.
  While a ratchet is felt and heard, the pointer H moves 90° every time.
  When pointer H is 90° from mark C, continue turning slowly.
  When pointer H has reached the mark C, stop turning and release setting spindle. If you override the tripping point inadvertently (ratchet is heard after the pointer has snapped), continue turning the setting spindle in the same direction and repeat setting process.

Figure 12: Control unit



13.2 Setting direction OPEN (white section)

- Move valve to desired intermediate position.
- **Press down** and turn setting spindle K (figure 12) with screw driver (5 mm) in direction of arrow, while observing pointer L.
  While a ratchet is felt and heard, the pointer L moves 90° every time.
  When pointer L is 90° from mark F, continue turning slowly.
  When pointer L has reached the mark F, stop turning and release setting spindle. If you override the tripping point inadvertently (ratchet is heard after the pointer has snapped), continue turning the setting spindle in the same direction and repeat setting process.

13.3 Checking the DUO limit switches

The red test buttons T and P (figure 12) are used for manual operation of the DUO limit switches.

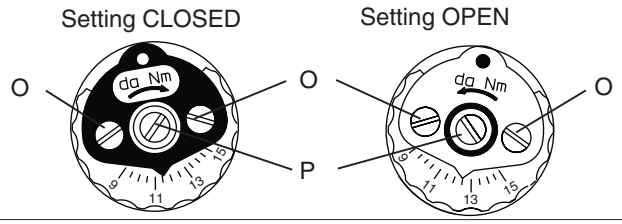
- Turning T in direction of the arrow TSC (DSR) triggers DUO limit switch CLOSED. The torque switch CLOSED is actuated at the same time.
- Turning P in direction of the arrow TSO (DOEL) triggers DUO limit switch OPEN. The torque switch OPEN is actuated at the same time.

14. Setting the torque switching

14.1 Setting

- **The set torque must suit the valve!**
- **This setting must only be changed with the consent of the valve manufacturer!**

Figure 13: Torque switching heads



- Loosen both lock screws O at the torque dial (figure 13).
- Turn torque dial P to set it to the required torque (1 da Nm = 10 Nm).
  Example:
  Figure 13 shows the following setting:
  11.5 da Nm = 115 Nm for direction CLOSE
  12.5 da Nm = 125 Nm for direction OPEN
- Tighten lock screws O again

- **The torque switches can also be operated in manual operation.**
- **The torque switching acts as overload protection over full travel, also when stopping in the end positions by limit switching.**

14.2 Checking the torque switches

The red test buttons T and P (figure 11) are used for manual operation of the torque switches:

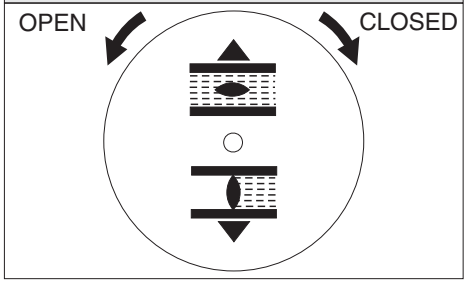
- Turning T in direction of the arrow TSC (DSR) triggers torque switch CLOSED.
- Turning P in direction of the arrow TSO (DOEL) triggers torque switch OPEN.
- If a DUO limit switching (optional) is installed in the actuator, the intermediate position switches will be operated at the same time.

15. Test run

15.1 Checking the direction of rotation

- Place indicator disc on shaft.
  The direction of rotation of the indicator disc (figure 14) indicates the direction of rotation of the output drive.

Figure 14: Indicator disc



- Move actuator manually to intermediate position or to sufficient distance from end position.
- Switch on actuator in running direction CLOSE and observe the direction of rotation:
  If the indicator disc turns clockwise, the direction of rotation is correct.

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

15.2 Checking the limit switching

- Move actuator manually into both end positions of the valve.
- Check whether limit switching is set correctly. Hereby observe that the appropriate switch is tripped in each end position and released again after the direction of rotation is changed. If this is not the case, the limit switching must first be set, as described from page 16.

If no other options (clauses 16. to 18.) require setting:
- Close switch compartment (see page 24, clause 19.).

16. Setting the potentiometer (option)

— For remote indication —

- Move valve to end position CLOSED.
- Pull off indicator disc.
- Turn potentiometer (E2) counterclockwise until stop is felt.
  End position CLOSED corresponds to 0 %, end position OPEN to 100 %.
- Turn potentiometer (E2) back a little.

Due to the ratio of the reduction gearings for the position transmitter, the complete resistance range is not always utilized for the whole travel. Therefore, an external possibility for adjustment (setting potentiometer) must be provided.

- Perform fine-tuning of the zero point at external setting potentiometer (for remote indication).

Figure 15: Control unit

17. Setting the electronic position transmitter RWG (option)

— For remote indication or external control —

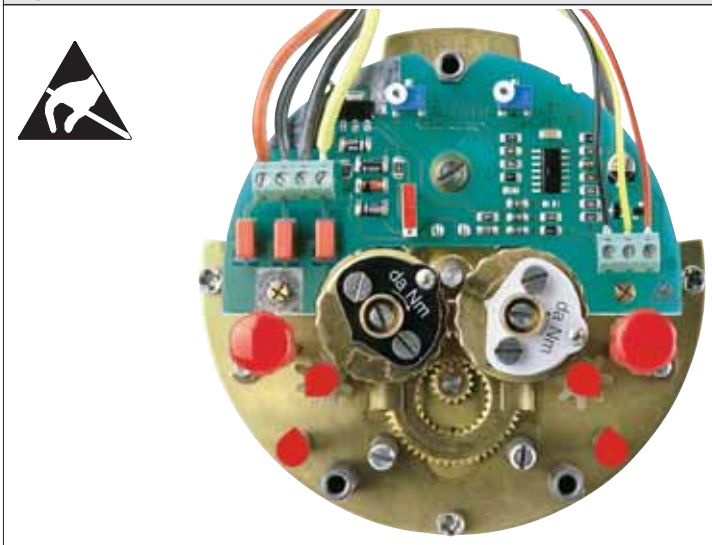
After mounting the part-turn actuator to the valve, check setting by measuring the output current (see subclauses 17.1 or 17.2) and re-adjust, if necessary.

Table 5: Technical data RWG 4020

Terminal plans		KMS TP_ _ 4 / _ _ _ 3- or 4- wire system	KMS TP _ 4 _ / _ _ _ KMS TP _ 5 _ / _ _ _ 2-wire system
Output current	I_a	0 – 20 mA, 4 – 20 mA	4 – 20 mA
Power supply	U_v	24 V DC, ±15 % smoothed	14 V DC + (I x R_B), max. 30 V
Max. input current	I	24 mA at 20 mA output current	20 mA
Max. load	R_B	600 Ω	(Uv - 14 V) / 20 mA

The position transmitter board (figure 16) is located under the cover plate (figure 17).

Figure 16: Positioner board



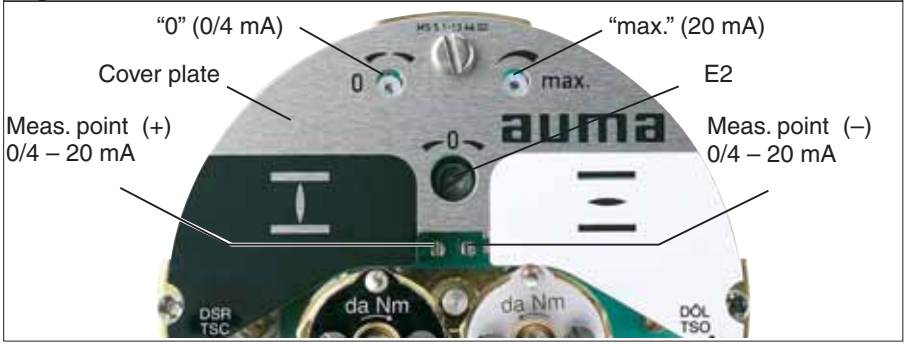
17.1 Setting 2-wire system 4 – 20 mA and 3- /4-wire system 0 – 20 mA

- Connect voltage to electronic position transmitter.
- Move valve to **end position CLOSED**.
- Pulling off the indicator disc.
- Connect ammeter for 0 – 20 mA to measuring points (figure 17).

The circuit (external load) must be connected (observe max. load R_B), or the appropriate poles at the terminals (refer to wiring diagram) must be linked, otherwise no value can be measured.

- Turn potentiometer (E2) counterclockwise until stop is felt.
- Turn potentiometer (E2) slightly back.

Figure 17



- Turn potentiometer "0" clockwise until output current starts to increase.
- Turn potentiometer "0" back until the following value is reached:
  for 3- or 4-wire system: approx. 0.1 mA
  for 2-wire system: approx. 4.1 mA.
  This ensures that the signal remains above the dead and live zero point.
- Move valve to end position OPEN.
- Set potentiometer "max." to end value 20 mA.
- Approach end position CLOSED anew and check minimum value (0.1 mA or 4.1 mA). If necessary, correct the setting.

If the maximum value cannot be reached, the selection of the reduction gearing must be checked.

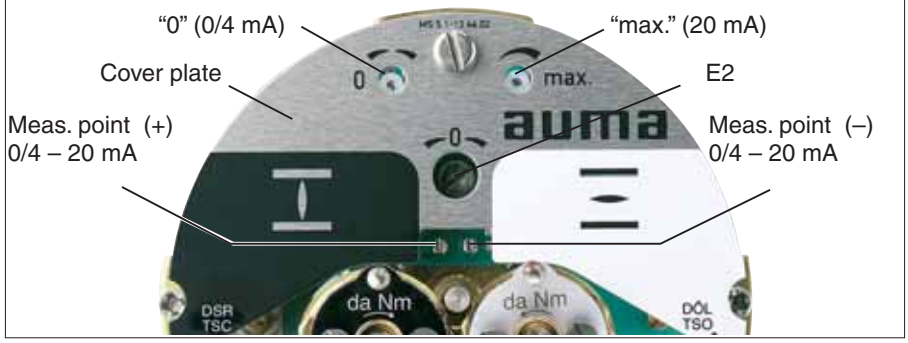
17.2 Setting 3- / 4- wire system 4 – 20 mA

- Connect voltage to electronic position transmitter.
- Move valve to **end position CLOSED**.
- Pull off indicator disc.
- Connect ammeter for 0 – 20 mA to measuring points (figure 18).

The circuit (external load) must be connected (observe max. load R_B), or the appropriate poles at the terminals (refer to wiring diagram) must be linked, otherwise no value can be measured.

- Turn potentiometer (E2) counterclockwise until stop is felt.
- Turn potentiometer (E2) slighly back.

Figure 18



- Turn potentiometer “0” clockwise until output current starts to increase.
- Turn back potentiometer “0” until a residual current of approx. 0.1 mA is reached.
- Move valve to end position OPEN.
- Set potentiometer “max.” to end value 16 mA.
- Move valve to end position CLOSED.
- Set potentiometer “0” from 0.1 mA to initial value 4 mA.
  This results in a simultaneous shift of the end value by 4 mA, so that the range is now 4 – 20 mA.
- Approach both end positions anew and check setting. If necessary, correct the setting.

If the maximum value cannot be reached, the selection of the reduction gearing must be checked.

18. Setting the mechanical position indicator

- Place indicator disc on shaft.
- Move valve to end position CLOSED.
- Turn lower indicator disc (figure 19) until symbol CLOSED is in alignment with the mark on the cover (figure 20).
- Move actuator to end position OPEN.
- Hold lower indicator disc in position and turn upper disc with symbol OPEN until it is in alignment with the mark on the cover.

Figure 19

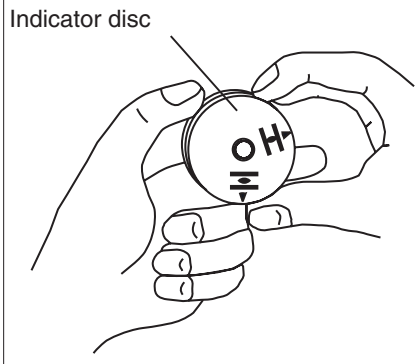


Figure 20

The indicator disc turns approx. 180° for a swing angle of 90°.

19. Closing the switch compartment

- Clean sealing faces of housing and cover
- Check whether O-ring is in good condition.
- Apply a thin film of non-acidic grease to the sealing faces.
- Replace cover on switch compartment and fasten bolts evenly crosswise.

Check the part-turn actuator for damage to paint finish. If damage to paint-finish has occurred after mounting, it has to be touched up to avoid corrosion.

20. Setting the operating time

For part-turn actuators with 1-phase AC motors, the operating time can be adjusted.

Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

- Remove motor cover (figure 21).
- Set required operating time with potentiometer (figure 22).
- Clean sealing faces of housing and motor cover
- Check whether O-ring is in good condition.
- Apply a thin film of non-acidic grease to the sealing faces.
- Fit and fasten motor cover.
  (For enclosure protection IP 68, the motor cover is additionally sealed with thread sealing material)

Check the part-turn actuator for damage to paint finish. If damage to paint-finish has occurred after mounting, it has to be touched up to avoid corrosion.

Figure 21: Part-turn actuator with 1-phase AC motor

Figure 22: Setting the operating time

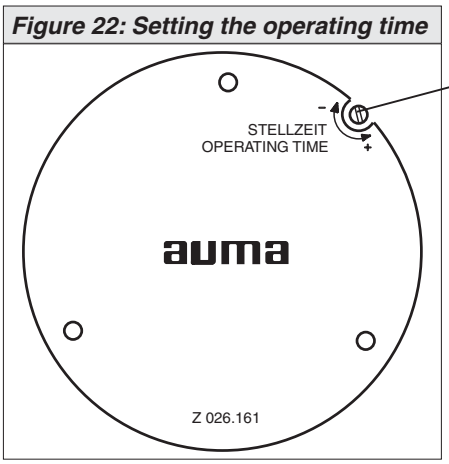


Table 6: Operating times for 90°	
SG 05.1	5.6 to 45 seconds
SG 07.1	11 to 90 seconds
SG 10.1	11 to 90 seconds
SG 12.1	22 to 180 seconds

21. Enclosure protection IP 68 (option)

Definition

According to DIN EN 60 259, the conditions for meeting the requirements of enclosure protection IP 68 are to be agreed between manufacturer and user.
AUMA actuators and controls in enclosure protection IP 68 meet the following requirements according to AUMA:
- Duration of submersion in water max. 72 hours
- Head of water max. 6 m
- Up to 10 operations during submersion
- Modulating duty is not possible during submersion

Enclosure protection IP 68 refers to the interior of the actuators (motor, gearing, switch compartment, controls, and terminal compartment).

Inspection

AUMA actuators and controls in enclosure protection IP 68 undergo a routine testing for tightness in the factory.

Cable glands

- For the entries of the motor and control cables, appropriate cable glands in enclosure protection IP 68 must be used. The size of the cable glands must be suitable for the outside diameter of the cables, refer to recommendations of the cable gland manufacturers.
- As standard, actuators and controls are delivered without cable glands. For delivery, the threads are sealed with plugs in the factory.
- When ordered, cable glands can also be supplied by AUMA at an additional charge. For this, it is necessary to state the outside diameter of the cables.
- The cable glands must be sealed against the housing at the thread with an O-ring.
- It is recommended to additionally apply a liquid sealing material (Loctite or similar).

Commissioning

When commissioning, the following should be observed:
- Sealing faces of housing and covers must be clean
- O-rings of the covers must not be damaged
- A thin film of non-acidic grease should be applied to sealing faces
- Covers should be tightened evenly and firmly

After submersion

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

22. Applications in Ex zone 22 (option)

Part-turn actuators of type range SG 05.1 – SG 12.1/SGR 05.1 – SGR 12.1 in versions AUMA NORM basically meet the requirements for applications in dust hazardous locations of ZONE 22, in compliance with the ATEX directive 94/9/EC.

The actuators are designed to meet enclosure protection IP 67 or IP 67 and meet the requirements of EN 50281-1-1:1998 section 6 – Electrical apparatus for use in presence of combustible dust hazards, requirements for electrical equipment of category 3 –protected by enclosures.
To comply with all requirements of EN 50281-1-1: 1998, the following points must imperatively be observed:

- In compliance with the ATEX directive 94/9/EC, the part-turn actuators must be equipped with an additional identification – II3D IP6X T150°C.
- The maximum surface temperature of the actuators, based on an ambient temperature of + 40 °C in accordance with EN 50281-1-1 section 10.4, is 150 °C. In accordance with section 10.4, an increased dust deposit on the equipment was not considered for the determination of the max. surface temperature.
- The correct connection of the thermoswitches or the PTC thermistors, as well as the fulfilment of the type of duty and the technical data are prerequisites for compliance with the maximum surface temperature of part-turn actuators.
- The connection plug may only be plugged in or pulled out when actuator and controls are disconnected from the mains.
- The cable glands used have also to meet the requirements of category II3D and must at least comply with enclosure protection IP 67.
- The actuators must be connected by means of an external ground connection (accessory part) to the potential compensation or integrated into a grounded piping system.
- As a general rule, the requirements of EN 50281-1-1 must be respected in dust hazardous locations. During commissioning, service, and maintenance, respective special care as well as qualified and trained personnel is required for the safe operation of part-turn actuators.

23. Maintenance

After maintenance, check part-turn actuator for damage to paint finish. If damage to paint-finish has occurred after mounting, it has to be touched up to avoid corrosion. Original paint in small quantities can be supplied by AUMA.

AUMA part-turn actuators require very little maintenance.
Precondition for reliable service is correct commissioning.

Seals made of elastomers are subject to ageing and must therefore regularly be checked and, if necessary, be exchanged.

It is also very important that the O-rings at the covers are placed correctly and cable glands fastened firmly to prevent ingress of dirt or water.

We recommend additionally:

- If rarely operated, perform a test run about every 6 months. This ensures that the actuator is always ready to operate.
- Approximately six months after commissioning and then every year check bolts between part-turn actuator and valve/gearbox for tightness. If required, tighten applying the torques given in table 1, page 9.

24. Lubrication

AUMA part-turn actuators are filled with grease for lifetime.
A change of grease or re-lubrication is not necessary.

25. Disposal and recycling

AUMA actuators have an extremely long lifetime. However, they have to be replaced at one point in time.
The actuators have a modular design and may therefore easily be disassembled, separated, and sorted according to materials, i.e.:

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

The following generally applies:

- Collect greases and oils during disassembly. As a rule, these substances are hazardous to water and must not be released into the environment.
- See disassembled material to a sound disposal or to separate recycling according to materials.
- Observe the national regulations for waste disposal.

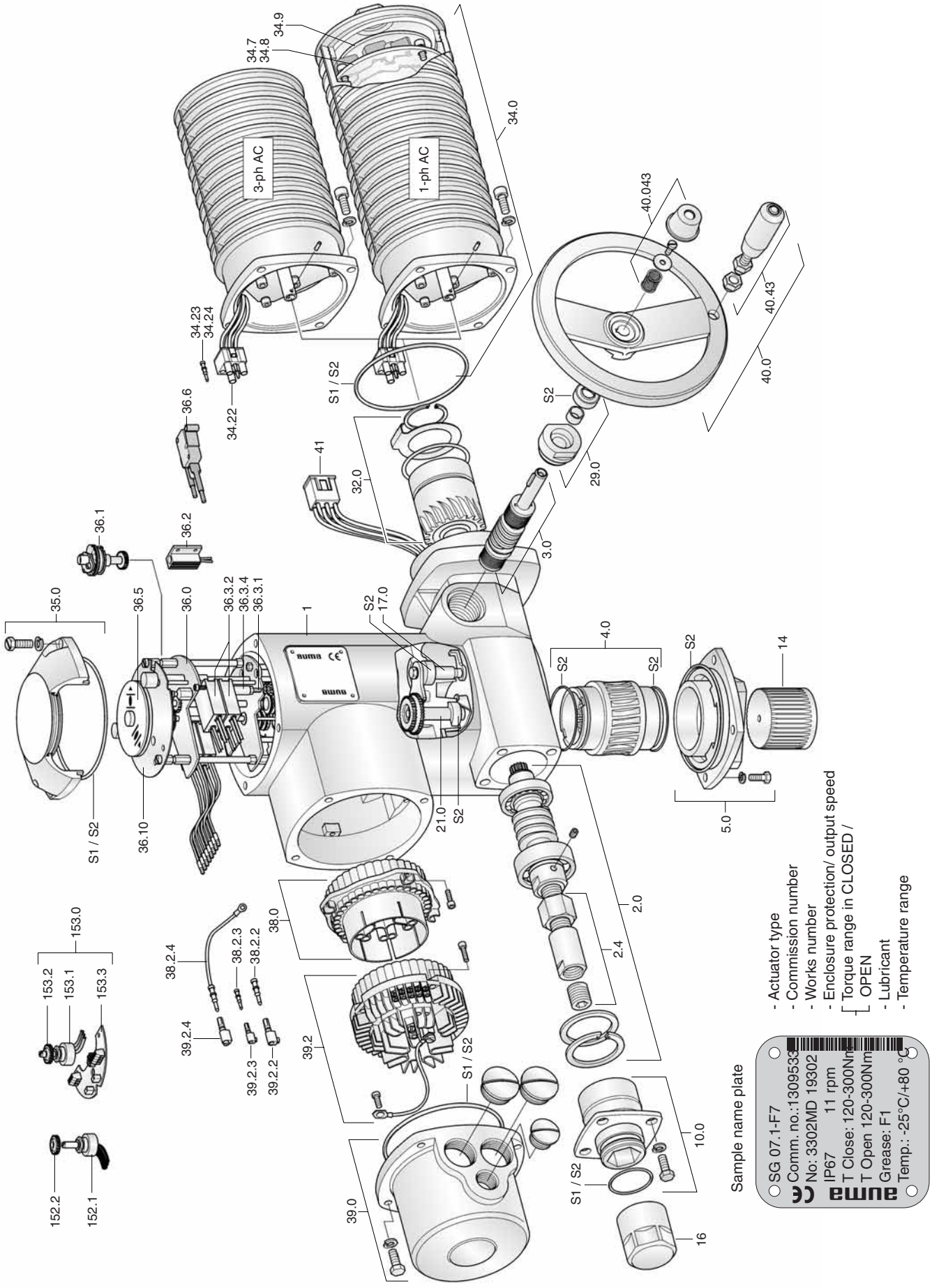
26. Service

AUMA offers extensive services such as maintenance and inspection for actuators. Addresses of AUMA offices and representatives can be found on page 36 and on the Internet (www.auma.com).

Notes

Notes

27. Spare parts list Multi-turn actuator SG(R) 05.1 - SG(R) 12.1 with plug/ socket connector



Note:
Please state type and commission no. of the actuator (see name plate) when ordering spare parts. Delivered spare parts may slightly vary from the representation in these instructions.

No.	Type	Designation	No.	Type	Designation
1	E	Housing	36.5	B	Mechanical position indicator
2.0	B	Worm shaft assly.	36.6*	B	Blinker transmitter including pins at wires (without impulse disc and insulation plate)
2.4	E	End stop nut (included in sub-assembly 2.0)			
3.0	B	Manual drive worm assly.	36.10	E	Cover plate
4.0	B	Worm wheel	38.0	B	Pin carrier (without pins)
5.0	B	Mounting flange assly.	38.2.2	B	Pin for motor
10.0	B	End stop assly.	38.2.3	B	Pin for controls
14	E	Coupling	38.2.4	B	Wire for protective earth
16	E	Cap	39.0	B	Plug cover assly.
17.0	B	Torque finger assly.	39.2	B	Socket carrier (complete with sockets)
21.0	B	Limit drive finger assly.			
29.0	B	Manual drive bearing assly.	39.2.2	B	Socket for motor (included in sub-assembly 39.2)
32.0	B	Planetary gearing assly.			
34.0	B	Motor assly.	39.2.3	B	Socket for control (included in sub-assembly 39.2)
34.22	B	Motor plug pin carrier (without pins)	39.2.4	B	Socket for protective earth (included in sub-assembly 39.2)
34.23	B	Pin for motor			
34.24	B	Pin for thermoswitch	40	B	Handwheel assly.
34.7	B	Motor brake	40.043	E	Cap assly.
34.8	B	Motor electronic board	40.43	B	Ball handle assly.
34.9	B	Cover plate	41	B	Motor plug, socket assly.
35.0	B	Cover assly.	152.1*	B	Potentiometer (without slip clutch)
36.0	B	Control unit assly. without switches	152.2*	B	Slip clutch for potentiometer
36.1	B	Torque switching head	153.0*	B	Electronic position transmitter (RWG)
36.2	B	Heater	153.1*	B	Potentiometer for RWG (without slip clutch)
36.3.1	B	Stud bolt for switches	153.2*	B	Slip clutch for RWG
36.3.2	B	Switch for limit/ torque switching (including pins at wires)	153.3*	B	Electronic board RWG
			S 1	S	Seal kit (small)
36.3.4	E	Spacer	S 2	S	Seal kit (large)

* not included in basic equipment Motor plug; motor directly wired to pin carrier (no. 52.0).

auma®

Declaration of Incorporation according to EC - Machinery Directive 98/37/EC article 4 paragraph 2 (Annex II B)

AUMA part-turn actuators of the type ranges

SG 05.1 – SG 12.1
SG Ex 05.1 – SG Ex 12.1
SG ExC 05.1 – SG ExC 12.1
in versions AUMA NORM, AUMA SEMIPACT, AUMA MATIC or AUMATIC

are designed and produced to be installed on industrial valves.

Messrs. AUMA RIESTER GmbH & Co. KG as manufacturer declares herewith, that when designing the above mentioned electric AUMA part-turn actuators the following standards were applied:

EN ISO 12100-1
EN ISO 12100-2
EN 60 204-1
EN 60034-1
EN ISO 5211

AUMA part-turn actuators covered by this Declaration must not be put into service until the entire machine, into which they are incorporated, has been declared in conformity with the provisions of the Directive.

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Müllheim, February 09th, 2005

H. Newerla, Managing Director

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EC - Declaration of Conformity according to the directive of the Council for the approximation of the laws of the Member States relating to the EMC Directive (89/336/EEC)and the Low Voltage Equipment Directive (73/23/EEC)

AUMA part-turn actuators of the type ranges

SG 05.1 - SG 12.1
in versions AUMA NORM, AUMA SEMIPACT, AUMA MATIC and AUMATIC

are designed and produced to be installed on industrial valves.

Messrs. AUMA RIESTER GmbH & Co. KG as the manufacturer declares herewith, that the above mentioned electric AUMA part-turn actuators are in compliance with the following directives:

- **Directive on Electromagnetic Compatibility (EMC) (89/336/EEC)**
- **Low-Voltage Equipement Directive (73/23/EEC)**

The compliance testing of the devices was based on the following standards:

a) concerning the Directive on Electromagnetic Compatibility
EN 61000-6-4: 08/2002
EN 61000-6-2: 08/2002
EN 61800-3: 02/2001

b) concerning the Low-Voltage Equipment Directive
EN 60204-1
EN 60034-1
EN 50178

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Müllheim, 1st March, 2005

H. Newerla, Managing Director

This declaration does not include any guarantee for certain characteristics.

The safety instructions in the product documentation supplied with the actuators must be observed.

Index

Information also available on the Internet:

Terminal plan, inspection records and further actuator information can be downloaded directly from the Internet by entering the order no. or COMM. no. (refer to name plate).
Visit us at: **http://www.auma.com**

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